

THE UNIVERSITY OF HULL

Listeners' Perceptual and Emotional Responses to Tonal and Atonal Music

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VOLUME I

Abstract

This thesis examines listeners' responses to tonal and atonal music through a combined model that encompasses music perception theories such as the cue abstraction mechanism, and both listener- and stimulus-based models of emotional responses to music. Aspects of this model relating to listener features and structural features are examined in more detail through an empirical investigation of the effects of musical experience and familiarity on perceptual and emotional responses to tonal and atonal music. Previous empirical investigation of these areas is limited: research concerning the effects of familiarity is largely unsystematic or explores the effects of immediate repetition of music on listeners' emotional responses; and research concerning emotional responses to music generally focuses on tonal repertoire. This empirical work encompasses a novel longitudinal mixed-methods approach to investigate listeners' changing emotional responses to music by Clementi, Schoenberg and Berio. Results suggested that musical experience increases listeners' perceptual efficiency, and influences emotional responses: music students' responses to the three pieces were at similar levels, whereas non-music students' responses varied more widely between the three pieces. With increasing familiarity, participants showed evidence of greater understanding of the structure of the music and greater awareness of details of the music. A significant ANOVA indicated changes in emotional responses with familiarity, and the triggers of these responses changed according to the participants' awareness of musical features. The number of associative sources of emotional responses also increased. Anticipatory emotional responses developed with familiarity, particularly in response to the Clementi. There were interesting differences between participants' responses to the tonal and atonal pieces. Participants found it easier to identify the musical structure of the tonal piece than the atonal pieces, and all participants felt more familiar with the Clementi than the Schoenberg and the Berio. Participants' overall levels of emotional responses were highest in response to the Clementi, followed by the Schoenberg and then the Berio, and triggers for these responses varied in importance for each piece. These results indicate that musical expertise and familiarity should both be considered as important variables in future research, and that responses to atonal music merit further investigation in the future.

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Introduction

There is a growing body of research on music and emotion, including studies of listeners' emotional responses (for a useful summary, see Sloboda & Juslin, 2001). Much of this work, however, concentrates on listeners' responses to tonal music on isolated occasions. The principal aim of this thesis is to examine listeners' emotional responses to both tonal *and* atonal music, and to observe how these responses develop over a period of time as the listener becomes familiar with the music. Two further aims are to examine the impact of musical experience on emotional responses to music, and to investigate the relationships between listeners' emotional responses and reported perceptions of music. In order to understand how listeners might respond emotionally to music (both tonal and atonal) it is necessary to consider theories relating to musical perception and listening in general as well as relevant theoretical and empirical work on the subject of emotional responses. Prior to the discussion of such work, the parameters of this study will be outlined and the structure of the thesis defined.

Understanding emotional responses to music

Emotional responses to music have been studied from a wide range of perspectives, and several pertinent theories have emerged, some of which are strongly supported by empirical evidence. Before exploring these theories, it is necessary to clarify that the focus of this thesis is on the emotional responses of listeners, as opposed to the expression of emotion by composers through musical structure (Gabrielsson & Lindström, 2001; Juslin & Madison, 1999), or by performers (Juslin, 1997; Juslin, Friberg, & Bresin, 2002; Palmer, 1996). Additionally, Gabrielsson (2002) and Kallinen and Ravaja (2006) highlight the potential differences, even within listener responses, between emotion perceived by the listener and emotion felt by the listener, that is, induced emotion. Gaver and Mandler (1987) suggest an interesting theory concerning

the difference between perceived and induced emotion. They suggest that while music may resemble emotions, and therefore allow those emotions to be perceived by the listener, it is only with arousal that music may induce emotional responses. Such arousal may occur from the musical structures being heard or from events external to the music. Gaver and Mandler's approach was purely theoretical, and there was no empirical evidence to support it. Recently, however, this hypothesis has been indirectly tested as part of a study by Dibben (2004). Dibben investigated the effects of exercise-induced arousal on emotional responses to music, and found that, though arousal increased the intensity of emotional responses felt by participants, a similar effect was not seen in the reports of emotions expressed by the music. This evidence appears to support Gaver and Mandler's theory. Intuitively, this idea seems logical, though it would not account for some of the wide discrepancies reported by Gabrielsson (2002) between perceived and induced emotions. This thesis remains focused on induced, rather than perceived, emotion, and therefore the relationship between the two will not be discussed further.

Evidence of induced emotions in listeners ranges from self-reports of their own feelings to physiological effects. Empirical work has attempted to identify the specific emotions experienced to music, and also investigated the intensity of a general, non-specific, emotional response. Both simple and complex emotions may be experienced by listeners in response to music: Panksepp's (1995) participants reported experiencing the simple emotions of happiness and sadness; more complex emotions found include grief (Sloboda & Juslin, 2001), nostalgia, awe and enchantment (Juslin & Zentner, 2002). Techniques for gathering evidence for such responses are varied, ranging from verbal and non-verbal self-report mechanisms to physiological measures, and will be discussed in more detail in the following chapters. The results these techniques have provided reveal that a range of physical effects may be experienced in association with emotional

responses to music. Many of these are related to what Panksepp (1995, p. 203) describes as a ‘skin orgasm’, and include thrills (Goldstein, 1980), chills (McEvilly, 1999; Panksepp, 1995), general shivers (Sloboda, 1996), shivers down the spine, and pilo-erection (Sloboda, 1991). Recent evidence suggests specific links between self-reported chills in response to music, pilo-erection and changes in galvanic skin response (GSR) (Craig, 2005). A second group of emotional indicators includes crying (Sloboda, 1996; Sloboda & Juslin, 2001), tears (Sloboda, 1991) and a feeling of having a lump in the throat (Sloboda, 1991). Other emotional responses include laughter; yawning; stomach sensations; sexual arousal; flushing or blushing; sweating; subliminal physical action of the face and elsewhere; and bodily changes in heart rate, blood pressure, respiratory rate, and reaction times to other stimuli (Sloboda, 1991; Sloboda & Juslin, 2001). Music listeners are able to subsume these responses into an overall measure of emotional intensity.

The triggers of these responses vary, and are influenced by a wide range of listener features and contextual features. This thesis will begin by outlining models of emotional responses to music that describe such features, and then focus on three specific areas of the model: the musical structure in relation to tonal and atonal music; the listener’s familiarity; and the listener’s musical experience.

Definitions of ‘atonal’

It is important to clarify the definition of ‘atonal’, for the purpose of this thesis. Schoenberg, who is often considered the father of atonal music, disliked the term (Dunsby & Whittall, 1988; Schoenberg, 1978 [1911], p. 432; Schoenberg & Feisst, 1999), but despite this, it has been adopted by musicologists to describe a variety of musical styles. Indeed, there is some confusion in the use of the term ‘atonal’ in musicological literature, with some authors using it to describe all music that is not

based in a key structure, including serial music. ‘Atonal’ has been described, for instance, as ‘the abandonment of key as a system of organisation’ (Hindley, 1971, p. 546), and it is this broad definition that Scruton (1997) appears to use in his study of the aesthetics of music, as he encompasses serial music within this category. Other authors, however, distinguish between atonal and serial music, with Jacobs (1996, p. 18) suggesting that the latter developed as ‘a systematization of atonal music’. Grout and Palisca (1996, p. 733) state categorically that the term ‘atonal’ is ‘no longer applied to music built on serial principles’, a view adopted by many musicologists (Dunsby & Whittall, 1988; Griffiths, 1986), and it is this definition of ‘atonal’ that this thesis adopts.

Alternative terms used in relation to atonal music are those of ‘nontonal’, ‘post-tonal’ and ‘pantonal’. ‘Nontonal’ literally means the absence of tonal features; as such, it is a broad term that includes all music that is not based on functional tonality, such as modal music, minimalism and serialism, as well as free atonal music. ‘Post-tonal’ is a term adopted by musicologists to avoid the use of the term ‘atonal’, and describes ‘the positive advances in harmonic organization and coherence which the abandonment of the major–minor key system afforded’ (Whittall, 2002). ‘Pantonal’ was a term first used by Réti (1958), and later adopted by Schoenberg in preference to the term ‘atonal’. According to Drabkin, however, the music Réti referred to in relation to the term was quite different to Schoenberg’s free atonal works, as they continued to utilize aspects of the tonal system:

pantinality is characterised chiefly by the notion of ‘moveable tonics’, that is, it recognizes and makes use of tonal relationships in intervals, melodic figures and chord progressions without defining, or even implying, a key centre in any large-scale sense.

(Drabkin, 2007)

The term ‘atonal’ is therefore deemed to be the most appropriate term for use in this thesis, and refers to music unconstrained by tonality, serial principles, and other systems of organisation: the music is not in any key, and all notes are used impartially (Kennedy, 2007).

Music listeners

Further clarifications are also required here regarding three issues relating to music listeners. These encompass the nature of what listeners hear, the parameters of music perception, and the different types of listening employed by listeners. Firstly, what do listeners hear? Listeners’ emotional responses to music are not based on the contents of a musical score, though this remains a valuable representation of musical sound. Equally, they are also not based on the sounds of a musical performance, though spectrograms or temporal representations of musical sound can be a useful tool of interpretation (McAdams, Depalle, & Clarke, 2004). Rather, listeners respond emotionally to the sounds they perceive, which will bear varying resemblance to both the musical score and a spectrogram. Interestingly, some researchers view a piece of music as a ‘mentally constructed entity, of which scores and performances are partial representations by which the piece is transmitted’ (Lerdahl & Jackendoff, 1983, p. 4). The assumption from this is that only the composer may have a complete mental representation of a work: if the tools of communication are incomplete, so too must be the knowledge gained by the listener. Nevertheless, the authors’ view of music as a mental construction rather than a score or a performance is a valuable perspective that usefully aids the understanding of emotional responses to music.

Similar distinctions have been made by Iser (2001) in literary theory: Iser discusses the artistic and aesthetic poles of a literary work. The artistic pole is the author’s text, whereas the realization of that text by the reader forms the aesthetic pole. The actual

over the past few decades (Clarke & Davidson, 1998; Davidson, 1993, 1994, 2001, 2002a, 2002b; Davidson & Correia, 2002; Timmers, Marolt, Camurri, & Volpe, 2006), and remains a growing area of research. Much music listening, however, takes place in a private sphere, without the additional stimulus of visual perception, whether from a television screen or the physical presence of a performer. For the purpose of this study, therefore, music listening will be defined as an essentially aural activity.

The third issue of concern here relates to the varied types of listening employed by listeners. This study focuses as much as possible on concentrated listening, as opposed to background listening. Though this may not be wholly ecologically valid, that is, it may not be true to the majority of listeners' everyday listening habits, it is impossible to determine the extent to which everyday music listening is in fact 'in the background'. Furthermore, background listening may not involve a musical response at all: as Cook suggests, music listening may engender a situation where music is 'not heard as music' (Cook, 1990, p. 12). Dibben (2001) explores this situation further, exposing the circumstances in which listeners hear sound and attribute it to its source ('non-musical listening'), and when listeners hear the same sound but focus on the acoustic properties of that sound ('musical listening'). The idiosyncratic nature of listeners' experiences suggests that it would be incredibly difficult to create a consistent measure of the extent to which music is 'in the background'; and even mentioning the music to listeners would immediately foreground its position. By asking listeners in a study to concentrate on the music, however, a measure of consistency is found, and for this study, that consistency holds greater importance than the specific ecological validity of concentrated or background listening. A final clarification of this study is that it focuses on music listening without a musical score, a preference that is ecologically valid for most listeners for the majority of their music listening.

Structure of this thesis

The first chapter of this thesis outlines a comprehensive model of perceptual and emotional responses to music, through which a discussion of pertinent theories will be undertaken. Following this, specific areas of the model will be highlighted, relating to the effects of familiarity; the tonal/atonal language of the music; and musical experience on listeners' perceptual and emotional responses. Subsequent chapters will discuss empirical work relating to these areas of interest. Chapter 2 puts forward the aims and methodological basis of the main project; Chapters 3, 4, and 5 provide analysis of data relating to experimental work; Chapter 6 summarizes and compares the findings from across the data; and Chapter 7 provides a concluding discussion.

Chapter 1

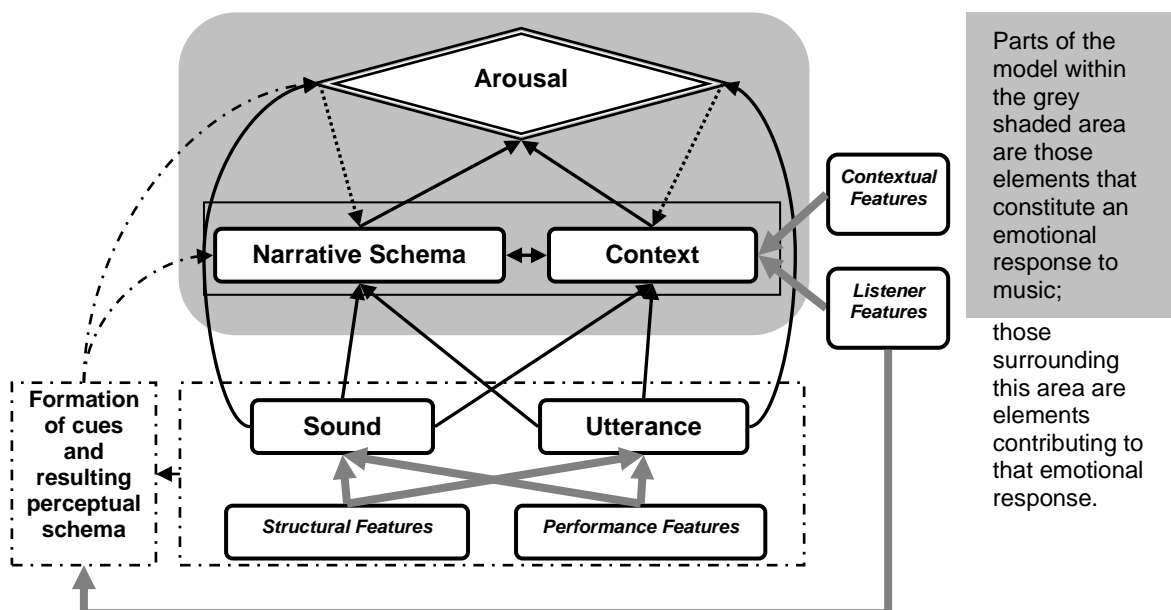
Context: Perceptual and emotional responses to music

This chapter will explore existing literature on perceptual and emotional responses to music, firstly in relation to an overall conception of the formation of emotional responses to music using a synthesis of several models found in existing research, and then in relation to three research issues arising from specific areas of the model.

1.1. A model of emotional responses to music

The model shown in Figure 2 provides a useful tool through which to understand emotional responses to music. It is, in fact, a synthesis of two existing models of emotional responses to music (Lavy, 2001; Scherer & Zentner, 2001) as well as aspects of existing research concerning music perception (Deliège, 1996; Deliège & Mélen, 1997; Ockelford, 2004). The derivation of this model will be exposed through discussion of its component models and other relevant literature.

Figure 2 Combined model of emotional responses to music, adapted from existing research (Lavy, 2001; Scherer & Zentner, 2001)



Emotional responses to music are viewed as being based on what is actually perceived by the listener, and therefore aspects of music perception will be considered initially, followed by other research in relation to the listener-focused approach of Lavy's (2001) model, and then by the stimulus-based approach of Scherer and Zentner's (2001) model.

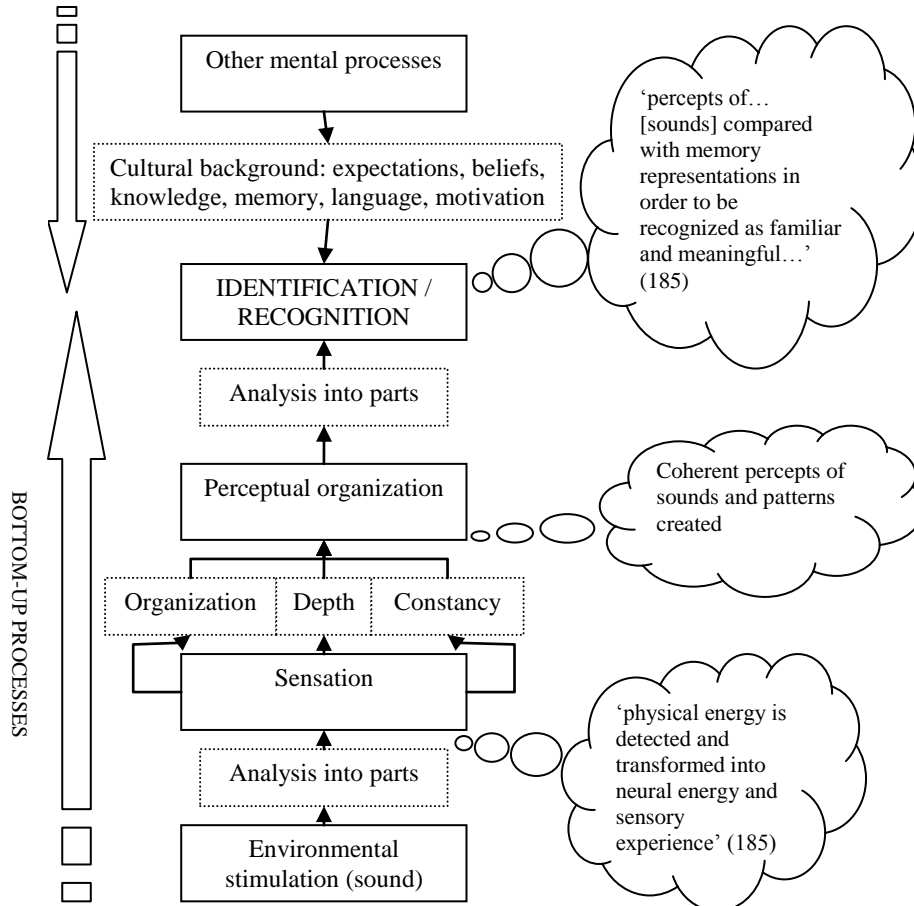
1.1.1. Music perception

The model shown above enables music perception to be considered in a variety of ways. Some aspects of music perception can be regarded in terms of the way they are utilized as part of a framework of emotional responses, while others relate to the formation of cues and a perceptual schema, which interacts with certain areas of the model and contributes to the development of emotional responses to music. The formation of cues and the creation of a schema link directly to a more general understanding of perception and perceptual processing in cognitive psychology. Such an understanding is necessary in providing a starting point to the ensuing discussion concerning music perception.

Zimbardo and Gerrig describe the role of perception as 'making sense of sensation' (2002, p. 133). The authors provide a model of perception that combines bottom-up, stimulus-driven processes, and top-down, conceptually-driven processes (see Figure 3). According to Zimbardo and Gerrig (2002), perception involves three stages: sensation; perceptual organisation; and identification or recognition. Sensation is the conversion of physical energy into neural impulses that can be recognised by the brain. Perceptual organisation involves the creation of an internal representation of the object, known as a 'percept'. Identification or recognition is a process whereby meaning is assigned to the object. Whereas the first two stages rely on bottom-up processes, the latter stage involves top-down cognitive processing, and may be influenced by beliefs, attitudes or theories held by the person. The percept formed by this process is subject to many

different interpretations, both for a single person at different times and for different people.

Figure 3 A model of perception (adapted from **Zimbardo & Gerrig, 2002, p. 140 and p. 185**)



Whilst the above conception of perceptual processing is dominant in the field of psychology, an ecological approach to perception has been adopted in the past (Gibson, 1979), and has recently been applied to music listening (Clarke, 2005). There are three main differences between each approach. Firstly, the ecological approach argues that perception is direct, and does not involve the creation of a percept or other mental representations. As Gibson states:

When I assert that perception of the environment is direct, I mean that it is not mediated by *retinal* pictures, *neural* pictures, or *mental* pictures.

(Gibson, 1979, p. 147)

This absence of mental representations in the perceptual process has been both recognised as possible in specific situations (Braisby & Gellatly, 2005), and criticised as impossible by later psychologists. Eysenck and Keane, for example, describe this argument as ‘seriously flawed’ (Eysenck & Keane, 2005, p. 114), and provide simple examples of perceptual activities which require reference to stored knowledge, such as the recognition of a friend’s face. An equivalent example in music might be the recognition of a perfect cadence as a possible end point, or the identification of a piece of music.

Clarke’s objection to the existence of mental representations is his idea of multiple representations and ‘homunculi’ (‘little men’) within the listener’s mind. He states:

a representation only has value or purpose if there is someone or something to perceive or use it, which leads to an infinite regress of homunculi inside the perceiver’s mind, each of which “reads” and in turn generates an internal representation.

(Clarke, 2005, p. 15)

Although Clarke argues that the interaction between top-down and bottom-up processing in the information processing approach results in multiple mental representations of perceived information, there is no necessity for more than one mental representation to exist (although multiple representations are possible). Rather than a representation being formed for the benefit of a homunculus, a mental representation allows the listener to re-visit his or her knowledge of the piece at a later stage of the same hearing, or during a new hearing. It is conceivable that existing representations are modified to reflect both new, bottom-up knowledge gleaned from the environment and

top-down knowledge. Neisser (1976) embraced many aspects of Gibson's ecological theory whilst maintaining a view of perception that included mental representations.

This thesis adopts the view that mental representations do frequently play a role in perception. There are, however, other aspects of Gibson's theory, as espoused by Clarke, that are important to consider. Clarke's second objection to the information processing model is that it does not view the process as being related to an action, but as a contemplative activity. To defend his argument, he suggests that our perception of objects relates to the function we require of them (for example, we may view a chair as a resting place or a weapon, depending on our situation). Related to this is his objection to the suggestion that cognitive psychology views perception as working from the bottom-up, followed by the top-down processing. I would suggest that both bottom-up and top-down processing may be invoked simultaneously, but that there are situations in which one type of processing will take priority, such as in the above example of the perception of a chair, or in Pople's (1994, pp. 111–112) discussion of the varied approaches of listeners in an opera house. Clarke's example specifying his objection to the bottom-up processing occurring first is as follows:

perception is characterised as working primarily from the bottom-up (despite the incorporation of "top-down" processes), with more complex levels constructed from the outputs of lower-level, more primitive processes. Direct experience suggests that this is wrong: if you hear a burst of music from someone's radio, for instance, it is more likely that you will be able to say what style of music it is (opera, hip-hop, Country and Western) than to identify specific pitch intervals, or its key, meter, and instrumentation. In other words, people seem to be aware of supposedly "high-level" features much more directly and immediately than the lower-level features that a standard information-processing account suggests they need to process first.

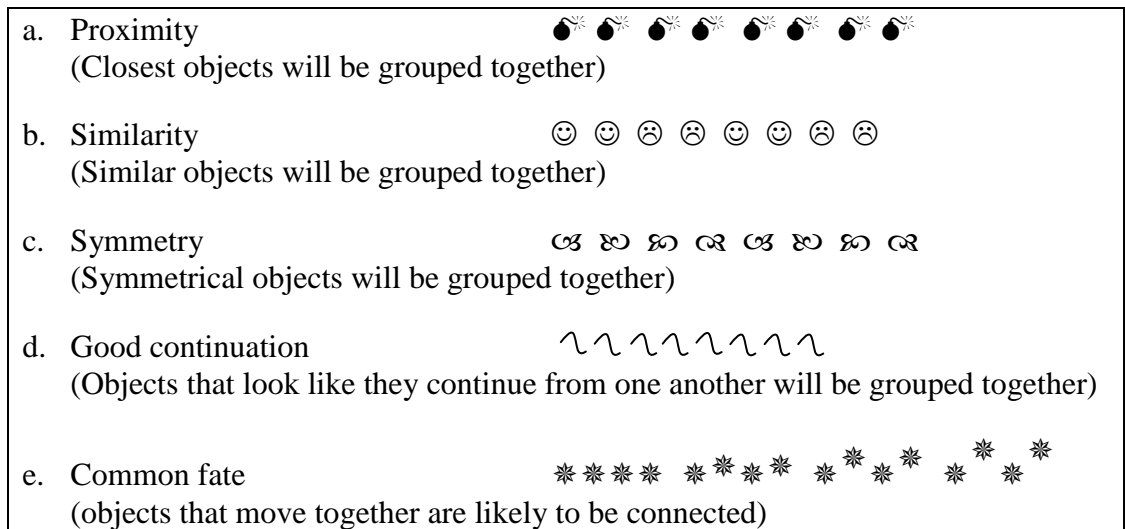
(Clarke, 2005, pp. 15–16)

I would agree with Clarke that it is not necessary to process smaller-scale features of the music, such as intervals or pitches in order to identify a piece of music: many of the cues for genre identification result from an overall conception of timbre and

instrumentation, followed by considerations of smaller-scale features such as pitch or harmony. The identification of these small-scale features, however, requires top-down processing as much as genre identification: to identify an interval, we need to refer to previous knowledge of what that interval sounds like. Additionally, bottom-up processing may occur concurrently, and often subconsciously. I therefore do not believe that this rules out the traditional arguments of cognitive psychologists' views of perception.

In summary, this thesis assumes that both bottom-up and top-down processes are utilized in music perception, and that a mental representation is formed and modified as part of the perceptual process. The order in which bottom-up and top-down processes are invoked may be subject to the situation and resultant attitude of the perceiver.

Despite the potential differences in perception that this approach allows for, certain features are almost always agreed upon, such as Gestalt grouping, which is purely the result of bottom-up processing. These groupings apply to both visual and auditory stimuli, but are probably most easily explained with the use of visual examples (see Figure 4). There are five Gestalt rules: those of proximity, similarity, symmetry, good continuation and common fate (Shepard & Levitin, 2002). Several authors have applied these rules to music (Borthwick, 1995; Deutsch, 1999; Lerdahl & Jackendoff, 1983; Meyer, 1956). Deutsch's (1999) approach excludes the rule of symmetry, replacing it with a familiarity rule: that we tend to form groupings so as to perceive configurations that are familiar to us. These rules may apply to our perception of surface musical dimensions such as pitch, timbre, rhythm and dynamics.

Figure 4 Visual Gestalt rules (adapted from Shepard & Levitin, 2002, p. 512)

Considerations of music perception may also be found within musicological and philosophical texts. In his extensive work on aesthetics, Scruton (1997) explores music from its very smallest components to large-scale form. One of the initial issues he discusses is the difference between the way in which we perceive music in comparison with everyday sounds. With everyday sounds, our focus remains on the source of the sound; in music, however, the ‘acousmatic’ experience is exploited, and we focus on the tone quality of the sound (Scruton, 1997, pp. 2–3). Dibben (2001) tests this idea empirically, exploring the extent to which listeners focus on the acoustic properties of sounds, as opposed to what those sounds specify. Dibben used both ‘everyday’ sounds, small musical sounds, and larger-scale musical extracts. Though her initial results suggested that listeners focused on acoustic properties of sounds, to the exclusion of specifications of sound source, an avoidance of forced-choice methodology in her second study revealed that listeners are aware of both categories of sound properties, the sound specifications extending not only to physical source, space and proximity, but also to genre, musical function, performance skill, emotional attributes, and social context.

A more detailed theory of music perception, the Generative Theory of Tonal Music, has been proposed by Lerdahl and Jackendoff (1983). This theory assumes that music listening shares some of the same processes as linguistic comprehension. Lerdahl and Jackendoff's intention was to create a model that would describe the structure of any piece of tonal music and that would conform to an experienced listener's mental construct of that piece. They propose four components to their theory, all of which are hierarchically based. The first component is *grouping structure*, which 'expresses a hierarchical segmentation of the piece into motives, phrases, and sections' (Lerdahl & Jackendoff, 1983, p. 8). Segmentation and grouping is known to occur during the cognition of a number of stimuli, including music (Deliège, 1987; Deliège & Mélen, 1997; Lerdahl & Jackendoff, 1983), and the concept of small motives forming a part of larger structures such as phrases and sections is intuitively sound.

The second component of Lerdahl and Jackendoff's theory is *metrical structure*: the idea that, as the authors state, 'events of the piece are related to a regular alternation of strong and weak beats at a number of hierarchical levels' (Lerdahl & Jackendoff, 1983, p. 8). Again, this appears to be intuitively logical: much music of our culture has clear metrical accents, and larger components, some of which carry more weight than others. The specificity of Lerdahl and Jackendoff's model is highlighted here, though: they admit that their principle of metrical structure is not universal, as the music of some cultures may have no discernable metrical structure, while others may have a metrical structure far more complex than that of Western tonal music. Palmer and Krumhansl (1987) have tested this part of the theory empirically; their results largely supported these first two components.

The third component of the theory is *time-span reduction*, which 'assigns to the pitches of the piece a hierarchy of "structural importance" with respect to their position in

grouping and metrical structure’ (Lerdahl & Jackendoff, 1983, p. 8). This component allows Lerdahl and Jackendoff to combine the findings of the first two components to form generative tree structures representing the hierarchical importance of each note of a piece. The fourth component of the theory is *prolongation reduction*, which ‘assigns to the pitches a hierarchy that expresses harmonic and melodic tension and relaxation, continuity and progression’ (Lerdahl & Jackendoff, 1983, p. 9). These third and fourth components rely on the notion of reduction. This is a common phenomenon in music-analytical circles, and it is associated with other techniques, such as Schenkerian analysis. As Lerdahl and Jackendoff suggest, if a listener hears a theme and variations, they perceive the underlying similarity between them, though the surface features may be entirely different. The authors suggest that this recognition occurs ‘because the listener relates them, more or less unconsciously in the process of listening, to an abstract, simplified structure, common to them all’ (Lerdahl & Jackendoff, 1983, p. 106). The creation of such a structure requires implicit knowledge of the relative importance of pitches, that is, the hierarchical relationships between pitches.

Lerdahl and Jackendoff suggest that the contents of an entire piece are reduced to a ‘single coherent structure, such that they are heard in a hierarchy of relative importance (Lerdahl & Jackendoff, 1983, p. 106). This is reminiscent of the Schenkerian *Ursatz*, the background structure that Heinrich Schenker believed was the basis of all good tonal music (Cook, 1987; Dunsby & Whittall, 1988). The idea of reduction, however, may be specific to tonal music: Dibben (1994; 1996) discusses the use of such reduction for the understanding of atonal music, and suggests that it may in fact be inappropriate. This will be discussed in more detail later.

Some problems remain with Lerdahl and Jackendoff’s (1983) theory, three of which are outlined by Scruton (1997). Firstly, he suggests that the theory cannot account for our

understanding of counterpoint, as it is so strongly harmonically-based. Secondly, Scruton argues that the main way we understand music is through a metaphor of movement, which could never be captured in such a model. Thirdly, he also criticises Lerdahl and Jackendoff's lack of a specific description of the deep structure of tonal music, and their focus on the syntactic features of music without consideration of its semantic features, in contrast with the work of Deryck Cooke (1959) which will be discussed later. Others have also criticised Lerdahl and Jackendoff's work. Deliège and Mélen (1997) suggest only the grouping rules have been empirically confirmed, according to research by Bigand, Lerdahl and Pineau (1994). Additionally, the authors posit their theory as 'a formal description of the musical intuitions of a listener who is experienced in a musical idiom' (Lerdahl & Jackendoff, 1983, p. 1). Though this knowledge does not rely on the listener having studied music, rather a process of 'enculturation' (Sloboda, 1985)¹, Lerdahl and Jackendoff do not account for the ways in which the knowledge required to form these representations of musical structure are assimilated. A further, related problem is that the authors are only concerned with the final state of a listener's understanding, as opposed to the real-time development of percepts of musical structure in the mind (Lerdahl & Jackendoff, 1983, p. 4). Schema theory, however, describes both the final mental construct (though admittedly in less detail than that of Lerdahl and Jackendoff) and the means by which it is constructed, for the novice and experienced listener alike. This theory also avoids the problems of genre specificity to which Lerdahl and Jackendoff's theory is tied.

¹ Sloboda describes the main elements of enculturation in the following manner:

'First, we find a shared set of primitive capacities which are present at birth or soon after. Second, there is a shared set of expectancies which the culture provides as children grow up. Third there is the impact of a rapidly changing general cognitive system as the many other skills supported by the culture are learned ...
'First, we find a shared set of primitive capacities which are present at birth or soon after. Second, there is a shared set of expectancies which the culture provides as children grow up. Third there is the impact of a rapidly changing general cognitive system as the many other skills supported by the culture are learned ...
Enculturation is also typified by a lack of self-conscious effort and a lack of explicit instruction.'
(Sloboda, 1985, pp. 195–196)

Schema theory has been invoked by a number of musicologists (Deliège, 1996; Deliège & El Ahmadi, 1990; Deliège & Mélen, 1997; Gaver & Mandler, 1987; Ockelford, 2004, 2006; Pascall, 1989), and is well-recognised by psychologists. Schemata have been described as ‘mental frameworks for representing knowledge, encompassing an array of interrelated concepts in a meaningful organization’ (Sternberg, 1996, p. 199). They can encompass other schemata in a seemingly hierarchical manner: Sternberg (1996) describes how a schema for animals may include a schema for cows, and a schema for apes. Schemata are not merely useful for static concepts, however, but can incorporate time-dependent information, when they may sometimes be described as ‘frames’ or ‘scripts’ (Sternberg, 1996, p. 200). Eysenck and Keane (1995, p. 262) provide a similar description: ‘A *schema* is a structured cluster of concepts; usually, it involves generic knowledge, and may be used to represent events, sequences of events, precepts, situations, relations, and even objects’. The relationships between different components within a schema are known as ‘variables’, or ‘slots’. These may be related in simple or complex ways, and any missing information may be inferred. Such inferred components are known as ‘values’. Schemata are thus an incredibly versatile means of knowledge representation.

In relation to music perception, Pascall describes schemata as follows:

A schema represents supra-sentential knowledge at all levels of abstraction, arrived at initially through bottom-up data-processing and forming the means of top-down processing of new data. It is formed by experiment and renewed by the experiences of its application. A schema includes variables and sub-schemata. Schemata are the control-structures of cognition and the very engines of interpretation.

(Pascall, 1989, p. 235)

Deliège and Mélen (1997) investigate the generation and use of schemata in considerable detail. The authors aim to model the cognitive processes that occur during attentive listening, which they clarify as ‘the situation in which the listener is devoting

maximal cognitive resources to engage with the structure of the piece in an active listening process' (Deliège & Mélen, 1997, p. 388). At the lowest level, their theory is based on the idea that as a listener hears music, they segment the musical structure according to Gestalt grouping rules and 'sameness' and 'difference' comparison judgements. The listener then selects salient features of the group to form 'cues', which Deliège and Mélen define as 'a kind of conspicuous point that becomes fixed in memory by virtue of its relevance and by repetition' (1997, p. 390). These small, salient features act as memory triggers, allowing the creation of a mental representation of the work on several hierarchical levels, without overloading the working memory.



Deliège and Mélen test each stage of their theory with different procedures, often adapted from other areas of psychology. The cue abstraction mechanism is tested with a segmentation procedure, in which listeners are asked to segment a musical line. The theory of cues acting as reference points within long time spans is tested with a 'mental line' procedure, in which listeners are asked to place segments in the order they occur in a piece they have heard only a few times. Similarly, a 'puzzle procedure' is used to confirm that subjects are extracting cues from the piece of music. This procedure entails subjects constructing a piece of music from segments without hearing the piece in its entirety. Whereas non-musicians could locate segments in their correct positions after hearing the piece, they were unsuccessful in the puzzle procedure, providing evidence that musical information is abstracted in this manner during listening. The authors also used a 'segment-pair relation' procedure, in which the similarity between segments was judged, and an 'imprint' procedure, in which variations on segments within the piece were presented to listeners, who had to decide whether or not they had heard the segments previously. Listeners frequently declared that they had heard absent segments, suggesting that the segments they actually heard were reduced to cues used for

comparison purposes. The authors suggest that the cues form a reduced mental structure of a piece of music, otherwise known as a schema.

In music listening, a schema may be formed during a first hearing of a piece. After its initial formation, parts of the schema will be transferred to the long-term memory, so that when the same piece is heard again, that schema will be activated, and any additional information perceived will be added. Similarly, a piece that is similar, but not identical to the piece heard originally will either be assimilated into the original schema or used to create a new schema, depending on the extent of the similarity between the two. Deliège (2007) expands this idea, suggesting that there are both internal and external similarity relations in music. Internal similarity relations exist at the level of motives within a work or a part of a work. External similarity relations ‘establish comparisons between distinct and autonomous entities’ (Deliège, 2007, p. 10). The author provides examples of similarities being perceived between a set of variations, different interpretations of the same work, or arrangements, transcriptions or orchestrations of the same work, and suggests that the perception of these similarities requires the immediate rendition of multiple versions of the work. I would argue, however, that if the alternative versions are sufficiently familiar to a listener, physical renditions of all the versions are unnecessary, and the listener will utilize existing schemata to make comparisons. I would also suggest a third level of similarity: meta-external similarity. This is the similarity observed between different pieces of music, which would allow associations to be formed between the schemata of different works. For example, meta-external similarity may be observed between the themes of Muzio Clementi’s *Sonatina in D major, Op. 37 No. 2 (I)*, and John Williams’s *Flying Theme from ET*; or perhaps more commonly, between the opening themes of the fourth

movement of Mozart's 40th Symphony and the third movement of Beethoven's 5th Symphony, as was intended by the latter composer (see Figure 5).

Figure 5 Themes from symphonies by Mozart and Beethoven between which meta-external similarity may be observed

<p>Mozart: Symphony No. 40, IV, Opening Theme Allegro assai</p> 	<p>Beethoven: Symphony No. 5, III, Opening Theme Allegro</p> 
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This idea of meta-external similarity is also discussed by Ockelford (2006), though not in those terms. He also notes similarities observed between different hearings of the same performance of the same piece (e.g. repeated hearings of a recording).

Elsewhere, Ockelford (2004) explores and extends Deliège's cue abstraction model. Though he does not dispute the overall model, Ockelford suggests that the existing model may not describe all the processes involved in musical understanding. He focuses on musical unity, and the intrinsic similarities between musical segments that are created by the listener. Ockelford highlights the potential problems with the principle of categorization according to sameness and difference: musically related segments may be placed in either the same or in different categories, depending on the extent of the similarity between them. This problem is particularly manifested in music that exploits progressive changes to motives within a piece. As Ockelford (2004, p. 29) states, '... while successive links in the chain of development could – we may surmise – be heard as model and variant (and therefore assigned to the same category), when the first link is compared to the last, it may be evident that the categorical bounds have been exceeded and a metamorphosis has taken place'. Ockelford's solution is to combine his own 'Zygonic' theory of the cognition of musical structure (see also Ockelford, 1999) with Deliège's understanding of the process to create a composite model that exposes the

processes by which musical structure is understood and subsequently represented within a schema. The differences in this new model are only present after the initial ‘chunking’ process, when the cognition of relationships between chunks occurs. The chunks are considered in terms of their similarity, producing three possible outcomes: global (exact) similarity; aspect similarity, in which one or more aspects of the chunks are the same; and no similarity. This process may occur in relation to any of the features of the musical chunk, such as pitch, rhythm, timbre, or dynamic level. The following similarity categorization will be mediated by the salience of the attribute being compared. Ockelford argues that pitch and rhythm are the most salient of these attributes for Western music, in contrast to surface features such as timbre or dynamic level. The feature’s salience determines the strength of the relationship as represented in the schema.

Ockelford’s argument for pitch and rhythm being the most salient features of Western music appears intuitively correct for tonal music: as the author suggests, we do not recognise a piece primarily by its dynamic level, but by its melody (Ockelford, 2004, p. 35). As the author is aware, empirical evidence contradicts this, suggesting that the ability to perceive similarity relationships according to pitch and rhythm dimensions only occurs with familiarity (Pollard-Gott, 1983). Ockelford’s suggested solution to this dichotomy is that pitch and rhythm remain the most salient features of music, but that the characteristics of pitch and rhythm pertaining to categorization only develop with familiarity. It may also be that some Western atonal music may have other features more salient than pitch and rhythm. The differences between the perception of tonal and atonal music and the effects of familiarity will be discussed in greater detail later.

The intrinsically flexible nature of schemata suggests that certain aspects of hierarchical reduction (including aspects described by Lerdahl and Jackendoff (1983)) may be

incorporated into the process of schema formation and assimilation, as well as associations between whole or parts of schemata on many different levels. This flexibility will allow the incorporation of any understanding we have of a piece of music, thus reductional similarities between musical structures may be included. When reductional similarity is perceived between two musical structures, separate schemata will be formed at the lowest hierarchical level, whilst the two structures may also share a higher-level schema, based both on surface segmentations and a deep structure. One advantage of schema theory over Lerdahl and Jackendoff's (1983) Generative Theory is that the constant comparison of cues provides a mechanism whereby contrapuntal music may be understood.

The suggestion of the incorporation of analytically-based, as well as perceptually-based, theories into schema theory is supported by the work of Narmour (1999) and Adessi and Caterina (2005). Adessi and Caterina examine the similarities between score-based 'perceptual' analyses, based on segmentation, of a piece of post-tonal music and listeners' perceived segmentations. Interestingly, they found many similarities between the analyses and the listeners' perceptions, and also between the perceived segmentations of musicians (who had received a conservatoire education, and were familiar with the post-tonal idiom) and non-musicians (who had received only the usual class music tuition in school, and were unfamiliar with the post-tonal idiom). Thus analyses carefully based on segmentation may provide an insight into the perception of music by musicians and non-musicians, and into the processes of schema theory.

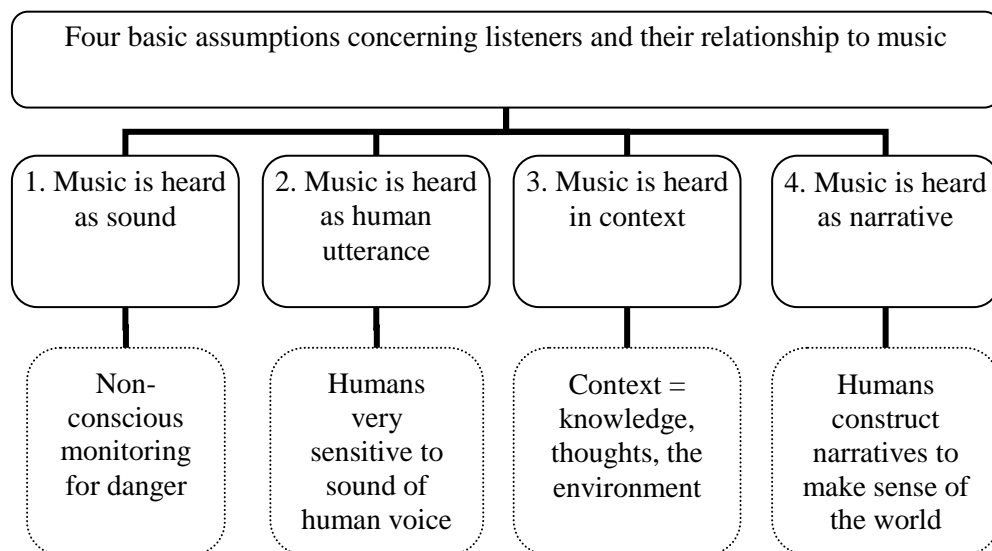
In summary, music perception involves the identification of perceptual cues in the music which are then used by the listener to create a schema. Schemata are flexible enough to allow both hierarchical and associative relationships, enabling links within and between different aspects of schemata to be made. The next section will discuss

Lavy's (2001) empirical model of emotional responses to music, which incorporates ideas concerning the perception of music, and remains focussed on the listener.

1.1.2. A listener-centred approach

Lavy aims to create an empirical model for music psychologists to use in their research concerning emotional responses to music (Lavy, 2001). To do this, he introduces four assumptions that are eventually used to create a complex model that Lavy claims can be used as a basis for empirical research in the field (see Figure 6).

Figure 6 Lavy's four assumptions (adapted from Lavy, 2001)



Lavy's first assumption is that music is heard as sound. He suggests that 'our innate, very low-level responses to the fundamental characteristics of sounds and basic patterns are integral to any musical listening experience' (Lavy, 2001, p. 15). Similarly, Clarke (2005, p. 4) states, 'it is self evident that we listen to the sounds of music with the same perceptual systems that we use for all sounds'. The extent to which music is heard as any other sound is heard is discussed above, and particularly considered by Scruton (1997) and Dibben (2001). Specifically, Lavy suggests that arousal can result from sounds that we associate with danger, in addition to any higher-level responses mediated by cognition. Lavy also acknowledges the role of Gestalt phenomena in

auditory perception, combining these with Bregman's (1990) concept of Auditory Scene Analysis, and linking these ideas to the concept of expectancy. He states,

If we have an innate ability to segregate sounds into auditory streams, and that ability derives from analysis of certain constant physical properties of sound, then hearing patterns in the auditory environment will involve the generation of expectancies as to how those sounds will continue or change over time.

(Lavy, 2001, p. 25)

In addition to these innate patterns of expectation, Lavy suggests that expectancies may be generated through stylistic norms, in a manner similar to the ideas of Meyer (1956) and Narmour (1990), and more recent work by Ockelford (2006). Lavy suggests that we always hear music first as sound, and that these perceptions will have specific emotional effects.

Lavy's second assumption is that music is heard as human utterance. He notes that humans can perceive the meaning of language without conscious effort, but that emotional information is carried largely para-linguistically or through non-linguistic verbal utterances. The three important dimensions for carrying emotional tone are the fundamental phonation frequency (the starting pitch), the intonation (the way the pitch changes), and the intensity of the voice. Though there is no measurable code for emotional tone, Lavy describes existing studies that show that participants can judge the emotional quality of speech samples consistently for a wide range of emotional expressions, even when the language used is totally unfamiliar. After examining wide-ranging research, Lavy concludes that there is 'a general consensus that the ability to produce and perceive non-verbal and paralinguistic emotional utterances is innate and that the relationship between emotion uttered and acoustic signal is somehow absolutely determined on some level' (2001, p. 47). He does suggest, however, that this ability may be supplemented by some culturally specific learning.

Lavy applies the ideas above to music perception, suggesting that when we hear music with the same acoustic profile as an emotive utterance, we interpret it as such. He goes further, however, suggesting that ‘there may be many modes of listening to music, but one of these always involves the unquestioned assumption that music is human utterance’ (Lavy, 2001, p. 57). Lavy’s idea of human utterance and music sharing emotive acoustic profiles is both logical and attractively simple. It is easy to think of musical examples corresponding to such an idea, such as Purcell’s ‘Ah, Belinda’ with its sighing appoggiaturas, or the opening phrase of Tchaikovsky’s Symphony No. 6 with its cries of longing and despair. Indeed, many of Cooke’s (1959) musical examples could perhaps work through this understanding of music as human utterance.

The third assumption of Lavy’s model is that music is heard in context. When listening to music, we hear sounds in the context of music, and according to Lavy, musical features emulating human utterances within a wider musical context. In addition, however, all music is heard within a larger-scale context. This context includes a listener’s mood; the situation in which the music is heard; past experiences associated with a particular piece or style of music; knowledge of the circumstances of composition or performance; a piece’s political significance; and any other extraneous but potentially significant information. Lavy suggests that features such as these ‘provide a framework within [which] physiological arousal from the sound and utterance domains can be interpreted and ... are in themselves crucial sources of emotion’ (2001, p. 58). Indeed, Lavy highlights associative memories and their emotions, which may be recollected consciously or unconsciously. This is similar to the category of associative emotional sources defined by Sloboda and Juslin (2001). Lavy extends this idea further in two related ways, however. Firstly, he suggests that an accultured listener may form ‘symbolic’ associations. He states:

the implicitly formed associations between music and filmic episodes or television advertisements ... can now be seen as exemplifying relationships between musical cues and extra-musical concepts on the level of motifs and patterns; it is not music as a whole to which the associations are attached, but those musical symbols that characterise a style or genre.

(Lavy, 2001, p. 65)

Thus an unfamiliar piece from a familiar genre may cause associative memories and emotions to be recalled by virtue of certain stylistic cues. Secondly, Lavy suggests that associative emotions need not be triggered by entire pieces or passages as a whole, as Sloboda and Juslin (2001) suggest. He claims, ‘associations do not necessarily relate exclusively to pieces of music as holistic units, but can also form on the level of musical fragments, so that idioms and conventions themselves create a context within which music is heard and understood’ (Lavy, 2001, p. 66). Interestingly, Cooke (1959) also suggests that smaller-scale fragments could trigger extra-musical associations: he states, ‘... there will be similar groups of memories of the expressive uses of various tonal tensions, attached to non-musical experiences of a similar nature ...’ (Cooke, 1959, p. 206). This has clear implications for the identification of triggers of emotional responses recorded with the use of continuous measurement devices.

Lavy also introduces the idea of ‘intra-musical elements’, musical structures that act as symbols, triggering associations with similar types of musical structures heard elsewhere. This is similar to Dikken’s (1996) syntagmatic and paradigmatic associations, which will be discussed later, and may also have links with cues associated with cue abstraction theory (see Deliège & Mélen, 1997). Lavy explores the effect of all associations made over the time-course of a piece. He speculates that there are two possibilities. Firstly, the symbols may be cumulative, ‘so it is not just a single token but a sequence in combination that is likely to spark associations that become part of the listening context’ (Lavy, 2001, p. 71). Secondly, Lavy suggests that each symbol forms

a ‘fleeting’ association, which is replaced by the associations of the next symbol. He then suggests that these two possibilities may create different effects: the former would lead to a change in mood, whereas the latter would create transient changes in emotion.

He states:

... we would hypothesize a two-tiered system of context involving static, global components and dynamic, local ones. The static, global context ... can lead to mood induction, but it is not so clear that dynamic local ones would have the same effect: inasmuch as the local lead to a cumulative static global amalgam, we can hypothesise that their role is identical to that of any other global aspect of context, but inasmuch as they are fleeting ephemera, they are much more likely to lead to transient *emotions*.

(Lavy, 2001, pp. 71–72)

Lavy makes a quick assumption that a cumulative system of emotional triggers would combine to create a change in mood, without providing evidence for this suggestion. He also omits a third possible effect of successive emotional triggers: that they should increase the intensity of an existing emotional response. It is strange that Lavy should suddenly consider the effects of music on mood here, considering his previous deliberate avoidance of this area elsewhere.

Interestingly, Lavy outlines the interacting nature of the first three components of his model. He suggests that sounds within music, and musical shapes that are heard as human utterances, may contribute to the context in which a piece is understood. Additionally, the context in which music is understood may mediate a physiological response.

Lavy’s final assumption in his model of emotional responses to music is that music is heard as narrative. The author refrains from exploring the debate concerning whether music has intrinsic narrative properties, instead remaining focused on the listener. He states, ‘For the music psychologist studying emotion, the questions that plague philosophers and musicologists can be avoided altogether if narrative is considered not

in terms of text and music, but in terms of the cognitive processes involved in creating narrative experiences' (Lavy, 2001, p. 85). Lavy's notion of narrative as a cognitive process is mainly derived from the creation of suspense, both in real life and as applied within music. He suggests that suspense requires four components (see Figure 7). In real life situations, these components lead to either fear or hope. Lavy replaces these concepts with the single concept of expectation, suggesting that this 'reveals the possibility that narrative suspense has a direct equivalent in the musical domain' (2001, p. 88).

Figure 7 Necessary components for suspense (adapted from Lavy, 2001)

1. Lack of knowledge about an ...
2. Important outcome (if this is not important for the self, empathy is invoked)
Affected by:
3. Possible outcomes ('problem space')
4. Time (delay increases suspense)

Lavy's use of the term 'suspense' is a deliberate attempt to situate his musicological work within a larger psychological field. If the processes involved in the creation of narrative can be fully understood from the study of real-life situations, this makes Lavy's musical application of the concept both more easily understood, and more credible, to a larger field of experts. Indeed, why should the processes of musical understanding be any different to those we use in everyday life? By using the term 'suspense', however, Lavy ignores a large component of musicological and psychomusicological research, which explores the creation of 'tension' within music. The extent to which the term 'suspense' is equivalent to the term 'tension' is difficult to gauge, but existing work may shed light on the musical features provoking tension or suspense, and thus allow a more specified approach to emotional responses to music than Lavy's current model permits.

Lavy suggests that narrative suspense and expectation work on varied cognitive levels. Whilst some expectancies will derive from Gestalt principles, others will be dependent on ‘the listener’s schematic knowledge of a musical style’ (Lavy, 2001, p. 88). The listener will construct a ‘problem-space’ that contains all the possible outcomes of the music, and will not know which of these outcomes will occur until the appropriate point in the music has passed.

The creation of a ‘problem-space’ and subsequent suspense requires the music to have sufficient importance for the listener, as shown previously in Figure 7. A potential criticism of the idea of the creation of suspense through music is that music may never hold sufficient importance for a listener to generate suspense. Lavy deflects this criticism, however, with three possibilities. Firstly, if the narrative generated by the listener has a plot for which the listener empathizes, then musical outcomes will be sufficiently important to the listener to generate suspense. Secondly, Lavy suggests that in conjunction with this first idea, sufficient importance may ‘derive not from the music but from the listening context or the mood that the context has evoked in a listener...’ (2001, p. 89). Thirdly, Lavy suggests that the importance of the outcome of a musical event may be mediated to such a large extent by the number of possible outcomes and time that the importance increases to a significant amount for the listener. Later, Lavy suggests that for a musical outcome to acquire sufficient importance, empathy is not necessarily required: all that is necessary is that the listener ‘has been captively involved in generated expectancies which may be confirmed or confounded, or immersed in a problem space that is sufficiently complex’ (2001, p. 90).

An attractive feature of Lavy’s theory is the fact that it incorporates existing theories of music perception, arousal and expectation. Lavy uses Lerdahl and Jackendoff’s (1983) work to explain why music may allow expectation to be sustained over time: because

music consists of multiple hierarchical layers, expectations may overlap or coincide, allowing continued suspense over a long period. Similarly, Lavy invokes Meyer's (1956) theory of expectation as a means by which narrative is created by a listener. Lavy claims, 'it explains how *knowledge* of a musical style can lead to the generation of *inferences* about the musical dynamic; these inferences provide the coherence required to maintain the existence of a narrative world' (Lavy, 2001, p. 98). Lavy is insistent that Meyer's expectation theories are not equivalent to narrative processes, but merely a component aiding the process.

This would appear to be confirmed by Meyer's texts (1956; 2001), who derives his theory of musical expectation from suspense. It is note-worthy however, that Meyer was discussing the creation of suspense over short time-scales, as opposed to the referential suspense he also mentions. It appears that Lavy's concept of narrative invokes the longer-term referential suspense.

Meyer (2001) also discusses the concept of narrative, distinguishing this from 'plot'. Though he appears to focus on narratives as a property of a stimulus, describing a range of histories and literary and musical genres as narratives, he retains an implied focus on the human interpretation of such events. Meyer suggests that in certain circumstances, when 'uncertainty is experienced in terms of an imagined goal', a narrative succession may be interpreted as a 'plot' (2001, p. 357). His idea of 'plot' is an 'implication-realization pattern', in comparison with his conception of narratives without goals as 'essentially fluctuating continuities' (Meyer, 2001, p. 357). Meyer's work will be discussed further in due course.

Bearing in mind Lavy's (2001) definition of narrative, which is reliant on suspense, Meyer's concept of 'plot', rather than his concept of 'narrative', seems equivalent to

Lavy's conception of narrative processing. The creation of a plot requires the stimuli to be considered as a coherent whole, and this is a characteristic of Lavy's conception of narrative. Lavy states, 'When we listen to music, we attempt to hear the notes, the musical structures and all salient aspects of the listening experience as a dynamic, coherent whole; such an activity can be described as listening to music as narrative' (Lavy, 2001, pp. 102–103).

The exact nature of Lavy's ideas of narrative are finally exposed when he remarks that 'we can perhaps suggest that music is heard as narrative because when we listen to music we conceptualise it *in terms of* narrative, with narrative itself acting almost as a metaphor within which all things can be made comprehensible' (2001, p. 99). Lavy is not the only author to discuss metaphor as a means of understanding music. Scruton (1997) discusses the concept of music being understood as a spatial metaphor, a metaphor of movement, and a metaphor of life. Cooke (1959) also suggests a metaphorical understanding of music: he suggests that music and literature share aspects of the larger-scale organisation of plot, and that they should be understood in similar ways:

The 'literary' aspect of music is to be found, to a greater or lesser extent, in most Western music ... since music is, properly speaking, a language of the emotions, akin to speech. The appeal of this music is directly to the emotions and, to be fully appreciated, should be responded to in this way.

(Cooke, 1959, p. 33)

Lavy (2001) suggests that, in a manner similar to Meyer's (1956) expectation theory, emotional responses may result from a listener's inability to construct a narrative, or a reaction to the implications of the narrative they have created.

Lavy's view of narrative as a cognitive process successfully avoids problems posed by the question of whether or not the music has intrinsic narrative properties, but this

viewpoint does create its own difficulties. Lavy appears deliberately unspecific: he describes narrative as a conscious or unconscious cognitive process; as being built from the creation of suspense; as acting as a metaphor through which the music can be understood; and simply as listening to the music as a coherent whole. This makes the study of the understanding of music as, or through, narrative very difficult. There is no clear, distinctive definition of what narrative is; or of how it appears, or is constructed. Lavy's empirical work fails to enlighten us: it is based on the concept that in the creation of narrative, binding occurs between different elements of the situation. Neither this, nor any other part of his thesis, provides an unequivocal definition of the narrative process. Is the narrative that is created an explicit narrative that, for instance, could be written down by the listener if desired; or is the narrative implicit, and therefore not readily accessible to description? Does the narrative contain extra-musical content, or associations; or is it based purely on musical structures and the tension or suspense they create? Would the type of narrative created differ according to the type of music being heard? For instance, perhaps an explicit narrative, with a non-musical plot, might be formed for programme music; whereas an implicit narrative might be created as a result of hearing absolute music.

This vagueness may be due to the narrative concepts upon which Lavy bases his work. Lavy focuses on the work of Richard Gerrig (1993), who first posits the idea of narrative as a cognitive process, as opposed to an intrinsic property of a stimulus. Gerrig mostly discusses narrative formation from within situations relying on language, though in his discussion of the results of narrative formation, he does mention art:

Readers become "lost in a book" ... moviegoers are surprised when the lights come back up; television viewers care desperately about the fates of soap opera characters; museum visitors are captivated by the stories encoded in daubs of paint. In each case, a narrative serves to transport an experiencer away from the here and now.

(Gerrig, 1993, p. 3).

Like Lavy, Gerrig avoids the discussion of the intrinsic narrative properties of the stimulus, focusing instead on the effects of transportation and the cognitive processes involved in this. Gerrig states,

If we define the experience of narrative worlds with respect to an endpoint (the operation of whatever set of mental processes transports the reader) rather than with respect to a starting point (a text with some formal features), we can see that no a priori limits can be put on the types of language structures that might prompt that construction of narrative worlds.

(Gerrig, 1993, p. 4)

Bearing in mind Gerrig's inclusive viewpoints, it seems that Lavy is right in extending the application of narrative as a cognitive process in response to a musical stimulus. Certainly the experience of being 'transported' is one many listeners experience through listening to music. DeNora, in her study of music's role in everyday life, describes the experience as a mode of listening that is aspired to by some music listeners. She states:

Within the modern institution of 'serious' listening, to listen 'correctly' is to be 'transported', to abandon, albeit temporarily, the realm of material and temporal being, to allow oneself to be taken over by music's textual time.

(DeNora, 2000, p. 157)

If, in literature, this transportation is a result of a narrative process, then there appears to be no reason why this should not be the case in music. Music, however, is not always based on text, and it does not seem possible that textual narratives should form unconsciously as part of the natural listening process (though much of the musical experience may be described verbally, as a conscious process). Rather, it seems more likely that narratives are formed out of musical structures themselves.

Agawu (1984) discusses the role of narrative in musical structure in his consideration of 'structural highpoints' or climaxes. Agawu's intention is to 'suggest the terms in which an empirically-derived theoretical model based on the notion of climax might be

couched' (1984, p. 160). He defines a moment of climax as a 'structural highpoint' or a turning point, in a work, which may be demonstrated through 'a simple melodic peak, a point of textural culmination, or the point of greatest harmonic tension' (1984, p. 162). Agawu also suggests that such a peak might be indicative of a dynamic or narrative curve, a shape that may represent the increasing and decreasing tension surrounding a structural highpoint. The shape of this narrative curve may vary with the piece being examined, as exemplified in Agawu's discussion of Schumann's *Dichterliebe*. The flexible nature of this narrative shape, and the idea of climax, would appear to conform to Lavy's (2001) conception of music being heard as narrative. Though Agawu's theory is based on musical structures, it could be seen that the musical structures present, and the peaks and tensions they create, enable music to be perceived and understood as narrative.

It is important to note one further feature of Lavy's assumption that music is heard as narrative that may be problematic: the theory upon which he draws suggests that the narrative experience is not compulsory. As Gerrig (1993, p. 5) states, 'the experiences of narrative worlds will be optional: a text cannot force a reader to experience a narrative world'. Lavy is insistent, however, that music is always, to some extent, understood in terms of narrative. This appears to be in direct contravention of the theory upon which he draws. A more appropriate fourth assumption might be 'music *may* be heard as narrative'.

In view of the previously discussed theories of music perception, it is fruitful to compare the properties of narratives, as far as they can be discerned, with the properties of schemata. A reviewer of the work of Gerrig (1993), David Miall, implies an intrinsic similarity between constructed narratives and schemata, whilst also shedding light on the creation of suspense, a necessary component of narrative construction:

Gerrig goes on to argue that suspense arises from the contrast between schematic expectation (what the narrative suggests is typically or likely to be the case), compared with the actual outcome; when the latter is already known, yet suspense is still felt (anomalously), this argues for the cognitive process supporting schematic expectations running off automatically, that is, being impenetrable to prior knowledge.

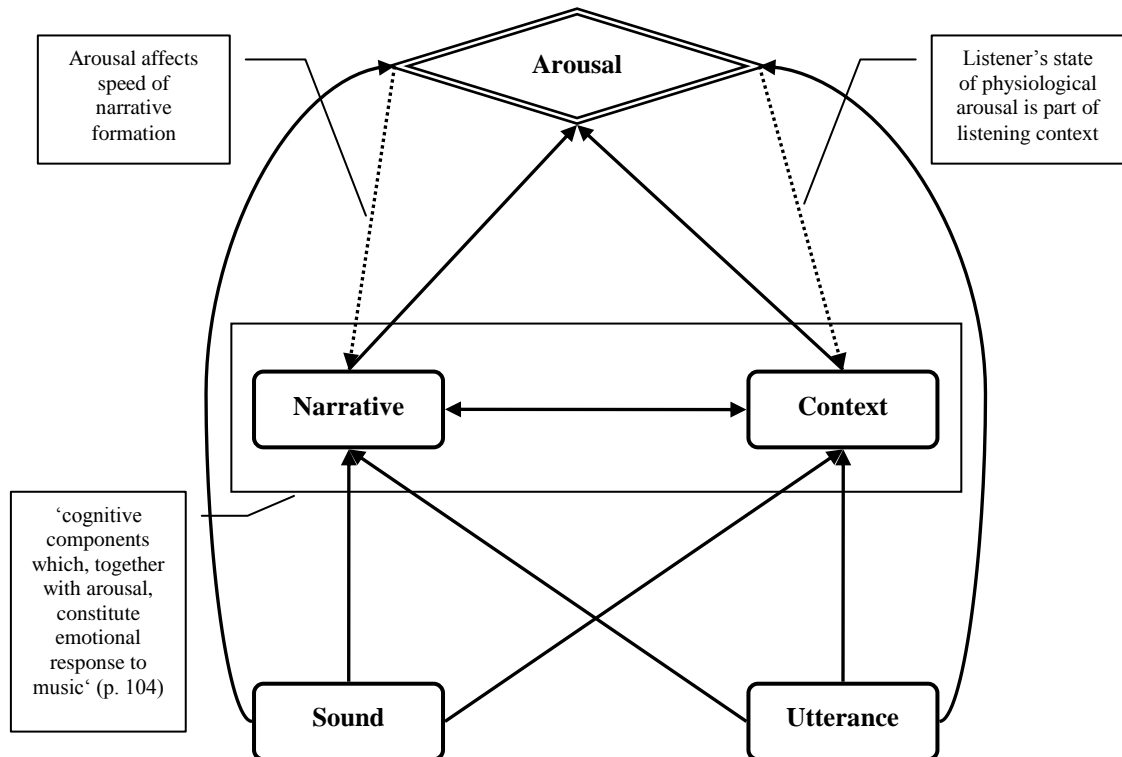
(Miall, 2000, pp. 380–381)

This suggests that narratives have a comparable structure with schemata, but that a distinction is made between the existing ‘typical’ situation described by the schema, and the new situation, interpreted through narrative processing. An important feature of Lavy’s use of narrative in his model, and Deliège’s use of schemata in music perception, is that Lavy highlights the concept of narratives being used to make sense of the complete listening situation. Further clarification will result from an examination of the relationships between the four assumptions of Lavy’s model.

Lavy is adamant that the four aspects of his model are not independent of one another; that they interact in a dynamic manner (see Figure 8). Sound, utterance, context and narrative are all able to influence physiological arousal directly. Whereas sound and utterance do this through immediate instinctive reactions, context and narrative require cognitive appraisal to be able to influence physiological arousal. Sound and utterance are also able to influence context and narrative. In turn, context and narrative may influence one another. Thus all four components interact to create emotional responses, which consist of physiological arousal and cognitive appraisal. Additionally, arousal also feeds back into the model, affecting the listener’s emotional response, an idea that has recently been confirmed by empirical research (Dibben, 2004). It seems important, in the light of the recent discussion of narrative processes, to highlight that the three other components of Lavy’s model all contribute to narrative formation. This is in direct contrast to the schemata discussed earlier in relation to music perception, though as schemata may form hierarchically, it seems possible that a schema formed from a purely

musical stimulus may provide a contribution to narrative construction in the form of a higher order schema.

Figure 8 Lavy's model (adapted from Lavy, 2001, p. 104)



Lavy claims that this model is complete and generic: he states,

it neither claims nor even aims to provide a full account of how emotion is evoked in a particular listener experiencing a particular piece of music in a specific situation; instead, it suggests how the almost infinite array of parameters that might possibly impinge on such a process can be understood as a coherent whole rather than a collage of disparate phenomena

(Lavy, 2001, p. 106)

The general nature of Lavy's model means that it may be used to explain emotional responses to music of any genre, including both tonal and atonal music, whilst encompassing existing empirical work and theories of expectancy. Though this is admirable, it is questionable as to whether Lavy's model can provide a framework for empirical research that is specific enough to provide explanations for emotional

responses to music from a research aim investigating the role of musical structure, or specific listener features. The next section of this chapter will examine theories that focus less on the listener's understanding, and more on the triggers of their emotional responses.

1.1.3. A stimulus-centred approach

Whereas Lavy maintained a focus on the listener in his theory, the majority of theories concerning emotional responses to music focus on the musical triggers of emotional responses in a more specific manner. The simplest of these theories involves a division of the listeners' emotional responses according to their source, as suggested by Sloboda and Juslin (2001). These authors separate emotional responses according to whether they have a source that is intrinsic or extrinsic to the music. Intrinsic sources of emotion are those that are caused by specific musical structures. Examples of such sources can be seen within an earlier empirical study (Sloboda, 1991), in which participants were asked to report memorable emotional experiences to music, and if possible, locate them on a musical score. The results suggested a range of harmonic and melodic sources, including a descending cycle of fifths to the tonic; melodic appoggiaturas; melodic or harmonic sequences; and new or unprepared harmony. There were also events that were a combination of timing devices and harmonic features, including a harmonic or melodic acceleration to cadence; and the delay of a final cadence. Other features included repeated syncopation; sudden dynamic or textural changes; and the occurrence of prominent events earlier than prepared for. These features were also found to be triggers of emotional responses in later empirical work (Waterman, 1995). Timmers et al. (2006) found that dynamics, local fluctuations in tempo, and phrase boundaries also affected listeners' emotional engagement with music.

Intrinsic emotional triggers have also been discussed by Cooke in his exploration of the concept of music as an emotional language (Cooke, 1959). Cooke suggests that music is subject to our understanding of its language, and that any listener may misinterpret a piece at any time. Though Cooke therefore implies that there may only be one correct way to hear a piece, his assumption that emotional response to music is based on the perceived components of musical content, rather than the totality, is particularly pertinent to this thesis.

Cooke's (1959) study is based solely on Western tonal music: it excludes both atonal music, and the music of non-Western cultures. Though Cooke's focused approach is consistent with the study of a language, it is not so with the study of linguistics; nor does it provide a complete picture of musical understanding. Nonetheless, the intricate detail of Cooke's work may provide a useful means of deciphering some of the structural causes of changes in a listener's emotional response. Cooke suggests that musical works are built out of tensions between notes, created in the parameters of pitch, time, and volume. These are coloured by tone-colour and texture, which Cooke dubs 'qualifying agents'. Within the pitch dimension, there are both tonal tensions between specific pitches, and intervallic tensions, which rely on the distance and direction between notes. In the time dimension, tensions are generated through the creation of boundaries, which are then violated. The effect of these time tensions are modified by factors of duration: tempo, movement, and phrasing. Both the dimensions of pitch and rhythm are important, and may interact, though Cooke suggests that, in our culture, pitch is the primary tension-generator.

Cooke examines the tonal tensions in some detail, isolating each interval, and justifying their effect by calling upon the natural laws of the harmonic series. He then considers the effect of the vitalizing agents, again positing a 'natural' phenomenon to justify their

effect: that of speech. Thus, increased volume indicates increased emphasis; increased speed creates increased animation; and higher pitch indicates greater assertion.² Of the qualifying agents, Cooke suggests that tone-colour is analogous with volume, and that texture has an effect similar to both pitch and tone-colour.

Cooke also uses existing musical works with explicit emotional content (often indicated by a vocal line) to enlighten those with only implicit emotional content. The author considers musical phrases of three or more notes from a wide-ranging repertoire. Though these phrases appear very small, it would perhaps be unwise to consider much larger phrases in this manner because of the rapidly-changing emotional content of music. If the lowest common denominator is used, the effect of their combination can be considered more easily. Cooke demonstrates the larger-scale functioning of these components through equating coherence of musical form with the coherence of emotional expression, suggesting that the former is a means to achieving the latter. Cooke suggests that his small-scale translations of musical phrases can be naturally extended to thematic development; and uses the analytical techniques of Hans Keller to demonstrate the process.

Though Cooke's work explores the musical vocabulary in considerable detail, examining the occurrence of each musical phrase with relation to accompanying lyrics in order to find its appropriate meaning, he has been criticised on several counts (Scruton, 1997). Firstly, Scruton disputes Cooke's definition of a language, highlighting the fact that, in languages, meaning is assigned to words by convention. Cooke, on the contrary, is adamant that the links he finds between meaning and music are innate, based on the properties of the harmonic series, and of the tonal system. For the purposes of this research, this dispute only matters when considering the relative experience of

² This is closely related to Lavy's (2001) suggestion of listeners hearing music as human utterance.

musicians and non-musicians. Whether innate, or long-standing conventions, the links Cooke discovers may provide excellent explanations for small-scale changes in emotional response, in a similar manner to the emotional triggers discovered by Sloboda (1991). Scruton further criticises Cooke for his exclusively positive exemplification of the emotions portrayed by certain phrases: Cooke always finds examples which concur with one another, and also never provides an example of a non-emotional phrase. Indeed, in Cooke's system, every interval carries an emotional tone, and therefore non-emotional phrases do not exist.

Sloboda and Juslin's (2001) intrinsic sources of emotional responses also include the expectancy theories of musicological theorists such as Meyer (1956), Narmour (1990; 1991) and Ockelford (2006). Meyer's work in particular has been highly influential. As indicated earlier, his theory of emotional responses to music was based on the concept of expectations derived from the notion of suspense. He states, 'it has been generally acknowledged that music arouses expectations, some conscious and others unconscious, which may or may not be directly and immediately satisfied' (Meyer, 1956, p. 25). Meyer claims that expectation may take several forms: there may be a specific expectation, such as that of the final chord of a perfect cadence; equally, the exact resolution of the expectation may not be known; in addition, expectancy and suspense may be created through a 'doubtful or ambiguous' stimulus (Meyer, 1956, p. 26). He argues that suspense is 'essentially a product of ignorance as to the future course of events' (Meyer, 1956, p. 27) and suggests that the level of suspense will be directly related to the level of the emotional response experienced when the expectation is fulfilled.

Interestingly, Meyer specifies that expectations may be based on both innate psychological reactions, and on knowledge gained through prior listening: he states,

‘Expectation ... is the product of the habit responses developed in connection with particular musical styles and of the modes of human perception, cognition, and response – the psychological laws of mental life’ (Meyer, 1956, p. 30). In later work, Meyer (2001) clarifies this distinction, describing ‘native’ and ‘syntactic’ musical processes. Native processes are universal, and are based solely on human cognitive and physical constraints. Syntactic processes are, as the name suggests, ‘based on the syntax of a style’ and are therefore dependent on both their culture and their position in history (Meyer, 2001, p. 345). Some innate responses to music are not due to expectation, but to what Meyer describes as ‘statistical’ parameters: those ‘aspects of sound [that] vary in *amount* or *degree*’ (Meyer, 2001, p. 345). He provides examples of dynamic variation, tempo, register, and continuity. Others, in research concerning emotions perceived in music, have also suggested that these responses are readily accessible (Gabrielsson & Lindström, 2001).

According to Meyer (1956), it is the fulfilment or otherwise of the expectations created by the music that have the power to evoke an emotional response. He suggests that if the music continues in a manner that is totally expected (for example, a progression that is a cultural norm is completed) no emotional response will be generated. It is only if the completion of the musical passage occurs in a manner that is contrary to cultural norms, or to the listeners’ native expectations, that an emotional response is generated. The nature of the suspense implicated in Meyer’s (1956) theory is clarified in his later work (Meyer, 2001). In this work, he states that suspense that is ‘created by syntactic or native processes is short-range, as compared with “referential” suspense – for example, about finding the culprit in, say, a detective story’ (Meyer, 2001, p. 347).

Meyer (1956) uses Western tonal music to build a theory of emotional responses to music based on predicted outcomes, suspense, expectation and fulfilment. Despite the

author's insistence that his theory could not be tested empirically, Meyer's work remains an important contribution to the field of research in emotional responses to music.

As mentioned previously, Sloboda and Juslin (2001) discuss extrinsic sources of emotional responses to music, in addition to the intrinsic sources described above. Extrinsic sources of emotional responses can be further divided into two categories: iconic sources; and associative sources. Sloboda and Juslin describe iconic sources as having a 'formal resemblance between a musical structure and some event or agent carrying emotional "tone"' (Sloboda & Juslin, 2001, p. 93). They usefully clarify the relationship between perceived and induced emotions from iconic sources, stating:

Empirical studies have shown that iconic relationships may specify particular emotions, and that they thus supply emotional content to the non-specific sensations of surprise, tension, and arousal engendered by the listener's engagement at the purely structural level of the music.

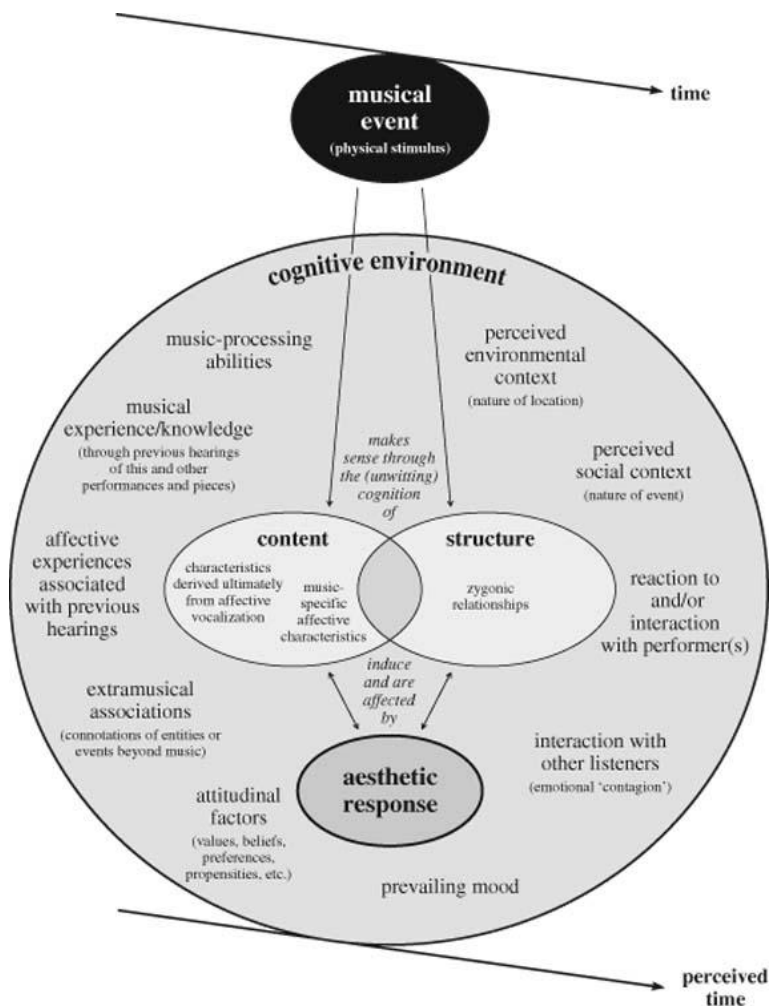
(Sloboda & Juslin, 2001, p. 93)

Thus, it appears that emotions induced by musical structure may be semantically vague, instead operating in terms of a feeling of intensity.

Associative sources of emotion are features that trigger recall of events and emotions external to the piece of music being heard. They are frequently self-referencing, and are therefore highly dependent on the experience of the listener. Empirical evidence for associative emotional responses to music has been found by Waterman (1995). Sloboda and Juslin suggest that associative sources may be less specific than either iconic or intrinsic structural sources, and that this type of emotional response may be triggered by an entire passage or piece of music. Lavy (2001) suggests that associative emotions may also be generated by small-scale cues.

Though the simplicity of this division of emotional response by source type is attractive and helpful, it is not intended to be a complete model of emotional response: there are many variables that will affect whether or not the emotional responses suggested by the music will actually occur in listeners. One model that does incorporate many of these variables, however, including a detailed exploration of the effect of musical structures on emotional response, has been proposed by Ockelford (2005) (see Figure 9).

Figure 9 Model of the relationship between musical events and aesthetic response (Ockelford, 2005, p. 92)



Ockelford explores the link between music perception and induced emotional ('aesthetic') response, arguing that much of the emotional response resulting from music is triggered by the interaction of the musical content ('content') with the

perceived similarities and differences between musical structures ('structure'). The music's content appears similar to Sloboda and Juslin's (2001) iconic intrinsic emotional sources. Ockelford defines content as 'the perceived sonic qualities of musical event, or the context-specific relationships that exist between them: particular pitches, melodic intervals, onsets, inter-onset intervals, durations, harmonies, dynamics, timbres, etc.' (2005, p. 76). Interestingly, his view of structure in his model is narrow.

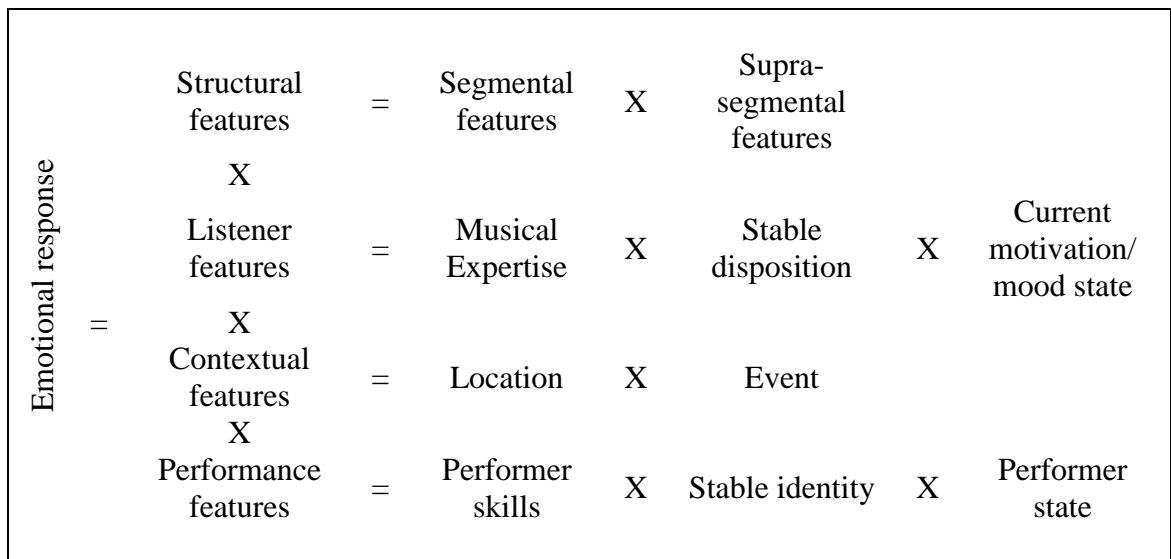
He states,

'Structure' refers solely to implicative relationships through which one perceived sonic event or feature is deemed to derive through imitation of another. Such relationships are termed 'zygonic'

(Ockelford, 2005, p. 75).

The author employs his 'zygonic' theory to investigate the emotional triggers in Beethoven's Piano Sonata Op. 110. This theory is analytical in nature, and makes links between musical segments of varying sizes, from a single interval to complete phrases or sections. According to Ockelford, the imitation and derivation between these segments provokes an emotional response.

Ockelford's model remains focussed on the imitation and derivation of musical features to form triggers of emotional response. Though imitation and derivation appear likely causes of emotional response, this approach minimises the impact of many of the structures found to be causes of emotional response by empirical studies (e.g. Sloboda, 1991). A model allowing a broader perspective on the possible causes of responses to musical structure has been proposed by Scherer and Zentner (2001), based on psychological literature on music and emotion. An adaption of this model is shown in Figure 10.

Figure 10 An adaption of Scherer and Zentner's (2001, p. 365) model of the emotional effects of music

Scherer and Zentner's (2001) model combines four main categories of variable that may all effect the extent to which a listener experiences an emotional response to a piece of music they are hearing. The first of these categories relates well to Sloboda and Juslin's (2001) structural (intrinsic and iconic) causes of emotional response, though Scherer and Zentner subdivide this category into two new components: segmental features; and supra-segmental features. Segmental features may be compared to phonemes in speech, as they consist of small-scale features such as individual tones or sounds, chords, or intervals and their pitch, energy, duration, timbre, or harmonic structure. They believe that these features are directly linked with neural networks in the brain that produce emotions, and consequently, that responses to segmental features are innate. Segmental features would appear to be an example of Sloboda and Juslin's (2001) iconic features, and also appear similar to Ockelford's (2005) 'content'. Scherer and Zentner's (2001) supra-segmental features are on a larger scale, and consist of patterns that unfold over time. These patterns may include melodies, harmonic patterns, tempo, rhythm and other aspects of musical structure and form. Emotional responses to these patterns may act as either innate and universal 'iconic' codes, or acquired and culturally specific 'symbolic'

codes. A range of theories of musical emotion, based on musical structure, may be incorporated into Scherer and Zentner's model within this category (Cooke, 1959; Lavy, 2001; Meyer, 1956).

The second category of Scherer and Zentner's (2001) model, 'listener features', also bears relation to the source categories of Sloboda and Juslin (2001). Listener features include three sub-categories (musical expertise, stable disposition, and current motivation/mood state). The musical expertise of a listener may affect their perception of musical structure, thus affecting their response to intrinsic structural features and iconic features present in the music. Musical expertise may also encompass knowledge of historical fact, such as the circumstances surrounding the composition of the work they are hearing, which may induce associative emotional responses, or moderate responses to intrinsic structural and iconic sources of emotion. In addition, musical expertise may encompass familiarity with a specific genre of music, which has been shown to affect participants' 'esthetic evaluation' of music (Edmonston, 1969). A listener's stable disposition, personality (Grewe, Nagel, Kopiez, & Altenmüller, 2007; Nater, Krebs, & Ehlert, 2005; Panksepp, 1995, p. 183; Rickard, 2004), and emotional intelligence (Resnicow, Salovey, & Repp, 2004) will affect the extent to which they will respond emotionally to a piece of music, as will their current motivation or mood state. A listener hearing a piece to discover its form, for example, is unlikely to respond in the same way as when they listen for pleasure alone (Pople, 1994). A listener's mood state may change between consecutive hearings of the same piece, and produce different responses (Cantor & Zillman, 1973). This should therefore be considered during empirical research in this area. In addition, this category should include associative features such as resurgence of memories of past events of a listener's life, and their associated emotions.

Scherer and Zentner's (2001) third category is 'contextual features', and encompasses features of the location, including its acoustics; the type of event at which the music is being heard; whether the music is live or recorded; and other, less specified happenings, such as interruptions to the music, and the behaviour of the audience. Though some of these variables will be eliminated in an empirical study, it is necessary to consider the circumstances surrounding the listening environment to ensure that it is conducive to an emotional response (Grewe et al., 2007).

The final category of Scherer and Zentner's (2001) model is 'performance features'. They suggest that these 'may have a major impact on the perception and induction of emotions' (Scherer & Zentner, 2001, p. 364). Emotions resulting from performance features may depend on the performer's technical and interpretative ability, which may contribute to the effectiveness of structural features in producing emotional responses. Considerable empirical research has been undertaken in this area, the results suggesting that different interpretations have significant effects on the emotions conveyed by the piece and induced in the listener (Juslin, 2001; Sloboda & Lehmann, 2001). This importance of interpretation is also highlighted in musicological texts: as Cooke (1959, p. 204) states, '... if the performer is unmusical, the chain of communication is broken or impaired; if he is genuinely musical, it is undamaged'.

The performer's stable identity will have a dual effect on the emotions experienced by the listener: not only will this affect the quality of the performance; a world-class performer may induce emotions such as awe even before they have begun to play. Finally, transient variations in the performance, relating to the performer's interpretation, concentration, mood, motivation, stage presence, and audience contact, may all play a role in the generation of emotional responses to music.

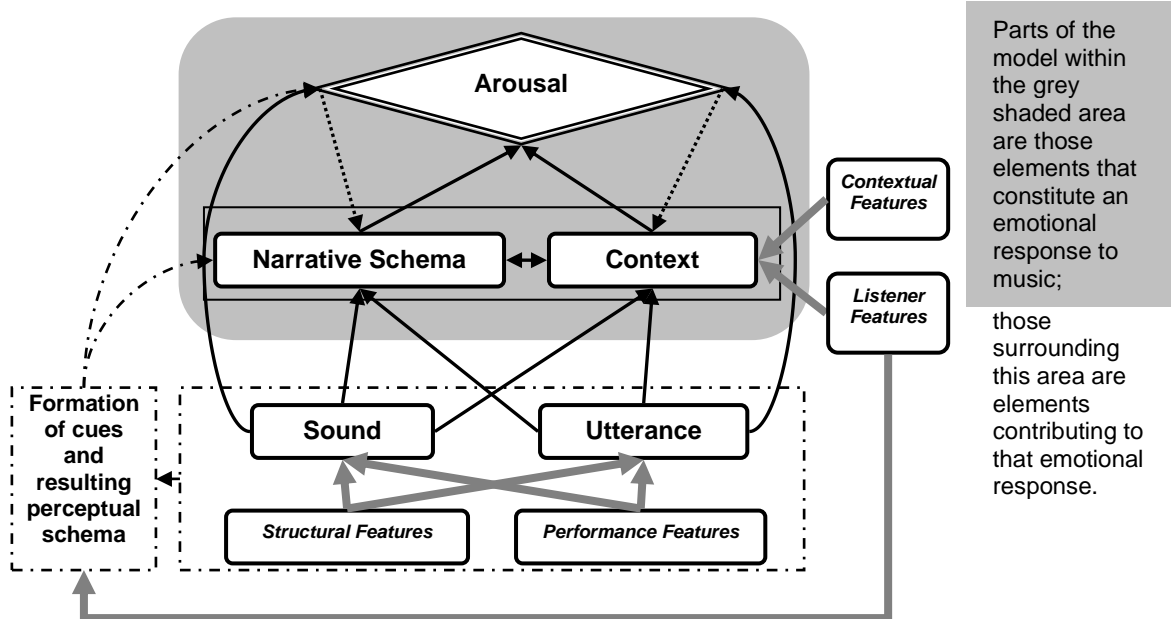
The approaches discussed here remain focused more on the triggers of emotional responses, and as such, provide considerable detail of the factors surrounding a listener that may provoke an emotional response to music.

1.1.4. A combined approach

Both listener-centred and stimulus-centred approaches make useful contributions to the understanding of emotional responses to music and, when combined, arguably provide a more comprehensive picture of how emotional responses are determined than hitherto suggested. The model shown at the beginning of this chapter (Figure 2) and reproduced here (Figure 11) effectively synthesizes the key components of this research so as to provide a novel tool for understanding emotional responses to music. Lavy's framework provides a principal basis of the model, with its components interacting with one another as well as contributing to the formation of cues and perceptual schemata. Scherer and Zentner's features also contribute to schema formation, as well as the listener's understanding of music as sound and human utterance and in context. It is perhaps worth noting that Lavy's model refers to the understanding of music in context, in contrast with Scherer and Zentner's model, which identifies the attributes to be understood by the listener. The formation of cues and a perceptual schema generates arousal directly, but along with the other assumptions outlined above, also inform the listener's understanding of the music as narrative, and the formation of a narrative schema. The narrative schema is not always formed in music listening, but when it is, it combines all aspects of the listening situation and enables the listener to be 'transported' into an experience unrelated to the everyday listening situation. Any of the components of the model may contribute to emotional arousal directly, but are likely to combine through a narrative schema to form a response based on the coherent whole of the listening situation. Within the model, the actual emotional response to the music

consists of arousal and cognitive appraisal, which includes the narrative and context components of Lavy's model, as Lavy suggests in his original model. The surrounding features of the model contribute to this emotional response to the music.

Figure 11 Combined model of emotional responses to music



The following sections of this chapter will examine aspects of the model in greater detail, specifically, listener features and structural features. Firstly, listener features will be considered in relation to their impact on listeners' perceptual and emotional responses, according to two issues: familiarity and musical experience. Secondly, structural features will be examined in relation to the similarities and differences between listeners' emotional responses to tonal and atonal music. Previous research about these issues – familiarity, musical experience and musical language (tonal/atonal) – will now be addressed.

1.2. The effects of familiarity

1.2.1. The effects of familiarity on perception

Various studies indicate changes in perception with familiarity or repeated listening. Pollard-Gott (1983) noted specific changes in perception with familiarity: she

investigated the changes in listeners' perceptions of thematic categories over repeated hearings of a piece of music. The categorization of themes is an important component of the cue-abstraction mechanism in Deliège and Mélen's (1997) work of schema construction. Pollard-Gott's methodology was specifically designed to be ecologically valid, that is, true to a real-life listening situation. She asked participants to listen to a real piece of music several times, unguided by any descriptions, analyses, or the score, in order to observe the development of listeners' perceptions. After each hearing of the piece, which occurred within one week, excerpts of the piece were heard in pairs, and listeners were asked to provide similarity ratings.

Pollard-Gott (1983) predicted that categorization according to superficial elements of the music, such as dynamics, tempo, or texture would occur after initial hearings of the piece, and that categorization according to thematic features of the piece would only appear gradually, with repeated listening. She suggests that 'this change may manifest itself in the relative salience of the musical dimensions listeners focus on at different points in the acquaintance process' (Pollard-Gott, 1983, p. 70). She found that these predictions were indeed supported by her results. Initial similarity judgements of listeners were based on dynamics, tempo and texture, dimensions Pollard-Gott describes as easily accessible and stable. Subsequently, however, thematic features began to have an effect on listeners' similarity judgements. Both musicians and non-musicians changed their focus in this way; though musicians progressed to thematic categorizations more rapidly than non-musicians.

A similar combined effect of familiarity and musical expertise was found in results of procedures testing the cue-abstraction mechanism (Deliège & Mélen, 1997). Although musicians were more efficient at creating schemata (as will be discussed in more detail later), non-musicians showed remarkable improvement with additional familiarity with

the piece. Deliège and Mélen state, ‘familiarisation with the musical structures through repeated listening influences the performance of non-musicians more than musicians: the accuracy of non-musicians’ similarity judgements improved linearly with the number of auditions of the segments to be compared’ (Deliège & Mélen, 1997, p. 404).

Familiarity, then, appears to increase the detail in the schematic representation of a piece, and enable a deeper focus in the listener on thematic and structural features, rather than readily-accessible surface features such as dynamics, articulation and tempo.

1.2.2. The effects of familiarity on emotional responses

Familiarity lies within the listener features of the above model, and would therefore contribute to Lavy’s category of hearing the music in context. Lavy uses Meyer’s (1956) ideas about expectation when dealing with the problem of familiarity, or ‘rehearing’. There are four ways in which Meyer tackles this issue. Firstly, there are the limitations of perception: on the first hearing of a piece, a listener creates a map of the structure, but they are largely unable to create expectations about the music. Subsequent hearings allow expectations to develop from the now familiar structural landmarks or cues, according to cue abstraction theory (Deliège & Mélen, 1997). Secondly, there are the limitations of the memory. As Lavy states, ‘there is always something new to hear when rehearing a piece of music’ (2001, p. 92). Thus new expectations will generate on every hearing. Thirdly, Meyer suggests that a listener’s mood and state of mind will affect how he or she listens to the music and generates expectations. This appears to relate to Lavy’s contextual ideas. Fourthly, ‘...each performance is a unique work of art, so in a literal sense every listening experience, even if it involves a familiar piece of music, is intrinsically a novel one’ (Lavy, 2001, p. 92). With the exception of the effects of contextual ideas mentioned above, and also memory and perception limitations, this

last example can only apply to live music, as opposed to recordings. This is explored further by Clarke, in his discussion of 'Listening to Performance' (2002).

Lavy suggests that rehearing music may be analogous to rereading a novel: though in both instances the outcome is known, suspense and expectation are still generated. The reason humans act in this way may be because in real life, similar situations are not expected to have exactly the same outcomes. As Lavy states, 'it would be a total waste of cognitive resources to attempt to recall knowledge that is particular to a one-off situation (a particular novel, or a particular piece of music) in another, different situation; only common general heuristics should be extracted from one situation and re-applied in another' (2001, p. 97).

Cone (1977) also compares multiple hearings of music with multiple readings of a story, focussing on a detective story and a Brahms Intermezzo. He describes three levels of reading a detective story. A 'First Reading' is described as any reading in which the reader is partially or completely unaware of aspects of the plot, and is therefore reading in order to find out what happens. In a 'Second Reading', the reader is aware of the plot, and is able to compare the plot that they know with the version of events presented in the narrative, a form of analysis. However, Cone suggests that

Mystery and suspense are banished from this reading, which admits of no emotional involvement on the part of the reader – except perhaps that resulting from his admiration of the writer's technique.

(Cone, 1977, p. 79)

The 'Third Reading', however, is described by Cone as 'the ideal reading' (1977, p. 81). In this reading, the reader suspends his knowledge of the plot, to allow him/herself to pretend that the story is being unfolded in the appropriate temporal narrative. Similarly, Meyer (2001) discusses the idea of the willing suspension of disbelief when interacting

with familiar stimuli. When applying this three-tier system to music, Cone suggests that the listener participates in ‘First Hearings’ to find out what happens in the music. He states,

Only when the listener is reasonably confident of what is coming, to the extent that he can expectantly follow the course of the composition, is he ready for the Second Hearing.

(Cone, 1977, p. 85)

The aim of the ‘Second Hearing’ is ‘to arrive at a spatially oriented view of the composition as a whole, and its method is atemporal study’ (Cone, 1977, p. 85). Cone suggests that the ‘Second Hearing’ may in fact be a Reading, with a listener being unlikely to be able to perform this task, and also suggests that many musicological analyses operate on this level. The ‘Third Hearing’, Cone suggests,

is temporal and experiential; but it is characterized by an enriched perception of the temporal flow, and it realizes a controlled and appreciated experience.

(Cone, 1977, p. 85)

Cone’s insistence on the difficulty of performing a ‘Second Hearing’ of a piece suggests that a ‘Third Hearing’ may rarely be attained by listeners who do not study scores. Many music listeners do notice relationships between aspects of the piece that occur in temporally distant areas, however: they are able to listen analytically. Equally, listeners may find themselves singing small parts of a work in ways that could be described as ‘atemporal study’, and therefore would be able to progress to this third stage. Interestingly, Cone utilizes schema theory to explain the processing behind the listener’s progression.

Ockelford (2006) explores the application of his zygonic theory to ideas of expectation proposed by other researchers, and in so doing, also explores the effect of familiarity on

such responses. According to Ockelford, our expectations of musical events are derived from three sources: knowledge from previous exposure to music, available through schemata ('previous structures encoded schematically'³); knowledge from earlier parts of the piece ('previous structures encoded veridically'); and current structures, stored in the short-term memory. Ockelford suggests that as we become familiar with a piece, we become less reliant on schematic musical structures and more on veridically-encoded structures to (re-)generate our expectations. He also suggests that in familiar listening, although we are aware of the next event in the music, part of our brain subconsciously suspends our disbelief and allows us to generate expectations and enjoy their fulfilment. This may occur because of the reasons suggested by Lavy (2001).

If Lavy's concept of narrative can be considered as a type of schema, the problem of familiarity can be further informed by psychological research in this area. Miall (2000, p. 381) describes the narrative response as being 'impenetrable to prior knowledge' because of its tendency to follow schematic expectations. Interestingly, Gaver and Mandler (1987) have investigated the concept of schemata in music with relation to emotional responses. Though the main focus of their article was the concept of liking, they also discuss issues pertinent to the study of emotional responses to music. Their work is situated within a constructivist theory of emotion, which, as they state, 'postulates evaluative cognitions that generate the quality of the experience, and autonomic (sympathetic) arousal that influences its intensity' (Gaver & Mandler, 1987, p. 259). Thus liking would result from evaluative cognitions, and emotional responses would arise from a combination of evaluative cognitions and arousal. Arousal occurs, the authors suggest, as a result of discrepancies between cognitive, perceptual, or

³ Ockelford's schemata relate to generic patterns developed in response to musical exposure, as opposed to detailed knowledge of specific pieces.

behavioural stimuli that are understood through the creation and comparison of schemata.

Gaver and Mandler are careful to describe exactly how this comparison occurs: they suggest that both bottom-up (stimulus directed) perception and top-down processing occur automatically during music listening. Thus schemata are formed from material perceived, and existing schemata are activated through recognition of features present in both schemata. The existing, high-level schemata allow the development of expectations relating to the continuation of the low-level schemata. As the authors state, 'When expectations are not met (when evidence is not found to support an activated schema), there is a lack of congruity in schematic processing. This discrepancy is one of the causes of autonomic (sympathetic) nervous system arousal, in part to prepare the organism to cope with a changing environment' (Gaver & Mandler, 1987, p. 265). Thus emotional responses to the music are a response to differences between the existing schema, and the expectations it creates, and the schema formed from the perceptions of the music heard.

Emotional responses are not the only product of the discrepancy between high- and low-level schemata. The new information provided by the low-level schema is, wherever possible, assimilated into an existing higher-level schema, which are somewhat flexible to allow for learning and increasing knowledge. Should the two schemata differ too much, however, accommodation will occur. Accommodation may involve either significant alteration to existing schemata, or even the creation of new schemata. Gaver and Mandler explain the effects of accommodation as follows:

The discrepancies that necessitate accommodation will give rise to a relatively high level of arousal, and the experienced emotion will be appropriately intense. The affective quality of the emotion produced will be subject to many possible influences. In general, when accommodation is successful, positive affect is to be expected; if it is unsuccessful, the affective experience will be negative.

(Gaver & Mandler, 1987, p. 269)

This theory of accommodation and assimilation would allow for both similarities and differences in listeners' emotional responses to music. The differences are formed from the differences in the schemata formed by each listener: as Gaver and Mandler state, 'Two different listeners may understand the same piece of music in very different ways' (1987, p. 264). It is inevitable, however, that over many years of music listening in a similar culture, similarities will occur between the schemata of two listeners. Thus Sloboda's (1985) concept of enculturation may be incorporated into schema theory and emotional response to music.

The authors explore the effect of repeated listening. No two hearings of the same piece will create identical schemata; and thus emotional responses may still be created as a result of these discrepancies. As mentioned earlier, Gaver and Mandler's main focus is on liking, as opposed to arousal-based emotional responses. They note that familiarity creates a basic positive reaction, stating that, 'In general, familiarity with a piece or style of music should cause liking' (Gaver & Mandler, 1987, p. 270). In terms of mental processes, each hearing of a piece allows the schema to be developed further, changing the mental representation. As the piece increases in familiarity, the schema is developed less and less with each new hearing, suggesting that, rather than purely liking the familiar, we like music that conforms to existing schemata, or 'music that is typical of its kind' (Gaver & Mandler, 1987, p. 271). This could raise the question of whether there is an archetypal schema to which pieces conform. The extent to which a piece conforms to this archetypal schema might explain why some pieces are more likeable

than others. It would be interesting to study the musical features of popular pieces to discover which features are present in an archetypal schema.

An exception to this rule of ‘liking the familiar’ occurs when the music is too simple: as the authors state,

in listening to music, listeners *expect* to be affected emotionally, to have their expectations challenged, and to have to think about what they hear. When a piece of music is predictable, unsurprising, and (too) familiar, expectations about the experience of listening to music are themselves disconfirmed, and in an unpleasant way – producing boredom.

(Gaver & Mandler, 1987, p. 275).

These explanations do not allow for the experience of listening to a highly familiar piece of music and still enjoying it and experiencing emotional responses to it: Gaver and Mandler invoke the theories of Meyer here, suggesting that some very high-level schemata on a level with Gestalt theories may allow us to experience emotional responses regardless of knowledge-based schemata. This appears to have similarities with Lavy’s (2001) innate responses to music as sound and human utterance; to Scherer and Zentner’s (2001) innate structural sources of emotional response; and to Sloboda and Juslin’s (2001) iconic and intrinsic sources of emotional response.

Considerable research has been undertaken focussing on the relationship between familiarity and liking. Some of the earliest research was conducted by Mull (1957), who investigated whether familiarity with ‘serious modern music’ (string quartets by Schoenberg and Hindemith) increased listeners’ liking for it. Though familiarity did increase their liking for the music, the overall levels of liking for the music were not high, even after listeners had heard the pieces five times. Five exposures to a piece, however, does not seem sufficient to equal listeners’ previous exposure to tonal music, and therefore the low overall levels of liking are not surprising. More recently, the

effects of familiarity on listeners' liking for music has been discussed by North and Hargreaves (1997). These authors describe Berlyne's inverted-U function between familiarity and liking for music. This suggests that liking for a stimulus will begin at a low level, but with increasing familiarity will rise to a peak. Once the piece becomes too familiar, however, liking will decrease once more. North and Hargreaves cite several studies concerning radio plugging and its effects on liking for music that corroborate this assumption. This empirical evidence would concur with Gaver and Mandler's (1987) theory.

Ritossa and Rickard (2004) have also investigated the effect of familiarity on liking and emotional responses to music. Though this study reveals some confusion between perceived and induced emotional responses, their findings included a moderate positive correlation between familiarity and the liking of a piece, and also that familiarity affected the emotions perceived in the music by listeners. With increasing familiarity, ratings of pleasant emotions expressed by pieces increased, and ratings of negative emotions expressed decreased: listeners found some pieces less unsettling and disconcerting with familiarity.

Schubert (2007) has recently investigated the relationship between emotion, locus of emotion and familiarity on preferences for music. He found that familiarity with a piece of music had a strong effect on preference for the piece, and that it was a strong predictor of enjoyment of the piece of music. Interestingly, listeners' preference for the music was greatest when the internal locus of emotion (the emotion they felt) was similar to the external locus of emotion (the emotion they perceived in the music). Schubert was investigating the type of emotion experienced by listeners, rather than its intensity, but the relationships found here suggest that there may be further connections between familiarity, musical preference, and induced emotion.

Interesting results have been found by researchers using continuous response methodology to measure emotional responses to musical stimuli. Iwanaga, Ikeda and Iwaki (1996) studied the effects of short-term repetition on physiological responses and subjective relaxation and tension responses to two pieces of music: Stravinsky's 'Sacrifice Dance' from *The Rite of Spring* and the orchestral version of Satie's 'Gymnopédie No. 1'. The Stravinsky was deemed to be an 'excitative' piece, in comparison with the Satie, which was classified as 'relaxing'. The authors found that with repetition, listeners' heart rates decreased significantly, whereas their respiration rates varied according to the type of piece (though these latter results were not significant). Subjective relaxation decreased with repetition, but the emotions listeners perceived in the music did not change. The changes in physiological responses suggest, however, that induced emotional responses may change with repeated exposure to pieces of music. It is important to note that these participants heard these pieces five times in quick succession, on only one occasion. Though these results are valid for similar situations in real-life, they cannot be generalized to normal listening familiarity occurring over a period of days, weeks, or months: it would therefore be worthwhile to conduct a more longitudinal study of the effects of familiarity on emotional responses to music.

Frederickson (1999) explored the perception of tension in Gustav Holst's First Suite in E-flat, and the effect of familiarity gained through performing that piece on those responses. The author used a continuous response mechanism to measure tension responses. Although performing the piece did not appear to affect the perceptions of tension in the music greatly, there were some interesting minor effects. Reported tension levels tended to be higher for unfamiliar listeners than for listeners who had previously performed the piece; and in one area of the piece there were considerable

differences in the response traces that suggested that ‘knowledge of the piece creates an expectation’ resulting in an anticipatory response in the performers (Fredrickson, 1999, p. 50).

Other authors have found similar anticipatory results in listeners who have previously performed a piece. Sloboda and Lehmann (2001) explored the effects of different pianists’ interpretations of a Chopin Prelude on the emotions perceived in the music by listeners. The authors used a two-dimensional response device that allowed the listeners to report the intensity of their perceived emotions in real-time, throughout the piece. Though their main findings were that different renditions of the piece produced differences in perceived emotions, they also generated some interesting results relating to familiarity. The authors allowed the pianists who recorded their renditions of the piece of music to also act as listeners, and found some interesting differences between their responses and those of the ordinary listeners, to the ending of the piece. The pianists found this section more emotional than other listeners. The authors suggested the following reasons for this difference:

We speculate that this difference may be due to either their [pianists’] greater awareness and/or anticipatory judgements of the gestural and postural qualities of the ending. Or, it may be that performers experience the building up to the end more actively and thus the ending carries over some of the dramatic buildup. Other listeners are less likely to be able to access these connotations.

(Sloboda & Lehmann, 2001, p. 111)

These results, and those of Fredrickson (1999), were specifically for performers who had learnt and performed the piece and therefore gained close familiarity with its content, yet it would be interesting to discover whether these effects would occur when familiarity was gained through listening. Waterman (2005, personal communication) suggests that anticipatory effects may also develop in listeners who are familiar with a

piece. In addition, neither of these studies explores the effect of familiarity on induced emotional responses in listeners.

1.3. Differences between musicians and non-musicians

1.3.1. The effects of musical experience on perception

Many researchers have considered the potential differences in music perception in musicians and non-musicians (e.g. Wolpert, 2000). Musicians and non-musicians share many abilities acquired through enculturation, including that of being able to hear shifts in tonality and understand complex rhythmic features (Dowling, 2002), as well as the ability to hear musical structure (Sloboda, 2002). There are suggestions, however, as mentioned earlier, of differences in cue-abstraction in music between musicians and non-musicians (Deliège & Mélen, 1997; Koniari, Predazzer, & Mélen, 2001).

Deliège and Mélen (1997) tested the cue-abstraction mechanism on both musicians and non-musicians. Though the procedure of cue-abstraction and the formation of schemata was identical in both musicians and non-musicians, musicians appeared to be more efficient in the processing: non-musicians tended to create smaller segmentations due to an increased sensitivity to temporal disjunctions in comparison with musicians; and the authors describe musicians' cues as being 'richer, broader, and more relevant than cues picked up by non-musicians' (Deliège & Mélen, 1997, p. 395). Later, using a mental line procedure, musicians were found to be more accurate than non-musicians in their temporal positioning of cues; and were also more successful than non-musicians in the puzzle procedure (building a piece without hearing it). In a segment-pair relation procedure, the authors suggest that non-musicians were misled by apparent similarities in cues. Overall, musicians were found to be more efficient than non-musicians in creating schemata in response to music. Musicians have also been found to be more successful than non-musicians in noticing thematic similarity in music (Pollard-Gott,

1983). These potential differences should not be exaggerated, but should be considered in terms of the way in which they may influence emotional responses to music.

1.3.2. The effects of musical experience on emotional responses

Few researchers differentiate between musicians and non-musicians in the study of emotional responses to music; those that have obtained variable results. One group of researchers explicitly tested for differences in the ‘aesthetic response’ of musicians and non-musicians to music by Puccini, Richard Strauss, Holst, Haydn and Mozart (Madsen, Byrnes, Capperella-Sheldon, & Brittin, 1993), and found no significant differences between the participants’ responses, though they did find considerable variation between individual subjects. This suggests that such responses to music may be idiosyncratic, and not bear significant relation to musical training. In a study of perceived emotional responses to music, Kallinen (2005) found no effect of musical expertise on participants’ responses. Similarly, Rickard (2004) found no significant correlation between musical experience and physiological aspects of emotional responses to music. VanderArk and Ely (1992; 1993), however, found significant differences between music students’ and biology students’ physiological responses to music.

Waterman (1995) has also explored differences between the emotional responses of musicians and non-musicians to musical stimuli. His trained musicians had received five or more years of musical training; and his non-musicians had received less than one year of musical training. Waterman used three pieces of tonal music from a variety of genres, and asked his participants to press a button while listening to indicate an emotional response. The listeners were then asked to indicate the reason for this emotional response in an interview. The author found no significant differences between musicians’ and non-musicians’ mean numbers of responses per bar; and noted only that

trained listeners were able to articulate the reasons for their responses more easily than non-musicians. Sloboda (1991) also noted musicians' greater willingness and ability to locate the triggers of their emotional responses.

These similarities are somewhat surprising: if emotional response to musical structures is based on the perception of those musical structures, and musicians and non-musicians differ significantly in their ability to perceive such structures, as seen earlier, it would suggest that some differences in the triggers of emotional response should be found. This is not to suggest that listeners without musical training will not experience induced emotional responses to music; rather that the triggers of those emotional responses may be different, perhaps progressing from surface features of the music through to thematic concepts more slowly than musicians, in line with trends found in music perception research (Deliège & Mélen, 1997; Pollard-Gott, 1983).

Perhaps the most relevant study relating induced emotional responses to music with musical experience investigates listeners' responses to an unfamiliar Scriabin etude (Timmers et al., 2006). Participants listened to either audio-visual or pure audio representations of three performances of the piece, twice. On the first hearing, they indicated the phrase boundaries they perceived in the music; on the second, they provided continuous response traces of their emotional engagement with the piece. The authors found that musical training not only influenced participants' segmentation of the music, with musicians marking aspects of the structure more clearly than non-musicians, but also found differences in the two groups' emotional engagement with the music. Interestingly, non-musicians' emotional responses were more clearly linked with variations in dynamics and the performer's movement-velocity than those of musicians, and were also more consistently linked with phrase boundaries. This seems surprising, particularly in light of the differences noted between the two groups' segmentations.

The authors suggest that ‘non-musicians tended to pay closer attention to or were more influenced by, the surface structure when indicating emotional engagement, while the musicians’ responses were more detached from the surface structure’ (Timmers et al., 2006, p. 503)

Cooke (1959) makes several distinctions between types of listener. Firstly, he is careful to distinguish between innate musicality (‘a sympathetic emotional response to a work’ (p. 205)); and musical experience or knowledge. Cooke dismisses the innately unmusical as impossible to discuss. Within the musical population, Cooke then differentiates (‘superficially’) according to musical experience. He states:

The difference is that the professional, besides apprehending the music emotionally, can analyse the form with his intellect, and can admire the formal beauty with his aesthetic sense (strange to say, these three processes can go on simultaneously); whereas the layman, unable to lay hold on the fluid, intangible sounds with his intellect, can only apprehend the music as emotion (and vaguely as formal beauty, no doubt, in an unconscious way).

(Cooke, 1959, p. 205).

This appears a very patronising stance towards the layman: there is no question of him appreciating the formal beauty of a work at all. Evidence from music perception suggests that cognitive processing of musical structure does not differ to this extent between musicians and non-musicians; it merely suggests that musicians generally apprehend musical structure more efficiently than non-musicians; and that familiarity enables non-musicians to ‘catch up’. Cooke continues, however, suggesting that the vast difference he outlines is unimportant:

... when we come down to the fundamental musical experience – the transfiguration of sound into emotion – the professional is as tongue-tied as the layman.

(Cooke, 1959, p. 205).

Again, Cooke's claims are contradicted by recent empirical evidence: it is in this area that many studies of emotional responses to music have found differences between musicians and non-musicians, with musicians being able to describe the reasons for their responses more successfully than non-musicians.

Though there is conflicting evidence concerning the differences between musicians and non-musicians, it appears that there are differences in the perceptual processing efficiency of the two groups, and that emotional responses to music may also differ, in terms of both the way they are expressed, in their intensity, and in their musical triggers.

1.4. Responses to tonal and atonal music

1.4.1. The perception of tonal and atonal music

The perception of atonal music has been examined empirically by Dikken (1996) and theoretically by Scruton (1997). Dikken (1996) examined the perception of atonal music through existing theory, including Lerdahl and Jackendoff's (1983) Generative Theory of Tonal Music, and her own empirical research, in which she uses both qualitative and quantitative methodology. She then uses musicological analyses of atonal works to create her own associative theory of music perception. Dikken justifies creating an associative theory, rather than one relying on hierarchical principles, by highlighting the different relationship between the foreground, middleground, and background in reductions of atonal music in comparison with those of tonal music. In tonal music, events at one hierarchical level represent those of a lower level as a consequence of prolongational processes. In atonal music, no such representation exists, because of the lack of prolongational processes in such music. The tonal hierarchy is unique in that pitches that are present are able to evoke absent pitches, because of the system's utilization of the harmonic series. Indeed, Schenker argued that the fundamental structure he identified in tonal music was merely an abbreviation of a horizontal

arpeggiation of the chord of nature (the harmonic series), and therefore represented all tones (Schenker, 1979 [1935], p. 10). Instead, atonal music relies more heavily on repetition, and thus the reductional relationship is associative, rather than hierarchical (see Straus, 1987). As Dibben states,

... an event in atonal reduction does not “stand for” other events, rather it simply expresses the relative structural importance of that event in relation to others and, hence, is connected to them by association rather than by virtue of a hierarchical pitch system.

(Dibben, 1996, p. 134)

She concludes,

... atonal music is best represented by a type of reduction in which structurally important events connect by virtue of repetition, and in which the resultant relationships are associational rather than hierarchical.

(Dibben, 1996, p. 135)

This suggests an intrinsic difference between the processes and resulting percepts formed by tonal and atonal music.

Despite Dibben’s convincing argument against the existence of hierarchical relationships in atonal music, she does acknowledge the importance of voice-leading in both tonal and atonal music, and also notes its close relationship with perceptual principles. Dibben suggests, however, that those voice-leading structures found in tonal music will retain their tonal connotations, and even the structural functions they have in a tonal context, when heard in an atonal context. Atonal music also retains many tonal implications: these do not include a sense of key, but do encompass local-level implications. Dibben states, ‘local tonal implications can emerge imbuing those pitch events with a stability or instability in keeping with the tonal implications of the collection’ (Dibben, 1996, p. 142). Hence, provided that the listener is familiar with

tonal music, the schematic expectancies of the tonal hierarchy are still heard in atonal music, and some elements of music perception remain constant, whether the music is tonal or atonal.

Salience also plays a role in the perception of atonal music, imbuing the most salient features of the music with the greatest structural importance. Occasionally, however, this logic may be overruled:

... while salience may usually be significant in determining the relative structural importance of event, these appoggiatura-like or cadential patterns in atonal music seem to be a “special case” which cannot be accounted for convincingly by surface salience alone.

(Dibben, 1996, p. 141)

Hence Dibben suggests that there are some important features of atonal music that cannot be attributed to either salience or tonal features. She uses the idea of ‘gestures’, ‘which have a structural stability not attributable to intrinsic properties’ (Dibben, 1996, p. 149). A cadence, for example, holds more importance than its individual components would suggest, and would therefore be considered to be a gesture. It might also be described as a poietic entity, or compositional construct (Nattiez, 1990). Dibben links the idea of gestures to the ‘signs’ and ‘topics’ of Agawu (1991). This idea allows a work to be historically positioned, as well as to have a degree of independence. Dibben outlines the function of gestures in atonal music in the following manner:

The use of ‘functional gestures’ in atonal music suggests a situation in which the reduction is associative, representing connections between events (i.e. complete or partial repetition), rather than a hierarchical reduction in which all levels are subject to consistent pitch relations of stability and instability. The implications of such ‘associative’ structuring are that any reductional representation will consist of an association between events at the surface (and perhaps middleground) levels and a degree of separation between that and any background pitch relations.

(Dibben, 1996, p. 157).

Dibben concludes by distinguishing between two types of associative structure: syntagmatic, which is based on the idea of associations being formed across the musical work, as opposed to hierarchical relationships; and paradigmatic, which involves events and gestures being associated with musical and extra-musical ideas external to the work.⁴ This distinction ensures that a listener's perception is historically and sociologically situated, and thus forms a more realistic idea of musical perception.

An examination of paradigmatic associations would not be complete without reference to semiotic theory. The concept of signs has been identified within linguistics (De Saussure, 2001). According to De Saussure, a sign consists of an object (the signified) and a sound-image (the signifier). Thus the sign 'chocolate' would consist of the reader's mental representation of that object, as well as its signifier (the word 'chocolate' itself). In language, the relationship between signifier and signified is arbitrary, thus 'chocolate' may be replaced with '*chocolat*', as it still belongs to the same concept. In music, this idea may be equated with certain sequences that have gained importance through cultural convention. The most obvious example of this would be the perfect cadence: this two-chord structure signifies an 'ending' of a phrase, section, movement, or an entire piece. The signified concept of ending may also be represented through a different signifier: for example, the plagal cadence, as seen in much liturgical music; or a simple fading out, as heard in The Beatles' *Yellow Submarine*. The signifier is applied by convention; the signified concept remains.

Further distinctions have been made between types of sign. For example, Peirce (2001) discusses sign in terms of icon, index, and symbol, within verbal reasoning. The icon, Peirce suggests, 'exhibits a similarity or analogy to the subject of discourse' (Peirce,

⁴ The term 'paradigmatic' is used here by Dibben (1996) in a different sense to its usage by Nattiez and Ruwet (see Nattiez, 1990, p. 57).

2001, p. 10). Monelle clarifies this definition as a relationship of resemblance, providing as examples a figurative painting, or ‘the imitation of a nightingale or cuckoo by an orchestral instrument’ (Monelle, 1992, p. 197). The icon therefore promotes an association between the signifier (the musical phrase, and the instrument), and the signified (the nightingale or cuckoo). The index ‘forces the attention to the particular object intended without describing it’ (Peirce, 2001, p. 10). Monelle (1992) illuminates the concept, suggesting that the aforementioned imitation of a cuckoo may in fact also have an indexical function: as he states, ‘it may proclaim, “Spring is here!”’ (Monelle, 1992, p. 213). Additionally, indices may be a means by which emotion is communicated through music: Monelle argues that music does not have an iconic relationship with emotions, despite their sometimes apparent similarities. Rather, he suggests that this direct resemblance to emotion is imitation, as opposed to a sign. He also suggests that emotions may be portrayed through indexical signs. The symbol ‘is the general name or description which signifies its object by means of an association of ideas or habitual connection between the name and the character signified’ (Monelle, 1992, p. 10). This appears more straightforward, and would operate on both personal and cultural levels.

Scruton describes semiology as ‘a false start’ (1997, p. 173), due to its lack of a complete system. A system, Scruton claims, should not only consider the relationships between a sign and its meaning (the signifier and signified), but should reveal evidence of a syntactic structure. He states:

The problem ... is that Saussurian linguistics gives no persuasive theory of syntax, and no theory as to *how* syntactic structures encapsulate meaning.

(Scruton, 1997, p. 174)

Nevertheless, the idea of signs creating both musical and extra-musical associations in the mind, rather than a complete system of meaning, corresponds with existing research

concerning associative emotional responses to music (e.g. we feel sad when we hear a piece of music we associate with a funeral) (Sloboda & Juslin, 2001) and the idea of associations being formed through the development of schemata.

Scruton (1997) observes many potential differences between the perception of tonal and atonal music, at both surface and deeper levels. Firstly, he suggests that the lack of consonant pitch relations in atonal music makes relationships between the notes of a musical structure harder to identify. On a small scale, Scruton suggests that this applies to small successions of notes:

Music becomes difficult, even incomprehensible, when the upper partials beat against one another, or the notes move, as in atonal writing, in unpredictable steps across the space of music, unguided by consonant relations or diatonic triads.

(Scruton, 1997, p. 244)

Not only does Scruton suggest that this may be difficult on a small scale, he also suggests that larger-scale structures are harder to identify. Scruton provides an example of a palindromic work, *Lulu*, by Berg, suggesting that its unusual structure is only audible at the turning point. He states,

The difficulty here is partly a result of the atonal idiom, which makes it so hard to hear long-range harmonic progressions. Tonal instances of palindromic music – for example Guillaume Machaut’s “Mon fin est mon commencement” – can often be *heard* as palindromic.

(Scruton, 1997, p. 214)

Similar difficulties are observed later by Scruton, this time in terms of the way the sound components of music are heard. He creates a similar distinction between ways of hearing to that of musical and non-musical listening created by Dibben (2001). Tonal music, Scruton suggests, invokes musical listening, in which the acoustic properties of the tones, and the relationships between them, are focussed upon. Atonal music,

however, encourages non-musical listening: the hearing of ‘a series of sounds, produced by many different sources in physical space’ (Scruton, 1997, p. 281). Despite these difficulties, and the slightly different percepts that might result from non-musical listening, Scruton maintains that ‘atonal music as *heard* is organized as tonal music is organized, and differs only in the one respect implied in its name—the absence of a tonic’ (1997, p. 336). Thus the cognitive processing involved in listening to atonal music remains the same as that involved in listening to tonal music. As discussed earlier, schema theory allows for an understanding of music perception that may incorporate both the similarities and differences between the perception of tonal and atonal music.

1.4.2. Emotional responses to tonal and atonal music

Emotional responses to atonal music are not explored extensively by music psychologists: the majority use repertoire of the Classical and Romantic periods, perhaps because of the relatively recent development of techniques to measure emotional response. Indeed, one of the few studies using post-tonal music gathered results concerning enjoyment, as opposed to true emotional responses (Mull, 1957). More recently, however, Kallinen (2005) investigated perceived emotional responses to a wide range of music, and found that when participants were asked to nominate musical works that expressed specific emotions, a higher proportion of tonal works were selected than non-tonal works. Two reasons were suggested for this: firstly, that non-tonal music portrays emotions in a different manner to tonal music; and secondly, that tonal music is more commonly performed than non-tonal music, and therefore more likely to be nominated in a survey. Their category of non-tonal music did not only incorporate free atonal works, but also music from the Renaissance period (e.g. Dowland’s *Lachrymae*) and quasi-tonal works from the twentieth century (e.g. the first

movement of Shostakovich's Symphony No. 5). These findings are interesting, and prompt a study of induced emotional responses using a methodology that will allow access to the triggers of such responses in greater detail.

Several writers have opinions on the emotional properties of atonal music. In his study of the language of music, Cooke expresses some controversial opinions, including the suggestion that atonal music is unnatural. He justifies his aforementioned exclusion of atonal music by suggesting that 'this new language clearly bears little or no relation to the long-established one based on the tonal system' (Cooke, 1959, p. xiii). Cooke does venture to suggest, however, that we might interpret parts of atonal music in the same manner as tonal music. He states:

Since the new language is unrelievedly chromatic by nature, it must be restricted to expressing what chromaticism always was restricted to expressing – ... emotions of the most painful type.

(Cooke, 1959, p. xiii)

Arguably, this is not necessarily the case. For example, the first of Bernstein's *Chichester Psalms* begins with a series of dissonant chords that express a sense of pride and power. John Cage's Sonata II for prepared piano has many features that convey a sense of playfulness. Similarly, much of Schoenberg's Suite for Piano, Op. 25, conveys 'positive' emotions.

Scruton (1997, p. 306), though, appears to agree with Cooke, suggesting that atonal music cannot be used to portray comedy: he argues, 'the attempt ... invariably falls flat, since comedy requires a background of joy, or at any rate gaiety, emotions which have no home in atonal music'. Though this could suggest that Scruton only feels that negative emotions may be portrayed through atonal music, later he suggests that atonal

music lacks a significant element that tonal music has: in his words, ‘most music that seems meaningful to us is tonal’ (1997, p. 233).

Indeed, Scruton also examines the construction of tension, relaxation, and expectation in atonal music. He suggests that the main source of tension and relaxation in tonal music is through harmony, but that in non-tonal works, such as Britten’s *Peter Grimes*, this tension and relaxation is not experienced. Personal experience of a performance of this opera contradicts this suggestion. Scruton states, ‘As soon as the prospect of resolution disappears, we cease to hear tension, and hear something else—a sequence of harmonies which are piquant, but also ... relaxed and directionless’ (1997, p. 269). In serial music, this effect is magnified: Scruton describes the process of tension and release in serial music as ‘marginal’ (1997, p. 302), suggesting that the composer must use other means to generate tension and release. These other means, however, are available, and may be used to great effect. These may include surface features such as dynamics, tessitura, tempo, and texture, but also deeper features such as thematic organisation and larger-scale structural features, though, as suggested earlier, these may be more difficult to perceive in atonal music than in tonal music. Thus various aspects of expectancy theories based exclusively on tonal music may be invoked in the study of atonal music. It will be interesting to discover any additional emotional triggers of atonal music; and also to compare the intensity levels of emotional responses to each genre of music.

1.5. Summary

I propose that emotional responses to music may be viewed through the combined models of Lavy (2001) and Scherer and Zentner (2001), with the added assumption that schematic representations of music are created during listening from the musical structures heard (see Figure 2 or Figure 11). This new model provides a coherent means

of understanding listeners' perceptual and emotional responses to music and it is hoped that the model will prove to be a useful research tool in empirical investigations of emotional responses to music.

Existing research has suggested that changes in perceptual and emotional responses may occur with familiarity; that musical experience may affect listeners' responses; and that there may be differences in perceptual and emotional responses to tonal and atonal music. These areas, however, merit closer attention than hitherto provided and they will be the focus of the empirical work undertaken as part of this thesis and discussed in the following chapters.

Chapter 2

Empirical work: Aims and methodology

Having reviewed the field of research concerning perceptual and emotional responses to music and identified a model through which such responses may be understood, three neglected issues were identified. The issue of familiarity, though considered in existing research, has not yet been investigated systematically in relation to emotional responses to music. This requires a longitudinal approach to provide sufficient data to gain a true insight into the development of perceptual and emotional responses to music. The second issue, musical experience, is also considered in existing research, but frequently provides conflicting results. Thirdly, atonal repertoire is largely neglected in this field: there is relatively little understanding of the similarities and differences in listeners' responses to tonal and atonal music. The purpose of this empirical work was to address these neglected issues.

2.1. Aims

The overall aim of this study was to investigate the effects of familiarity and musical experience on listeners' perceptual and emotional responses to tonal and atonal music. This overall aim can be broken down into three contributory aims and corresponding research questions. Firstly, this study aimed to investigate listeners' responses to music and the ways in which those responses changed with familiarity.

Research question 1: How do listeners perceptual and emotional responses to music change with familiarity?

Evidence from the existing literature in the field suggests that perception is based on the cue abstraction process, incorporating the grouping of musical material according to similarity, difference and derivation, the extraction of cues, and the formation of a

schema in the mind. A schema created from a first hearing of a piece will not be detailed, and will consist mainly of surface features of the music, such as tempo and dynamics, as well as salient melodic and rhythmic features. Other perceptions of listeners may include associative resurgence of memories and ‘appropriate’ thoughts and images. Evidence from existing literature concerning the effects of familiarity suggests a comparison process occurring in the listeners’ mind between the existing schema and the music heard, leading to the creation of a schema of increasing detail. The more detailed schema will incorporate deeper structures, such as thematic features, as well as surface features such as tempo and dynamics. It was hypothesized that listeners’ emotional responses would also change significantly with familiarity, reflecting the changes in perception suggested above; through an increased number of associative responses gained with familiarity; with the development of a narrative schema for the piece; and in the creation of anticipatory responses to musical structures known to trigger emotional responses.

The second aim of this study was to investigate the effects of musical experience on listeners’ responses to music.

Research question 2: What are the effects of musical experience on perceptual and emotional responses to music?

It was expected that non-musicians would be less efficient than musicians at creating schemata, but that this effect would lessen with familiarity. Additionally, it was expected that these effects of musical expertise on music perception would also affect emotional responses to the music, with participants responding to the features they perceived in the music.

The third aim of this study was to investigate the similarities and differences between listeners' responses to tonal and atonal music, whilst extending the repertoire used in music psychology research concerning continuous emotional response traces to music.

Research question 3: What are the similarities and differences between listeners' perceptual and emotional responses to tonal and atonal music?

Existing research suggests both similarities and differences in listeners' perceptual responses to tonal and atonal music; few studies of emotional responses to music use atonal music.

In order to investigate these aims, an empirical study was designed of a largely exploratory nature. This study is described below.

2.2. Method

The study was of a mixed methods design, and therefore generated both quantitative and qualitative data. This allowed both a broad perspective on the data and a focussed approach to explore the reasons behind changes in emotional response. The data were collected and analysed according to a Concurrent Triangulation Strategy (Creswell, 2003): both sets of data were generated and analysed simultaneously. The study provided data for within- and between-subject comparisons. It consisted of three experiments, each of which took place over a two-week period. Each experiment took place approximately three months apart.

2.2.1. Participants

19 participants (mean age = 22.9) with a range of musical experience (see Table 1) were recruited within the University, using an opportunity sample. The group of 'musicians' ($n = 10$; 3 male, 7 female; mean age = 20.2) were undergraduate music students; nine other participants were recruited from other departments (4 male, 5 female; mean age =

25.9). The music students had all received five or more years of instrumental tuition, had achieved 'A' level music or an equivalent qualification, and were of a standard of at least ABRSM Grade 7 on their instrument. Non-music students had considerably less musical experience. There was some drop-out between the three experiments, but bearing in mind the difficulty and length of each experiment, and the time gap between the experiments, this is not surprising. To avoid excessive drop-out in the third experiment, a variation of the normal methodology that exploited the internet enabled three participants to complete the experiment at home.

Table 1 Musical experience of participants

Key:
Music Tuition: 0 = None; 1 = Class tuition in school up to the age of 14; 2 = 0–2 years of instrumental tuition; 3 = 2–4 years of instrumental tuition; 4 = 5 or more years of instrumental tuition
Academic Music Qualifications: 0 = None; 1 = G.C.S.E Music; 2 = ‘A’ Level Music or equivalent
Musical Performance Qualifications or Equivalent Standard on any instrument: 0 = None; 1 = Grades 1 or 2; 2 = Grades 3 or 4; 3 = Grades 5 or 6; 4 = Grades 7 or 8
Experiment Participation: Y = Yes, experiment completed; Y* = Yes, experiment completed using online distance methodology; N = No, participant did not complete experiment

Participant	Subject of study	Music Tuition	Academic Music Qualifications	Musical Performance Qualifications	Experiment participation		
					1	2	3
A	Music	4	2	4	Y	Y	Y
B	Music	4	2	4	Y	Y	Y
C	Music	4	2	4	Y	Y	Y
D	Music	4	2	4	Y	Y	N
E	Music	4	2	4	Y	Y	Y*
F	Music	4	2	4	Y	Y	Y
G	Music	4	2	4	Y	Y	Y
H	Music	4	2	4	Y	Y	Y
I	Music	4	2	4	Y	Y	N
J	Music	4	2	4	Y	Y	Y
K	English	3	0	3	Y	Y	Y
L	English	3	0	1	Y	N	N
M	English	2	1	1	Y	N	N
N	Social	4	0	0	Y	Y	Y*
O	English	3	0	0	Y	Y	Y
P	Psychology	1	0	1	Y	Y	Y
Q	Psychology	2	0	0	Y	Y	Y*
R	English	1	0	0	Y	Y	N
S	Psychology	0	0	0	Y	Y	Y
Total					19	17	14

2.2.2. Materials and apparatus

This study focussed on three pieces of music, one of which was tonal and the other two, atonal. Three piano works were used, to avoid differing responses to varying instruments. The pieces had to be relatively short, as participants were expected to listen to them repeatedly. The chosen pieces were between three and five minutes in length. Most importantly, the three pieces had to be unfamiliar to the participants. The chosen pieces were the second movement of Muzio Clementi’s Piano Sonata in F-sharp minor,

Op. 25 No. 5; the first of Arnold Schoenberg's Three Piano Pieces, Op. 11; and Luciano Berio's *Rounds* for Piano Solo (see Appendix 1 for scores). A single recording of each work was chosen, to avoid problems of differing interpretations (see Appendix 2 for the recording details and the inside back cover for a recording of the works). The Clementi was chosen for its tonal language and its clear structure, and could be used as a tonal baseline with which to compare participants' responses to atonal music. The Schoenberg is one of the composer's first free atonal works, but maintains relatively conventional rhythmic and structural features. The Berio is also atonal but is more complex in terms of its rhythmic features. It does, however, retain a relatively clear and conventional formal structure.

Each participant was provided with a compact disc recording of the relevant piece for the experiment to listen to at home on a daily basis, whilst recording any thoughts, perceptions, feelings, or emotional responses they experienced whilst listening to the music. All participants had access to a CD player.

The same pieces of music were attached to a custom-designed computer programme, Intensity v. 2.0 (Nte, 2005) (see Appendix 3B) that measured participants' self-reported emotional intensity continuously during the piece.⁵ Similar mechanisms have been investigated in terms of their reliability (Gregory, 1995), have been used in existing research (Fredrickson, 1999; Sloboda & Lehmann, 2001), and have been explored in terms of the possible means of analysing the resulting data (Schubert, 2002). Participants heard the recording through high quality headphones, whilst using cursor keys and a visual feedback mechanism to indicate their level of emotional intensity. The

⁵ It is recognised that emotions have many different facets, including physiological responses and expressive behaviour as well as the subjective experience (Kihlstrom, Mulvaney, Tobias, & Tobis, 2000). As expressive behaviour is often suppressed in the act of listening to classical music, and the sources of physiological responses are sometimes difficult to ascertain, it was decided to focus on the participants' subjective experiences, as accessed through self-report mechanisms such as a computer programme and interviews.

programme recorded the intensity of induced emotional responses every 0.5 seconds, and stored the data in a spreadsheet for data analysis and conversion into graphic traces.

These traces were then used during the experimental procedure to prompt the participant to explain reasons for their reported responses. These data were gathered by a semi-structured interview, which was largely prompted by the trace. The interview data were recorded directly onto compact disc. The three participants from the third experiment who used the online distance methodology were provided with the necessary software and paper response mechanisms to complete the same procedure at home, but the interview was conducted using online real-time chat programmes (e.g. Google Talk, MSN Messenger). This methodology was adopted to avoid participant drop-out caused by changes in participants' geographical location.

2.2.3. Procedure

Participants were informed of ethical issues, such as their right to withdraw from the study, and the uses of the data to be collected. The participant was then provided with an outline of the data gathered in the study. A similar outline of the entire procedure from the researcher's viewpoint is shown in Table 2. Participants attended three experimental sessions (A, B and C) with the researcher, over a two-week period; between these sessions, they were asked listen to the piece daily.

Table 2 An outline of the data-gathering process

2 Weeks				
Day 1 (Session A)	Days 2-7	Day 8 (Session B)	Days 9-14	Day 15 (Session C)
Mood Measure (control)	Participant listens to the piece at home in their own time, once per day, completing a listening diary as they do so.	Mood Measure (control)	Participant listens to the piece at home in their own time, once per day, completing a listening diary as they do so.	Mood Measure (control)
Computer programme records continuous emotional responses to music (x 2)		Computer programme records continuous emotional responses to music (x 2)		Computer programme records continuous emotional responses to music (x 2)
Measures of familiarity and liking for the piece		Measures of familiarity and liking for the piece		Measures of familiarity and liking for the piece
Interview based on continuous responses		Interview based on continuous responses		Interview based on continuous responses

Within the experimental sessions, the participants' first task was to record their current mood using The Affect Grid (Russell, Weiss, & Mendelsohn, 1989). This is a single item mood measure in the form of a grid (see Appendix 3A), in which participants have to place a cross indicating their arousal and the valence of their current mood. This grid has been used previously in music and emotion research to record participants' mood state (Dibben, 2004).

Following the mood response, participants undertook several practice trials with the computer programme, initially using the continuous response mechanism without any music, to allow a thorough understanding of the response mechanism, the speed at which it moved, and the accuracy of their response. The participants then responded to a short practice piece, reporting the emotional intensity they felt in response to the music.

The participants were then exposed to the test piece for the first time, and provided self-report responses using the computer program (see Appendix 3B). To avoid problems

such as boredom, and others associated with the immediate repetition of a piece of music, participants answered a questionnaire (see Appendix 3C), between the first and second hearings of the piece. This comprised personal information, measures of liking and familiarity with the piece on a continuous scale, and information concerning participants' musical background. The technique of asking the participant to mark a single point on a continuous line allows them to make a response as accurate to their beliefs as possible, and avoids problems of working with ordinal data. Following the questionnaire, the test piece was heard for a second time, and the computer programme response mechanism used. The recording of two continuous response traces for each session allowed more detailed analysis of the results than would otherwise be possible, and also allowed reliability checks to be carried out.

The participants were then interviewed. The two continuous response traces gathered were converted into line graphs visible to both the experimenter and the participant (see Appendix 3B for an example). The piece was played once more, using a CD player, and stopped at places where relatively large changes were made in the emotional response traces. The participant was asked why they made the change (i.e. what triggered their response). Participants also requested that the recording be stopped at certain points, to allow them to explain their responses. This interview methodology is adapted from Waterman (1996) and enables the relatively straightforward identification of triggers of emotional responses. The three participants who used the online distance methodology in the third experiment used the same procedure, but the communication in the interviews was typed using a real-time online chat programme.

At the end of this process, the participant was provided with the CD⁶ and the first week's response booklet (see Appendix 3D), and asked to listen to the piece each day, and complete a diary entry while they did so.⁷ A time was confirmed one week later for their next experimental session. Following Session B, the first week's response booklet was collected, and a second week's booklet provided for use by the participant. A time was confirmed for the final session of the experiment. Following Session C, the participant was debriefed about the purposes of the experiment (without compromising their participation in future experiments) and asked for their opinion about the experimental procedure. They were also asked about their willingness to participate in any future experiments, and whether they would like to receive information about the results of the study.

The entire procedure was repeated with each piece of music at approximately three-month intervals, with as many of the existing participants as possible.

2.3. Methods of data analysis and methodological issues

This experiment generated large quantities of both qualitative and quantitative data, which required careful handling and analysis. The ensuing discussion of this process will begin with details concerning the quantitative data, which incorporated the continuous response traces, the overall measures of familiarity and liking for the piece, and measures of participants' mood and musical experience. Following this, the approaches to the qualitative data will be discussed. This data was generated through the interviews and the daily listening diaries.

⁶ No access to a score of the piece was given. This ensured that all participants would be using aural, not visual, cues when completing their diary entries, and maintained the ecological validity of the study through the relatively realistic listening situation.

⁷ The mood rating used as a control measure before the emotional response traces were collected was not required before participants completed their daily listening diaries. This was partly because the qualitative nature of the diary entries made it impossible to gain anything other than a subjective opinion of the effects of mood on diary entries. Additionally, it was important to maintain the brevity of the daily task to avoid participant fatigue or drop-out.

2.3.1. Quantitative data

The quantitative data was analysed in a variety of ways using SPSS software, in order to address the relevant research aims. The quantitative mood responses and overall measures of familiarity and liking were used to compare participants' responses to the three pieces, and also in case-studies of participants' responses. The continuous response traces were considered in both their original form (usually as mean figures concerning the overall level of participants' emotional responses) and as first-order difference figures. This approach reduces the risk of serial correlation of the data, i.e. that all the data will be very similar simply because of the potential cumulative effects of time on the response mechanism. To explain, if a participant is responding at 30 on the intensity scale at 5 seconds, their level of intensity at 10 seconds is likely to be higher than that of a participant who was only at 10 on the intensity scale at 5 seconds. By calculating the difference in intensity levels between each time point, the change in intensity levels will be observed, as opposed to the actual levels of intensity. This technique is advocated by Schubert (2002) when calculating correlations of such data. This process will also have an effect of 'normalising' the data, by reducing its variance, and thereby providing more meaningful mean values, and also making it more amenable to inferential statistical tests such as ANOVAs.

To identify the triggers of emotional responses to music, the continuous response data was triangulated with data from the musical scores and participants' comments from interviews. The extent to which listeners' emotional responses to the music changed with familiarity was assessed using mostly Pearson correlation tests and ANOVAs, as well as visual inspection of the traces. These tests were also used to consider the effects of musical experience on emotional responses, and to assess the differences between participants' responses to each piece.

2.3.2. Qualitative data

All the interviews were transcribed and subjected to content analysis using NVivo software (see Appendix 3E for a sample transcription). The diary entries remained in their original written form (they were not transcribed) and were not included in this large-scale analysis due to the large amounts of data collected in the interviews: instead, they supplemented the interview data in a case-study approach to investigate in depth the changes in perceptions and emotional responses with familiarity. Three participants (A, J and S) who participated in all three studies were selected for case study, according to their musical experience.

The interviews were analysed in accordance with the components of the combined model proposed in Chapter 1 (see Figure 2). It should be noted that the model was not seen as prescriptive: should a superior alternative have arisen from the data, then that would have been adopted.

A variety of useful methodologies have been advocated for the analysis of qualitative data. The choice for the researcher is partly dependent on the research question, and partly on the philosophical assumptions and positions attached to each theory. Some aspects, though not all, of grounded theory (Charmaz, 2003; Strauss & Corbin, 1990) were considered in the process of data analysis. An important element of grounded theory is the idea of themes and concepts emerging from the data, rather than being imposed upon the data from any initial hypotheses. Though various aspects of the theory, such as the simultaneous involvement in data collection and analysis, were not used here, the aim of the researcher is to be sufficiently open-minded to be able to consider new themes and theories that emerge from the data, in addition to those suggested by the existing literature.

A second relevant methodology is that of discourse analysis. This methodology involves a critique of cognitivism, which assumes that participants' beliefs may be accessed through discussion, or 'talk'. An issue confronted by discourse analysis that is of particular relevance here is the assumption of cognitive psychology that cognitions are based on perception. Willig (2003, p. 161) describes this conflict in the following paragraph:

Ultimately, cognitivism has to assume that *cognitions are based on perceptions*. Cognitions are mental representations of real objects, events and processes which occur in the world. Even though cognitions are abstraction, and therefore often simplifications and distortions of such external events, they so constitute attempts to capture reality. Once established, cognitive schemata and representations facilitate perception and interpretation of novel experiences and observations. By contrast, discourse analysts argue that the world can be "read" in an unlimited number of ways, and that, far from giving rise to mental representations, objects and events are, in fact, constructed through language itself. As a result, it is discourse and conversation which should be the focus of study, because that is where meanings are created and negotiated.

I would suggest, however, that while discourse may serve to clarify mental representations of objects, an initial percept is formed before this process occurs. Rather than being mutually exclusive contributors to a mental representation, perceptions are the primary stimulus and informer of schemata, and that discourse may only serve to clarify those representations (see Figure 12)

Figure 12 Possible relationships between perception, discourse, and a schema

Cognitive Psychology:
Perception → Schema

Discourse Analysis:
Perception → Discourse → Schema

Alternative:
Perception → Schema → Optional clarification of schema through discourse

A second emphasis of discourse analysis is on the means by which people express attitude or beliefs, as opposed to the cognitive structures those expressed views represent. Discourse analysis is therefore not entirely suited to the analysis of this data, which is considered to allow access to the perceptions and emotional responses of

participants, and therefore their cognitive representations. A relevant challenge of discourse analysis is that people's stated beliefs will change according to the context in which they are expressed. In this study, a particular issue may be the participants' attitude towards the pieces used in each study: participants may feel that they must, to a certain extent, express a positive view of the pieces so as not to offend the researcher. Effort was made, however, to ensure that participants felt sufficiently comfortable with the researcher to be able to separate their judgements of the music from their relationship with the researcher, and this may have been aided by the emphasis in the experiment of there being no 'right or wrong' answer.

The influence of context on participants' expressed views and perceptions is recognised: their means of expression may vary between interviews and between different diary entries. However, the large amount of data collected and the triangulation of qualitative and quantitative data should allow access to systematic changes in participants' responses that may legitimately be attributed to the acquisition of familiarity with the music.

The suggestion outlined in Chapter 1 of narrative being an important means by which listeners understand music suggests that many of the assumptions of narrative psychology may be relevant here. Murray (2003) provides a concise overview of the area, an underlying belief of which is that humans understand the world through narratives. Additionally, humans may use narrative to reconstruct aspects of the world. A particularly relevant part of this chapter is Murray's description of Bruner's (1990) two forms of thinking: the paradigmatic and the narrative. As Murray states, 'The former is the method of science and is based upon classification and categorization. The alternative narrative approach organizes everyday interpretations of the world in storied form' (Murray, 2003, p. 112). The understanding of music may involve both

paradigmatic and narrative thinking, with themes and musical events being classified as ‘same’, ‘different’, or as Ockelford (2004) would suggest, ‘similar’, and assimilated into the formation of a schema, which may contribute to a narrative understanding of a piece.

Part of the process of the interviews undertaken in this study may be considered to be the participant ‘organizing the disorganized’ and ‘giving it meaning’, both of which are considered to be features of a narrator (Murray, 2003). Moreover, the flexible nature of narratives allows for their potential development, in this case, with familiarity with the music. The analytical process of narrative psychology involves the identification of a beginning, middle, and an end of a narrative, and the type of narrative, be it progressive, stable, or regressive, as well as a consideration of the data-gathering context. Table 3 shows the features of narratives, and each type of narrative, in more depth. In addition, the main feature of narrative highlighted by Lavy (2001) was the creation of suspense.

Table 3 Features of narratives, and different types of narrative (content from Murray, 2003)

Features of narrative	Emplotment	We organize a sequence of events into a plot - ‘an interconnected sequence that leads from start to finish’ (Murray, 2003, p. 115)
	Narrative structure	Beginning, middle, end
	Rhythm and metaphor	Poetry and descriptive language are highly developed forms of narrative
	Order and rationality	When describing events through narrative, we emphasize our own rationality and reasonableness, or justify ourselves
	Agency vs. suffering	Inanimate objects may be given agency; lack of human control of events is described as suffering
Types of narrative	Regressive narrative	Events have ended narrative
	Stable narrative	Events have changed narrative, but narrative continues
	Progressive narrative	Events have provided new opportunities for narrative continuation

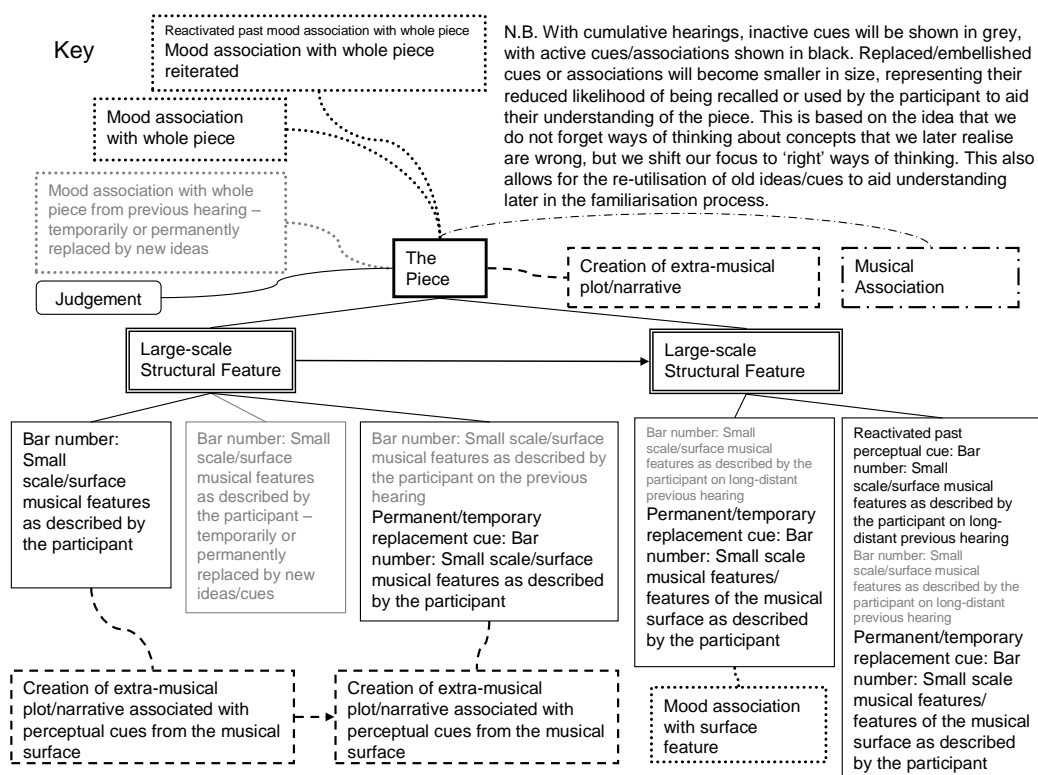
The identification of the use of narrative by participants will provide evidence to substantiate or refute Lavy’s (2001) suggestion of music being understood as narrative.

An attempt was made, therefore, to identify narrative structures and features of narratives in participants' responses, in addition to the other aspects of the combined model.

In addition to the content analysis of the interview data, three participants were selected as case studies and all their quantitative and qualitative data examined in order to gain an understanding of the development of their perceptual and emotional responses to the three pieces over the familiarization period. As part of this process, visual representations of schemata were created. These were data-led, but were influenced by representations of schemata and similar models in existing literature (Buzan, 1995; Clarke, 1988; Deliège & Mélen, 1997; Eysenck & Keane, 2005; Gaver & Mandler, 1987; Howard, 1987). The aim of this exercise was to create data-driven models of the cognitive and emotional experience of music listeners over a familiarization period. As these models developed, it became apparent that certain aspects of the schemata were related hierarchically, whilst others were related in an associative manner to create a network of ideas similar in nature to a mind-map. This gave rise to the shape of the models, with data relating to the piece as a whole being placed to the top of the schemata, and data relating to smaller aspects of the model placed below. Different types of comments in the schemata are bordered by differing lines and shapes, some of which relate to the model of emotional responses described in Chapter 1. Structural features of the music identified by the participant are shown with straight connecting lines; associations the participant makes with the piece are shown with curved connecting lines. The musical excerpts described by each participant are annotated by bar numbers and the small-scale progression of the piece of music is shown from left to right in the diagram, as indicated by the arrows. Using the initial representation of the schema from participants' first interviews, excerpts from the participants' diary entries

and subsequent interviews were used to build representation of their schemata as they developed with their familiarity with each piece. Existing aspects of the schema are shown in grey, and become smaller as they recede in time, signifying the increasing difficulty in accessing this information. Where similar comments are made on several occasions, these are shown within the same box. A key for these diagrams is shown in Figure 13.

Figure 13 Visual reconstruction of a perceptual schema



These schemata were considered in relation to the three case study participants' quantitative data, in particular, the continuous response traces. Further details are outlined in Table 4.

All these data must be examined in the context of the piece of music being studied; therefore a brief analysis of the poetic and neutral levels of each piece used in the experiments precedes the main data analysis sections. These analyses are intended to provide some description, in musicological terms, of what the listener might hear whilst

listening to the piece. This allows some comparison between analyses based on a score and a recording and the comments provided by listeners. The score-based analytical approaches chosen are similar for the three pieces, and constitute a discussion of form, repetition, harmonic, rhythmic and textural features, and aspects of the music known to trigger emotional responses, such as syncopation. Though each piece may be particularly suited to a specific analytical technique from a musicologist's viewpoint, (for example, pitch class set analysis might be appropriate for the atonal pieces, but less useful for the tonal piece), using similar techniques for all three pieces facilitates the comparison of the musical features present in each work. The performance analyses that follow the score-based analyses are based on the recordings used in the experiment, and discuss aspects of the performances likely to influence emotional responses, such as fluctuations in tempo and dynamics.

Table 4 summarizes the handling of the data in each of the forthcoming three chapters. Chapter 6 will provide a comparison of the data from each experiment, to allow an insight into the similarities and differences between listeners' responses to tonal and atonal music.

Table 4 Summary of approaches to the data in the following chapters

Section	Relevant data	Content
1	The music	Poietic considerations
		Score-based analysis
		Performance analysis
2	Quantitative data (continuous emotional response traces)	Musicians vs non-musicians
		Familiarity and musical structures (triggers of emotional responses ⁸)
		Anticipatory responses
3	Qualitative data (interviews)	Narrative
		Sound and human utterance
		Context
		Other issues
4	Triangulation (overall measures of familiarity and liking; mood measures; continuous emotional response traces; interview data; diary data)	Participant A (experienced music student)
		Participant J (less experienced music student)
		Participant S (inexperienced non-music student)
		Summary, comparing responses of participants with varying amounts of musical experience and the development of those responses with familiarity.

⁸ The identification of triggers of emotional responses will be executed through the triangulation of the continuous emotional response traces, the musical score, and the interview data

Chapter 3

Experiment 1: Responses to Clementi

3.1. Clementi's Sonata in F-Sharp Minor, Op. 25, No. 5: II '*Lento e patetico*'

The piece used in this experiment was written by Muzio Clementi (1752–1832), a well-known and respected early Classical Italian composer. The sonata was written in 1790, when Clementi was living in London, spending his time composing, teaching and performing, although this was the year of Clementi's last public performance as a pianist (Plantinga, 2006a). Much of the music Clementi produced during this period was written for commercial reasons (Plantinga, 2006b); however the composer would surely have been aware of the musical structures that would have prompted emotional responses in listeners.

3.1.1. Score-based analysis

Few analyses of this sonata exist in the English language; however Plantinga (2006b) describes this particular sonata as having considerable 'expressive power'. It is therefore an ideal piece for use in an experiment investigating emotional responses to music. This experiment used only the second of the three movements of the sonata. This movement is in the dominant minor key of the sonata, B minor. It is 55 bars long (see Appendix 1), and on the recording used in the study, lasts approximately 3 minutes (see Appendix 2). The piece is in two main sections, each of which consists of two related themes to form an abridged sonata form (with no development section) (see Table 5).

Table 5 Form and key scheme in Muzio Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II

Bar Number	0 ⁴ –11 ³	11 ⁴ –13 ³	13 ⁴ –27 ³	27 ⁴ –40 ³	40 ⁴ –45 ⁴	46 ¹ –55 ³
Theme	A	Transition	B	A	Transition	B
Key	B minor	F sharp minor	D major	B minor	F sharp minor to B minor	B minor
Key relation	Tonic	Dominant	Relative major	Tonic	Dominant to Tonic	Tonic

The form of the piece is indicated to the listener by the initial theme of the piece, which is used at the beginning of each section. This theme is transposed into the relative major key, D major, for the beginning of the initial B section: this new key, and some new content after the first two bars, provide memorable cues for the listener. The return of the B section for the second time is not marked by this key-change cue: instead, there is a more extended transition and a less distinct return to B section material (bars 40⁴–46). Further cues marking the structure of the piece are the unaccompanied spread diminished seventh chords Clementi uses to emphasise two important modulations (bars 10–11 and bars 39–40). These chords mark the end of the first section (A) of the piece and the beginning of the transition to the second (B) section.

Though there is considerable repetition within the piece, Clementi elaborates the texture of each theme with many of the repetitions, increasing the interest for the attentive listener. This is particularly evident with the oscillating figure first seen in bars 18–19, then in the return of the transition in bars 36–38, and later in bars 46–47. In bars 46–47, the composer adds a pedal note above and below the oscillating figure, doubling the texture from two lines in the versions in bars 18–19 and 36–38, to four lines in bars 46–47.

The delineation of the piece and the recognition of its formal structure is made possible in part by clear phrase boundaries. These are made evident to the listener both through aspects of the musical structure and through the performer's expression, as will be seen

later. The Gestalt ideas mentioned in Chapter 1 can be seen here, with smaller intervals being used in the middle of phrases, and larger intervals (a compound 5th at the end of bar 4, for example) marking the ends of phrases (see Figure 14). These delineations, though present at a surface level, do not override the unity of the piece created by voice leading at deeper levels (see Figure 15).

Figure 14 Phrase boundaries marked by large intervals in Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II. Bars 1–8

Anacrusis to new phrase

Perfect 4th Major 6th Compound 5th:
Phrase Boundary

Figure 15 Overriding unity provided by voice-leading in Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II. Bars 1–8

Such large intervals at the surface level are not the only marker of musical phrase-endings; indeed, bearing in mind the underlying unities in the music, they alone would not seem sufficient to create clearly perceivable phrase boundaries. Rather, they are used in conjunction with other musical features, such as specific rhythmic structures and textural changes, to create a clear sense of a boundary. In this piece, the composer's frequent use of an anacrusis to each new phrase heightens the sense of a phrase boundary, whilst maintaining the sense of flow within the piece.

In addition, the composer clarifies the differences between each phrase with his use of differing textures: the alternation of the main moving part between the right and left

hands (and the consequent variation in pitch), and the more static octaves in the accompanying hand are particularly striking features (see Figure 16). These textural changes are of particular interest in this analysis, as such changes are noted by Sloboda (1991) as being triggers of emotional responses.

Figure 16 Phrase boundaries marked by changes in texture in Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II. Bars 1–10

0	1	2	3	4	5
Melody in Right Hand (Movement)					Accompaniment (Stasis)
Accompaniment (Stasis)					Movement in Left Hand

6	7	8	9	10
Accompaniment (N.B. Octaves) (Stasis)			Shared interest (Stasis)	
Movement in Left Hand			Shared interest (Movement)	

Other triggers of emotional responses include repeated syncopation, as well as sequences and other harmonic features (Sloboda, 1991). Repeated syncopation occurs in two instances in this piece (bars 20 and 48; see Figure 17).

Figure 17 Repeated syncopation (bars 20 and 48) in Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II

There are five sequential passages in this piece that may trigger an emotional response (see Figure 18). These passages are all based upon a turn motive that features heavily in the piece, sometimes in the context of an alberti-bass-like figure in the right hand (bars 21–22 and 49–50). The repetition occurs in several senses: at the half bar, Clementi repeats the figure an octave higher; and the overall pattern is heard twice in each instance. The overall pattern of the right hand rises in pitch by a tone or a semitone between the first and second bar. The left hand accompaniment is important in each of these examples, as it rises with the right hand pattern. In bars 49–50, however, it rises chromatically, increasing the quasi-sequential feeling.

Figure 18 Sequential patterns in Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II

The figure displays four systems of musical notation for Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II. Each system consists of a grand staff (treble and bass clefs) in 2/4 time. The first system (bars 18-22) features a right hand with a turn figure and a left hand with an alberti-bass-like figure. The second system (bars 36-40) shows a similar pattern with dynamics *rf*, *p*, and *ff*. The third system (bars 46-50) shows a right hand with a turn figure and a left hand with a chromatic accompaniment. The fourth system (bars 51-55) shows a right hand with a turn figure and a left hand with a chromatic accompaniment.

Plantinga (2006b) notes the powerful harmony of the piece, a further trigger of emotional responses (Sloboda, 1991). Elsewhere, Plantinga describes this movement thus:

The Lento e Patetico ... is one of Clementi's concentrated, potently expressive slow movements whose effect is achieved largely through immovable pedal points and acrid dissonances. Its opening subject, and later its syncopated, chromatically moving chords, vividly recall the slow movement of his G-minor Sonata, op.7 no. 3.

(Plantinga, 1977, pp. 140–142)

An example of the pedal points and acrid dissonances Plantinga describes occurs in the very opening of the piece (see Figure 19) and in bars 27⁴–31, where the opening returns. Here, the tonic pedal in the bass is combined with chord VII to create harmonic tension.

Figure 19 Pedal notes and resulting dissonance in the opening of Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II



Bar	1	2	3	4
Chord	I	VIIb	VII7	I
Feature	Tonic pedal ...			
Key	B minor (Tonic)			

One of the harmonic triggers found by Sloboda was 'new or unprepared harmony' (Sloboda, 1991, p. 114). In the beginning of the second half of the piece (bars 27⁴–34), the harmony is exactly the same as the original version (bars 1–7); however, in bar 35, a new and more distant harmony is heard, suggesting a modulation to E minor, which would seem likely to trigger an emotional response (see Figure 20).

Figure 20 Harmonic variation with repetition in Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II

Bars 4–8:

Bar	4	5	6	7	8
Chord	I	I	Imp. VII	IV	I
Feature	Tonic pedal ...				
Key	B minor (Tonic)				

Bars 31–35:

Bar	31	32	33	34	35
Chord	I	I	Imp. VII	IV	V7d of IV
Feature	Tonic pedal			Sequence in LH	
Key	B minor (Tonic)			Flavours of E minor (Subdominant)	

Two triggers of emotional responses involve the alteration of timing in preparation for a cadence. A harmonic acceleration to a cadence can be seen in bars 9–10, where Clementi changes the chord almost every quaver beat before he introduces a spread diminished chord that leads to a cadence. Conversely, the ‘delay of [a] final cadence’ (Sloboda, 1991, p. 114) also triggers emotional responses, and may be achieved through expressive or structural means. Interestingly, though the overall length of the final cadence preparation in each half of the piece is identical, Clementi provides a longer preparation for the final cadence than for the cadence that ends the first half by doubling the length of the cadential second inversion chord from one bar (bar 24) to a full two bars (bars 51–52). This feature, combined with any expression provided by the performer, may prove to be an important trigger of listeners’ emotional responses.

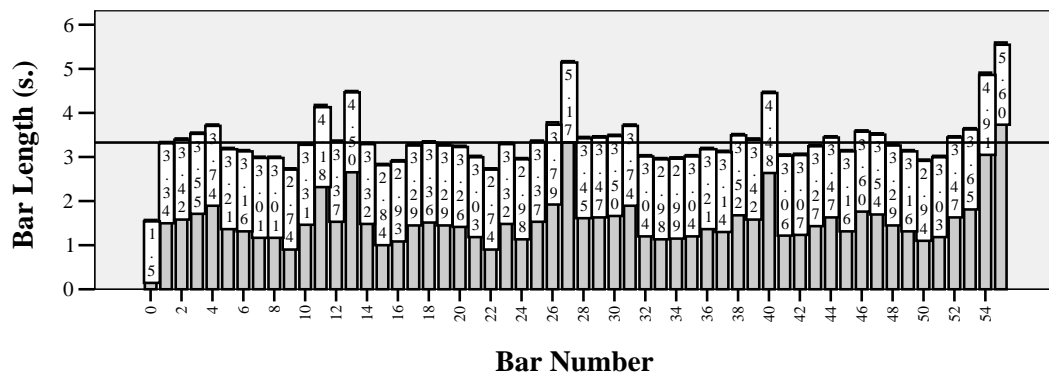
It is clear from this preliminary analysis that this piece has many striking and innovative features that are likely to trigger emotional responses.

3.1.2. Performance analysis

The participants in this study were not asked to listen to a mechanically produced version of the score, but a professional recording (see Appendix 2), which deviates from the score for expressive purposes. One such deviation commonly used by performers is timing: a performer will use *rubato* to emphasise the importance of certain notes over others (Clarke, 1988). One way of measuring the timing of a performance is by measuring the length of each bar in seconds. This was done using the computer programme Audacity 1.2.4 (Mazzoni et al., 2005), in which a label was assigned to each audible onset of the first note in each bar, and the differences between neighbouring labels calculated. The mean bar length was 3.39 seconds, with a standard deviation of 0.614. The graph in Figure 21 provides a visual representation of the length of each bar of the piece.

Figure 21 Length of bars (seconds) of the recording of the Clementi used in Experiment 1

The horizontal reference line denotes the mean bar length (3.39 seconds).



Visual inspection reveals several bars which are prominently longer than others in the piece (bars 55, 27, 13, 40, and 11, in order of length). Comparison with the score reveals that all these bars mark the end of each musical section of the piece, and each

contain a moment of rest (see Figure 22). The performer is therefore either lengthening the notes in these bars, or the silence, or both, in order to denote an important structural break.

Figure 22 Lengthened bars in the recording of the Clementi used in Experiment 1

- a) Bar 55, the end of the piece



- b) Bar 27, the mid-point of the piece (between the initial rendition of section and the return of section A)



- c) Bar 13, the end of section A and the beginning of section B



- d) Bar 40, the end of the second rendition of section A and the beginning of the second rendition of section B



- e) Bar 11, the end of the diminished 7th chord which later in the piece denotes the end of the A section. Here, the piece continues through its transition to the B section



With the exclusion of the initial quaver anacrusis of the piece, the shortest bars are 9, 22, 15, 16, 50, 24, 33, and 34 (in order of length). Interestingly, all these bars are full in

texture, with a large number of notes (often of small rhythmic duration), and are preparing for a crescendo and a cadence (see Figure 23).

Figure 23 Shortened bars in the recording of the Clementi used in Experiment 1

a) Bar 9



b) Bars 15–16



c) Bars 22–24



d) Bars 33–34



e) Bar 50

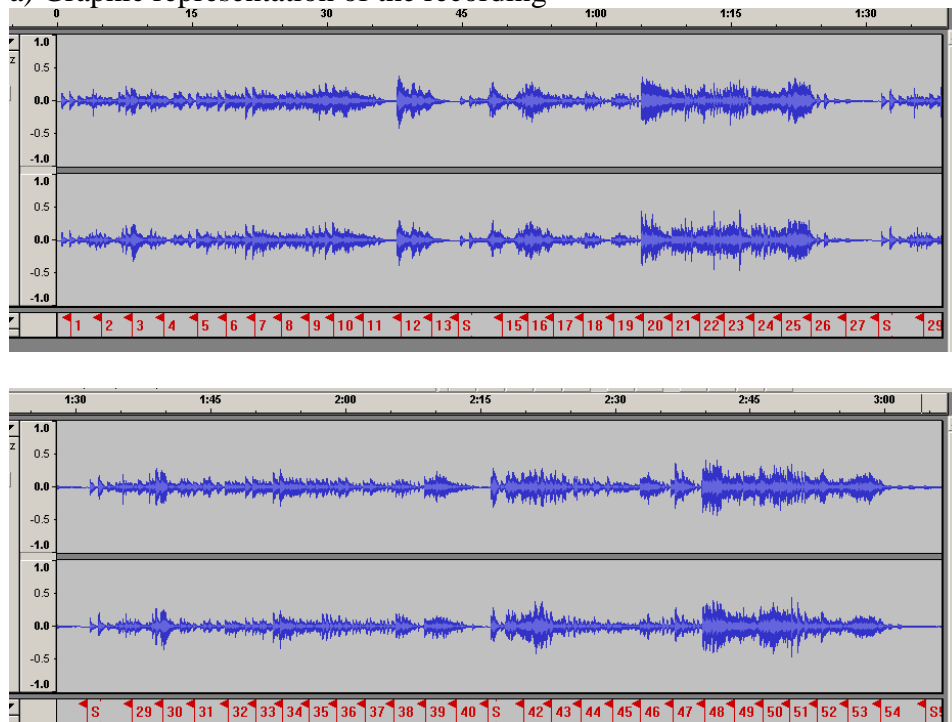


A second feature of the music that may correspond more to the recording than the score is the dynamic variation, which has been found to trigger emotional responses in previous research (Sloboda, 1991). Figure 24 shows a graphic representation of the recording used, generated by the Audacity programme (Mazzoni et al., 2005), a graph of the dynamics indicated on the score, and a graph of the texture of the piece. The

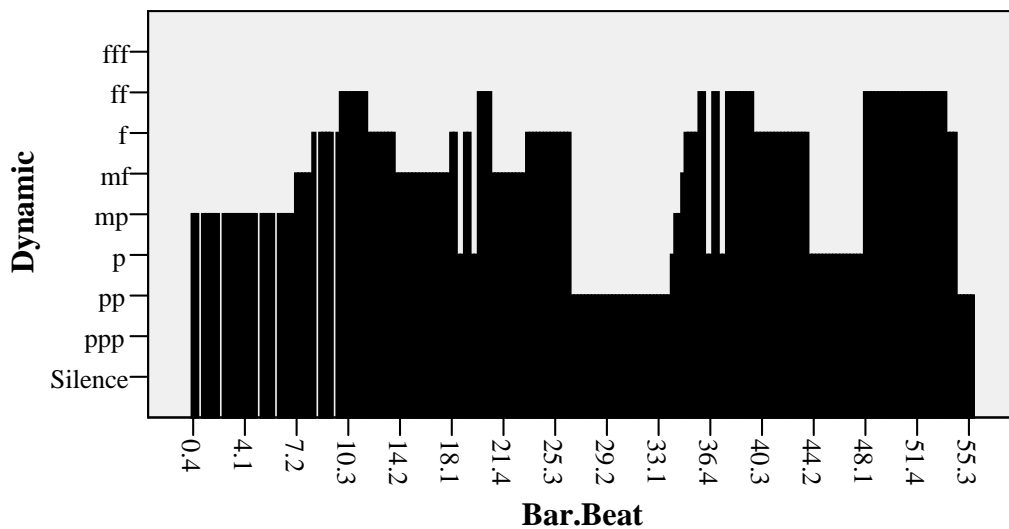
graphic representation of the recording reveals the two large sections of the music, and also the differences between the two halves. In the first half of the piece, the intensity of the sound varies widely, with some fairly sudden increases. Before the end of the first half, there is a considerable reduction in this intensity. In the second half of the piece, the intensity varies less, and the longest area of high intensity occurs near the end of the section. This is particularly interesting because of the comparison of the graphic representation of the recording with the graphs of the dynamic and textural features of the score, which reveal a much more similar pattern between the first and second halves of the piece. Although the reduced intensity of the beginning of the second half of the piece is perhaps evident in the graph of the dynamic variation in the score, the differing features between the two halves of the recording are not present in the graph of texture. Clearly, the performer is adding considerable large-scale expression to the piece, which has the effect of making the piece conform more to what Agawu (1984) describes as a normative narrative curve.

Figure 24 Volume changes in Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II

a) Graphic representation of the recording⁹

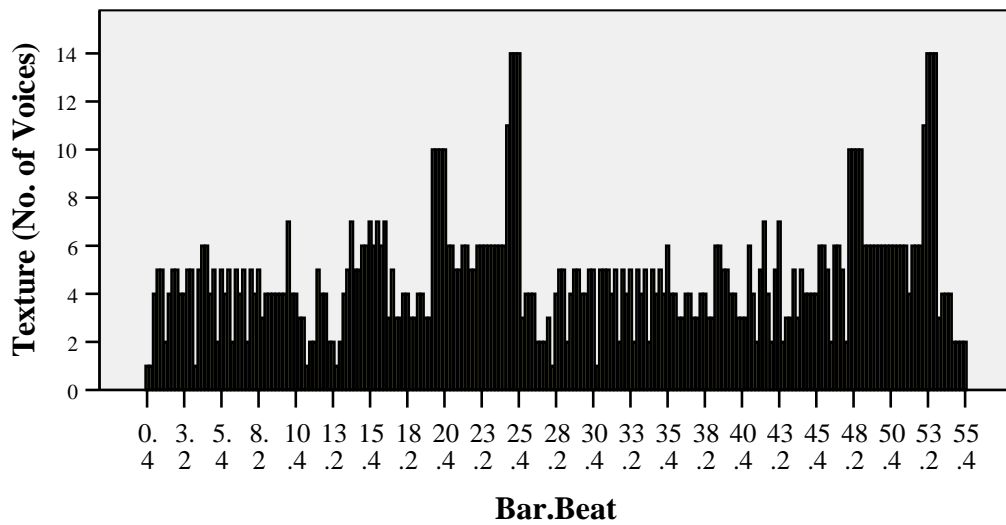


b) Graph of dynamics marked in the score



⁹ The recording was made in stereo, therefore the two channels in the recording are shown. They are very similar, but not identical.

c) Graph of textural density of the score



The rest of this chapter will examine participants' perceptual and emotional responses to the piece through an examination of the quantitative and qualitative data gathered in this experiment.

3.2. Analysis of quantitative data: Continuous response traces of emotional intensity

In this section, the quantitative data will be examined with the use of Pearson correlations and ANOVAs, to discern whether there is a significant effect of musical experience and familiarity on emotional responses. The musical structures that appear to act as triggers for those emotional responses will also be identified.

3.2.1. Musicians vs. non-musicians

To assess the differences between musicians and non-musicians, six multivariate ANOVAs were conducted on the mean response rate per half-second in each bar (calculated from first-order difference figures of the emotional intensity traces¹⁰, and

¹⁰ The first-order difference data contains many time units in which the intensity level remains constant, and therefore gives a figure of zero. This makes some ANOVA calculations impossible. Therefore, the first-order difference data was averaged over the length of each bar, to find the mean change in intensity per half-second in each bar. These will henceforth be referred to as ICB figures.

henceforth referred to as ICB figures). One ANOVA was conducted for each response trace. The between-subjects variable was type of student (music student/non-music student). There were few significant differences between the types of student; however the exceptions are outlined in Table 6.

Table 6 Significantly different estimated marginal means of music students and other students in ICB figures as a response to the Clementi

Bar	Session/trial ¹¹	ANOVA result and significance		Estimated marginal means	
		$F(1, 11)$	p ¹²	Music students	Non-music students
10	C1	6.64	0.02	0.573	-0.031
14	B2	6.58	0.05	-0.418	1.223
26	C2	6.62	0.02	-1.472	0.056
33	A1	6.22	0.03	0.267	1.333
41	C1	6.38	0.02	-0.333	1.222
42	C2	5.41	0.03	0.964	-0.222
46	A1	4.98	0.049	0.144	-0.763
51	C1	4.47	0.049	0.481	0.111

The relatively low proportion of significant findings, the lack of consistency of location between traces, and the relatively borderline significance of each instance of difference suggests that these differences should be treated with caution. These bars will be examined in relation to the score, however, to determine whether or not any musical consistencies between the bars will reveal any important revelations about these differences. The bars that show differences are bars 10, 14, 26, 33, 41, 42, 46, and 51 (see Figure 25).

¹¹ Key to session/trial: A = 1st Session, B = 2nd Session, C = 3rd Session; 1 or 2 indicates trial within each session

¹² Throughout this thesis, exact p values are reported (with the exception of those less than 0.001), to allow for the clearest reporting of statistical effects, as advocated by Wright (2003).

Figure 25 Bars with significant differences in mean response rate per half-second between music students and non-music students



Bars 10, 14, 26, 41, and possibly 46 could all be considered to denote the beginnings or endings of sections of the piece. Bars 41–42 denote a development of the motive heard at the same structural point in the first half of the piece (bar 12); and similarly, bars 46 and 51 can be considered to be developments of their respective counterparts (bars 18 and 23). The results suggest that in some occasional instances that may bear relation to the large-scale structure of the piece, the music students and non-music students differed significantly from one another in their mean response rate per half-second. The direction of this difference appeared to be rather inconsistent.

3.2.2. Familiarity and musical Structures

To assess the effects of familiarity, first-order differences of the continuous response data were analysed using Pearson correlations. In order to minimise the likelihood of significant results occurring by chance, the mean intensity differences at each individual point in time were found for all participants for each trial. These mean difference traces were then subjected to Pearson correlation tests. It was expected that correlations

between traces nearest in time (in terms of data collection), e.g. A1 and A2, would be stronger than those further apart, e.g. A1 and C1. All these correlations were highly significant and range from substantial to very strong associations (see Table 7).

Table 7 Pearson correlations of mean difference traces according to session and trial

Session		A		B		C	
	Trial	1	2	1	2	1	2
A	1	1	0.540 <i>p</i> <0.001	0.573 <i>p</i> <0.001	0.598 <i>p</i> <0.001	0.620 <i>p</i> <0.001	0.551 <i>p</i> <0.001
	2	0.540 <i>p</i> <0.001	1	0.544 <i>p</i> <0.001	0.566 <i>p</i> <0.001	0.550 <i>p</i> <0.001	0.518 <i>p</i> <0.001
B	1	0.573 <i>p</i> <0.001	0.544 <i>p</i> <0.001	1	0.690 <i>p</i> <0.001	0.707 <i>p</i> <0.001	0.604 <i>p</i> <0.001
	2	0.598 <i>p</i> <0.001	0.566 <i>p</i> <0.001	0.690 <i>p</i> <0.001	1	0.727 <i>p</i> <0.001	0.604 <i>p</i> <0.001
C	1	0.620 <i>p</i> <0.001	0.550 <i>p</i> <0.001	0.707 <i>p</i> <0.001	0.727 <i>p</i> <0.001	1	0.687 <i>p</i> <0.001
	2	0.551 <i>p</i> <0.001	0.518 <i>p</i> <0.001	0.604 <i>p</i> <0.001	0.604 <i>p</i> <0.001	0.687 <i>p</i> <0.001	1

To assess the effects of familiarity, the correlation coefficients were subjected to a univariate ANOVA, with the three levels of closeness in time being the ‘between-subjects’ variable. Although there were differences between the strength of the correlation, and the strongest correlations were those closest in time (see Table 8), these differences were not significant ($F(2, 12) = 1.663, p = 0.230$).

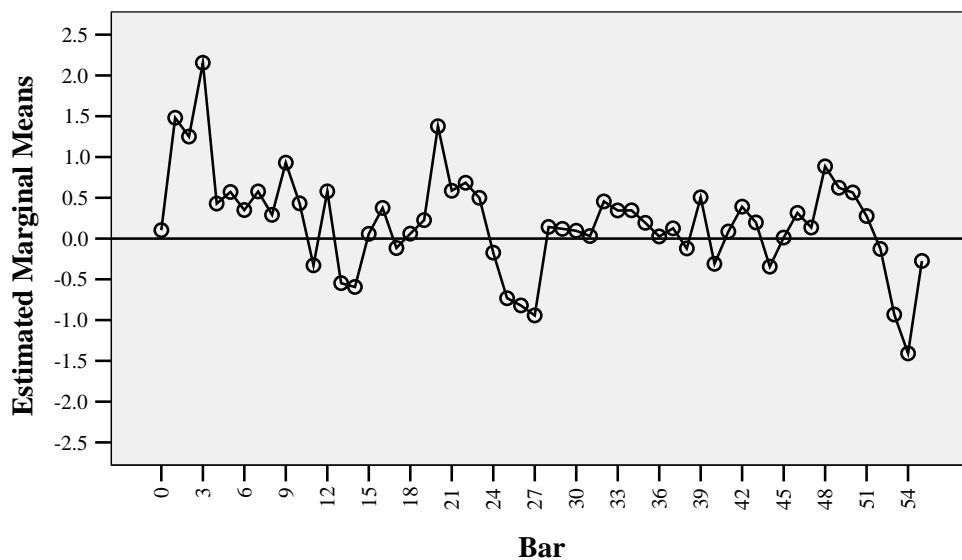
Table 8 Means of correlations at each level of closeness

	Mean	Standard Deviation
Within session	0.6390	0.08575
Between neighbouring sessions	0.6241	0.06659
Between distant sessions	0.5598	0.06840

ICB figures were used in a repeated-measures ANOVA. Within-subjects variables were session (3), trial (2), and bar (56); the between-subjects variable was type of student (2). There was a significant main effect of bar ($F(55, 825) = 10.216, p < 0.001$), confirming that the musical structures in different areas of the piece caused differing responses in

participants (see Figure 26). This effect will be explored shortly. No other main effects were significant, suggesting few quantitative differences in responses to the music as a result of increased familiarization. Had there been a significant interaction between session and bar, these areas would have been examined in more depth. There was one significant three-way interaction between session, trial and bar ($F(110, 1650) = 1.269$, $p = 0.035$); however such complicated interactions are difficult to interpret.

Figure 26 Estimated marginal means of the significant effect of bar¹³



The significant effect of bar in the ANOVA described above prompts some triangulation of the data: it would be interesting to discover exactly which musical structures were causing important increases or decreases in emotional intensity for participants.

3.2.2.1. Areas with important increases:

The beginning of the piece (bars 0–10) (see Figure 27) appeared to evoke a rapid increase in participants' emotional intensity.

¹³ Because these are difference figures, the direction of the gradient is unimportant: what reveals whether the intensity is increasing or decreasing is the position of the point in relation to the origin of the graph. Therefore any point greater than 0 on the y axis reveals an increase in intensity during that bar; any point less than 0 on the y axis reveals a decrease in intensity during that bar.

Figure 27 Bars 1–10 of Clementi’s Sonata in F-sharp minor, Op. 25 No. 5, II

It is clear from Figure 26 that participants increased the level of intensity rapidly within the first three bars, and then somewhat more slowly for the fourth bar. Some participants commented that they felt they had to increase the intensity simply because the piece had started, arousing a pleasant response:

Participant E: Just because ... the piece starts, you get the emotion going, and then it just ... stays there for a while, while the music settles.

Others, however, described specific musical features that affected their emotional response:

Participant H: I think it might have been to do with the [sings melody bars 1⁴–2² with clear emphasis on bar 2¹] that bit. I think that was my ... cue for jumping up the scale.

Participant P: I quite like those ... chords and that kind of tempo. It was very ... rhythmic and ... in a pleasant key. I'm not too sure on the terminology, but I quite liked that, kinda, tune and tempo, it was a nice combination.

Participant B, a musician, described the repeated patterns in bars 5–8 as a cue for a gentle rise in intensity following the beginning of the piece:

Participant B: Repeated patterns there ... it sounds like a decoration on one note, each of the patterns ...

Participant C appeared to notice the same pattern, describing it as a sequence:

Participant C: I think it was the ... increase in the volume of dynamics ... and it almost just ... seemed like the piece was rising and moving towards somewhere with ... I don't know if there was a rising sequence in it ...

Participant K described the increasing intensity of the music in bars 9–10 as responsible for the increase in her emotional intensity at that point:

Participant K: It's ... the tone as it increases, and sort of gets louder, it becomes more intense.

The increases in the mean emotional intensity per bar for all participants appear at this point to be caused by three triggers. Firstly, the start of the music encouraged participants to respond emotionally. Secondly, the repeated patterns, or as one participant described it, sequence, in bars 5–8 encouraged an increasing level of emotional intensity. This would corroborate the findings of Sloboda (1991). Thirdly, the dynamic increase in bars 9–10, perhaps combined with the composer's use of a wide range of notes at that point, and octaves in the right hand, also evoked an increasing emotional response. Interestingly, the idea of dynamic variation corresponding to an emotional response would fall under the category of both hearing music as sound, and as human utterance. In terms of stimulus-based factors, dynamic variation can be considered both a structural feature and a performance feature.

Bars 18–23 (see Figure 28) also appeared to have important increases in emotional intensity.

Figure 28 Bars 18–23 of Clementi’s Sonata in F-sharp minor, Op. 25 No. 5, II

The beginning of the increase in emotional intensity occurred in response to bars 18–19. There were few comments relating directly to these two bars, but as noted earlier, this is a sequential passage, with considerable dynamic and registral contrasts. Although there were increases in emotional intensity throughout this short passage, bar 20 appears to have triggered the most rapid rise in emotional intensity. Here, there are dominant 7th and diminished 7th block chords with a syncopated rhythm, to be played *fortissimo*. This was recognised by some participants as an important trigger of their emotional response.

The presence of demisemiquavers in the right hand during bars 21–23 was indicated as a trigger for a rise in emotional intensity by participants, many of them describing it as a tempo change:

Participant Q: ... there started getting more notes, and ... the tempo was picking up ...

Participant M: Yeah, it was the faster tempo, obviously, faster tempo ...

In his third interview, Participant M also recognised the additional effects of pitch:

Participant M: As ... the notes get higher and higher, the intensity goes up ...

The increasing dynamic levels were also reported as a trigger, sometimes in combination with rising pitch:

Participant D: ... I think it was increasing dynamics, but also because it's going up the scale ... and ... it just felt much more ... like it was going somewhere ...

Participant C, on two occasions, described the combination of dynamic increases, rising pitch, faster rhythms, and also the effect of imitation, probably referring to the imitation at the half bar of the right hand figure:

Participant C: I think that was when you had the ... imitation between, I don't know if it was the two hands or definitely the two different registers, and ... the bass came in and it was all building up a lot more ... in dynamic, and it was building up in pitch as well. And the bass was just a bit heavier.

Participant C: I think it's just ... the rise in the level of dynamics, and the rise in the pitch, and there's just ... I think, it sounds like, you know, it's quavers that's being played ... however it's written, that it's faster notes, and so ... the music just sounds a bit busier, ... so there's always something going on, and so you can ... feel that it is building up to somewhere. 'Cos I think it rises in pitch as well, and you've got the ... imitation in the octaves ... or whatever the distance is.

Others, who were perhaps less familiar with musical terminology, described the effects of that part of the music in more detail:

Participant O: I keep on saying there's a build up, but the music ... it becomes much more, kind of strong, it kind of, you know when you get that kind of inexplicable kind of ... feeling up your spine, it kind of lifts up the back of your hairs [*sic*] ... that's what it did, last week, and it's kind of slightly reminiscent of that ... feeling I felt when I first heard it ... it's so stirring ... you know, I'm not remotely patriotic, but I think it's almost like a patriotic kind of song You know that feeling of ... pride, almost, and aspirations ...

The combination of rising pitch, notes of shorter rhythmic duration, imitation between two registers, and increasing dynamic appear to have triggered this sharp rise in emotional intensity.

Bars 46–51 was a third area of important increases in emotional intensity (see Figure 29). Interestingly, this is the equivalent area in the second half of the piece to bars 18–23, the area just discussed. Similar triggers for this rise in emotional intensity in the participants were therefore expected.

Figure 29 Bars 46–51 of Clementi’s Sonata in F-sharp minor, Op. 25 No. 5, II

The pattern of increases in this area is remarkably similar to that of bars 18–23, with bar 48 marking the greatest increase in reported emotional intensity, as did bar 20 in the previous section (see Figure 26). Participant C described the features of bars 46–47 particularly clearly, explaining the small rise in emotional intensity at that point:

Participant C: ... there was like a bit of a rise, and then it would just fall away, when it was just the right hand by itself. Then it would rise a bit again a bit more, so the rises were generally when the left hand came in, just with the bass.

He also explicitly recognised the similarity with bars 18–23

Participant C: It was like what happens about 60 and 70 [seconds] ... There’s like a small, like, motif that keeps changing octaves ... or pitch, whichever it is. And it heard quite high and then quite low, and it keeps rising and rising and rising, and again, with the bass you know that it’s just moving towards somewhere, there’s a crescendo going upwards ...

Participant I reported similar features as were observed from bars 18–23, including dynamics and tempo, but also thought the mode of the music had an effect:

Participant I: ... it’s the minor ... bit of it ... and it sounds like it’s ... getting louder and faster, like it’s building up to something.

Participant A noticed the chromatic bass line reappearing at this point:

Participant A: The bass notes again ... going up in chromaticism. I was just listening to it again. It’s just really good [laughs] ...

Participant G also described similar triggers to those in bars 18–23, but described this section as the climax of the piece:

Participant G: ... the dynamics in the whole piece were getting louder, and ... the ... motifs in the both hands, the rhythms were getting faster and faster, and it just leads to this natural highlight in the whole piece, the whole rest of it leads up to this climax, and gets you intense ... -ified.

Participant L also described a ‘peak’ in the music at this point:

Participant L: I think that’s where ... it’s sort of got to like the, the peak of it ...

Similar features, incorporating rising pitch and volume, notes of shorter rhythmic duration, and imitation appear to trigger the participants’ rise in emotional intensity at this point, but despite this similarity with bars 18–23, the later section is still recognised as the climax of the piece. This may be a result of the small differences in pitch between the two sections, or may be a combination of these differences and the context in which these few bars are heard: there are important differences in the transitions leading to each of these points in the piece.

3.2.2.2. Areas with important decreases:

All three of the areas with important decreases were structural boundaries within the piece. The first of these, in bars 13–14, marked the first key change into the relative major key, and the beginning of the B section (see Figure 30).

Figure 30 Bars 13–14 of Clementi’s Sonata in F-sharp minor, Op. 25 No. 5, II



Participants generally recognised the pause in the music, stating that as the reason for their drop in emotional intensity:

Participant M: ... it was a pause, and there was nothing going on, so I just went straight down.

Some of the musicians recognised the advent of a new section in the music:

Participant A: It was just the introduction into the major ... section, and I was just waiting for the next thing, the next little tune, to come along.

Participant B: ... It was a different tune, wasn't it? ... it seemed a lot more settled ... than what had been going on before. So ... it didn't need quite the same amount of emotion.

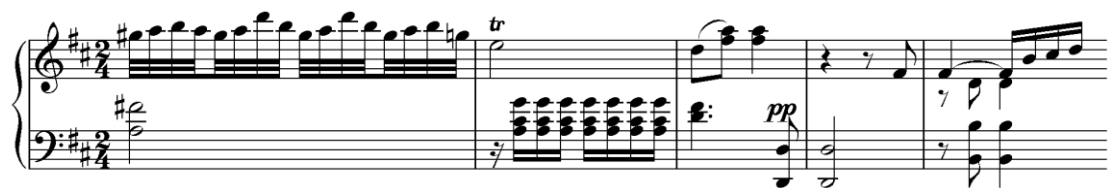
Some other participants were less coherent, and probably not able to access the relevant musical vocabulary, but appeared to be saying the same thing:

Participant R: ... it's that little piece ... and then it goes, 'cos it goes, like it goes up, but ... it changes, but then it goes back to the way it was, or it goes ... back to the same sort of ... volume. 'Cos like, there's one, and then it changes, and then it goes, sort of, it's back to where it was.

It appears that the average participant noticed this pause in the music, and some participants recognised it as a structural boundary. This appeared to trigger a decrease in emotional intensity in the participants.

Bars 24–28 mark a longer area of decreasing emotional intensity, and mark a more significant structural boundary: the half-way point of the piece (see Figure 31).

Figure 31 Bars 24–28 of Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II



Participants recognised this part of the piece as sounding like an ending, and the piece as 'starting again' at this point. Their descriptions are varied in their technicality, according to their musical experience.

Participant B: Oh, it's the cadence point. It just feels like it's releasing everything because it's coming back to where you expect it to be.

Participant G: It sounds like the piece has finished. So ... it feels like it's ended, so there's nothing left for it.

Participant H: ... tailed off towards the end of the section ... 'cos I know I've got listen to it all again, basically. ... I had the same feeling when it starts again as when I started [at the] beginning ...

Participant K: ... the piece, in a way, begins again, it, you know, goes right back to the beginning, and it's like, repeating itself ...

Participant R: ... there's a slight silence, before there's a change in pitch.

Bars 52–55 was the third major area of decreasing emotional intensity, and is the very end of the piece (see Figure 32). It is therefore structurally similar to bars 24–27, above.

Figure 32 Bars 52–55 of Clementi's Sonata in F-sharp minor, Op. 25 No. 5, II



All the participants appeared to expect the end of the piece, and described the end of the piece as rather calmer than the preceding bars:

Participant E: I knew the end of the piece was coming. I'd had the excitement, and it was fading away.

Participant K: ... it just dies out again ...

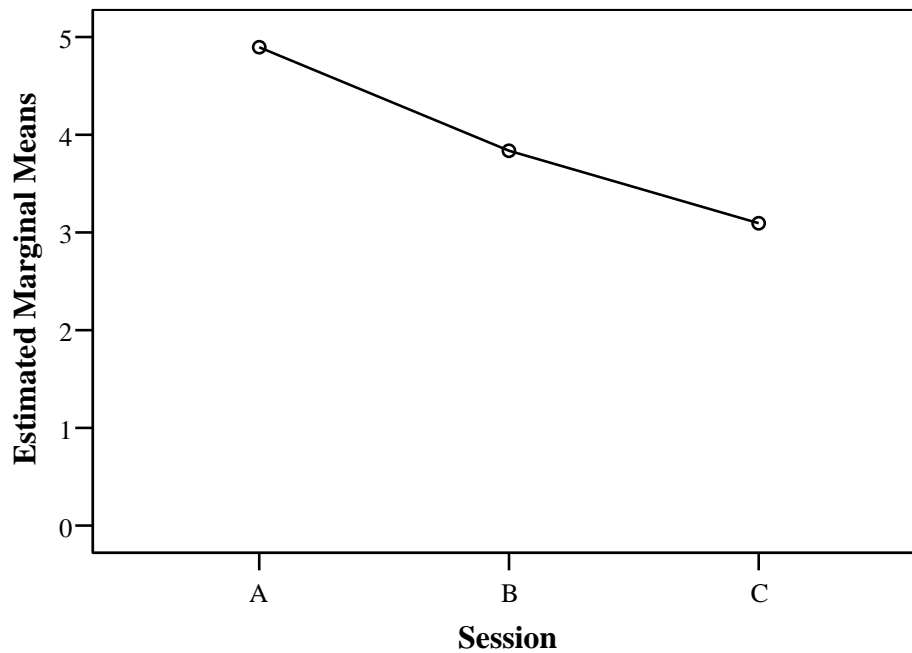
Participant G: I think after that big climax in the piece, the actual ending is a bit of a let down because it just, it's not this big dramatic ... chord ending. It's just a gentle ending and it kind of, didn't really do it for me. It kind of got a bit ... it's a bit boring.

It appears that the decreases in emotional intensity reported were in response to the ends of sections of the piece. These included the transition between the first and second theme of the piece, the mid-point of the piece, and the very end of the piece.

A repeated-measures ANOVA was undertaken on the maximum levels of participants' ICB figures. This was intended to assess any change in the magnitude of participants' greatest increases in emotional intensity due to familiarity. Within-subjects variables

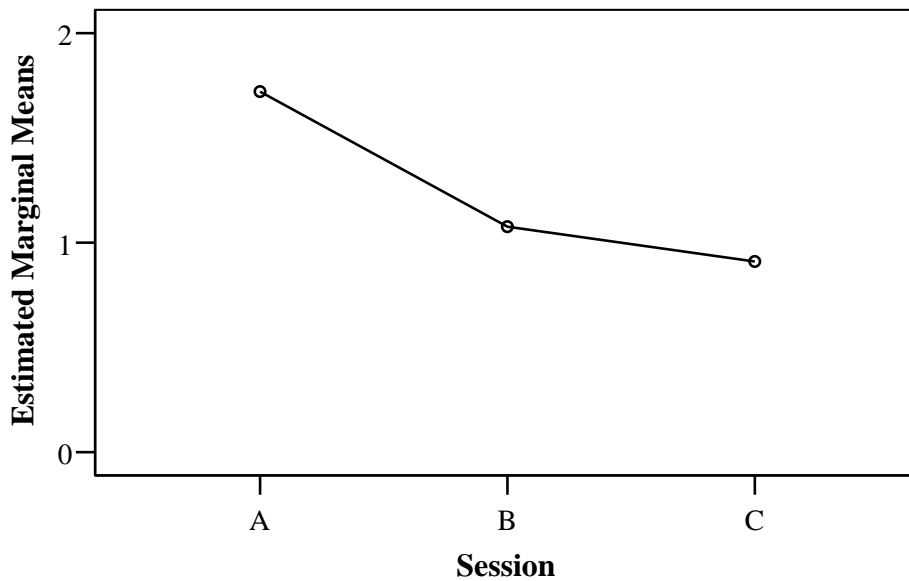
were session (3) and trial (2); and the only between-subjects variable was type of student (2). The main effect of session was highly significant ($F(2, 32) = 8.176, p = 0.001$) (see Figure 33).

Figure 33 Estimated marginal means for the effect of session on participants' maximum ICB figures



This was investigated further by finding the mean magnitude of the increases in the ICB figures. A repeated-measures ANOVA revealed a significant effect of session ($F(2, 32) = 4.087, p = 0.026$), in which magnitude of participants' increases in emotional intensity decreased with familiarity (see Figure 34).

Figure 34 Estimated marginal means for the effect of session on participants' mean increases in ICB figures



Interestingly, though, in a similar ANOVA, no effect of familiarity was seen on the mean decreases in ICB figures ($F(2, 32) = 1.109, p = 0.342$). There were also no significant interactions.

3.2.3. Anticipatory responses

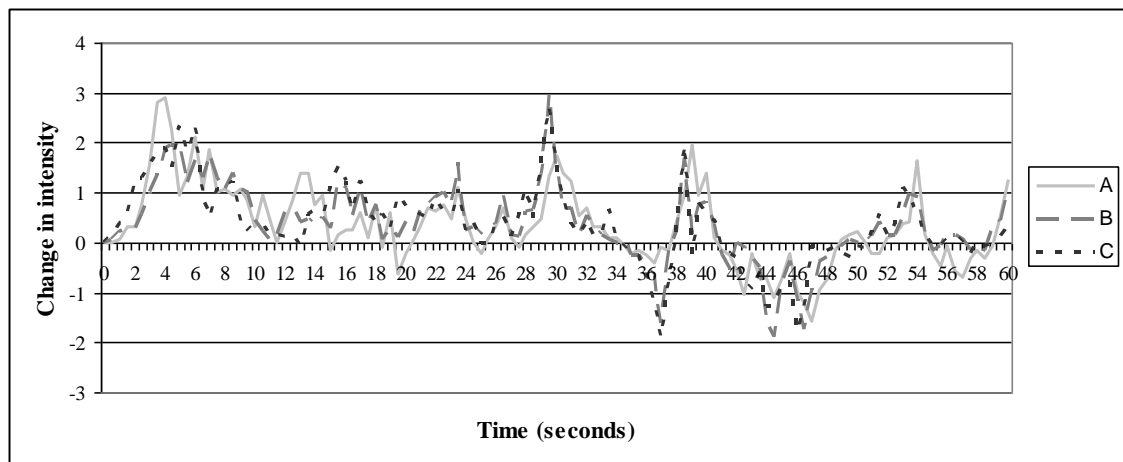
Existing research has suggested that with repeated listening, participants may show evidence of anticipatory emotional responses. This would suggest that some areas of the emotional response traces would contain increases that begin earlier in traces recorded in the second and third experimental sessions than those recorded in the first experimental session.

The mean response traces for all participants and trials were calculated for each experimental session, and converted to graphs to allow visual inspection of any systematic changes. Several areas of the piece show interesting trends. For instance, the area between 27 and 32 seconds (bars 8–10) suggests that participants responded earlier and with a larger increase in the second and third experimental sessions (B and C) than in the first experimental session (A). These bars are marked *forte* and in bar 10,

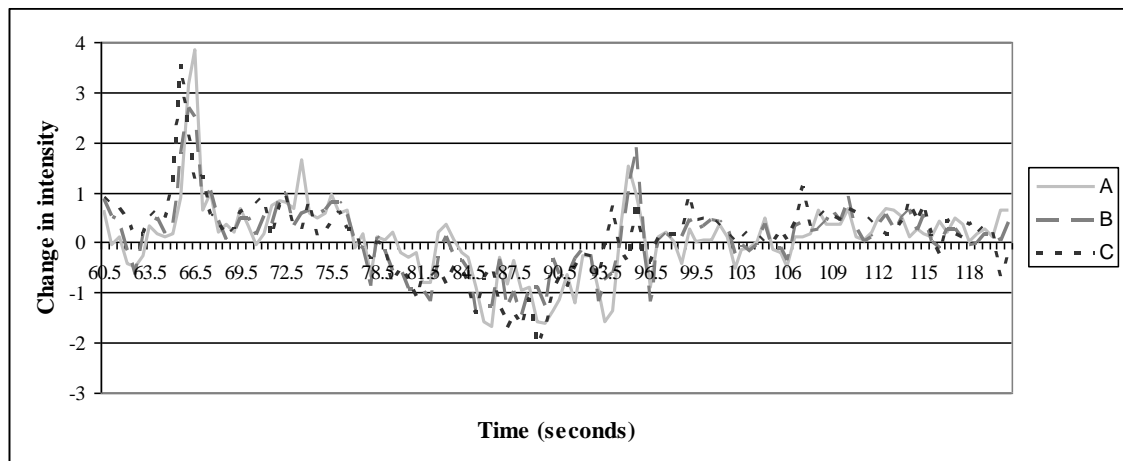
sforzando, and are located towards the end of the first section of the piece. The subsequent decrease also suggests interesting differences: the mean decrease between 35 and 37 seconds (bar 12) in session A was smaller than those from the sessions B and C. This point marks the transition between the first and second sections of the piece. The peak increases between 38 and 41 seconds (bar 13) are slightly earlier in the second and third experimental sessions than in the first experimental session. Similarly, between 46 and 48 seconds (bar 14), responses from sessions B and C were earlier than those from session A. Bars 13–14 mark the beginning of the second section of the piece. A similar pattern is seen between 53 and 54 seconds (bar 16), 63 and 65 seconds (bar 19), 93 and 95 seconds (bar 28), 106 and 108 seconds (bars 31–32), and 139 and 145 seconds (bars 41–43) with earlier peaks occurring in the second and third experimental sessions than the first (see Figure 35). Some of these bars mark structural boundaries: bars 28 is the point of recapitulation; bars 31–32 mark the end of a phrase and the beginning of a new one. Others contain known emotional triggers: bar 19 contains a pattern that forms a sequence of the previous bar; bars 41–43 marks the point at which the recapitulation of the first section of the piece deviates from the original. It is clear that participants learned to expect these structural boundaries and emotional triggers and therefore responded earlier to them as they became more familiar with the piece.

Figure 35 Mean changes in emotional intensity in each of the three experimental sessions in response to the Clementi

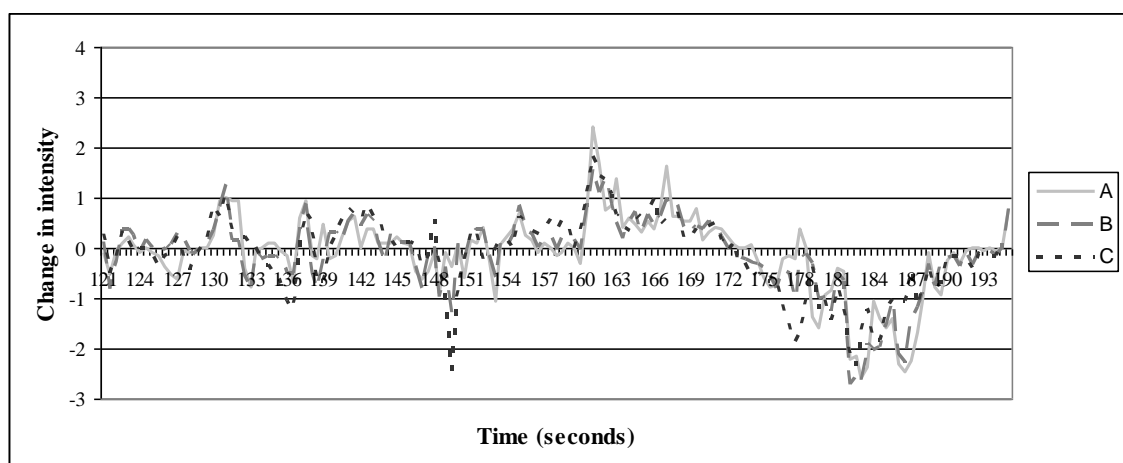
0–60 seconds:



60–120 seconds:



120–196 seconds:



The quantitative data has revealed some interesting findings relating to the differences between musicians and non-musicians, the effects of familiarity on emotional

responses, and the triggers of emotional responses. There were some differences between music students' and non-music students' emotional responses to structural features of the music, but these were inconsistent between the six traces. There were several important effects of familiarity on emotional responses. Firstly, participants' traces were more strongly correlated the closer in time they were gathered (though this effect was not significant), suggesting that there were increasing differences in the traces with familiarity. There were also decreases in the magnitude of participants' maximum and mean increases in emotional intensity. Further, there was evidence that participants were anticipating musical events relating to structure and other triggers of emotional responses, as they became familiar with the piece. Structural features of the music that influenced emotional intensity largely corresponded to findings in existing research: participants suggested that repeated patterns and sequences, dynamic increases, changes in register or texture, rising pitch, syncopation, notes of shorter rhythmic duration and awareness of the climax of the piece all contributed to increases in emotional intensity. Decreases in emotional intensity were triggered by structural boundaries. The next section of this chapter will examine data from participants' interviews in greater depth.

3.3. Analysis of qualitative data: Interviews

As noted in Chapter 2, the interviews will be analysed in accordance with the model outlined in Chapter 1, and particularly, to identify evidence for participants' use of a narrative understanding of the music.

3.3.1. Narrative

3.3.1.1. Emplotment

Several participants (A, G, J, K, O, and S) stated that they viewed the music as a story, or assigned a plot to the music. Some of these plots can be considered to be stable

narratives: the music enabled participants to create a narrative, but that narrative remained the same with each new hearing, such as that described by Participant A:

Participant A: ... it's a plot. It's like an old man sitting in his chair ... smoking a pipe ... He just sits there, and listens, possibly remembers things ... that's sort of what happens. It all joins on.

Others, such as Participant G, described a more eventful plot that was subject to change with each new hearing. In some ways, this might be described as a progressive narrative, with each new hearing providing opportunity for changes:

Participant G: It's like there's a conversation going on between two people with the two hands ... it's some kind of love story, that's what I've been thinking about this piece, and it, it's like this woman ... got ... her heart broken, and she's in love with this man and he doesn't love her. [laughs] And they're having a ... conversation ... I think it's very descriptive, 'cos each time I've listened to it, I've thought of a different story for it.

Only one participant categorically denied using a narrative structure when asked, although it might be argued that using narrative as a means of understanding is not a conscious process. In response to the question of hearing the music in terms of a story, Participant C, however, commented:

Participant C: Not really ... I mean, I think I wrote on one of them that ... I'd just been reading my book ... and ... I think ... it would accompany something like that quite well, but I've never really thought of it as, like ... written, based on, like, a story or anything like that.

There was evidence that some participants had outlined a complete narrative structure with a beginning, middle, and an end. Participant J, for example, described the piece in the following manner:

Participant J: ... the whole piece ... seems to represent someone who's ... anxious, or depressed, or ... sad about something, and for a brief, brief moment, they have this kind of hopefulness creep in, and then it's dashed by this ... third section, and so they re-think the hope that they had earlier in the piece ... almost ... ridiculing it.

Other participants referred to parts of the narrative structure, but not the complete structure. Participant B, for example, described the beginning of the piece and the associated narrative structure:

Participant B: ... it started to sound like the piece was moving somewhere, although you don't really know where at that point, 'cos it's only just beginning.

Several participants referred to a climax, or a main peak, of the structure.

Participant B: ... just building up to the climax of the piece.

Participant C: It was just after that ... arpeggio up in the bass line. I think that was ... where it peaked ... and then it just started to ... fall away after that.

The end of the piece was also described by a number of participants. Participant J described the need for a 'finishing place', and similarly, Participant P desired a 'conclusion' to the piece. Participant A invoked the use of metaphor, another feature of narrative description, whilst referring to the end of the piece.

Participant J: Same pattern again ... There's a great deal of uncertainty in that ... not until at the end is there a real sense that you're moving towards a finishing place.

Participant P: ... before ... that dramatic bit, you really get going and then it just stops, and there's a little bit of flourish here and there, but it doesn't bring you to any kind of conclusion or anything like that.

Participant A: But the reason it drops is because it just ends, it's open when it ends and it just feels empty.

3.3.1.2. Metaphor

One participant used the idea of narrative as a metaphor for a pause in the music, when referring to the narrative 'flow' of the piece. This more negative approach to the events in the music could be considered to form a regressive narrative.

Participant P: ... it didn't carry on. It didn't give it ... a conclusion, it just stopped dead, and then carried on. It's like ... there was no transition. It was like it was left up to me to decide what happened in between, you know? It's like reading a story and it's like there's a scene missing, and ... it doesn't flow.

Participants' uses of metaphor were incredibly varied, from the simple use of movement words to describe the music 'going somewhere', 'rising', 'leading up to somewhere' or 'moving towards something' (Participants B, D, and J), to the description of a build up in the music as 'the crest of a wave' (Participant O). Participant M provided a very clear

representational metaphor, initially in his diary, and later in an interview, perhaps referring to the composer's intentions, as opposed to the musical events:

Participant M: ... it's just a combination of emotions just thrown together, and it could represent ... the ... complexity of human nature and the emotions that go through us aren't always simple, and they are just thrown together like they are in this piece of music.

Participant F used a metaphor to describe the actions of the performer, in combination with the structure of the piece. This could also be considered to be evidence of the participant providing evidence for her own rationality:

Participant F: I don't know why it dropped away quite so much in the first one, but as the tension just seemed to ... relax a little bit I thought he was going to ... maybe go off and have a cup of tea and come back and play some more, so I was ready to ... have a cup of tea with him, and switch off for a while. [laughs] ... But the second time 'cos I knew he wasn't going to go and have a cup of tea, I decided that I was still paying attention, 'cos I wanted him to continue.

Participant O was also keen to explain the source of her associations or plots created in conjunction with the music:

Participant O: I was just doing Shakespeare, and talking about ... it was Hamlet, believe it or not, but it was something to do with ... being in a garden at one point, and ... that's what I was thinking, it just suddenly ... made me think of this classical-type, mythological garden. And when ... the delicate part of the piano came on ... it kind of just, made me think of that. So I suppose I was ... thinking about something else as well, at the time, so it was, kind of, reminiscent of the music. So it definitely made me think about certain scenarios, even if, you know, they are make-believe.

There is also evidence within the interviews of, on one occasion, events in the music causing a narrative containing suffering (Participant K) and, more commonly, non-human events being ascribed human agency. Participant K's narrative involved suffering:

Participant K: The actual ... woman, the image is like dying ... sort of, not dying, just ... fading away, 'cos you know, she's just been quite kind of, stronger now, because ... the prominence of the feature of the male, it's ... just died away and it's like ... she can't fight it. ...

Participant K also personified the characteristics of the music in a manner that ascribed them agency:

Participant K: ... it's ... a more masculine sort of sound, like it sort of dips away again, then it goes down, and ... the part that kind of dips is not as strong as the more prominent sound.

[Plays music]

Researcher: So is that the more masculine bit?

Participant K: Yeah. It's like a stronger, like deeper, kind of sound ... and ... this part's more feminine ... But it's ... dominated by the male.

Participants F and G also personified the music, describing imaginary conversations constructed from musical events:

Participant F: ... it was ... saying, "Listen, I'm not quite finished yet, I've got something else to say." ... and then he tailed off ...

Participant G: It's like there's a conversation going on between two people with the two hands.

Finally, there was evidence to suggest that participants conceived the music in terms of suspense, though only two participants described it using this term:

Participant L: Well ... it seemed like it was leading up to something. So it was ... making me think a lot more about it, and ... it was sort of causing some ... suspense, I just was expecting something to happen, I think.

Participant Q: ... it seems like it's building up to something. You know like suspense kind of music? That's what I was viewing it as ...

A large number of participants described the music as 'building up'. A few examples are provided below:

Participant E: ... the music was just building up there before it went down again.

Participant F: Listening to it then ... I think it was 'cos I had the impression that it was going somewhere. It was starting to build up again to something ...

Participant G: Because the bass line was progressively getting louder and building up more and more.

Participant L: ... it's the same, like, as the beginning part, I think, like it seems to increase, it seems to be building up to something.

Participant N: Well I guess the music was building up, and it was just very beautiful and meditative.

Participant O: That was ... the music building up, and it was becoming much more ... rousing, and it's much more ... stirring music.

The idea of the music having ‘tension’ was present in nine of the interviews. Interestingly, though, this term was only used in one of the non-music students’ interviews, in contrast with eight of the music students’ interviews. Other differences between music students and non-music students will be discussed later. Whilst on some occasions the term was used to explain an emotional response to the music, at other times the term was linked with specific musical features, such as repetition, harmony, and dynamic variation.

Participant B: I think it was just instinctive. More ... a feeling of rising tension I think more than anything.

Participant B: Along with ... the growing intensity in the music, I think. ... Dynamic and ... general harmonic tension and things ... It’s the repeated note ... kind of builds up the tension and the suspension-type harmonic things going on.

Participant G: I think it was the whole repeated, sort of, fragments again. With them being repeated, it builds the tension and ... it focuses you to the music ... I can’t explain, but it does build the intensity from what I was listening because you get ... you notice it if you hear it more than once.

Participant J: ... I think it was like a diminished progression or something, and that, kind of added ... tension, and ... at the same time you’ve got this pattern moving up the register.

The discussion of expectancy was more evenly distributed between all participants. Some comments relating to this area were vague, concerning the idea of waiting for an event but being unsure of its nature:

Participant F: It relaxed. I kind of sat back, and ... you could feel it, kind of, ebbing away a little bit, and so I relaxed with the music. But then I expected something else to happen, so it went up again.

Participant J: ... you’d had the first statement ... and then ... the phrase had paused, and so ... my response had paused to it as well and I’m waiting for the next thing.

Participant S: Came back down there. But it built up overall... it didn’t come back down to this level because there was that expectation that maybe something else might happen again, so ... it’s all building the ... dramatic content of it ...

Other comments were more specific, relating to a specific aspect of the music, often the harmony of the piece:

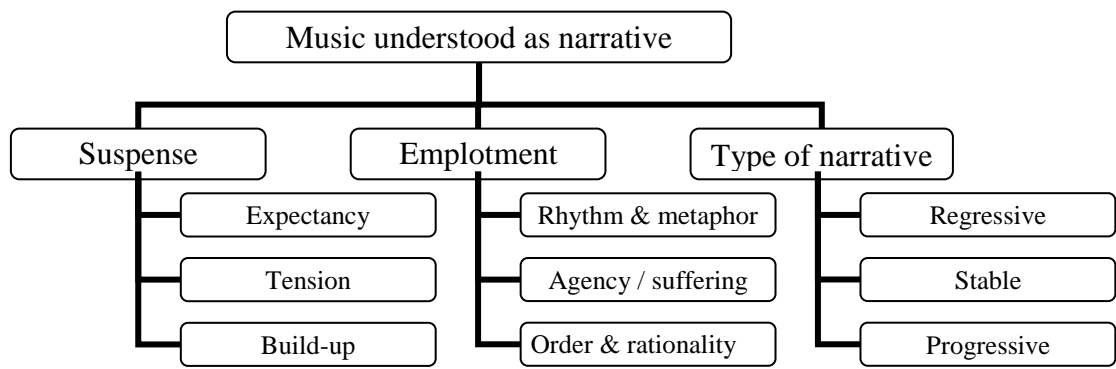
Participant A: ... you're expecting a certain chord, but it doesn't actually come.

Participant A: It was just the introduction into the major, sort of, section, and I was just waiting for the next thing, the next little tune, to come along.

Participant I: I know why that is, 'cos I'm waiting for the spread chord.

In terms of participants' narrative understanding of the piece, the diagram in Figure 36 can be constructed. Here, the aspect of narrative most commonly described by participants is shown on the left, and at the top of each group.

Figure 36 Aspects of a narrative understanding of the Clementi



This diagram does not vary considerably from Table 3, which shows the features and types of narrative description. There is, however, the addition of suspense, an idea highlighted by Lavy (2001), and the subcategories of that attribute: expectancy, tension, and build-up. The importance of the type of narrative classifications suggested by Murray (2003) appears to be somewhat reduced in the context of listening to music, however, and could probably be omitted from the diagram in this instance, as could the subcategory of order and rationality. The two remaining categories of the model, suspense and emplotment, also appear to have a slightly different balance of importance in musical narrative, in comparison with normal narrative construction. Whereas in normal narrative construction suspense would form a part of the emplotment process, there appeared to be two, sometimes distinct, types of narrative structure evident from participants' descriptions: those based on the musical structure and musical events

creating suspense; and those based on extra-musical images, ideas and scenarios prompted by the music. For instance, Participant C focuses entirely on the musical narrative, in a manner which would be classified within the suspense category of the above diagram:

Participant C: ... you can tell that the music's going somewhere ... there's ... that small little sequence that keeps rising up in pitch, and so you know that it's ... aiming towards something ... you've got the bass line as well which is quite strong, and then you've got the ... almost in between quavers, in the middle of it.

In contrast, Participant O was able to provide many different narratives, but the majority of these were extra-musical scenarios or associations prompted by aspects of the music:

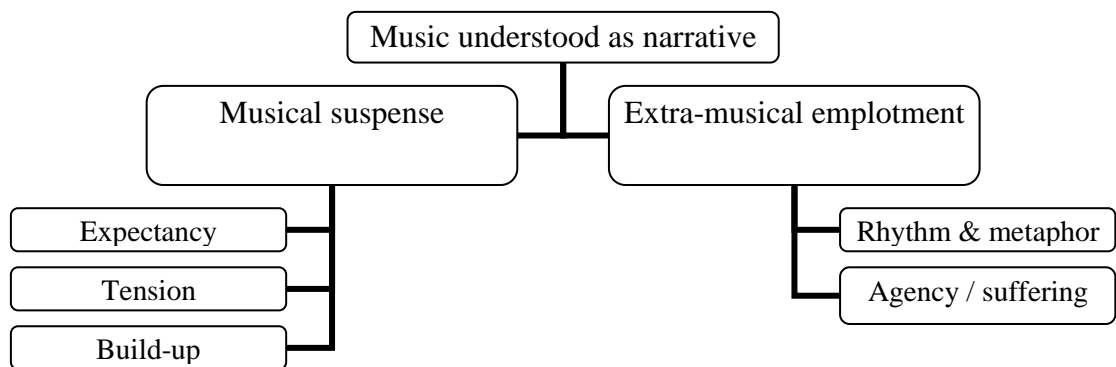
Participant O: ... I think I had a slight war scenario in my head. But it was like, very romantic at the same time, so it was like a real cliché, a kind of toe-curling cliché, in a way!

Though it might appear that each participant may have a particular way of creating narrative, either through musical suspense or extra-musical emplotment, Participant K explicitly combined the narrative structures of extra-musical scenarios with particular sounds and events in the music, which also formed their own narrative structure.

Participant K: ... after listening to it for a week ... it sounds strange, but I got like a kind of ... story [laughs] in my head, and it's like ... I think it's in a like, minor key, or something, 'cos it's different, kind of, sounds, and it's like ... to me it represents like, loneliness, and ... it starts to increase again and again ... there's one crescendo in the middle, and it's really really really big ... it emphasises ... how much ... loneliness this ... person's feeling.

While the musical- and extra-musical narratives may be combined, they remain different ways of conceiving the music. In addition, while the category of emplotment may contain suspense, it appears that the creation of narrative from musical suspense does not necessarily require emplotment. The diagram above has therefore been modified for clarity, and is shown in Figure 37.

Figure 37 Aspects of a narrative understanding of the Clementi: a clarified model



3.3.2. Mood or character of the music: Evidence for listeners hearing music as sound or human utterance

One of the most important features of the music described by all the participants was the mood or character of the music. This could be viewed as hearing the music as human utterance, as it is the content of the emotion that is important in this type of communication. Participants described positive, negative, and neutral emotions that had been conveyed by the piece.

The music was able to convey a positive simple emotion, happiness, to some participants:

Participant A: ... it's just the general mood of it really, it's just lighter ... happier.

Others, such as Participant I, relate the mood of the piece to an aspect of the music; in this case, the mode:

Participant I: ... it's not minor any more, it's major, and happy.

A number of participants described the mood of parts of the piece as negative, but did not restrict themselves to simple emotions: adjectives such as 'mournful' and 'resigned', which are considered to be complex emotions (see Strongman, 2003), were used by participants.

Participant J: ... it was a very, it was like a slightly depressing kind of ending to it, it was like it was a bit mournful.

Participant L: ... the music itself seemed to feel sad, it made me feel quite strongly ... it seemed to be really, really intense and passionate.

Participant M: Just, obviously when the more brutal and deeper tones come on ...

Participant P: I think that was probably because it changed ... from ... that nice tune to something a bit more ... down, I suppose. I can't think of the words, but it was ... you know the mood of the, the song went a bit more, not so much aggressive, but ... depressing, a little bit.

More neutral emotions were also described by a number of participants:

Participant A: Just urgency.

Participant B: I don't think it's sad ... I think it's quite poignant in places ... but I think it's quite resigned. And it's ... peaceful.

Participant D: It's very serious, and it sounds, again, it sounds impressive.

Participant Q: It's kind of mellow, chilled out ... that's how I viewed it ...

In summary, the music was understood by participants in terms of its mood, and was able to convey both simple and complex emotions that were positive, negative, and neutral. This provides evidence that music may be understood in terms of human utterance.

3.3.3. Music heard in context: Evidence for the influence of contextual and listener features

Some listeners acknowledged the effects of contextual features on their perceptual and emotional responses. Participant R, for example, described in detail the effect that events during the day had had on the extra-musical associations he had formed with the music during his daily listening sessions:

Participant R: ... some of them are sort of depending as to what's been happening in the day, apart from ... the one of the bloke playing the piano, and the one of the people, the Beauty and the Beast scene, dancing in a ballroom. That's pretty much, it happens every time. I only write it down when it's ... the only thing. But ... there's one about ... in a log cabin, that I wrote about ... My dad had phoned the day before and suggested that we might be doing that next year. So it was sort of on my mind when I was listening to it ... and it sort of went nice ... We're a very relaxed family, so it would be the sort of thing, not the sort of music we listen to, but the sort of ... mood ... that would be set by

that kind of music ... But mainly the piano, the man playing the piano and the ballroom dancing theme are the ones that crop up the most. And then the other ones are just, sort of, what's been going on in the day.

Participant S acknowledged the occasional distractions caused by day-to-day events, and highlighted the effect of these on emotional responses:

Participant S: I think there was times during the week when ... I sort of listened to it and I didn't really feel that much, but that's maybe ... got something to do with what was happening at the time, and maybe I, I knew I had to listen to it, I just had to fit it in and listen to it and then note down what, and then go and do something else. But I think the times when I've had more time to think about it, or ... I've ... been able to ... get more into the music, so probably the first time I listened to it on my own, that's when I experienced most, sort of, graphic interpretation of it ... but that might just be a product of ... what was going on around me at the time ...

The effects of listener features also became apparent through the interviews: Participant J acknowledged the negative effects a busy week could have on emotional responses to a piece of music:

Participant J: ... it's begun to make me really cringe ... I think that's possibly just because, you know, it's been a funny week, you know, busy ... very easy to get stressed ...

Conversely, Participant D noted the positive effects of tiredness on her appreciation of some aspects of the piece:

Participant D: ... even at the beginning where it's quite, you know, it's not particularly loud, or moving very fast ... it creates a different type of emotion ... I listen to it ... and think 'oh', you know, 'it sounds nice' ... or maybe it's cos I'm slightly ... tired. It's kind of relaxing and, and it's nicer.

Other listener features also became apparent, although these were not always referred to directly by participants. For instance, the musical associations made by participants were dependent on their musical experience. Five of the non-music students and two of the music students mentioned musical associations with the piece. Participant J referred to a wide range of composers in all three of his interviews, including Handel, Mozart, Beethoven, and Liszt, but his most specific reference to another piece was to a specific piece by Beethoven that shared a textural feature of the Clementi:

Participant J: And this bit reminds me of Beethoven. A lot. ... I was learning to play the Pathétique a little while ago, and there are bits in it that crop up in this that I think, that's the same kind of, like, descending chord progression that ... comes out in the Pathétique ... and in the same way that that's quite a brooding piece of music ... this seems ... similar ... I don't think my aural skills are good enough to actually say what's going on, but ... this descending ... 'dum dum dum' with the repeating note on the top and then the chord moves down underneath it ... there's a lot of that in the Pathétique, in bits ... That bit, actually, where it goes down ... it's more forceful ... than ... the theme that comes at the beginning. The theme at the beginning's quite ... sorrowful. But understated. And ... almost calm. Whereas that's an element of anger creeping in, which I suppose goes with the whole Beethoven kind of idea.

Clearly, this participant would not have made this association without having played the piece in question. Participant N also referred to Beethoven, though to the 'Moonlight' sonata:

Participant N: ... he was doing this nice Moonlight Sonata-y kind of meditative thing ...

Similarly, though the reference was not direct from piece to piece, Participant D was reminded of a recital she had performed at her sixth-form college. Participant L referred to a computer game with music that she plays: clearly, her response would not have been the same had she not played this game:

Participant L: ... it seems more relaxed, even though it's still quite ... the music itself seems quite intense but it doesn't make me particularly ... feel a lot, it just seems to be ... like background music ... it reminds me of a game I've got at home, actually.

Other listener-dependent associations were created with films. Participants R and S referred to a specific piece of music within a particular film, whereas Participant J referred to a film genre.

Participant R: ... it reminds me of The Godfather. ... where he kills his brother Fredo on the pond. It's the same ... kind of music as this, it's like a one bloke playing the piano ... I think it starts nearly almost the same, and it's at that point ... one of the two we were doing today, I remembered that I'd written that down, and I thought 'oh, yeah, it does actually remind me of The Godfather'. And there, it's at that point, it's the start, that point at which it reminds me of The Godfather.

Participant S: I just started ... thinking about the music and ... just trying to extract the emotion from it, and it reminded me of a film called 'The Pianist', where it was ... very emotional because he was in Nazi ... Germany and was a pianist who was persecuted as a Jew, and he was playing the music and it was this sort of music. I don't know what it was, what he was playing but it was very ... emotional, so it was like ... a

cinemagraphic representation I had ... in my mind ... so it just brought back that sort of ... emotion I think.

Participant J: But it's like ... a black and white 1950s film, or something and it's got ... the pensive moment for the character, and ... that's a theme, that you might associate with the character and it might come back throughout the film ... it's got this definite association of like a melancholy moment ...

These listener features are important, but mostly relate to associative responses to the music. Further listener features seem likely to come apparent with the process of the triangulation of the data. The focus of the next section will be on other holistic issues arising from the qualitative data.

3.3.4. Other holistic issues

3.3.4.1. Difficulty expressing oneself

One issue surrounding the methodology was that participants may have found it difficult to express their emotional responses to music in words, or to remember the triggers for their emotional response retrospectively. A certain degree of difficulty was evident in 63.27% of all the interviews. For example, Participant B had difficulty remembering why she had increased the intensity in the computer programme.

Researcher: Do you know what that was a response to, or, what was going through your mind?

Participant B: ... Um ...

Researcher: If you don't know, it doesn't matter.

Participant B: I don't really know, sorry.

Participant J expressed his difficulty in finding the appropriate language to describe his emotional responses:

Participant J: It's very difficult putting these kinds of things into words because ... they're just feelings and, like, putting words to it can be quite difficult. It's not something you do very often, I don't think.

Participant O had a similar difficulty:

Participant O: Sorry, that was utterly incoherent, but ... I knew I had something important to say about that bit, it just didn't come out right. But this is so hard, man! This is so tricky! [laughs] ...

Interestingly, a greater proportion (67.86%) of the music students' interviews contained some aspect of difficulty, in comparison with the proportion of the non-music students' interviews (57.14%) that contained some difficulty. There may be a number of reasons for this difference, which will be returned to later in the chapter in relation to the other differences between music and non-music students. It is important to note, however, that every participant was able to identify triggers for their emotional responses and provided a wealth of data.

3.3.4.2. Terminology

Differences were expected in the vocabulary used by music students and non-music students, as suggested by Waterman (1995). Table 9 shows the list of technical terms that were included in the study, and the percentage of interviews in which they appeared at least once. It is evident that the music students had a much wider musical vocabulary available to them than the non-music students, from the number of terms not appearing in any of the non-music students' interviews. Interestingly, though, non-music students' described the 'notes' being played to a greater degree than music students, who used other terms to describe the same phenomena. Additionally, non-music students' use of the term 'octave' was slightly greater than music students', and both groups discussed pitch or register equally. The structure of the music and the melody were both discussed fairly frequently by each group.

Table 9 Technical terms used by participants (music students and non-music students) in Experiment 1

	Percentage of interviews containing at least one instance of a term		
	Music students	Non-music students	All
All technical terms	96.43	66.67	83.67
1. Harmony	21.43	4.76	14.29
1.1 Suspension	7.14	0	4.08
1.2 Modulation	7.14	0	4.08
1.3 Arpeggio	7.14	4.76	6.12
1.3.1 Spread	21.43	0	8.16
1.4 Diminished	21.43	0	14.29
1.5 Major	17.86	0	6.12
1.6 Minor	25.00	4.76	16.33
1.7 Dissonant	3.57	0	2.04
1.8 Cadence	25.00	0	14.29
1.9 Pedal Point	3.57	0	2.04
1.10 Ostinato	3.57	0	2.04
2. Melody	21.43	14.29	18.37
2.1 Sequence	14.29	0	8.16
3. Phrase	42.86	4.76	26.53
4.1 Ornament	7.14	0	4.08
4.2 Trill	25.00	0	14.29
4.3 Decoration	7.14	0	4.08
5.1 Left or right hand	46.43	4.76	28.57
5.2 Imitation	7.14	0	4.08
5.3 Octaves	3.57	4.76	4.08
6. Expression	14.29	0	8.16
6.1 Crescendo	17.86	14.29	16.33
6.2 Diminuendo	3.57	0	2.04
6.3 Forte	3.57	0	2.04
6.4 Rubato	10.71	0	6.12
7. Texture	42.86	4.76	26.53
8. Note	64.29	80.95	71.43
9. Pitch or register	57.14	57.14	57.14
10. Structure	92.86	61.90	79.59

Some of the non-music students lacked confidence in their musical abilities, some merely in terms of the appropriate terminology, but one participant (Q) questioned her ability to hear what others would hear.

Participant O: I'm not going to use any music terminology, because frankly, I'm inept.

Participant P: I'm not too sure on the terminology, but I quite liked that ... tune and tempo, it was a nice combination.

Participant Q: ... I can't pick up different things, 'cos I don't know music and things. So for me, I'm just kind of hearing the same thing. Over, and I can't pick out new things versus ... if you know what I mean.

In addition, non-music students tended to focus on their subjective responses to the music considerably more than the music students. Whereas only five of the music students (Participants A, D, H, I and J) discussed whether they liked aspects of the piece, seven of the non-music students mentioned this in their interviews (Participants K, L, M, N, O, P, and R).

Participant A's comments were very focused:

Participant A: I do like bass notes.

Participant A: That was the harmony then. In the right hand because ... it's a happier bit, and there's leading notes everywhere, and I just, and suspensions, and I just like them.

Similarly, Participant D's, I's, and J's comments were focussed on one particular part of the piece.

Participant J: I like that modulation, just a very slight change.

However, whereas the majority of the musicians only commented once or twice on aspects of the piece, Participant J, the least experienced of the music students, provided 10 comments referring to his liking of the piece. The non-music students' comments varied: some provided general comments about their liking for the entire piece:

Participant P: Overall, I'm liking the piece less and less, and I think that may be because ... if I find a piece of music I like, I tend to listen to it to death, and then ... you know, the day after, just discard it, it doesn't hold me too far.

Others were as specific in the parts they liked as the music students:

Participant O: ... when the keys ... go up in that sense, I really find that ... kind of, very provocative ... to me, that's intense music, 'cos it, it makes you feel ... emotional, kind of like empowering, in a way ... It's great stuff, I like it a lot.

The differences found between the music students and non-music students appear here to be based on terminology, supporting the findings of previous work by Waterman (1995).

3.3.4.3. Colour

Two music students (Participants B and J) mentioned their association of the piece with a specific colour, in their third interviews. Participant B described the piece as yellow.

When asked to explain this association, the following discussion occurred:

Participant B: ... it just feels yellow. ... It's slightly different shades, as well, at different moments.

Researcher: Does it change throughout the piece?

Participant B: The intensity of the colour changes with the intensity of the music.

Researcher: Wow. That's really interesting. Do you get that with all pieces?

Participant B: Yeah. Sometimes it's kind of triggered by what it's about or something, or the title, so it's kind of subconsciously there, anyway.

Researcher: Is it anything to do with key?

Participant B: A lot of things ... I don't see how it can be ... because I don't have perfect pitch, and I don't know what key it's in.

Researcher: It was in B minor. ... Do you happen to know of any other piece that's yellow, and in B minor? [laughs]

Participant B: [Laughs] Not that I can think of! ... Though most things in E minor are yellow, if that helps. I don't know whether it's something connected with something I learnt to start with, or ... I don't know.

Researcher: Wow. So are there patterns, or is it, kind of, just a colour?

Participant B: Just a colour.

Participant J also mentioned the piece having 'yellow' qualities, but later changed his mind:

Participant J: ... if I had to put a colour on the piece, it's yellow and black. ... I don't know if I'd stick by that, actually. I can't understand the rationale behind it, because it's not like I've got synaesthesia or anything like that, I don't have strong colour associations with music. But I was just thinking if I had to put a colour, what would it be? And it's ... it's grey, it's such a grey piece of music, not because it's boring, but because ... the image I've got is kind of black and white cinema, and ... very ... sad introspective moments which, I don't know maybe are ... often portrayed in black and white ... there's no joy in it, so you know, strong vibrant colours would be totally ... misplaced with it. But ... it's quite dark, and ... except for that second section, where it gets quite ... I don't think joyous is the right word, but ... it's happier, and ... it's a bit delightful ... And ... the rest of it's quite morose. So kind of black, browns, greys, and ... and the angry bits are ... well the bits I associate with Beethoven are a bit ... I suppose you would say red, but ... it's almost too strong, it's like a really horrible brown. [laughs].

Neither of these participants claim to have synaesthesia, and although Participant B describes the association as on that she has with many pieces of music, this association was an unusual one for Participant J. Unlike synaesthetics, the links these participants made were not with specific pitches, but rather with the mood of the piece. Interestingly, both participants suggested that the colour would change with the varying emotional intensity of the piece.

Not all the music students associated the piece with a particular colour, and these two participants cannot necessarily be assumed to be a representative proportion of musicians who do so. Musicians frequently think of portraying colour through music when performing, however, and it is possible that this experience may have influenced their response to the music. It is also interesting that though the non-music students created elaborate plots and images in response to the music, none of them mentioned colour in their interviews.

3.3.4.4. Ways of listening

Participants reported listening to the music in different ways. One difference described by two participants was the difference between listening analytically, to the notes, and listening in a more relaxed fashion:

Participant H: Well, simply because the first time, I reacted as though how I might react if I was analysing the piece, 'oh this piece ... this is an exciting bit ...' while the second time mainly because mainly I'd heard it before ... and ... I didn't really like it that much in any case, I was fairly ... negative towards it generally, and I think that shows, looking at my lines, that I'm generally Although I seemed to be more ... excited by the quiet bits the second time round, the more gentler bits as opposed to the ... obvious crescendos, 'oh this is where I'm supposed to get excited' ... type thing.

Participant M: I just felt that I analysed it, I was focused on the notes themselves, rather than anything that ... came to the fore.

One participant went into more detail about listening strategies and their effect on emotional responses, describing large-scale and small-scale listening:

Participant B: So I think I was probably reacting more to immediate things in the first one.

Researcher: Like ...

Participant B: Like ... just ... smaller things. 'Cos in the second one I was kind of thinking all the way through a phrase or something ... Perhaps that's anticipation as well. But ... I was reacting more ... to the little things that happened like a change of the harmony or something ...

Researcher: In the first time?

Participant B: Yeah.

Researcher: Whereas in the second time you were ...

Participant B: Thinking more about the whole section

Other participants mentioned listening specifically to the performer, as opposed to 'the notes':

Participant C: I don't know whether it was just because I was ... listening and judging it on the placement of the notes a bit more ... like when the notes were being played, and it's ... seemed like there was an increase in intensity, I was doing it more as each note was actually played, as opposed to just a general ... holding down, going up.

Participants' perceptions of the music were clearly influenced by their approach to the music, which appeared to be flexible.

3.3.4.5. Familiarity

Participants frequently discussed the effects familiarity with the piece had on their perceptual and emotional responses to the music. Several participants discussed small-scale features and details of the music that only became apparent after repeated listening:

Participant A (Session 3): ... the inner part ... where you've got the semiquaver or quaver figures in the middle, and I just noticed it ... for the first time.

Participant C (Session 3): ... the fluctuations in the bass bit where I've got the little bumps. I think it's the first time I've really ... noticed them, consciously anyway ...

Participant L (Session 3): The first few times, it was only the big dramatic changes that caught my attention, but I just started to gradually be ... noticing all the little changes ...

Participant O (Session 3): ... when you're more familiar with something, you start noticing like, littler things ... I think there's also the bits where, 'Oh, I didn't realise that that bit came after that bit' ... it all starts to fit together in your head.

Some participants noticed repetition or varied repetition within the music:

Participant A (Session 3): ... at one point the bass is playing in octaves, just repeating the same notes. And I noticed that today, as well.

Participant J (Session 3): ... one thing that I noticed halfway through the second week was ... that the diminished run that I disliked at first in the middle ... appears very similarly at the beginning. And it's, it's placed ... after a different piece of music, after a different theme, and ... its beginning is veiled, harmonically, whereas halfway through, it's very stark, so there's a stop and then there's this upbeat at this diminished arpeggio.

For Participant J, some aspects of the music seemed to become simpler with familiarity:

Participant J (Session 3): I've noticed are the texture of the music is much simpler than I thought it was at first, when I first listened to it ... I almost thought it was Liszt, that there was so much in it ... but then I was listening to it this week, and I was like, 'Actually, most of the time, there's only, there's only a few things happening, you've got a melody in the right hand, and you have got chords in the left hand' ...

Some participants mentioned the effects of familiarity on the development of their expectations in the music:

Participant B (Session 3): ... now that I know the piece so much better I know where it's going to.

Participant E (Session 3): I just know it better. I know what's coming next so I can think, "This bit's gonna be exciting", so I get more excited! And this bit's just gonna send me to sleep, so I'll just sit back and relax!

Participant P became bored with some aspects of the piece:

Participant P (Session 3): I hate to say it, but it could be just boredom with it, you know? I'm getting a bit over-familiar with the tune, the melody.

Participants discussed a number of effects of familiarity with the music, including noticing more detail in the music, previously unheard features, or repetition. For one participant, some aspects of the music appeared simpler, and others felt that their expectations in the music were more accurate. One participant reported a result of boredom with familiarity, although he still appreciated some qualities of the music.

An examination of the interview data has revealed evidence to suggest that participants do respond in each of the four ways suggested by the model outlined in Chapter 1. They were also aware of the different triggers of their responses and of factors that might

influence their responses. Additionally, participants described different ways of listening to the piece. There appeared to be some interesting differences in the use of technical terminology between music students and non-music students, and some evidence of colour associations made with the piece. The following section will triangulate the data gathered in relation to three case studies, to investigate in greater depth the effects of familiarity and musical experience on perceptual and emotional responses to the Clementi.

3.4. The effects of familiarity: Building representations of participants' schemata of the Clementi

Three participants were used as case studies, and all their data (quantitative overall measures of mood, familiarity and liking; quantitative continuous response data; qualitative interview data; and qualitative diary data) examined at each stage of the familiarization process. These case studies were undertaken for several reasons. Firstly, by looking at the quantitative and qualitative data of individual participants over several pieces, idiosyncratic familiarization trends may become evident that are not apparent from collated results. Equally, by comparing a single participant's responses to several, stylistically contrasting pieces, trends may be observed that relate to the tonal language of the music. Such detailed comparison is not easily completed with a larger sample. Finally, though the results are not easily generalizable, a detailed picture of the role of musical experience may be gleaned by the selection of three participants with varying musical experience.

These particular students varied considerably in musical experience: Participant A was the most experienced music student, and had absolute pitch; Participant J was the least experienced music student, but had good relative pitch; and Participant S was the least experienced non-music student.

3.4.1. Participant A

Participant A was a first-year music student aged 18 years, with more than 5 years of instrumental tuition, an ‘A’ Level in music, and Grades 7 or 8 in an instrument. She revealed in interviews that she had the ability of absolute pitch. She completed the continuous response mechanism without difficulty and was willing to provide all the requested information.

3.4.1.1. *Changes in overall measures*

At the first session, Participant A provided a mood rating of [1, 2] (i.e. slightly pleasant feelings with some arousal). In the second session, her mood rating was [2, 2] (i.e. pleasant feelings with some arousal), and in the third, [-1, 1] (slightly unpleasant feelings with slight arousal) (Russell et al., 1989). The slightly lower mean levels of emotional intensity in the third session may reflect the participant’s lower levels of arousal and valence, though this is difficult to confirm with this small sample of data (see Table 10).

Table 10 Comparison of mood and emotional intensity (mean of continuous emotional response traces): Participant A

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	1	2	63.70	16.71
A2			53.46	17.51
B1	2	2	58.59	21.88
B2			55.03	21.82
C1	-1	1	48.83	17.17
C2			45.33	18.07

Participant A reported an increase in familiarity with the piece over the course of the experiment (see Table 11). Although the initial level of familiarity was reported to be quite high, the participant clarified this by stating that she had not heard the specific piece before, but was familiar with the style of composition. A sizeable increase is seen

in familiarity between sessions A and B, and a smaller increase between sessions B and C. Participant A's reported liking for the piece decreased over the three sessions.

Table 11 Participant A's reported familiarity with and liking for the Clementi

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant A	Session		
	A	B	C
Familiarity	39.3	60	66.9
Liking	73.8	68.3	63.4

3.4.1.2. Participant A's changes with familiarity: Continuous response data

Only four out of a possible 15 Pearson correlations between Participant A's first-order difference traces of emotional intensity were significant at both the 0.01 and 0.05 levels, and these were relatively weak, varying from 0.14 to 0.28 in strength. Two of these correlations were between traces from the same session; the other two were between traces from neighbouring sessions. These results cannot provide conclusive evidence for quantitative changes in emotional response traces with familiarity.

3.4.1.3. Building schemata: Triangulation of continuous response data, interview data, and the music

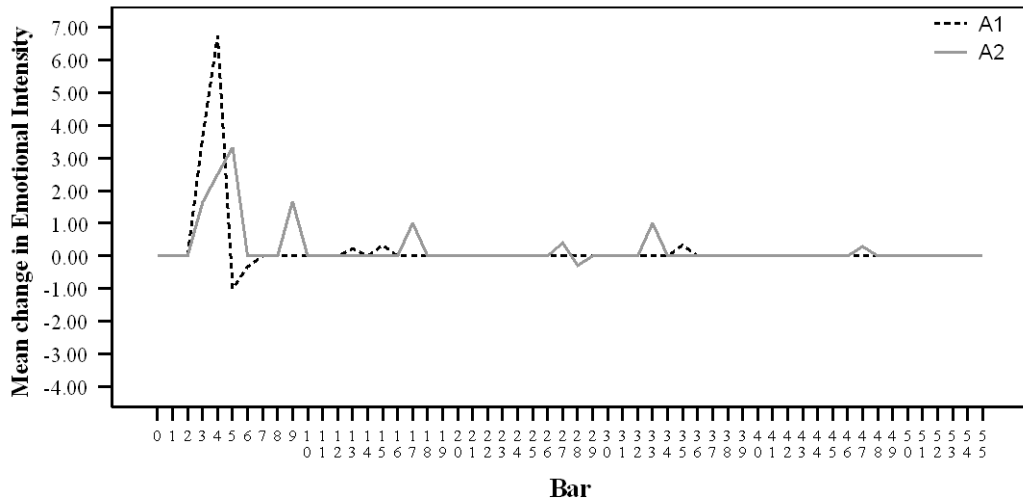
The schemata discussed below and presented in Appendix 4 evolved from the data provided by participants in both interviews and diary entries. A key for these diagrams is shown in Chapter 2 (Figure 13) and in Appendix 4.

Participant A's initial continuous response trace is fairly simple. Figure 38 reveals that she mostly increased her reported level of emotional intensity, and remained constant much of the time. Her greatest rise is at the beginning of the piece, with the start of the music, and the movement in the trace is concentrated on the first half of the graph. Similarly, there is a focus on the first half of the piece shown in the visual representation of Participant A's initial schema of the piece (see Schema 1). In her first interview, Participant A identified three main features of the work: harmonic features, a

chromatic bass line, and a structural division between two sections of the piece.

Participant A also described the character of the piece.

Figure 38 Participant A's reported changes in emotional intensity (mean levels per bar) in response the Clementi: Session A



Participant A completed the listening diaries daily, between the three interview sessions.

In the first diary entry, Participant A again focused on harmonic features, describing the key of a certain section, and a diminished arpeggio. She described two general associations with the music, however, including the effect of the music on her, and an image (that returned later in the experimental process) that might signify a narrative understanding of the music, or a Peircian symbol. Participant A's comment regarding the major passage in bars 14–18 corresponds with Cooke's assertion that 'the positive emotions ... are expressed by major music, and the negative emotions ... by minor music' (Cooke, 1959, pp. 50–51) (see Schema 2).

Participant A's second diary entry (Schema 3) was based mostly on the resurgence of the structural features identified in the first interview. One additional description was added, concerning the ending of the piece. In addition, the participant elaborated on the initial perceptual cues from the piece, and formed two, more specific, associations. One of these was with the beginning section of the piece; the second was with the effect of a

small-scale musical feature, namely, the chromatic bass notes. Participant A suggested that these created a sense of ‘urgency’, corresponding with Cooke’s suggestions that chromaticism portrays ‘emotions of the most painful type’(Cooke, 1959, p. xiii), and that rising pitch conveys ‘an outgoing of emotion’ that may, in varying contexts, generate an ‘active, assertive, affirmative, aggressive, striving, protesting, or aspiring’ effect (p. 103). The third diary entry (Schema 4) appeared to be a continuation of this elaboration process: two extra small-scale musical features were described, a general association was reiterated, and a new association, or Peircian iconic relationship, was formed with a ‘question and answer statement’.

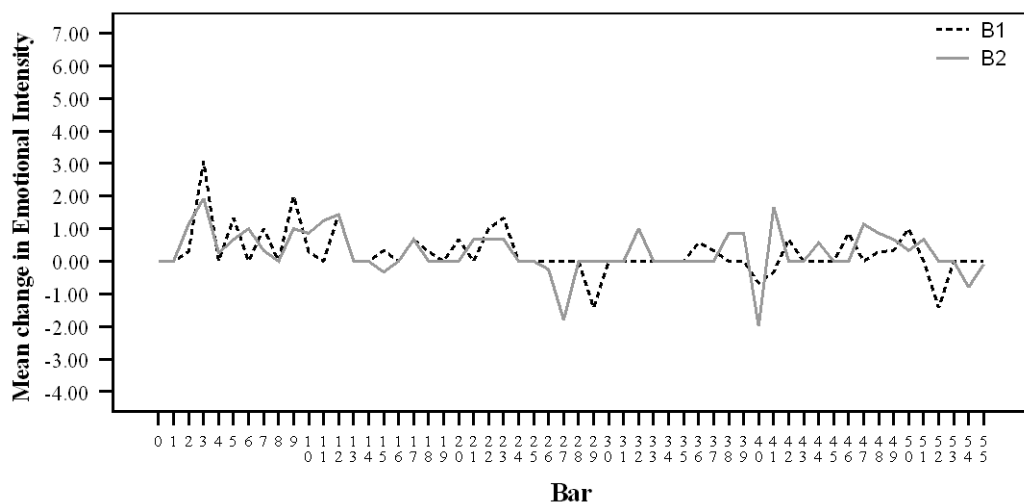
In the fourth diary entry (Schema 5), the larger-scale structure of the piece was corrected. Where Participant A had described three parts of the piece previously, she now asserted that there are two sections that are repeated. The very beginning of the piece was mentioned for the first time, and more attention was paid to the texture of the first section of the piece. The idea of a small-scale musical feature creating expectation was mentioned later in the diary entry.

The fifth diary entry (Schema 6) was fairly short, and focussed on the beginning and ending of the piece. Both of these created associations in the listener’s mind relating to expectancy, but her description of the ending revealed the participant’s use of her absolute pitch ability. In contrast, the sixth diary entry (Schema 7) was based purely on a narrative understanding. Participant A created plot-like associations on three different levels: the general level, relating to the whole piece; those relating to sections of the piece according to their key; and a plot-association with one specific musical feature.

It is evident that Participant A’s schema for this piece of music changed over the course of the first week: it became more complex in terms of the structural features of the piece

she identified, in terms of the general associations she made with the piece, and in terms of the associations made with smaller-scale musical features. Interestingly, the continuous response trace from session B (see Figure 39) appears to show a more active response to the music, with a larger number of increases and decreases in the reported emotional intensity. There are also a greater number of decreases in emotional intensity (shown by those troughs dipping below zero on the y axis). During the second interview (Schema 8), Participant A revealed considerably more detail about the piece. In some instances, she was elaborating or reiterating aspects of the piece she had discussed before, but the addition of features such as *crescendos* and the observation of textures are interesting.

Figure 39 Participant A's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session B



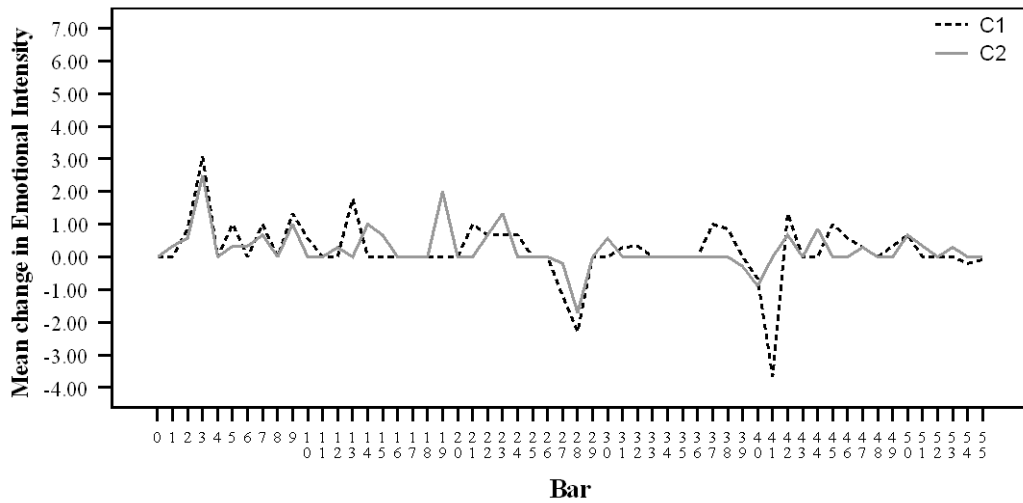
In the seventh diary entry (Schema 9), Participant A mentioned all four sections of the piece explicitly for the first time, and she added small details to existing perceptual cues. The eighth diary entry (Schema 10) revealed the participant's considerable attention to the details of texture at this stage in the familiarization process: she described the difference in texture between the chords in the left and right hands at the beginning of the piece. Her observation was correct: where the left hand has chords of

two notes varying between a seventh, an octave and a ninth, the right hand has chords of three notes: an octave and an added third each time.

The ninth diary entry (Schema 11) revealed a very specific plot that was closely linked with the musical structure. It is evident that previously-identified perceptual cues were forming ideas and a narrative within the listener's mind. The tenth, eleventh, and twelfth diary entries (Schemata 12, 13 and 14) again focused on small details of the musical structure and both general associations and associations with smaller perceptual cues. Perceptual cues noted earlier in the familiarization process are again highlighted at this later stage, revealing some constancy in the developing schema. Some new details are noted, however, such as the quaver movement described in the tenth diary entry. Participant A also reiterates the aforementioned indexical relationship between the chromatic chords and her association of an unanswered question in Diary 10, and also in the association of rocking with the continuous accompaniment, described in Diary 11..

Participant A's third continuous response trace appears to be fairly similar to the second, with a greater number of changes in emotional intensity reported here than in the first interview (see Figure 40). Here, however, the two traces from within the third interview appear to be very consistent, suggesting that the participant is no longer surprised by new musical events. The increases and decreases in the graph below appear to be of mostly similar magnitude and commence at the same time.

Figure 40 Participant A's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session C



Participant A's final schema (Schema 15) is very detailed concerning the musical structure, and concerning the three associative plots devised by the listener. The participant was clearly aware of the larger-scale musical structure as well as the smaller details contained within the music, and created both small- and large-scale narratives through which she could enhance her understanding and enjoyment of the piece. Her clear understanding of the piece might be said to be on a level of Cone's (1977) 'Third Hearing', as she has clear spatial awareness of the music, but is experiencing 'suspended disbelief' as she responds emotionally to the piece.

The development of this participant's perceptual schema varied over the course of the experiment. Initially, she focussed on the musical structure, and then supplemented this information as she noticed more details. Her associations were general to begin with, but as the detail of the musical structure emerged in the perceptual cues of the schema, these associations became embedded to smaller-scale musical features as well as the piece as a whole. Participant A appeared to understand a musical narrative relating directly to the structure of the piece, as well as associative plots, some of which were fleeting, while others were more enduring. Some of these appeared to form indexical

and iconic relationships with musical features. It is interesting to observe the extent to which the features of this participant's schematic development are similar or different to those of other participants.

3.4.2. Participant J

Participant J was also a first-year music student, though a less experienced musician than Participant A, without absolute pitch. He was 23 years old, and had received five years of instrumental tuition. He had neither a G.C.S.E. nor an 'A' level in music, but had passed a University entrance test of a similar standard to 'A' level music. He was of Grades 7–8 standard on a musical instrument. He completed the continuous response mechanism without difficulty, and was willing to provide all the requested information in the interviews, but did not complete as many diary entries as Participant A. He completed five of the six requested diary entries in the first week, and four of the requested six in the second.

3.4.2.1. *Changes in overall measures*

In the first session, Participant J provided a mood rating of [2, 1] (i.e. pleasant feelings with a little arousal). In the second session, his mood rating was [-2, 2] (i.e. unpleasant feelings with some arousal), and in the third, unpleasant feelings with considerable arousal [-2, 4] (Russell et al., 1989). Participant J's increasing levels of arousal over the three sessions may have contributed to his increasing levels of reported emotional intensity, although the precise nature of this relationship is difficult to ascertain with this small amount of data.

Table 12 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity

A1	2	1	58.11	16.71
A2			59.37	18.30
B1	-2	2	60.01	19.37
B2			66.99	16.25
C1	-2	4	69.87	20.39
C2			68.69	21.42

Participant J reported an increase in familiarity with the piece over the time course of the experiment (see Table 13). A very large increase is seen in familiarity between sessions A and B, and a marginally smaller increase between sessions B and C. Participant J's liking for the piece increased with the time he was involved in the study.

Table 13 Participant J's reported familiarity with and liking for the Clementi

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant J	Session		
	A	B	C
Familiarity	6.2	58.6	84.5
Liking	56.9	61.4	67.9

3.4.2.2. Participant J's changes with familiarity: Continuous response data

Eleven out of a possible 15 correlations between Participant J's first-order difference traces of emotional intensity were significant at the 0.01 level; however these were relatively weak, varying from 0.1 to 0.34 in strength. Table 14 below shows the correlation strengths for those correlations that were significant at the 0.01 level, and the mean correlations between pairs of traces within a session (0.23), pairs of traces from neighbouring sessions (0.15) and between distant sessions (0.13), which provide tentative evidence for quantitative changes in Participant J's emotional response traces with familiarity.

Table 14 Pearson correlations between pairs of traces provided by Participant J

* indicates significance at 0.05 level; ** indicates significance at 0.01 level.

Participant J	A1 / A2	B1 / B2	C1 / C2
Correlation	0.27**	0.26**	0.15**
Mean correlations	Within Session: 0.23		

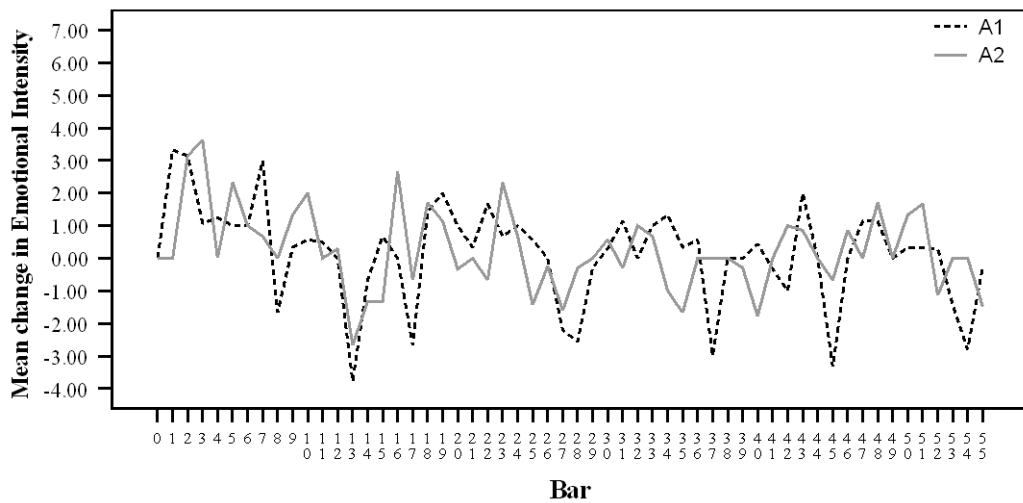
Participant J	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	0.20 **	0.23 **	0.26 **	0.34 **	n/s	n/s	0.13	n/s
Mean correlations	Neighbouring Sessions: 0.23 not including n/s results; 0.15 counting n/s results as 0.							

Participant J	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	0.20**	n/s	0.16**	0.14**
Mean correlations	Between distant sessions: 0.17 not including n/s results; 0.13 including n/s results as 0.			

3.4.2.3. Building schemata: Triangulation of continuous response data, interview data, and the music

Participant J's initial continuous response trace is fairly complex (see Figure 41). Participant J varied his reported level of emotional intensity widely and sometimes rapidly. He responded almost continuously, reacting perhaps to the changing details of the musical surface. Interestingly, there is a focus on detailed surface features of the music in the reconstruction of Participant J's perceptual schema of the piece from the first interview, which is shown in Appendix 4 (Schema 16). Participant J was able to identify and describe many of the musical features present. He also made comments about these surface features that may show evidence for a narrative understanding of the music, and other associative comments. Additionally, Participant J made an associative link between the ornamentation of a single bar of the piece and music by another composer, Mozart. Interestingly, though Participant J did not overtly describe the overall musical structure of the piece, he did identify one feature, a diminished arpeggio, that returned later in the piece, describing it as 'banal'.

Figure 41 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session A



Participant J's focus was very different in his first diary entry (see Schema 17). Rather than focussing almost exclusively on the surface features of the music as they occurred during the listening process, the participant was able to observe the piece in its entirety, identifying an associative mood, an overall narrative for the piece, and a likely (or unlikely) composer. Participant J did not identify any more surface features of the music in technical terms, but referred to areas of the piece by mood, and interestingly, noticed the reiteration of the initial melody, part way through the piece. He did not yet refer to sections of the piece, however, and therefore each surface feature was seen as emerging from the piece as a whole. As in the first interview, Participant J observed the similarity between a small feature of the musical surface (a surface cue) and music by another composer, in this instance, Beethoven, providing an example of the recognition of meta-external similarity between two pieces. He also showed evidence for a narrative understanding of the piece at a surface level.

In the second diary entry (Schema 18), Participant J moved away from the idea of the piece as a whole, instead identifying additional surface features to those mentioned in the first interview, such as the trills. He made further links between surface features of

the piece, showing evidence of his implicit awareness of the overall structure of the piece. Additionally, for the first time, Participant J issued a judgement of an aspect of the piece, revealing his dislike of the trills. He continued to show evidence for a narrative understanding of the piece.

The schema relating to Participant J's third diary entry (Schema 19) is particularly important and interesting. It appears simplified in comparison to previous schemata, and this is because of the participant's explicit increased awareness of the overall musical structure of the piece. He divided the piece into two sections, creating a more hierarchical organisation, and removing the need for the lower-level links made between surface features of the music. The majority of his comments regarding the surface features of the music were a reiteration of comments shown in previous schemata, suggesting that the participant was comparing his mental representation of the piece with his current aural perceptions. The participant also repeated his suggestion of Liszt as the composer of the piece, while identifying a small area of the piece as reminiscent of Beethoven.

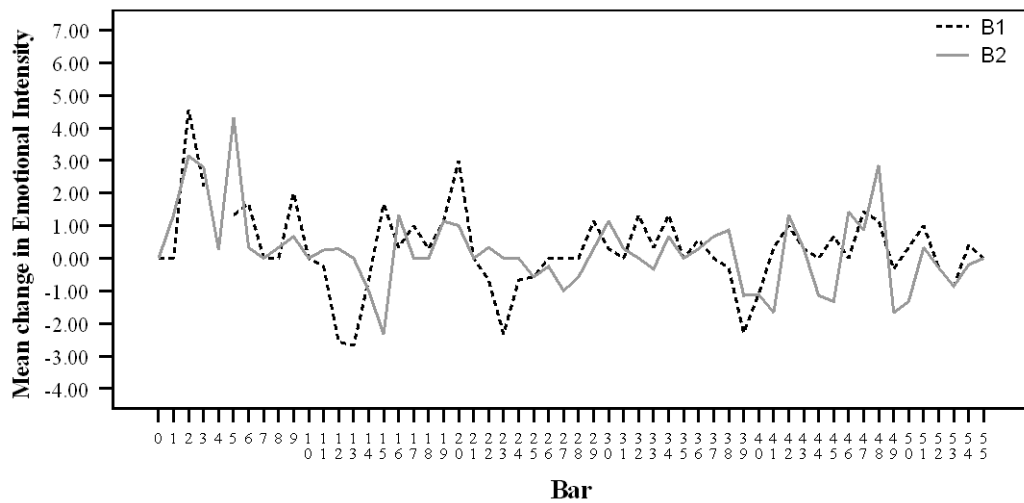
Again, the schema of the fourth diary entry (Schema 20) reveals a shift of focus towards larger-scale features of the piece. Participant J did not refer to a single small-scale perceptual cue, instead identifying a sub-section of the first half of the piece, and describing it by mood and association. The participant was undoubtedly referring to the major section of the piece, though it is not clear whether he was aware of the reason behind the change of mood, as he did not explicitly describe the key of that section. At a higher level on the schema, Participant J clearly used a narrative plot to aid his understanding of the piece, but also perhaps revealed the effects of his musical training by discussing the features of the piece as a whole in terms of analytical categories. He

described rhythmic features of the piece, made associations and a judgement about the harmony of the piece, and also revealed his appreciation of the texture of the piece.

Participant J's schema for the fifth diary entry (Schema 21) has a more balanced focus on both holistic and detailed cues and features of the piece. Again, the apparent discrepancy occurs between lower-level cues providing associations with Beethoven, and the knowledge at a higher hierarchical level that this piece is not, in fact, by Beethoven. Indeed, the participant does not even consider this possibility, but instead suggesting that instead of his original proposal of Liszt as the composer, it may be by Mozart. This schema also contains evidence of increased awareness of particular musical features, narrative understanding, and mood associations with the piece at both low and high hierarchical levels.

Figure 42 shows the continuous response trace data for Participant J during the second session. There are three particularly striking decreases in emotional intensity at bars 11–15, bars 23–27, and bars 39–42. It is particularly interesting that in his interview, this was the first occasion on which Participant J observed four sections to the piece (see Schema 22), the boundaries of which roughly correspond to the aforementioned decreases.

Figure 42 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session B



Participant J's perceptual schema for the second interview (Schema 22) is considerably more detailed than many of the diary entries. This may be partly due to the lack of time constraints on the participant in the interview; the fact that the reporting is done orally, rather than in written form; and perhaps because of prompting occurring in the research process, both from the emotional response traces and the researcher. Many of the features of the schema are reiterations or corrections of perceptual cues mentioned previously, and as discussed above, the presence of explicit reference to four sections of the piece adds a new hierarchical level to the schema.

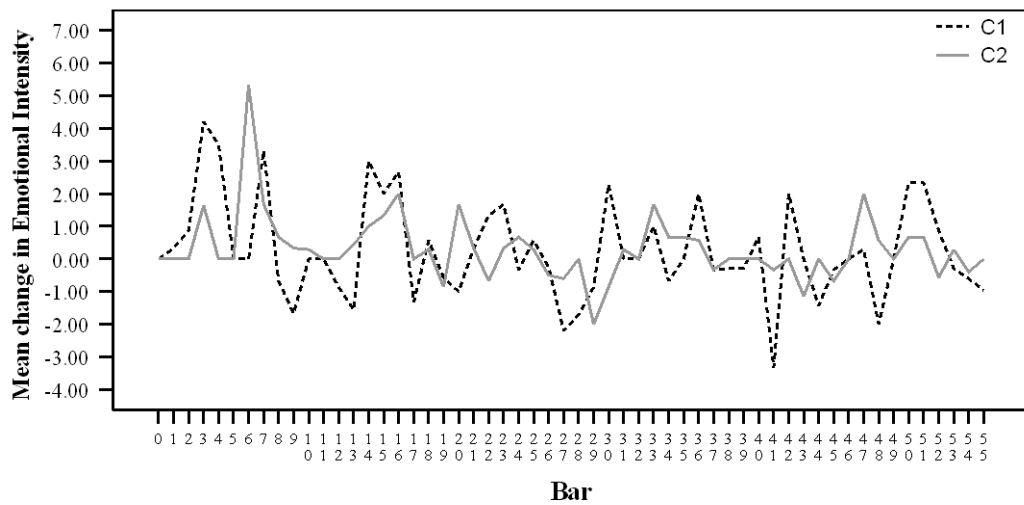
For Participant J, the resumption of daily listening and the use of the diary to record responses to the piece marked a return to the focus on surface features or cues of the music (see Schema 23). The participant mentioned two features (the opening melody, and the diminished arpeggio), both of which are repeated within the piece, and related them to the overall structure of the piece. Interestingly, he noted that the second time the diminished arpeggio occurs (bars 39–40), it 'stands out less' than in the original version (bars 10–11). The participant was clearly able to perceive the resulting differences in length, pitch, and scoring of the two versions of this arpeggio, but was either unable to

perceive the specificities of those differences in the time available, or was unable to articulate them.

The seventh diary entry (Schema 24) revealed what appeared to be a backward step in Participant J's understanding of the piece: he found that the four discrete sections he had observed previously were becoming less noticeable for him. He also described a few surface features. Again, the eighth diary entry (Schema 25) seemed to revert to an earlier representation of the piece, with just two surface features mentioned and no reference to the overall structure of the piece. Associations with the whole piece were made, however, and also a judgement of the pianist, rather than the music itself. This marks an increase in Participant J's awareness of performance features: he was concerned with how the piece 'should' be performed, indicating that he felt he had a good understanding of the piece. This concern with the performance in the recording continued in the ninth diary entry (see Schema 26), with the observation of the contrasts between the four sections of the piece. This time, however, the four sections to the piece were observed, as well as small perceptual cues and overall, fairly analytical comments concerning the texture of the piece.

Participant J's emotional responses were fairly erratic in the third session (see Figure 43). The four decreases mentioned previously that appear to mark the end of sections of the piece, are still present here, though perhaps they are slightly less pronounced because of the surrounding changeable data.

Figure 43 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session C



The final schema (Schema 27), relating to the third interview, is the most comprehensive of all of those presented here for Participant J. All hierarchical levels of the schema are active here, with overall judgement comments relating to the performer and the texture of the piece, revealing analytical thinking, as well as associative comments relating to the overall mood of the piece. The suggestion of Mozart as the composer is fairly realistic. An interesting part of this schema is the reference to the four sections of the piece, which are still present in the participant's representation, but have become less distinct, because of the similarity in themes and motives used throughout the piece. At the level of perceptual cues, no new cues were observed, but some existing cues were reiterated, and both musical and non-musical associations were made with these cues. The increase in judgement comments is seen here, too, with the perceptual cues acting as triggers prompting the critique of small-scale features of the music and the performance.

The schemata shown for Participant J clearly show progressive development. In terms of his understanding of the music, he initially focused on small scale features of the music, only grasping the formal structure of the piece after several hearings. Following

this, his understanding became deeper, noticing the similarity in themes and motives used throughout the piece in a progression that seems akin to that of Pollard Gott's (1983) participants. This deeper understanding of the piece was also revealed through his criticism of the performer: Participant J had a clear conception of how the piece should be performed, and the recording provided conflicting information to the participant's 'ideal' schema. In fact, two linked schemata might provide a more appropriate representation of Participant J's final understanding of the piece (see Schema 28 for a simplified version). Here, some shared elements of the overall schema of the piece are shown relating to the piece and both of the recorded versions, yet contrasting elements are also shown in the mini-schemata of the ideal performance and the provided recording.

In addition, Participant J's schemata reveal many different modes of listening: on some occasions he chose to focus on surface features even when he was aware of the larger-scale features of the music; he listened analytically to the harmony, rhythm and texture of the piece; he listened with both a musical and an extra-musical narrative understanding of the piece; and he listened associatively, linking the piece with moods, feelings and other pieces of music. This breadth of listening styles may be idiosyncratic, but it may be partly due to his status in this data set as a music student with slightly less formal musical training than Participant A. In addition, the depth of Participant J's understanding of the piece may have only become apparent because of his slightly slower development of his understanding of the musical structure, in comparison to the very fast development of Participant A's. The next section will examine data relating to a non-music student.

3.4.3. Participant S

Participant S was a postgraduate student from the Psychology department. He was 41 years old, and had received only the compulsory school music lessons up to the age of 14. He had neither a G.C.S.E. nor an ‘A’ level in music, and had no practical music qualifications. He completed the continuous response mechanism without difficulty, and was willing to provide all the requested information in the interviews and the diaries.

3.4.3.1. *Changes in overall measures*

At the first session, Participant S provided a mood rating of [0, 2] (i.e. neutral feelings with some arousal). In the second session, his mood rating was [2, 0] (i.e. pleasant feelings with no arousal), and in the third, [0, 2] (neutral feelings with some arousal) (Russell et al., 1989). There does not appear to be any clear link in Participant S’s data between mood and the level or standard deviation of his emotional responses.

Table 15 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	0	2	28.48	11.79
A2			41.03	10.11
B1	2	0	62.51	15.69
B2			61.76	15.91
C1	0	2	58.36	20.05
C2			57.65	22.86

Participant S reported an increase in familiarity with the piece over the course of the experiment (see Table 16). A very large increase is seen in familiarity between sessions A and B, and a considerably smaller increase between sessions B and C. Participant S’s liking for the piece increased over the time he was involved in the study.

Table 16 Participant S's reported familiarity with and liking for the Clementi

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant S	Session		
	A	B	C
Familiarity	0	70.3	84.8
Liking	61.4	71.7	79.3

3.4.3.2. Participant S's changes with familiarity: Continuous response data

Seven out of a possible 15 Pearson correlations between Participant S's continuous response traces were significant at the 0.01 level; a further three correlations were significant at the 0.05 level. These, like those of participants A and J, were relatively weak, varying from 0.11 to 0.25 in strength (see Table 17). The mean correlations between pairs of traces within a session (0.12), pairs of traces from neighbouring sessions (0.12) and between distant sessions (0.09) provide extremely tentative evidence for quantitative changes in Participant S's emotional response traces with familiarity.

Table 17 Correlations between pairs of traces provided by Participant S

* indicates significance at the 0.05 level; ** indicates significance at the 0.01 level

Participant S	A1 / A2	B1 / B2	C1 / C2
Correlation	0.11*	0.11*	0.14**
Mean correlations	Within Session: 0.12		

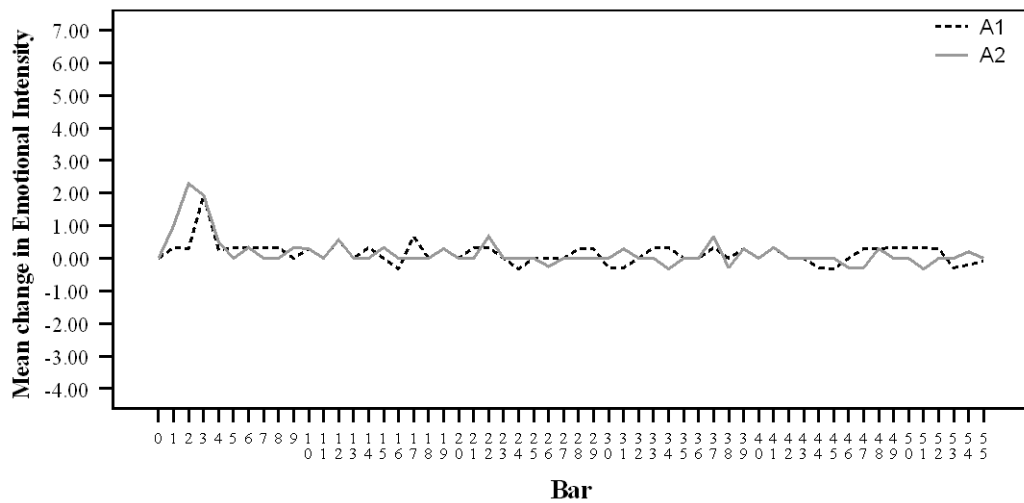
Participant S	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	n/s	n/s	0.25**	0.15**	0.22**	0.21**	0.16**	n/s
Mean correlations	Neighbouring Sessions: 0.20 not including n/s results; 0.12 counting n/s results as 0.							

Participant S	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	0.13*	n/s	0.23**	n/s
Mean correlations	Between distant sessions: 0.18 not including n/s results; 0.13 including n/s results as 0.09			

3.4.3.3. Building schemata: Triangulation of continuous response data, interview data, and the music

Figure 44 shows Participant S's continuous response trace from session A. It fluctuates in a less extreme manner than Participant J's, but appears to have more changes than that of Participant A. It is evident that continuous response traces are idiosyncratic, despite having some similar trends. The largest increase in this trace for Participant S is at the beginning of the piece, and gentle changes in emotional response occur throughout.

Figure 44 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session A



The emphasis on the beginning of the trace was explained as the result of a musical association Participant S made with the music of the film ‘The Pianist’, as shown in the schema for this interview, in Appendix 4 (Schema 29). It is noticeable that in contrast to the two previous case studies, this participant focused more on associations and a narrative understanding of the piece than on surface or structural features of the music in his initial interview.

A similar emphasis is shown in the schema of the first diary entry (Schema 30): only one additional perceptual cue from the surface of the music was added, but two potential narrative understandings of the music were outlined. Similarly, though the second diary entry contained a brief comment about the tempo and ‘riffs’ in the piece, these were related to judgement comments, rather than any detailed description of the features themselves (see Schema 31).

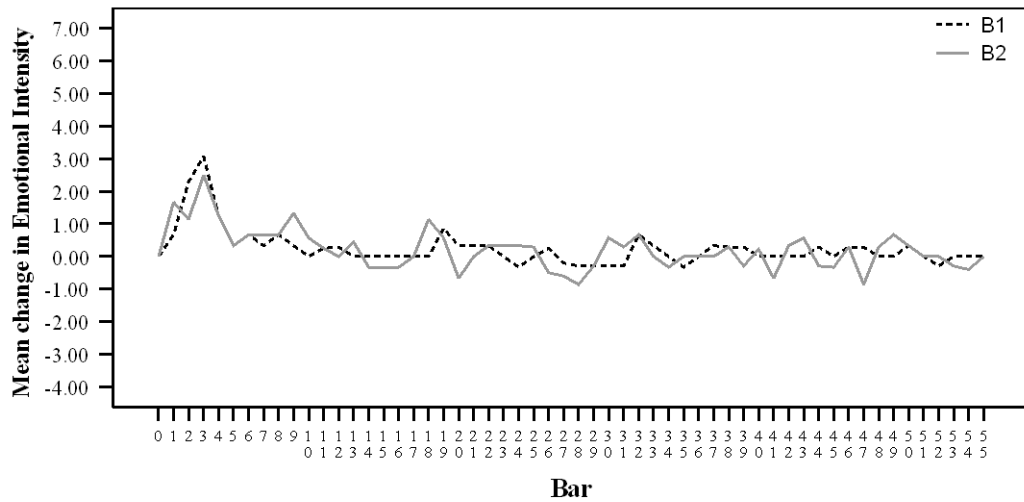
The third diary entry (Schema 32) revealed a closer focus on the details of the musical surface. Participant S reported that he had noticed some familiar patterns of notes returning during the piece, and also noted the point at which the music ‘could have

stopped' at bar 27. Although this might be taken to indicate an understanding of the two halves of the piece, the participant did not explicitly divide the piece into sections. Comments from his final interview also suggest that this was not Participant S's understanding of the piece: the cadence and pause were recognised as such, but were not understood to indicate a structural boundary in the same manner as that understood by Participants A and J. Participant S also made a musical association with a surface cue, and commented positively on the final trill of the piece.

Participant S focused a little more on the surface cues of the piece in the fourth diary entry, although he does not use detailed description but single adjectives (see Schema 33). The fifth and sixth diary entries (Schemata 34 and 35) revealed Participant S's narrative understanding of the music.

Participant S's second continuous response trace is slightly wider-ranging than his first (see Figure 45). Interestingly, his interview revealed a more comprehensive understanding of the piece, with greater detail in the musical surface cues as well as mood associations and a narrative understanding of the music. The participant spoke of repetition within the music, even though he did not describe the overall structure of the piece, and also noticed some performance elements of the music (see Schema 36).

Figure 45 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session B



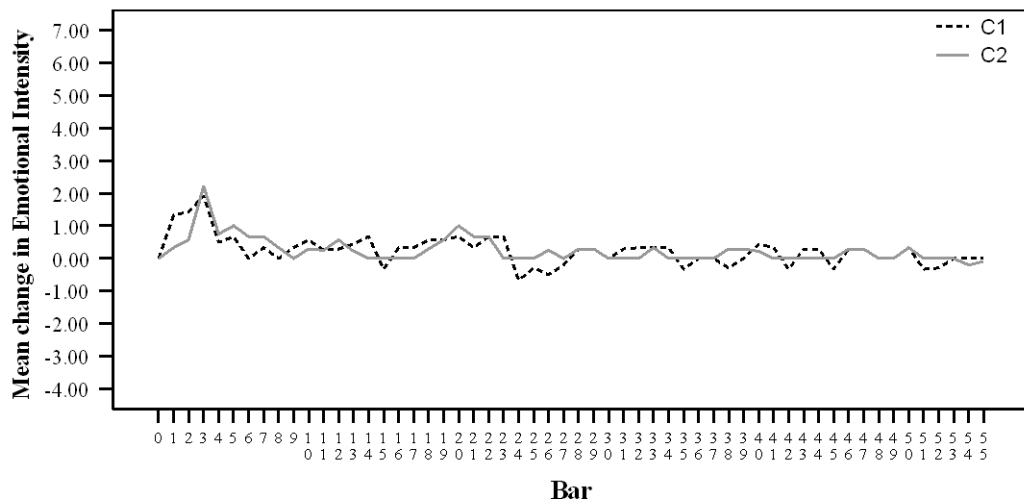
The seventh and eighth diary entries (see Schemata 37 and 38) were very brief, and concentrated on judgements relating to the piece as a whole, and narratives connected with the piece. In his ninth diary entry (Schema 39), Participant S provided timings for various adjectives, allowing access to a more specific narrative understanding of the music based on surface cues. The tenth diary entry (Schema 40) added a single adjective to this existing narrative, and referred to a second narrative structure expounded in a previous entry. This suggests that two narratives can co-exist during one listening of a piece, and perhaps be combined where they previously were not. This pattern was repeated in the eleventh diary entry (Schema 41).

A new, apparently section-based narrative appeared in the final diary entry (Schema 42). Participant S referred to the seasons as a means of interpreting the larger-scale moods of the piece. His focus on this single, more over-arching narrative may have been a development of his existing adjectives that appeared in earlier diary entries.

Participant S's final continuous response trace appears to be slightly less volatile than his second trace. His decrease in the middle of the piece occurs slightly earlier (bars 22–

24 instead of 25–28), suggesting some anticipation of the events in the music (see Figure 46).

Figure 46 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Clementi: Session C



Participant S's final schema (Schema 43) exploits the season-based narrative described in the final diary entry, but also clarifies his understanding of the structure of the piece. The participant divided the piece into two sections, but did not put this division where he has noticed the part at which the 'piece could end' in bar 27. Rather, he observed a 'memorable melody', in fact, the first version of the 'familiar pattern of notes' that in previous diary entries he noticed in the second half of the piece. This, for him, marks the beginning of the second half of the piece. This boundary is incredibly surprising. It does not correspond with the beginning of the main theme, either when it is repeated in its original form (bar 27⁴) or when it begins the second small section in the relative major key (bar 13⁴). Rather, it is a two-bar phrase (bar 18–19) that is a pre-cursor to the climax of each half of the piece. It is noticeable for this participant because of its wide ranging pitch, and probably for its dynamic contrast (it contains dynamic changes every half bar, from *forte* to *piano*), though Participant S did not mention this.

Participant S did not have an accurate conception of the piece: he did not observe the return of the main opening theme of the piece in bar 27, even though he said he recognised the beginning of the piece when it starts in the ninth diary entry. Notwithstanding this surprising conception of the structure of the piece, Participant S's schema did develop over the two-week listening period. He was able to create increasingly complex extra-musical narratives to aid him in his understanding of the music. Initially his narratives had been based on associations with the music, or with moods or emotions conveyed by the music. His first extra-musical narrative was relatively static, and involved a girl sitting listening to the music whilst looking out of a window. His later narrative was more abstract, involving a portrayal of the seasons.

3.4.4. A comparison of the case studies

The three case study participants all varied in their emphasis of each type of comment over the time course of the experiment. All three participants seemed to refer to small-scale perceptual cues more frequently than other types of comment, but narrative comments were also popular and sometimes appeared to be more dominant than perceptual cues. Participant A was unusual in her lack of comments regarding musical associations and judgements, and Participant J made few comments regarding structural features of the music.

Figure 47 Prevalence of each aspect of the schema over the familiarization period: Participant A

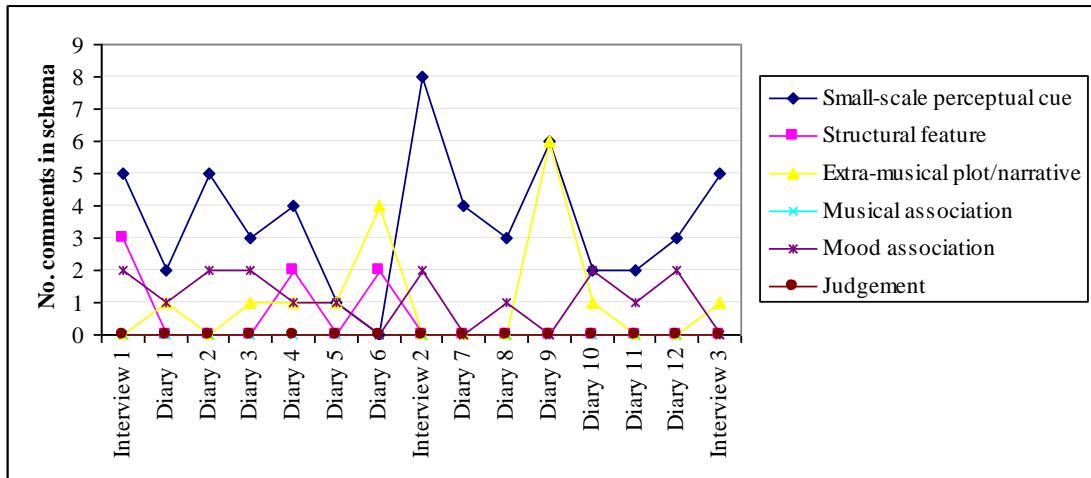


Figure 48 Prevalence of each aspect of the schema over the familiarization period: Participant J

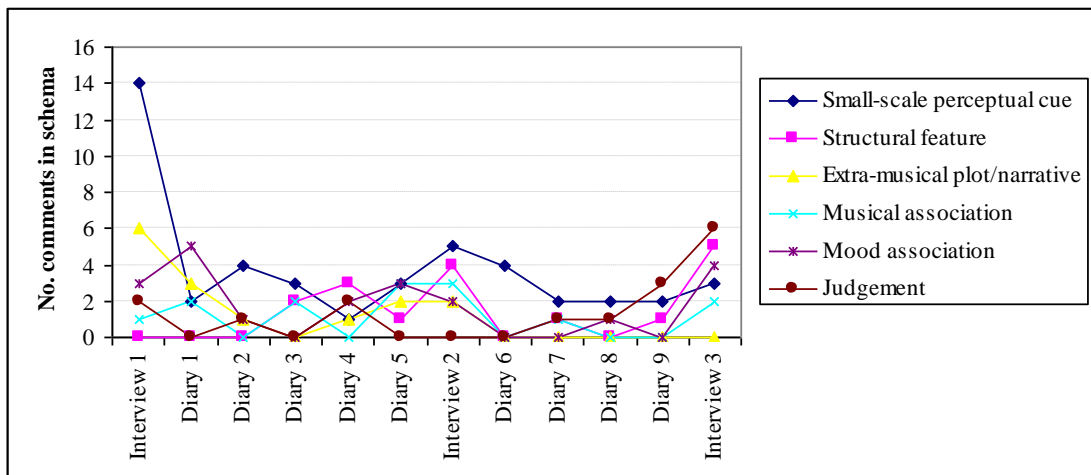
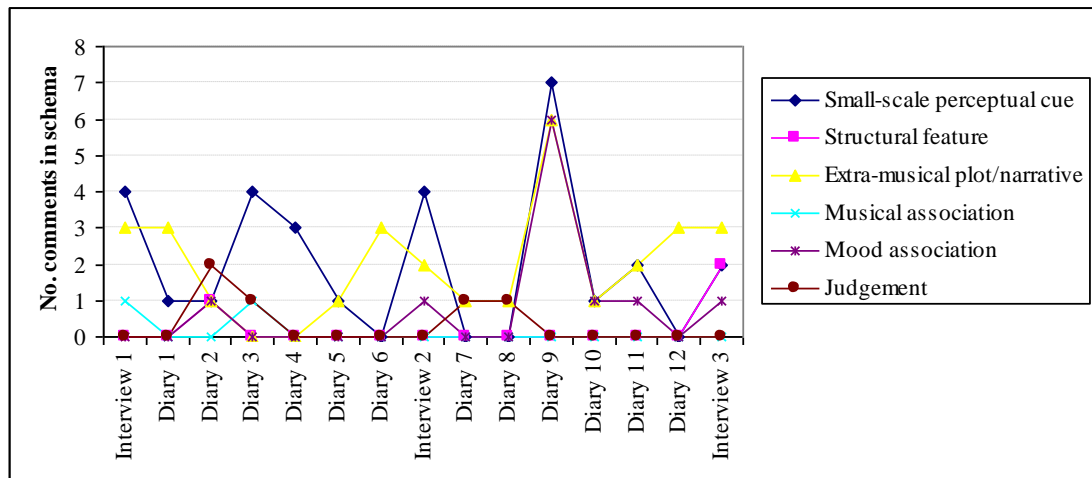


Figure 49 Prevalence of each aspect of the schema over the familiarization period: Participant S

Participant S's schema relies far more heavily than those of Participants A and J on a narrative understanding of the piece, and also contains little detail of the musical surface. This is more than a mere lack of vocabulary: Participant S's conception of the structure of the piece was less accurate than those of Participants A and J. Equally, there are occasions when the participant suggests that he 'likes the combination of notes', suggesting that when necessary, he is able to improvise to create a suitable vocabulary. It may be that Participant S's listening style is entirely idiosyncratic; however it is also possible that the musical training given to both participants A and J has prompted them to either use or learn a different mode of listening. Their focus on aspects of the musical surface and underlying structure may relate to their practical instrumental studies: performing musicians must be aware of these features as they learn new pieces, and it is possible that this mode of listening becomes engrained as they listen to themselves perform. Equally, their academic studies at degree level strongly encourage the observation of surface and structural features of the music, through classes in analysis and in aural skills. Further study would be necessary to discover which of these activities, or indeed any others, contribute to this way of hearing the music, and to

confirm that non-musicians such as Participant S would be able to adopt such a listening style with tuition and practice.

A further question is to discuss whether the adoption of such a listening style is desirable. Observation of the reported liking for this piece by these participants suggested that it may not in fact be desirable: Participant S's liking for the piece was rather higher than either Participant A or Participant J. It is difficult to find meaningful results for this data: while the overall measure of liking was recorded for each participant, the participants' status as music student or otherwise does not confirm their listening style. Furthermore, though it may be possible to find a correlation between participants' listening style and their liking for the piece, this does not show causation between the two variables.

It would be surprising if all the music students were found to like this music less: after all, they have devoted many years of their lives to classical music, suggesting an enduring affection for music. What may be affecting the liking figures is a long-term genre familiarity effect: Participant S, as a non-music student, may not have had the same amount of exposure to this type of music as Participant A or Participant J, and may therefore be experiencing a pleasurable novelty effect.

3.5. Preliminary conclusions

These results suggest that participants' emotional responses to the Clementi were observable in the model of emotional responses proposed in Chapter 1. Participants' emotional responses varied according to the musical structure: increases in emotional intensity largely conformed to those structures observed by Sloboda (1991) and Waterman (1995); decreases appeared to responses to structural boundaries in the music. There is tentative evidence for both qualitative and quantitative differences

between the perceptual and emotional responses of musicians and non-musicians. Additionally, there is considerable evidence to show that familiarity with a specific piece of music leads to quantitative and qualitative changes in participants' perceptual and emotional responses that broadly support the findings of Pollard-Gott (1983).

Chapter 4

Experiment 2: Responses to Schoenberg

4.1. Schoenberg's Three Piano Pieces (*Drei Klavierstücke*), Op. 11 No. 1: *Mäßige*

The piece used in this experiment was written by Arnold Schoenberg (1874–1951), an Austro-Hungarian composer who is remembered principally for his pioneering move in his compositions towards an atonal and later serial, musical language. The Op. 11 piano pieces were written in 1909; the piece used in this experiment is the first of a set of three (McCoy, 1999). Schoenberg experienced numerous problems in his personal life around this time: not only was he experiencing financial difficulties (Neighbour, 2007), his wife also had an affair with the artist Richard Gerstl, who had given lessons to the couple. Schoenberg's wife left him for a period, but later returned, and Gerstl committed suicide shortly afterwards (Bailey, 1998; Neighbour, 2007). As Bailey suggests, though,

There is a very strong temptation to link the upheaval of Schoenberg's personal life with the novelty of the compositions and paintings that he created at this time. But it is also possible that the musical changes and the sudden interest in painting, as reflections of general aesthetic changes that were in the air, would have happened anyway. In terms of trends then apparent in the arts, Schoenberg's creations were closely related to expressionism. A movement evident in all the arts prior to World War I, expressionism concerned the direct depiction of the artist's or composer's deepest, most personal feelings without regard for any social norms of beauty.

(Bailey, 1998, p. 20)

Schoenberg felt that his music came from him intuitively, and that he was compelled to write his music with many of the dissonant features that shocked his audiences, but he also believed that the foundations of his music lay within the classical traditions (Bailey, 1998). The music Schoenberg wrote during this time was highly original, as he moved away from the use of triadic, functional tonality as an organizing principle (Frisch, 1993). Many authors describe the Three Piano Pieces of Op. 11 as the

culmination of this period, and the first of Schoenberg's atonal works (Brower, 1989, p. 25; Frisch, 1993, p. 248; Simms, 1998, p. 236).¹⁴ The work was not well received when it was performed in concert in 1910 (Botstein, 1999; Neighbour, 2007), but it has since been described as a 'masterwork'. This mixed reception is perhaps best described by Kramer:

the *Klavierstücke*, Op. 11 (Piano Pieces, Op. 11), three impressionistic *Stimmungsbilder* that repel you as you play them. You will be lucky if you can force yourself to go through them at a single sitting. You will say "ugly,"—you will wonder "why?" Then you will put them aside. You will however, return to them and, if you are honest with the composer and yourself, you will eventually begin to find in them a message, the like of which tonal art has never before conveyed ... Opus 11 reveals the impressionistic master, seeking new piano colours, undisclosed moods. He delves into the matter of overtones ... Only a master could have conceived it!

(Kramer, 1999, p. 314)

4.1.1. Score-based analysis

The tonal language used in the first piece varies between implied consonance provided by single horizontal lines (e.g. bar 1, bar 15), implied dissonance created by extremely rapid single lines (e.g. bar 12) and extreme multi-layered dissonance (e.g. bars 50–51) (see Appendix 1 for a score of the piece). This language has prompted considerable discussion concerning the extent to which, despite Schoenberg's opposing insistence, this piece retained a tonal centre. Home keys of G major, a combination of E major and E minor, and fluctuation between E and E-flat majors have been suggested (Simms, 1998), as well as shifting tonal centres of G major, G minor, A minor and D minor (Brower, 1989, p. 26). Post-tonal examinations have been similarly diverse in their findings (Simms, 1998). It is evident from the lack of consensus of analysts that the piece does not retain a clear single tonal centre, and that it is a useful piece for the examination of emotional responses to atonal music.

¹⁴ As mentioned in the Introduction, Schoenberg himself disliked the term 'atonal' (Dunsby & Whittall, 1988, pp. 105–106; Schoenberg, 1978 [1911]; Schoenberg & Feisst, 1999), but here it is used without its negative connotations as a tendency towards the equality of tones, as suggested by Dunsby and Whittall (1988).

Despite this radical tonal language, many other aspects of the piece are more traditional (Simms, 1998, p. 236). Formally, a structure of sonata form has been suggested for this piece (Brower, 1989), though the author maintained that the dramatic content of sonata form was the most important retained element. Webern (1999, p. 224), however, suggests that this first piece is related to the three-part *lied* form, stating, ‘The short motives which immediately detach from one another are repeated again and then spun out further’. The formal structure of the piece is outlined below (see Table 18).

Table 18 Formal structure of Schoenberg’s Three Piano Pieces, Op. 11 No. 1

Section	A ‘Exposition’?		B ‘Development’?	C ‘Recapitulation’?
Content	First motive	Second motive	Both motives	Mostly First motive
Bar Numbers	1–11	10–24	25–52	53–64

The piece relies on a few small motives for its content, which are repeated at pitch, in sequence, and varied in numerous ways (Simms, 1998). It is the nature of the motives and the way in which they are combined that provide the piece with its distinctive tonal language. For example, the first motive of the piece (see Figure 50) consists of a largely descending melodic line which, though it is chromatic, retains a sense of resolution with its final note through its appoggiatura-like figure on the first beat of the third bar. The initial interval of this motive is inverted in bars 4–8 of the piece to create an answering phrase (Figure 51). The original theme is then modified to end the first section of the piece in bar 11 (Figure 52). More dramatic modification of this initial motive is seen throughout the piece.

Figure 50 Bars 1–3 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1: Motive A



Figure 51 Bars 4–8 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1: Use of the inverted initial interval of bar 1 to provide an answering phrase



Figure 52 Bars 9–11 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1: A modified Motive A



The piece also contains considerable rhythmic fluctuation and textual innovation. Rhythmically, note values vary between demisemiquavers and those sustained over up to $5\frac{1}{2}$ crotchet beats. Dotted rhythms are frequently present, and the use of syncopation creates areas of metric ambiguity (Brower, 1989). Complex rhythms frequently overlap to create interlocking textures. Texturally, there are normally three voices divided between the two hands of the pianist, but also areas of melody supported by homophonic chords. A particularly innovative textural feature is the use of the harmonics of the piano in bars 14–17, where the pianist is instructed to hold down the notes indicated without allowing them to sound, whilst playing other notes in the left hand (see Figure 53).

Figure 53 The use of harmonics in bars 14–17 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1

The musical score for bars 14-17 of Schoenberg's Three Piano Pieces, Op. 11 No. 1, is shown. The score is in a key with one flat and a 3/4 time signature. The treble clef part has a 'Flag.' marking and a 'langsam' tempo marking. The bass clef part has 'sf' and 'p' markings. There are 'ohne Ped.' markings under the bass clef part. The score is in a key with one flat and a 3/4 time signature.

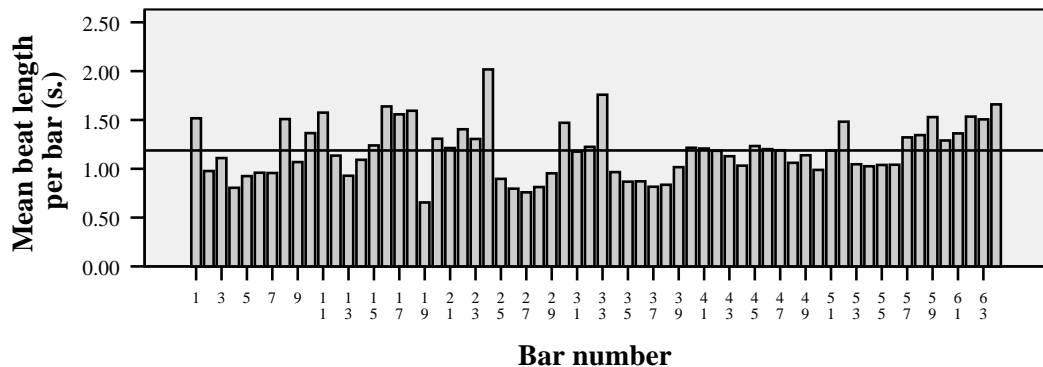
Further noteworthy features include the wide pitch range of the piece (from E'-flat to b''-flat), the considerable tempo fluctuations marked, and the wide-ranging and rapidly-fluctuating dynamics. As a whole, the piece is highly innovative, and provides much interest for the listener.

4.1.2. Performance analysis

As in Experiment 1, a professional recording of the piece was used (see Appendix 2). To assess the performer's use of tempo deviation, the bar lengths were calculated. The mean bar length was 3.58 seconds, with a standard deviation of 0.884 seconds. This slightly larger standard deviation than the Clementi must be considered in the light that the Schoenberg contained several changes in metre. Because of this, the mean length of each beat per bar was calculated. The overall mean of this figure was 1.19 seconds, with a standard deviation of 0.279 seconds. The graph in Figure 54 provides a visual representation of the mean beat length per bar of the piece.

Figure 54 Mean beat length per bar (seconds) in the recording of the Schoenberg

The horizontal reference line denotes the mean beat length per bar (1.19 seconds).



Visual inspection reveals considerable variation in mean beat length. Interestingly, there is a general increase in mean beat length per bar towards the end of the piece, indicating the performer's use of gradual slowing to portray this large-scale structural feature. The bars with the largest mean beat lengths are 24, 33, 64, 16, 18, 11, and 17 (in descending order). Comparison with the score reveals that bars 24, 33, 18 and 11 mark section boundaries, and 64 is the last bar of the piece (see Figure 55a–e). All these bars also contain decreasing dynamics. As seen in the Clementi, the performer is therefore lengthening the bars to provide emphasis of structural features. Bars 15–18 are marked *langsamer* in the score, and are therefore performed more slowly than the rest of the piece (see Figure 55f).

Figure 55 Lengthened bars in Schoenberg's Three Piano Pieces, Op. 11 No. 1

a) Section boundary: bar 11

b) Section boundary: bar 18

Musical score for section boundary at bar 18. The score is in G major and 3/4 time. It shows measures 17 and 18. The tempo is marked *sehr langsam*. The dynamic is *f*. The right hand has a melodic line with a slur over measures 17 and 18. The left hand has a bass line with a slur over measures 17 and 18.

c) Section boundary: bar 24

Musical score for section boundary at bar 24. The score is in G major and 3/4 time. It shows measures 23 and 24. The tempo is marked *rit.* and *Mäßig.*. The dynamic is *f* in measure 23 and *p* in measure 24. The right hand has a melodic line with a slur over measures 23 and 24. The left hand has a bass line with a slur over measures 23 and 24.

d) Section boundary: bar 33

Musical score for section boundary at bar 33. The score is in G major and 3/4 time. It shows measures 32 and 33. The dynamic is *pp*. The right hand has a melodic line with a slur over measures 32 and 33. The left hand has a bass line with a slur over measures 32 and 33.

e) Section boundary: bar 64 (the final bar of the piece)

Musical score for section boundary at bar 64 (the final bar of the piece). The score is in G major and 3/4 time. It shows measures 61 and 64. The dynamic is *pp*. The right hand has a melodic line with a slur over measures 61 and 64. The left hand has a bass line with a slur over measures 61 and 64.

f) Bars 15–18, with a slower tempo marking

14 Die Tasten tonlos niederdrücken! *Flag.* *langsamer* *sel*

sf *sf* *p* *p*

ohne Ped...... *ohne Ped.*.....

The bars with the shortest mean beat length are 19, 25–28, 4–5, and 35–38 (see Figure 56). These areas are all relatively near the beginnings of sections, and are relatively busy in texture (a similar pattern to that seen in the performance of the Clementi), with the exception of bar 19. This bar contains two crochet rests that appear to have been hurried through to get to the beginning of the next section: it is possible that the performer was compensating slightly for his very slow tempo in bar 18.

Figure 56 Shortened bars in Schoenberg's Three Piano Pieces, Op. 11 No. 1

a) Bars 25–28

b) Bars 4–5

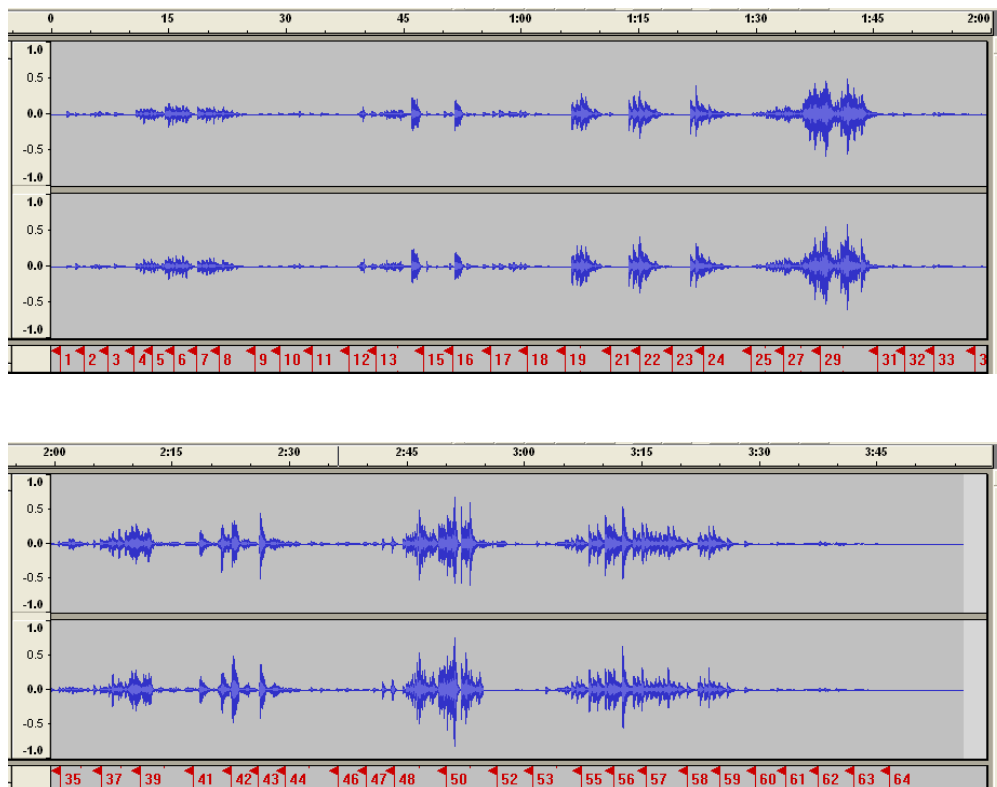
c) Bars 35–38

A second feature of the music that may correspond more to the recording than the score is the dynamic variation, which has been found to trigger emotional responses in previous research (Sloboda, 1991). The amplitude of the recording shows a peak around

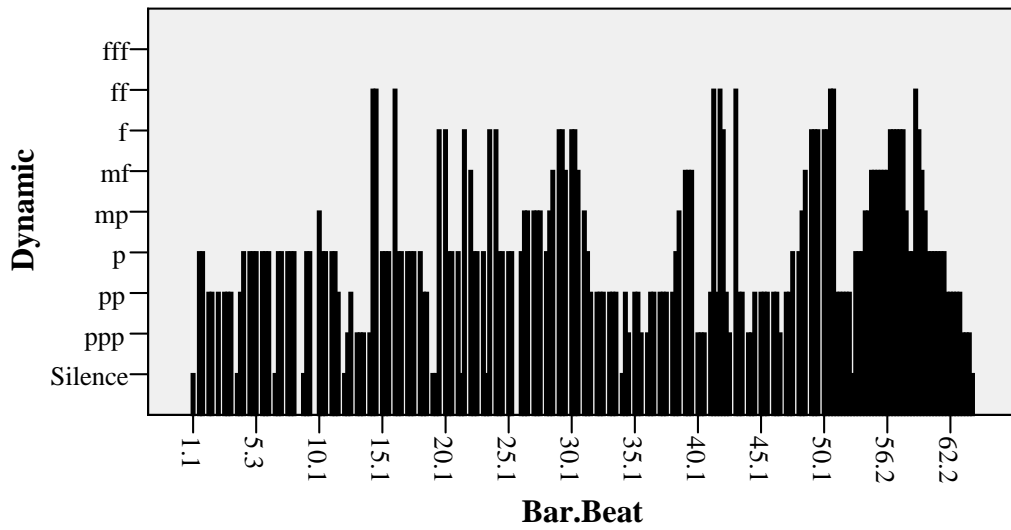
bars 27–29, and a main peak around bars 48–52 (see Figure 57). A final smaller peak is shown in bar 56. This shows similarities with the peak areas shown in Figure 57 b and c, but not an exact realisation. This will be taken into consideration when examining triggers for changes in emotional intensity.

Figure 57 Volume changes in Schoenberg’s Three Piano Pieces, Op. 11 No. 1

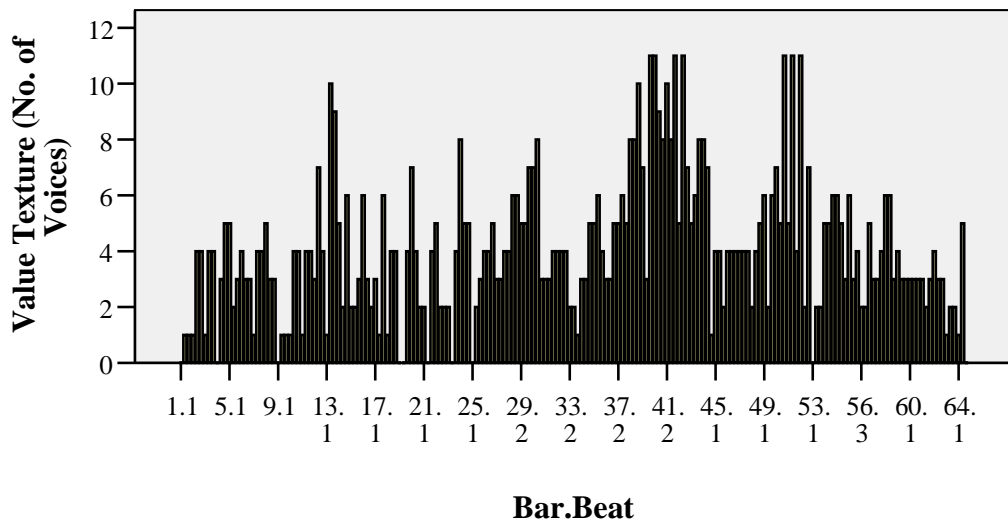
a) Amplitude representation of the recording



b) Graph of dynamics marked in the score



c) Graph of textural density of the score



The rest of this chapter will examine the quantitative and qualitative data gathered in response to the first of Schoenberg's Three Piano Pieces.

4.2. Analysis of quantitative data: Continuous response traces of emotional intensity

In this section, the quantitative data will be examined with the use of Pearson correlations and ANOVAs to discern whether there is a significant effect of musical experience or familiarity with the piece on emotional responses. The triggers of these emotional responses will also be examined.

4.2.1. Musicians vs. non-musicians

To assess the differences between musicians and non-musicians, six multivariate ANOVAs were conducted on the mean response rate per half-second in each bar, calculated using first-order difference figures. One ANOVA was conducted for each response trace. The between-subjects variable was type of student. There were relatively few significant differences between the musicians and non-musicians; however the exceptions are outlined in Table 19.

Table 19 Significantly different estimated marginal means of music students and other students in ICB figures as a response to Schoenberg¹⁵

Bar	Session / trial	ANOVA result and significance		Estimated marginal means	
		<i>F</i> (1, 15)	<i>p</i>	Music students	Other students
7	C2	4.75	0.046	0.926	0.667
8	A1	4.98	0.041	-0.247	0.250
9	B2	4.77	0.045	-.349	.179
22	A2	4.79	0.045	-0.111	0.219
25	C1	6.57	0.022	-.889	-0.063
31	C1	6.60	0.021	-0.730	.071
32	A2	6.83	0.020	-2.111	-.313
36	B1	4.64	0.048	-0.1778	0.2000
50	A1	5.57	0.032	1.644	0.450
57	B2	14.291	0.002	0.311	0.025
62	A1	6.176	0.025	0.200	-0.150

¹⁵ Key to session/trial:

A = 1st Session, B = 2nd Session, C = 3rd Session
1 or 2 indicates trial within each session

Responses in bars 7, 8, and 9 were all significantly different between the two types of student, on one occasion. This difference was not consistent in direction, however: in bar 7, during trial C2, music students reported significantly greater increases in emotional intensity than non-music students; whereas in bars 8 and 9, in trials A1 and B2 respectively, music students reported a decrease in their emotional intensity in contrast with the reported increases of the non-music students. These bars are shown in Figure 58, below. All three bars are subject to considerable variation in both tempo and dynamic level. Though the results seem opposing, it may be that, having increased their emotional intensity to a greater extent than the non-music students, the music students need to return to a certain level by the end of bar 9. This area of the music is close to a section boundary, and change of mood, at the end of bar 11.

Figure 58 Bars 7–9 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1



In bars 22 and 25, music students decreased their emotional intensity to a greater extent than non-music students. Again, this area of the piece is subject to variations in tempo and dynamics, and the beginning of bar 25 marks the beginning of a new section of the piece (see Figure 59).

Figure 59 Bars 22–25 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1

A similar trend occurs in bars 31, 32, and 36: music students decrease their emotional intensity at a more rapid rate than non-music students. Again, this area surrounds a structural boundary (bar 34), and is subject to dynamic variation (see Figure 60).

Figure 60 Bars 31–36 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1

The musical score for Schoenberg's Three Piano Pieces, Op. 11 No. 1, bars 31-36, is presented in two systems. The first system (bars 31-34) is in the bass clef, and the second system (bars 35-36) is in the treble clef. The key signature is one flat (B-flat major/C minor), and the time signature is 3/4. The score shows a structural boundary between bars 34 and 35. Dynamics include *pp* (pianissimo) and *ppp* (pianississimo). A vertical line is drawn between bars 34 and 35, indicating a structural boundary.

In bars 50, 57, and 62, music students are increasing their emotional intensity to a greater extent than non-music students. Bar 50 might be seen as the climactic moment of the piece; and is very loud. Bars 57 and 62 contain reiterations of the main themes used in the piece. All three extracts have considerable dynamic variation. Bar 62, of course, is approaching an important structural boundary, namely, the end of the piece (see Figure 61).

Figure 61 Bars 49–51, 56–58, and 61–63 of Schoenberg's Three Piano Pieces, Op. 11 No. 1

The figure displays three systems of musical notation for Schoenberg's Three Piano Pieces, Op. 11 No. 1. The first system (bars 49-51) features a treble and bass clef with a 3/4 time signature. It includes dynamic markings of *f*, *ff*, and *pp*, along with an *accel.* instruction. The second system (bars 56-58) shows a treble and bass clef with a 4/4 time signature, marked with *f*, *p*, and *sf dim. - - -*. The third system (bars 61-63) is in a bass clef with a 3/4 time signature, marked with *pp*. The notation includes various rhythmic patterns, accidentals, and phrasing slurs.

These differences between the two types of student are more consistent than those seen in response to the Clementi, and they may suggest greater structural awareness in the music students than the non-music students; however, they should still be treated with caution. The two groups did not respond differently to any bar in the piece on more than one occasion, and though there seems to be a link between the differences in terms of their proximity to a structural boundary, this link is somewhat tentative.

4.2.2. Familiarity and musical structures

As in Chapter 3, to assess the effects of familiarity, first-order difference traces of emotional intensity were analysed. Mean difference traces for all participants were subjected to Pearson correlation tests. Correlations between traces nearest in time (in

terms of data collection), e.g. A1 and A2, were expected to be stronger than those further apart, e.g. A1 and C1. All these correlations were highly significant, and are mostly substantial associations (see Table 20).

Table 20 Pearson correlations of mean difference traces according to session and trial

Session		A		B		C	
	Trial	1	2	1	2	1	2
A	1	1	0.501 <i>p</i> <0.001	0.509 <i>p</i> <0.001	0.493 <i>p</i> <0.001	0.434 <i>p</i> <0.001	0.347 <i>p</i> <0.001
	2	0.501 <i>p</i> <0.001	1	0.586 <i>p</i> <0.001	0.520 <i>p</i> <0.001	0.498 <i>p</i> <0.001	0.410 <i>p</i> <0.001
B	1	0.509 <i>p</i> <0.001	0.586 <i>p</i> <0.001	1	0.580 <i>p</i> <0.001	0.534 <i>p</i> <0.001	0.465 <i>p</i> <0.001
	2	0.453 <i>p</i> <0.001	0.520 <i>p</i> <0.001	0.580 <i>p</i> <0.001	1	0.459 <i>p</i> <0.001	0.384 <i>p</i> <0.001
C	1	0.434 <i>p</i> <0.001	0.498 <i>p</i> <0.001	0.534 <i>p</i> <0.001	0.459 <i>p</i> <0.001	1	0.511 <i>p</i> <0.001
	2	0.347 <i>p</i> <0.001	0.410 <i>p</i> <0.001	0.465 <i>p</i> <0.001	0.384 <i>p</i> <0.001	0.511 <i>p</i> <0.001	1

To assess the effects of familiarity, these correlation coefficients were subjected to a univariate ANOVA, with the three levels of closeness in time being the ‘between-subjects’ variable. Although there were differences between the strength of the correlation, and the strongest correlations were those closest in time (see Table 21), these differences were not significant ($F(2, 12) = 3.094, p = 0.082$).

Table 21 Means of correlations at each level of closeness

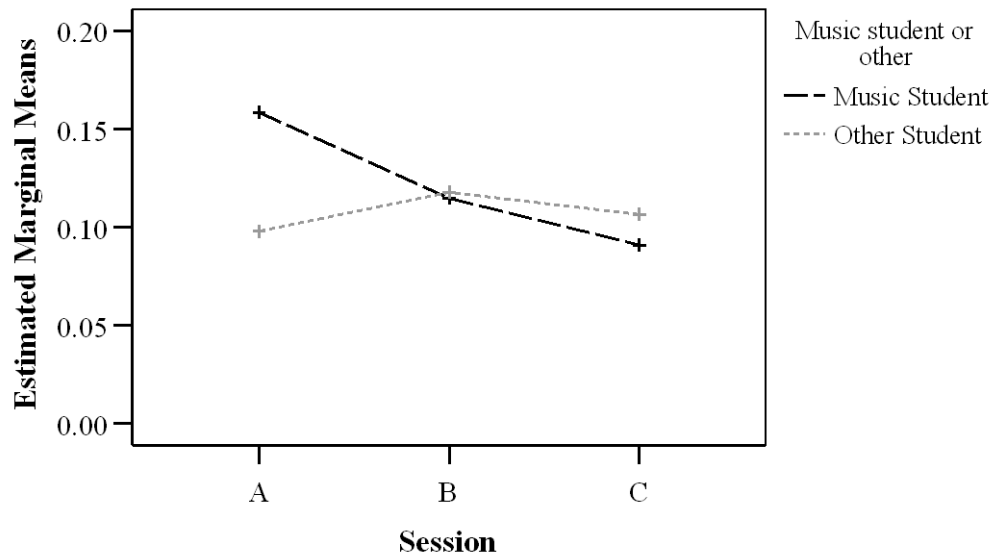
	Mean	Standard deviation
Within session	0.5307	0.04302
Between neighbouring sessions	0.4888	0.06163
Between distant sessions	0.4223	0.06742

ICB figures¹⁶ were used in a repeated-measures ANOVA. Within-subjects variables were session (3), trial (2), and bar (56); the between-subjects variable was type of student (2). There was a highly significant main effect of bar ($F(63, 945) = 6.85, p <$

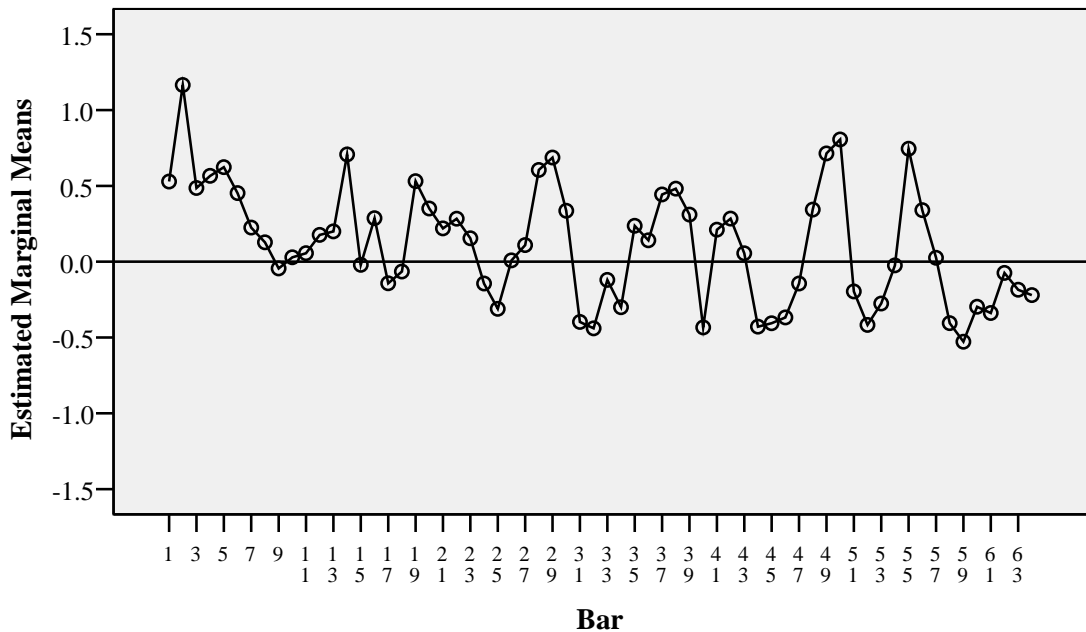
¹⁶ The mean change in intensity per half-second in each bar, as described in Chapter 3.

0.001), confirming that changes in the musical structure had a significant effect on ICB figures. Though there were no other main effects, there were some very interesting 2-way interactions. Firstly, there was a significant interaction of session and bar ($F(126, 1890) = 1.246, p = 0.037$), suggesting that there were consistent changes in emotional response to specific musical structures between each session. The effect and interaction that involve the bar variable will be examined in greater detail shortly. Secondly, there was a significant interaction between session and type of student, suggesting differences in the changes in emotional response with familiarity according to the musical experience of the participant ($F(2, 30) = 3.783, p = 0.034$). It is important to note that there was no significant interaction between trial and type of student, reducing the likelihood that this interaction occurred by chance. The estimated marginal means of this significant interaction are shown below (Figure 62). The graph suggests that music students had greater mean increases in their emotional responses than other students during the first session, but that the size of those increases reduced over the three sessions. The other students' increases grew in magnitude between the first and second sessions (with familiarity), but then decreased to a slightly higher rate than those of the music students.

Figure 62 Estimated marginal means of the interaction between session and type of student in response to the Schoenberg



The estimated marginal means of the significant main effect of the bar of the piece mentioned above are shown in Figure 63. The greatest areas of increase and decrease will be examined. Excluding the initial rise, which may be seen as a response to the music beginning, the seven greatest increases were seen in bars 5, 14, 19, 28–29, 37–38, 49–50, and 57. The greatest areas of decrease were seen in bars 25, 31–32, 40, 44–46, 59, 52. In each case, the surrounding area of a peak or trough will be discussed, so that the musical context may be taken into consideration, in addition to comments made by participants in their interviews.

Figure 63 Estimated marginal means of the significant effect of bar

4.2.2.1. Areas with important increases

The first area of the piece that triggered large increases in emotional intensity was in bars 4–5. A range of musical features were reported to have contributed to this effect, one of which was dynamic variation. This occurs for the first time in the piece in bars 4–5 (see Figure 64). These dynamics were noted by Participant K:

Participant K: ... it goes into more of a crescendo here [bars 4–6] ... the intensity ... increases, so the graph's going up, but then ... it keeps ... increasing and then ... dying down, like this part [bar 8].

Participant A described the bass movement in bar 4 and its increased activity as emotional triggers:

Participant A: ... the bass, it just gets, it builds up a little bit. And it starts moving more than the small bits that it had done before.

Participant B described the beginning of the piece as 'the most emotionally charged bit', and 'tense' and 'unhappy'. She suggested that this emotion may have been conveyed through the use of *rubato* by the performer, as well as by the musical features such as 'unexpected chords'. Harmonic features were discussed by other participants, several of

whom said that they enjoyed the beginning of the piece because of its relatively conservative harmony:

Participant D: I do like the beginning though, because it's all relatively nice ... tonal, you know, proper, real music. Not these funny notes!

Participant F: It's really gentle. I put it on on my computer, and walked away, and I thought it was a different CD, because it's open and pretty, and then the harmony kind of ... I don't know, I actually quite like it.

Participant N: Well this part, in the first one, I liked it, because at least it's regular. It's really my favourite part of the piece, 'cos it's at least ... regular ... normal sounds.

A seemingly important, but unmentioned, feature is the ambiguity of pulse at the beginning of the piece: none of the first beats of the bar are emphasised, with perhaps the exception of bar 3, and no entry begins on the first beat of a bar. Additionally, in bar 5, the right hand entry is altered rhythmically from the last time it was heard in bar 4, the upper part entering a quaver beat earlier than the other parts, and a quaver beat later than it did originally (see Figure 64).

Figure 64 Bars 1–6 of Schoenberg's Three Piano Pieces, Op. 11 No. 1



Bars 14 and 19 (see Figure 65) both mark initial instances of loud motives in the piece, and are both preceded by quiet music. Interestingly, both loud moments occur at the end of their bars, again moving the accented beat away from the first beat of the bar. These dynamics were mentioned by several participants as triggers of their increase in emotional intensity.

Participant B was less direct, saying that the cause of her increase was that the ‘sudden chords were still surprising’, even after two weeks of daily listening. Similarly,

Participant G suggested the rousing effect of the sudden chords:

Participant G: ... it engaged my attention, I think, both times. When you hear it, it makes you sit up and listen. ‘Cos I think ... it gets a bit hard to listen to before that bit. So you sort of shut off, and you’re not really listening to the music, but when you hear that big chord, you sort of jump up and wake again, and go, ‘Oh yeah, I remember what was going on now!’

Participant F describes the combined effect of the contrast in dynamic and pitch between the two ideas present in this excerpt:

Participant F: You’ve got these two kind of contrasting ideas: you’ve got the loudness, and the kind of lower pitch, and then the tinkly kind of pensive high bit that comes out if it. And it, that maintains the tension. Rather than having silence, when you might kind of fade away, having quiet little bits, that pretty at the top of the piano holds it on, and so it’s ... rather than rising and falling, it’s progressively rising up. For me personally. It’s going towards a kind of greater climax, but at that point it reaches a very interesting point.

Participant O described her reluctance to equate loudness with emotional intensity, but admitted that the volume of musical features did affect her emotional response:

Participant O: I’d like to think that I’m kind of employing more than just, like, loudness equals intense, because obviously, it doesn’t. But also, the fact that the piano is very ... loud, and sudden, and then it kind of stops, it’s kind of like force, and lulls ... it builds up, it feels like it’s building up to something.

Dynamics are clearly an important feature here.

Figure 65 Bars 13–22 of Schoenberg's Three Piano Pieces, Op. 11 No. 1

Die Tasten tonlos niederdrücken!
Flag.

ppp

f

sf

ohne Ped.....

13

15

p

sf

ohne Ped.....

18

sehr langsam

f

p

f

p

Bars 28–29 (see Figure 66) show large increases in emotional intensity. Again, these bars are loud, especially in contrast with the preceding dynamic, *piano*, with a rapid *crescendo* to *forte* in bar 29. Participants D, G, I, K, and O mentioned the dynamics having an effect on their emotional intensity. Several other participants mentioned the rising pitch, and increased activity of these few bars. For instance, Participant G states:

Participant G: I think it's because it's loud, for starters. And it's quite high up, and I think I respond more to high notes ... than the low notes ... it was faster, to an extent, than it had been before.

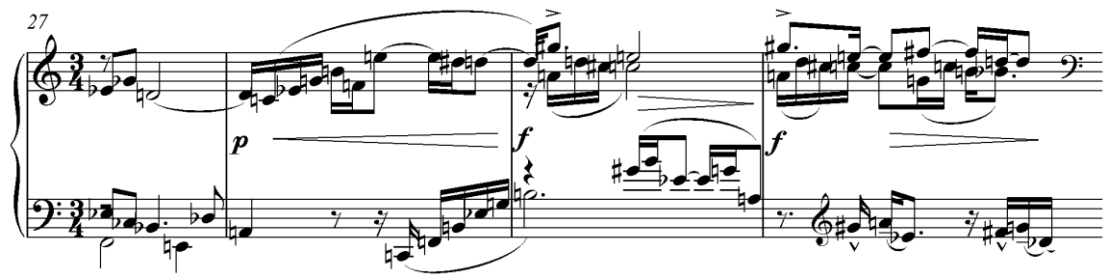
It may also be noteworthy that the motive played so loudly at this point is taken from the beginning of the piece, with its striking interval of a descending third. The importance of the top line of music is noted by Participant C, though he doesn't specify its relationship with the beginning of the piece. He also notes the dissonance of these few bars:

Participant C: Yeah, this is where it comes in with big, almost like, spread chords, and the dissonance in the right hand. I think that has more of an effect than the bass bit does. The bass bit to me just sounds like it's this annoying thing that's there, that's just, you

can't get rid of. And it's just there, making a lot of noise. Whereas the top part actually, it's trying to say something. It struggles because of the 'bluburrmm' bass.

The triggers for these few bars of increasing emotional intensity appear to be the increase in dynamic, pitch and activity, the dissonance, and the importance of the top line of the music.

Figure 66 Bars 27–30 of Schoenberg's Three Piano Pieces, Op. 11 No. 1



Bars 37–38 (Figure 67) are rather quieter than these previous examples; however the surrounding context may provide an explanation for these large increases in emotional intensity. Bars 34–38 contain two rising sequences, a feature previously seen to trigger emotional responses in tonal music. The first of these sequences is an oscillating variation of the original theme of the piece, which is spread over more than five octaves. This sequence reaches its peak at the beginning of bar 38, only to be followed by a miniature sequence on the second and third beats of the bar, which might be heard as a *stretto* effect. Interestingly, no participant mentioned that this was a sequential passage, though Participant G did notice that the main motive of the piece was present:

Participant G: I think it was the same as before, as that one, it had that same sort of motif to it ...

Other participants noted the repetition, and that the piece was 'building up' at this point:

Participant F: But this bit's building on itself, so again the same things are coming, and there's lots of things happening.

Participant I: It sounds like it's rushing up to something.

Participant O: I think I'm ... more aware of ... the creeping noises that were coming up.

Participant A described the interlocking rhythmic patterns in the music:

Participant A: It's the patterns ... the different rhythms ... and the hands going against each other.

This increase occurs in an area of a sequential passage, and participants noted that the music was based on the main motive of the piece, was rising in pitch, building up, and that there were interesting interlocking rhythmic patterns in the music.

Figure 67 Bars 34–38 of Schoenberg's Three Piano Pieces, Op. 11 No. 1

Bars 49–51 (Figure 68), a further area of increase in emotional intensity, have been previously inspected as one of the areas in which music students and non-music students differed in their responses to the music. This area may be seen as the climax of the piece, and was described as such:

Participant K: ... all of a sudden it gets more ... emotional round here [bar 50]. And again, after such a point, like, climax of emotion, it just kind of ... trails off again [bar 52].

The emotional response this caused was, in at least one case, manifested in physical sensations:

Participant O: That bit sends like shivers up my spine when I'm thinking about it ... it's really creepy, in a way. It's really ... jarring.

There is a large increase in dynamic, accelerating tempo, and short note values that cover a large expanse of the piano's range. Participants C and E particularly notice the strong bass line and the contrast between the two hands:

Participant C: Yeah. It's like coming back for more, um, the big chords in the bass, and then it's covering quite a big range of the piano, with quite a bit of dissonance, it just makes it a bit more ... angry.

Participant E: The chords underneath. The right hand's doing the ... little bits on the top, and then the left hand's like building up underneath. So it was the left hand that did it.

The climax of the piece, demonstrated by strong dissonance, a wide range of pitch, a strong bass line, and short note values appears to be the trigger for this increase in emotional intensity.

Figure 68 Bars 48–51 of Schoenberg's Three Piano Pieces, Op. 11 No. 1

The musical score for bars 48-51 of Schoenberg's Three Piano Pieces, Op. 11 No. 1, is presented in two systems. The first system covers bars 48 and 49. Bar 48 shows a melodic line in the right hand with a slur and a sharp sign, and a bass line in the left hand. Bar 49 features a forte (f) dynamic marking. The second system covers bars 50 and 51. Bar 50 features a fortissimo (ff) dynamic marking, and bar 51 features a pianissimo (pp) dynamic marking. The score includes various musical notations such as slurs, accents, and dynamic markings.

The final area of increase is bar 57, which was also found to induce differing responses in music students and non-music students. The dynamics and articulation of this area of the music seem likely to trigger increases in emotional intensity, perhaps in addition to the changing time signature (see Figure 69). Several participants noted the forceful articulation of these few bars:

Participant F: It's a kind of forceful ... 'I'm gonna play this, and I'm gonna play it now, and I'm gonna make it what I wanna say.'

Participant O: And also the really kind of like, heavy playing of the keys is really kind of powerful, and I like that.

Participant R: That's definitely the most intense bar, I think. Because it sounds as if he's slamming the keys down with some force. The person.

A number of participants also mentioned the small-scale repetition of the right-hand theme at this point, Participant C creating a musical association between this chromatic theme and the DSCH theme of Dimitri Shostakovich.

Participant C: And there's my DSCH theme, as well, again there ... in the melody.

Participant P: ... there's a repetitive thing ... it just repeats it twice, I think, but you hear it once, and then you hear it again, which leads to a little increase there, in both listens.

Participant A also noticed a larger-scale connection between this theme and the piece as a whole:

Participant A: I think that's a return of some sort of big tune that we've heard earlier: there's a sense of familiarity, I think.

The articulation and the small-scale repetition in these few bars appear to be the triggers of participants' increases in emotional intensity.

Figure 69 Bars 56–58 of Schoenberg's Three Piano Pieces, Op. 11 No. 1



In summary, triggers for increases in emotional response in this piece appear to be related to increasing dynamics, powerful articulation, rhythmic or metric ambiguity, harmonic features, pitch-based features, thematic recognition, and repetition and sequential passages.

4.2.2.2. Areas with important decreases

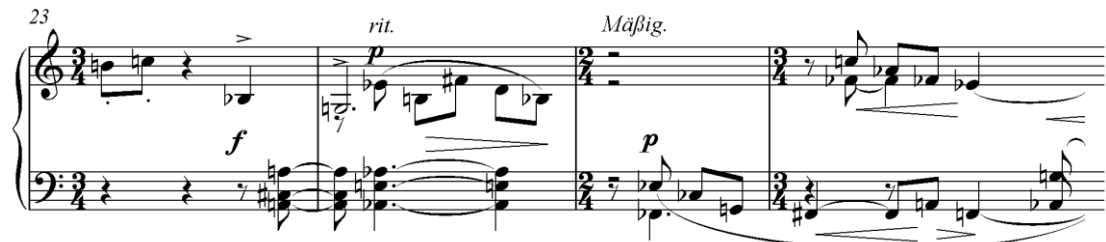
Areas with decreases in emotional intensity were mostly contained within the second half of the piece. Bar 25, an area previously seen as triggering differing responses in music students in comparison to non-music students, contains a slowing of tempo and decrease in volume, and a momentary silence, all of which mark a section boundary (see Figure 70). Participants noted these features in different ways, though no participants explicitly commented on the section boundary:

Participant F: ... it sounds like it's going to fall asleep ...

Participant R: It's getting quieter.

The decreasing dynamic and other features of the section boundary appear to be triggers for a decrease in emotional intensity.

Figure 70 Bars 23–26 of Schoenberg's Three Piano Pieces, Op. 11 No. 1



Bars 31–32 also provoked differing responses from the two types of student, and also contain decreasing dynamics, and the preparation for a structural boundary (bar 34); (see Figure 71). Several participants mentioned the decrease in dynamic as a trigger for a corresponding decrease in emotional intensity:

Participant A: 'Cos you can hardly hear anything. It just sort of dies away to nothing.

Participant B: ... less intensity of dynamic, just, thinner texture ...

Participant E: That bit, where it goes real quiet again. ...

Participant Q: See, you can barely hear it. That's why.

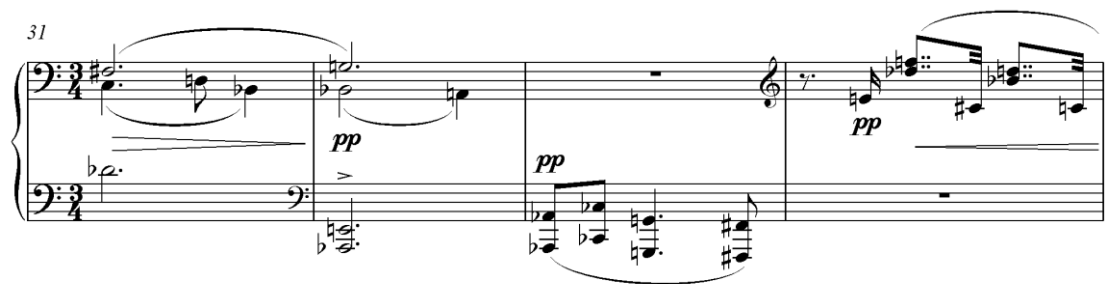
Participant R: That's 'cos it's all gone quiet.

Participant F, however, came closer to describing the section boundary with her railway analogy:

Participant F: ... the moment of ... whatever was happening, has happened, and the sound kind of fades away in the decay of the piano ... And then you get ... something else happening. But at that moment, it's kind of relaxed again, and kind of ... waiting for the next train to come along.

For these bars, the section boundary and its indication provided by the decreasing dynamic appeared to trigger the decrease in emotional intensity.

Figure 71 Bars 31–34 of Schoenberg's *Three Piano Pieces, Op. 11 No. 1*



Bar 40 (see Figure 72) shows a point of rapid decrease in emotional intensity, and may be explained by the change in texture and contour of the music. In bar 39, the contour sweeps upwards twice. This is followed by an oscillating passage in contrary motion that alternates rapidly between the right and left hands. In addition, the dynamic level is marked as one of the quietest moments in the piece. It is also perhaps significant that this material is related to the second subject material of the piece (bars 12-13), as opposed to the initial theme. Many participants were unable to identify the cause of their decrease, but Participant G described the motivic features of the music as being a trigger for a decrease:

Participant G: I think it was the same as before, as that one, it had that same sort of motif to it, which just ... I don't understand it. [laughs] That sounds really stupid! 'I don't understand it', but ... it doesn't seem like it should belong to the piece, because it's been carrying on with this idea, there in the high, and then it's going down the scale, and it sort of ... breaks it up.

Participant O described the trigger of her decrease as the muted quality of sound:

Participant O: [bar 39] Even though that is getting more and more intense, in a way, it's kind of building up to something, at the same time, it's still kind of muted, it's not actually explicit, it seems very kind of ... like it's got a blanket over it, or something. It just doesn't seem to quite kind of, jump out at me.

Though not all participants could identify the reasons for their decrease in emotional intensity, it seems likely that the sudden textural and dynamic change, and the change in motivic material, prompted this response.

Figure 72 Bars 39–40 of Schoenberg's Three Piano Pieces, Op. 11 No. 1



Bars 44–46 are marked by a textual and motivic change: the descending sequences of bars 42–44 end, and the uppermost part of this sequence is continued, without the accompaniment provided by the inner part. The left and right hands imitate one another in the lower register of the piano, and at a very quiet dynamic level that continues to decrease (see Figure 73). This dynamic level was noted as a trigger of a decrease in emotional intensity by almost all the participants, some of whom acknowledged the role of both the composer and the performer:

Participant O: ... I think it's also the way the keys are played, as well, because I mean, it can be quiet and really high pitched, and that would, for me, be more kind of ... I don't know, make me alert, kind of, in a way, but because it was very kind of muted, and like, low, and like softly played and things ...

Most participants acknowledged the decreasing dynamic as the trigger for their decrease in emotional intensity.

Figure 73 Bars 44–46 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1

The image shows a musical score for bars 43-46 of Schoenberg's Three Piano Pieces, Op. 11 No. 1. The score is in 3/4 time and consists of two systems. The first system (bars 43-44) shows a piano part with dynamic markings 'f' and 'pp'. The second system (bars 45-46) shows a piano part with dynamic markings 'pp' and 'pp'.

Bar 52, the next area of decrease, is a similar moment: the climax of the piece precedes this, in bars 50–51, and there is a sudden decrease in dynamic. Participants C, N and R described the dynamic decrease. Participant B described this area of the piece as ‘peaceful’ and ‘calmer’, and Participant G used the word ‘gentle’. In addition, a structural boundary is reached before the reiteration of the original theme of the piece (see Figure 74). Participants A and K noted the thinner texture of the return of the original theme:

Participant A: I think it’s just because it turns singular, as in there aren’t very many notes there.

Participant K: Then these bits, like nothing really ... happens, it’s just like a few notes, and they’re quite sort of spread out compared to a lot of it.

The decrease in dynamics and the thinning texture of the return of the original theme appear to be the triggers of the decrease in emotional intensity here.

Figure 74 Bars 50–53 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1

A combination of this thinner texture, low pitch and a decreasing dynamic appears to have a similar effect in bar 59 (see Figure 75).

Participant D: ... it was all quite similar music towards the end. It was all calm, the low notes at the end ...

Participant I: ... it’s kind of eerie as well, ‘cos it’s all quiet and low.

Participant Q: This is a piece that makes me go to sleep, ‘cos it’s so like, soft and slow, like, and that’s why I’m like, ‘Oh, ok ...’, and I view it as less intense.

Participant R also noted the slowing of the piece:

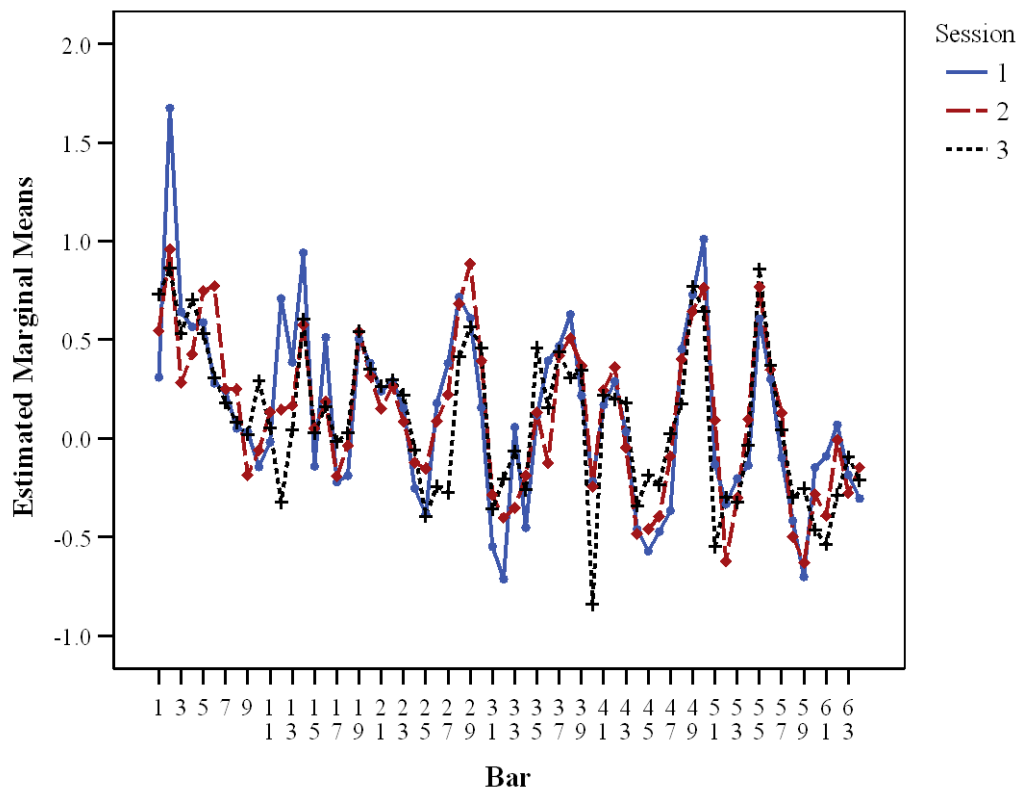
Participant R: ... it went down ‘cos it got quieter, and it just ... the keys are being played, time-wise, further apart. So it was just basically, slowing down and coming to an end.

Figure 75 Bars 58–60 of Schoenberg’s Three Piano Pieces, Op. 11 No. 1

In summary, the decreases in emotional intensity appear to be triggered by decreasing dynamics, structural boundaries, thinning texture, and changes in contour and motive.

As reported earlier, there was a significant interaction between session and bar that appeared to indicate changes in emotional responses with familiarity in specific areas of the piece (see Figure 76).

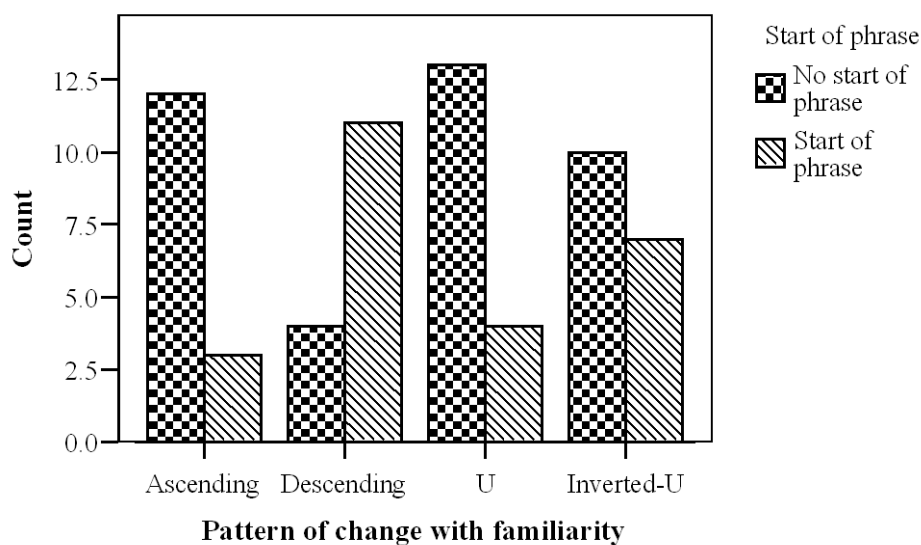
Figure 76 Estimated marginal means of the significant interaction between session and bar



The complexity of the interaction was such that polynomial contrasts on the effect showed neither an overall linear nor quadratic significant trend. On further analysis, four change patterns were evident in the data: a linear ascending pattern; a linear descending pattern; a positive quadratic (U-shape) pattern; and a negative quadratic (inverted U-shape) pattern. On visual inspection of the score, it was not apparent that any of these patterns corresponded to specific musical features. Musical features such as dynamics, rhythmic complexity, register, sequences, phrase and section boundaries, and tempo changes were tabulated for their presence in each bar, and a Pearson Chi Square test performed to see whether there was a relationship between the presence of each musical feature and the type of change in response caused by familiarity. There was a

relationship between the type of change and the presence of the start of a musical phrase ($\chi^2 = 11.446$, $df = 3$, $p = 0.01$). If the start of a phrase was present, a descending pattern was most likely to occur. Thus with familiarity, participants' responses to the start of a phrase decrease in the amount they fluctuate.¹⁷ No other musical features gave significant results.

Figure 77 Comparison of the type of change in emotional intensity with familiarity and the presence of the start of a phrase



A repeated-measures ANOVA was undertaken on the maximum levels of participants' ICB figures. This was intended to assess any change in the magnitude of participants' greatest increases in emotional intensity due to familiarity. Within-subjects variables were session (3) and trial (2); and the only between-subjects variable was type of student (2). There were no significant main effects or interactions. The ANOVA was repeated for the minimum ICB figures, and had no significant main effects or interactions. A similar repeated-measures ANOVA was conducted on the mean levels of increases and decreases in ICB figures, with no significant main effects or interactions.

¹⁷ Because the data on which the ANOVA was carried out were not the original intensity levels, but difference figures (to avoid serial correlation and excessive variance), the interpretation of this relationship is more difficult, and does not relate to the actual emotional intensity levels but the fluctuation of those levels.

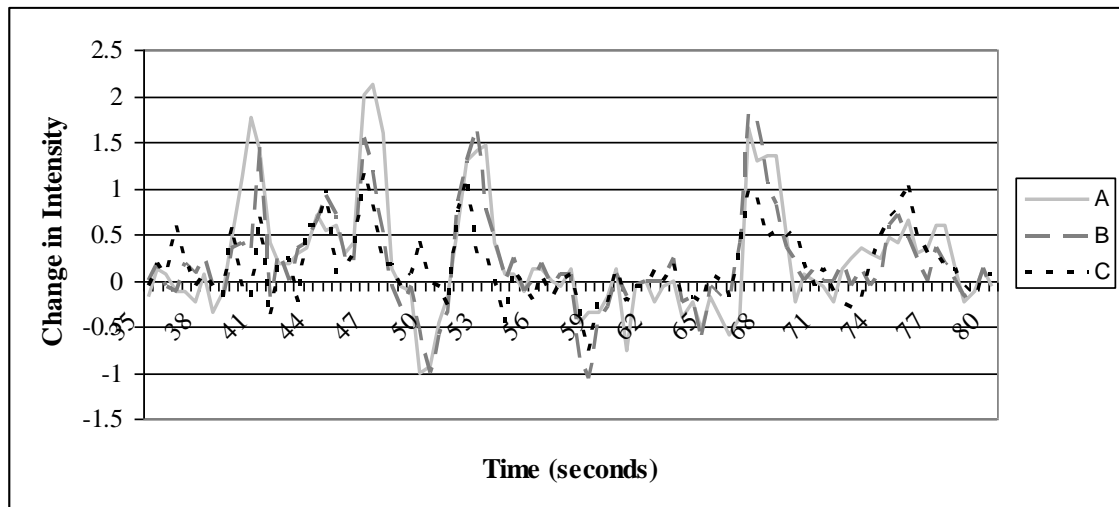
4.2.3. Anticipatory responses

As seen in the previous chapter, the mean difference traces for each experimental session were converted into graphs so that any anticipatory responses that developed with familiarity could be observed.

There do appear to be some anticipatory responses in the second and third experimental sessions in response to the Schoenberg. For example, between 40 and 45 seconds (bars 12–14), more detail is shown in the traces relating to the second and third experimental sessions than that from the first session. In the first session, participants rose rapidly to a peak, whereas in the second and third sessions, participants rose to a small peak, increased at a slower rate, and then rose more rapidly once again. Bar 12 marks the beginning of the second section of the piece, and contains rapid figurations at a quiet dynamic level. In bar 14, the dynamic increases to *sforzando* and the texture changes to sustained harmonics with short interjections.

The three peak increases in emotional intensity between 47.5 and 50 seconds (bar 15), 52.5 and 55 seconds (bars 16–17), and 67.5 and 70 seconds (bars 19–20) also show some interesting effects. These relate to the aforementioned melodic interjections that begin at the end of bar 14. These alternate in dynamic, between *piano* and *sforzando*, and in register. Bar 19 marks the beginning of a new section of the piece, with a loud chordal entry, which is echoed by a short *piano* melodic motive. Although in each case all three traces rise at a similar time, the trace from the first experimental session rises for a longer period of time and begins to decrease later than the second and third experimental sessions (see Figure 78). This may suggest participants' increased sensitivity to the decreasing dynamics that follow the sudden loud figures.

Figure 78 Mean changes in emotional intensity in each of the three experimental sessions in response to the Schoenberg: 35–80 seconds.



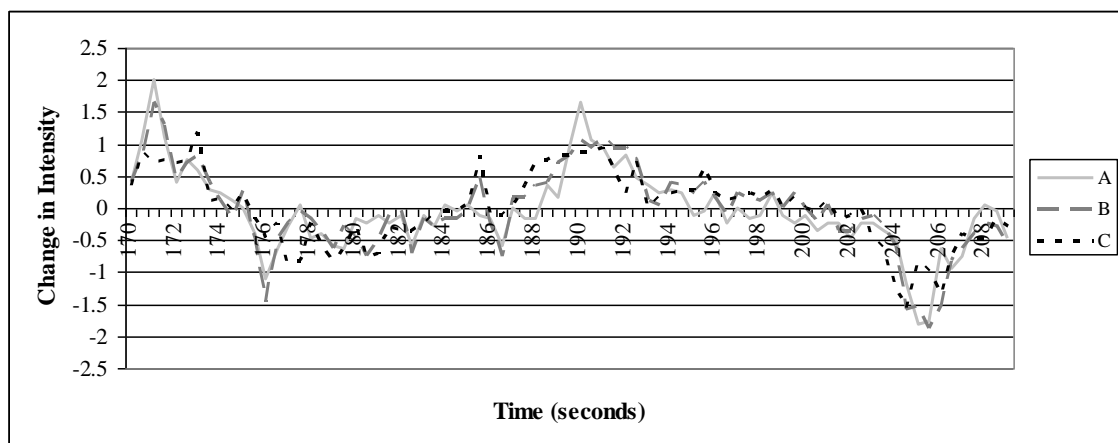
Interestingly, there also appear to be areas of the piece in which participants responded to with greater or lesser changes in emotional intensity in the second and third experimental sessions. For instance, the peak increase between 170 and 172 seconds (bar 50) is greatest in the first experimental session, lower in the second session, and lowest in the third. Bar 50 might be described as the climax of the piece: its content is an ascending pattern in the right hand and an ascending arpeggio-like figure in the left hand. These provide the bar's wide pitch range, and also increase in dynamic to *fortissimo* by the end of the bar. Clearly the participants became used to this loud figure as they became familiar with the music.

Conversely the following peak between 172 and 174 (bars 51–52) is smallest in the first session, larger in the second session, and greatest in the third. These bars mark a sudden decrease in dynamic after the climax in bar 50, but contain ascending arpeggio-like figures that accompany a descending sequence in the right hand. Participants may have responded more intensely to these bars after their initial shock from bar 50 had abated due to familiarity.

An interesting effect is seen between 187 and 194 seconds (bars 55–57). Here, a sharp peak increase is seen in the first experimental session. In the second and third experimental sessions, the increase in emotional intensity begins earlier and is more gradual, suggesting an anticipatory effect with familiarity. The musical content of this area is partly sequential, and also uses a motive heard previously in the piece. The dynamic is increasing gradually, and from bar 56²–57, each new note in the right hand is accented. This is a clear trigger of emotional responses, and the participants seem to have anticipated its effects as they became more familiar with the music.

A further anticipatory response is seen between 203 and 205 seconds (bar 58): the earliest decrease is seen in the third experimental session, in comparison with the traces from the first and second traces. Here, a chord marked *sforzando* enters on the final quaver of the bar, only to decrease in dynamic immediately. The participants appear to be responding more sensitively to this decrease with familiarity.

Figure 79 Mean changes in emotional intensity in each of the three experimental sessions in response to the Schoenberg: 170–209 seconds.



Participants appeared to show evidence for anticipating emotional triggers in the music, and for responding to rapid fluctuations in dynamics. There was also some evidence to suggest that participants became used to the loud, short triggers of emotional responses in the piece, and responded less to these features with familiarity.

The analysis of the quantitative data has revealed some interesting effects. Musical experience appeared to influence participants' responses to a number of bars in the piece, and the development of the two groups' responses with familiarity. There were also some clear effects of familiarity on participants' emotional responses to specific musical features, as indicated by the significant interaction between session and bar, and by the evidence of anticipatory responses. Triggers of increases in emotional responses included dynamic variation, pitch-based features, harmonic features, and the level of activity in the music. Decreases were seen in response to decreasing dynamics, structural boundaries, thinning texture and low pitch. The next section will examine participants' qualitative data in greater detail.

4.3. Analysis of qualitative data: Interviews

As in the first experiment, the interviews will be analysed in accordance with the model outlined in Chapter 1 (see Figure 2 or Figure 11).

4.3.1. Narrative

As in Chapter 3, the identification of the use of narrative by participants will provide evidence to substantiate or refute Lavy's (2001) suggestion of music being understood as narrative. An attempt was made, therefore, to identify narrative structures and features of narratives in participants' responses.

4.3.1.1. Emplotment

As in participants' responses to the Clementi, both musician and non-musician participants (Participants A, C, E, F, K, O, and R) assigned plots or stories to the music. Participant K, a non-music student, described a fairly stable narrative idea of a person being chased. In her first interview, she stated:

Participant K: ... it's as if someone's like following you, or you're trying to follow someone. It's like that kind of situation ... so you can ... if you relate it to like ... like

say a character, or something, in a film, or a novel, or something, then ... you can imagine ... the music trying to reflect the emotions like they are being followed or chased, and your heartbeat increases, and you're getting more sort of anxious. It's like that kind of thing, like the lows, the deeper tones are like, that's like the villain ... of the piece, trying to like, get you, and stuff. It's like a nightmare, like really kind of like ... it's like gothic, kind of horror music.

Participant K referred to this same narrative in her second interview:

Participant K: ... you can either reflect what she's feeling, that moment, because she's being chased or something ...

She also used the narrative to explain aspects of the musical structure in her third interview:

Participant K: ... the more dominant notes I just presume ... are male, and the high pitched ones are female, so you can imagine like, if a woman's being chased or something, he's actually caught up with her.

As well as using narrative to explain the musical structure, it was evident that Participant K had generated a complete narrative structure, which became evident when she described the climax of the piece:

Participant K: Yeah, it crescendos and dies down, and then there's like ... the villain in the piece is either ... I don't want to say killed, 'cos it's ... too dramatic, but ... they've got whatever they were trying to chase, 'cos it seems like, maybe not so much at the beginning, but in the middle sections, when they're trying to chase someone, it just seems like all the anxiety and everything, where it's like, the creeping kind of notes, like, lurking in the background, and stuff, and it just like, seems like someone's gonna get someone else, and then towards the end with the final crescendo, I think it's like they've actually got there. Because the more dominant note does fade out with the piece, and like, you don't hear the high pitched shrill hand as much.

Other participants appeared to take longer to assign narratives to the music. For example, Participant A did not mention the idea of emplotment until her third interview.

When asked whether she thought the piece had a story, Participant A responded in a relatively vague manner:

Participant A: Quite possibly. I'm not sure what it is, but it could be many different things. It could be someone's angry with somebody else, or they could just be having a really bad day.

When she later elaborated, however, it became clear that her perceptual schema for the structure of the piece and her complete narrative structure were intertwined:

Participant A: It's binary, in a way. Because you sort of get the opening phrase at the end, again. So, it could be like he's having a bad day, it starts off ok, gets really hectic, and then it gets back to being normal, when he gets home.

Despite these examples, complete narrative structures were not commonly obvious in response to this music. Instead, many of the narratives described involved some element of confusion, perhaps relating to participants' confusion regarding the structure and relatively unfamiliar musical features of the piece. Participant N, for instance, describes a confrontational situation in her second interview:

Participant N: It's like ... somebody who ... says something just really stupid to you, just to get a reaction, something like that. That they know it doesn't make sense, but it's like ... what's the word? It's presumptuous, a bit, posturing ...

By her third interview, this narrative idea has degenerated into one involving insanity:

Participant N: Well, it's the irregularity of it, it's like talking to a crazy person, or something. You know ... you think that you might be going somewhere with the conversation, and then all of a sudden the conversation shifts: you start talking about oranges and penguins or something. And you just think, 'well, no.'

In a less confused vein, one of the music students' narratives was an argument:

Participant C: [It's like an argument because of] the way that you've got one theme and then something just interrupts it, that's completely different. And then, with the dissonant pitch, and it's quite often very ... I don't know what the best way to describe it is, but the far ends of the piano. There's not really in the middle, and it's not really a close texture; it's all quite a way from each other. And just how you have all these different ideas that keep coming up against each other makes it seem almost like an argument or a 'discussion' [gestures inverted commas].

Another music student conveyed a narrative with less of an element of confrontation but with an equal amount of confusion: that of a room full of gossiping people. This narrative description also involves the application of human agency to non-human events, and personification of the music. The participant's description continued for a considerable part of the piece, during the third interview:

Participant F: There's a little frenzy of action going on, of kind of ... it's cool ... It's like a little conversation is happening. All of a sudden, everything's getting ... their confidence, they start answering back and talking between each other ... And so it gets a little bit more excitable. Like there's a buzz in a room, and like, in a minute, somebody'll say something and everybody'll go, 'Oh, ok', and stop talking again.

Participant F: It's ... the little ideas, perhaps I'm wrong, they seem to be ... quite close together in the way that they move, and when you talk, everybody's got a range of how high or low their voice is, and so, because they're coming in from all the different directions, they interact with each other, like a conversation would. Just like a room, generally. If you're waiting for a party to start or something, everybody's mingling around, and it's all excitable, waiting for the party to start.

Participant F: [bar 39] People are starting to disagree with what somebody's said. And then the little ... [bar 40] 'She said this', and 'He said that', and 'Did you know this about so-and-so?', or 'Have you seen so-and-so recently?', and 'They're having a baby', and ... 'She's not, is she?' and 'They don't actually know who the father is', and ...

Despite many participants' confusion, and the lack of evidence for a complete narrative structure in their interviews, many participants referred to parts of a narrative, such as the climax or the end:

Participant C: Yep, this is just with the crescendo and this is what, it's like the two parts have a conversation [bar 39]. And so it's like, at that peak there, it's like one person's just hit the other person.

Participant O: ... that last bit ... it's just death, it's ... not a bad thing, but like, old lady death in her mid-eighties ...

4.3.1.2. Metaphor

Participants' use of metaphor was relatively common, with a similar amount of variety of use as that seen in Experiment 1. Movement words were common once again, with participants describing the music as either 'building up to something', 'leading somewhere' (Participant G) or 'wandering, and going nowhere' (Participant B).

Metaphors were used to describe the actions of the performer, with one participant describing the performer as 'standing on the piano' (Participant S). Participant O described a narrative involving suffering and human agency, with the music representing two people:

Participant O: ... it's so contrary, so contrasting, it gives the impression of ... two people – one piece of music's simultaneously trying to represent the actions of two people and their relation to each other, and it just kind of makes me feel so ... upset for this little person that's being kind of um ... you know, subjugated by this larger, kind of more dominant character.

As in Experiment 1, participants did appear to conceive the music in terms of suspense, although this was perhaps less common in response to the Schoenberg. Three participants mentioned the term directly:

Participant B: [bar 32] It's suspense: I don't know where it's going.

Participant F: And then it hangs you in suspense. I mean, I guess I know because it's coming to the end of the piece, I know that it's ending, but there's that kind of, 'or is it? What's gonna happen next?', and suspense, like, when you had to write stories in primary school and you had to have something that kept you really interested until the final conclusion.

Participant K: I think it keeps the listener in suspense

Participants frequently described the music as 'building up':

Participant B: There's an obvious kind of ascending pattern here, I think. It feels like it's building towards somewhere.

Participant E: And then it builds up.

Participant G: And so ... it seems it's building up to something. But ... I think each time I hear it, I forget what it's building up to.

Participant O: Even though that is getting more and more intense, in a way, it's kind of building up to something.

Participant S: It's just building up ...

Although in Experiment 1 the term 'tension' was used by many of the music students, the term was not used at all in response to the Schoenberg. In participants' responses to the Clementi, the term had been linked with either participants' emotional responses to the music or specific musical features, such as repetition, harmony, and dynamic variation. It might be argued that the atonal nature of Schoenberg's work disguised repetition (although this was occasionally described, as will be seen later), and that harmonic tension in the traditional sense is not present in the work. Dynamic variation, however, was commonly observed by participants.

It may be that rather than tension not being present in the music, that participants merely chose not to use that term to describe the music or their responses. The term or concept of ‘expectancy’ was alluded to by a few participants:

Participant K: Then, I dunno, there’s like a lot of repetition and it sort of crescendos, and it goes down, and it’s not really, you know nothing much is gonna happen in this part.

Participant J was frustrated by what he saw as the failure of the piece to continue in the manner in which he expected:

Participant J: there are little rhythmic motifs like that, and sometimes, like, tonal motifs, that ... don’t continue. And it’s very frustrating to listen to. Like, you hear it once, maybe twice, and you think, ‘My ear wants it to do this’, and it doesn’t, and it goes off into something else. That’s really annoying to listen to ... it doesn’t give any satisfaction, like in any way. In that your ... ear wants to be satisfied by hearing what it expects to come next, which I think is probably how you usually listen to music, I think you kind of anticipate what’s coming next. And it doesn’t give you that, at all. But like, it feels like it should, in places.

Similarly, Participant N, a non-music student, became disappointed when she no longer felt able to create expectations of the music:

Participant N: And then basically I lose the plot. I don’t like that bit, when it goes, ‘[sings fast notes]’. ‘Cos it stops being regular, it stops being predictable ... I don’t like that.

Several participants reported surprising events in the music, suggesting that they too had, subconsciously or consciously, created expectations of what should or should not occur within the next few bars of the music. Participant B, in particular, mentioned feeling surprised on a number of occasions, and in response to several different events in the music. Commonly, these events were loud chords that had been preceded by quiet passages, for example, bars 16 and 42. In her third interview, Participant B outlined some reasons for this response:

Participant B: I think because the music’s not particularly tonal, or predictable, in terms of melody and stuff, I don’t necessarily know where I am in the music, so I don’t see it coming.

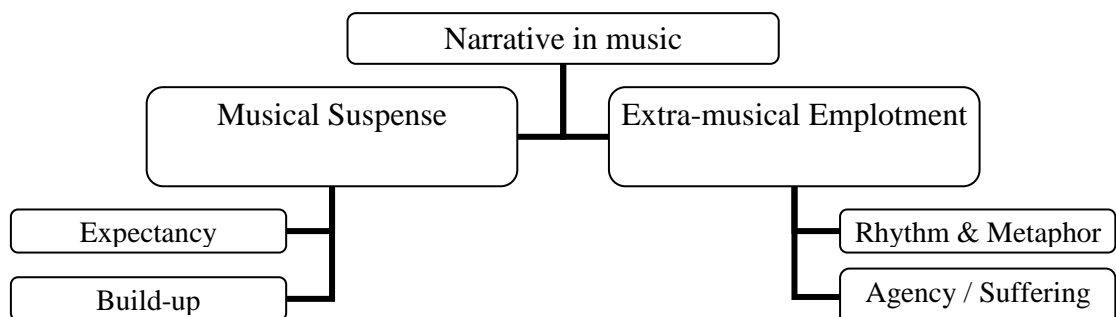
Other participants also described other loud events that had been preceded by quiet passages as surprising. For example, Participant E claimed that the end of bar 14 (where an identical chord is played to the beginning of bar 16, cited by Participant B) ‘scared’ her, and participant R described the loudness of bar 29 as ‘a shock’.

Participant P, a non-music student, however, felt that he was unable to create expectations of what the music would do. He found this to be a positive experience:

Participant P: I know I keep mentioning the previous piece, but that was ... you kind of kept getting disappointed in that, because it never did what you wanted it to do, in terms of a nice melody, but this doesn’t even begin to start doing what you want it to do, so ... you start to appreciate it more for what it is, than for what it could be, and what it isn’t, you know.

Participants did appear to create narrative responses to this music, although it appears that aspects of the music relating to tension and expectancy may be less important than in participants’ responses to the Clementi. Extra-musical employment remains important, however, and the use of narrative is clearly central to the participants’ conceptions of the piece. A model of participants’ responses to the Schoenberg is shown in Figure 80. It will be interesting to observe whether the ideas of tension and expectancy are evident in participants’ responses to a later atonal piece.

Figure 80 Aspects of a narrative understanding of the Schoenberg



4.3.2. Mood or character of the music: Evidence for listeners hearing music as sound or human utterance

As suggested in Chapter 3, participants' conceptions of the piece portraying different moods or a particular character may be considered to be a listener hearing the music as human utterance. In Chapter 3, participants described positive, negative, and neutral emotions that had been conveyed by the piece. Participants also responded to the Schoenberg in a similar way, although no participants described the overall piece as happy. A basic emotion of sadness was conveyed to Participants A and K by the piece as a whole:

Participant A: It's quite a sad piece.

Participant K: ... well, the whole piece is quite ... sombre and ... it hasn't really got any happy kind of ... bits in it, I don't think. It's more ... unhappy, and kind of like, sort of, scary. I think you can relate it to like, a horror or something.

A certain element of confusion was conveyed by the piece to some participants, with one participant (D) describing the piece as 'mad', and Participant F describing it as follows:

Participant F: ... there's not, to me, a great deal of emotion displayed in this piece of music, apart from perhaps the complete and utter confusion of the person who's writing it!

Perhaps this confusion is what Participant Q also describes, when she cannot identify an appropriate emotion for the piece as a whole:

Participant Q: where the rest of it I thought was like, there wasn't much going on for me to get any sort of feeling of like, a happy song for me or like a sad song for me, because it's so ... like I can't explain any more.

Despite this portrayal of the piece as one conveying no emotion or confused emotions, participants were also able to assign varying moods to different areas of the piece, according to the variation in musical structure. Various participants described the first section of the piece (bars 1–11) as 'calm' and 'gentle' (Participant S). Other participants

viewed the beginning as less positive, suggesting that it was ‘miserable’ (Participant K), ‘sad’ and ‘poignant’ (Participant O). Participant B elaborated further:

Participant B: I think there’s a kind of tense sort of waiting about it, I think. You kind of know something’s going to happen. I just, I think the beginning’s really unhappy. There’s just loads of emotion in it.

Participant S describes in some detail the rapid variation of the moods conveyed by the piece:

Participant S: ... you can imagine someone attacking the keyboard, ‘durm durm dum’, so it’s quite dramatic, that bit ... but it wasn’t a continuous thing, it seemed to be quite variable, and how it was changing from those intimate bits to where it was like, quite ... forceful. And then ... it mellowed out again. It was almost, I was expecting it to go back to that ... I thought it was gonna be one of those pieces where it’s nice, gentle, and then, ‘dur dur dur dur’.

Participant O views a later, very quiet area of the piece, with slow low pitched chords, more negatively:

Participant O: That [bar 31] kind of just heightens the intensity, there, it’s becoming, to use my last word, depressing. It’s becoming more depressing, in a way.

Participant B continued with her view of the piece towards the middle, when she described bars 36–41 as ‘threatening’.

Participant B: I think this bit sounds really threatening, as well. I don’t know why. Unless it’s the sudden chords.

Participant P described later areas of the piece as ‘aggressive’ and ‘cantankerous’; other participants used the words ‘exciting’ (Participant S) and ‘surprising’ (Participant B).

Although participants suggested that the musical structure carried moods, they also highlighted aspects of the performance of the piece that conveyed moods to the listener:

Participant A: ... the attack on the ... hammers of the keys is greater ... And it just makes it seem a bit more urgent.

Participant F: A rise in the intensity of the playing. It sounds like that ... the guy, girl, whoever, who’s playing, is more ... intrigued and intense in his, her, playing.

There is evidence for listeners hearing this music as both sound and human utterance, whether they are focussed on the musical structures or on the performer of the piece.

4.3.3. Music heard in context: Evidence for the influence of contextual and listener features

Several participants displayed evidence of an awareness of the role of the listening context in influencing their emotional responses. A particularly interesting example was provided by Participant H. This participant had responded very conservatively on the graph, with his trace showing only a few peaks, and the rest of the graph being left at zero. Upon being asked about one of those peaks, he responded:

Participant H: ... it was because ... that's always quite a mournful bit, isn't it, and suddenly I saw a hearse drive past, and I thought, 'That's quite fitting actually.' ... it made me realise that it would be quite ... [laughs] it's true!

Participant H also showed awareness of how his response might differ if he was listening to a live performance, as opposed to a recording. Participant D also highlighted the importance of visual aspects of the performance, and described intermingled emotions of awe, responses from the music, and responses from the visual stimulus:

Participant H: I think when you hear this kind of music live, it can be a bit different: you see the performance and things.

Participant D: Listening to this piece like this, here, is hard. But ... if I hadn't seen anything like this before, and I went and saw it in a concert, I'd have to, to be able to engage with this music, I think I'd have to see the performer playing it, and I think I'd have to see their emotion in the performance. And then you kind of react with their emotion and how they're ... treating the music ... Because I was thinking ... if I saw this in a performance, I think I'd be really impressed, because ... I imagine it would be a difficult piece to play, but then it's because I think I'd be more, you know, my feeling would be more intense because it was a difficult piece of music, and the pianist was finding it, you know, was doing it well, rather than actually liking the sound that he was creating. But the thing is, you can see when a performer puts lots of intense feeling into a piece.

Several participants described how their daily lives had influenced the content of their listening diaries. Participant S described how his responses to the piece changed according to the attention he was able to give the music:

Participant S: But I think the times when I've had more time to think about it, or ... I've sort of been able to, sort of, get more into the music, so probably the first time I listened to it on my own, that's when I experienced most, sort of, graphic interpretation of it ... but that might just be a product of ... what was going on around me at the time ...

It is clear that there is evidence for both contextual and listener features of the music influencing participants' emotional responses to Schoenberg's piece.

4.3.4. Other holistic issues

4.3.4.1. Difficulty expressing oneself

Surprisingly, only two participants, Participants A and Q, appeared to have difficulty expressing themselves. Participant A was a music student, and expressed difficulty in remembering the reason for a particular change in emotional intensity. Participant Q was a non-music student, who had difficulty in describing the musical features that triggered her responses, and was even slightly unsure that she recognised the musical structures that did so:

Participant Q: Did I just hear the big ... thing?

Other non-music student participants lacked confidence, as demonstrated by Participant O:

Participant O: I'm assuming it's played on a piano ...

Researcher: Yes.

Participant O: I'm not being really stupid?

Researcher: No.

Participant O: Wicked! Ok. Whoa. That's how little I know about music.

Some non-music student participants were more clearly aware of the triggers of their emotional responses, but felt that they lacked the vocabulary to describe them:

Participant K: I think ... 'cos I don't do music, I think, like it's in a minor key, and that tends to sound or make music that sounds a bit more, sort of ... subdued. Not miserable, but just um ... it could be like depressing and stuff.

Participant Q: Yeah. So the second time I felt the, the deep, it is kind of like a ... um ... I don't know music, I don't know how to explain music.

Despite the lack of confidence of these few participants, most participants felt able to remember and describe their emotional triggers.

4.3.4.2. Terminology

Table 22 shows the percentage of interviews containing a variety of technical terms mentioned by participants in response to the Schoenberg. As in the first experiment, music students used technical terms more frequently than non-music students, with music students using a technical term in 73.33 per cent of their interviews, and non-music students only using them in 52.38 per cent. Many of the technical terms used by participants in response to the Clementi were not employed here; this is probably resulting from the considerably different musical structures present in the Schoenberg. There did not, however, appear to be any new technical terms. The concept of pitch and register was used very frequently by both music students and non-music students. It is also interesting to note that the use of the term ‘melody’ was reasonably frequent.

Table 22 Technical terms used by participants (music students and non-music students) in Experiment 2

	Percentage of interviews containing at least one instance of a term		
	Music students	Non-music students	All
All technical terms	73.33	52.38	64.71
1. Harmony	13.33	4.76	9.80
1.1 Suspension	0	0	0
1.2 Modulation	0	0	0
1.3 Arpeggio	0	0	0
1.3.1 Spread	6.67	0	3.92
1.4 Diminished	0	0	0
1.5 Major	0	0	0
1.6 Minor	3.33	9.52	5.88
1.7 Dissonant	13.33	4.76	9.80
1.8 Cadence	3.33	0	1.96
1.9 Pedal Point	0	0	0
1.10 Ostinato	0	0	0
2. Melody	23.33	14.29	19.61
2.1 Sequence	13.33	0	5.88
3. Phrase	20.00	0	11.76
4.1 Ornament	0	0	0
4.2 Trill	3.33	0	1.96
4.3 Decoration	0	0	0
5.1 Left or right hand	13.33	0	7.84
5.2 Imitation	0	0	0
5.3 Octaves	0	0	0
6. Expression	0	4.76	0
6.1 Crescendo	10.00	19.05	13.73
6.2 Diminuendo	0	0	0
6.3 Forte	0	0	0
6.4 Rubato	3.33	0	1.96
7. Texture	13.33	4.76	9.80
8. Note	20.00	38.10	27.45
9. Pitch or register	46.47	76.19	58.82
10. Structure	10.00	23.81	11.76

4.3.4.3. Liking and familiarity

In Experiment 1, non-music students tended to focus on their subjective responses to the music considerably more than music students. In response to the Schoenberg, almost all the participants described their subjective responses to the piece, many of them on more than one occasion. Only participants C, I and Q did not mention whether or not they liked the piece of music. Participants' responses seemed to change over the course of

the listening period. In the first interview, participants B, D, E, F, J (music students), K, O, P, R, and S (non-music students) commented on their liking for the piece. Some of the music students were rather positive about the piece, suggesting that they would grow to like it as they became more familiar.

Participant B: I like it. I think it's the kind of thing I'll get to like more as I hear it more, as well.

Participant E: Usually, I wouldn't like that sort of thing, 'cos it's more chromatic, and it sounds a bit ... twentieth-century. But ... I think I could get used to it. I liked it better the second time than the first time.

Some other music students, such as Participant F, were less immediately positive, but retained an open mind, again suggesting that they could like it once they knew it better:

Participant F: I don't dislike the piece of music ... I, yeah, I don't dislike it ... perhaps ... not ... I don't think it's fair to say that I would choose to play it or listen to it, but it's ... ok. There are certainly ... exciting moments.

Participant J, another music student, didn't like the piece at the end of the first session, and felt no desire to hear it again. He did imply, however, that listening to the piece privately might enable him to change his view of the piece:

Participant J: I don't like it so much having listened to it a couple of times. Maybe I need to go away and spend a bit more time, listening to it privately, and not having to think about it so much ... the first listen I was kind of, 'This is alright, I can listen to this, it's not ... I'm not gonna reject it out of hand.' But having listened to it a couple of times now, and thought about it a bit, I don't think I particularly want to listen to it any more.

Participant O was less inclined to state whether she liked or disliked the piece, describing an 'appreciation' for the music, but also invoking the listener effect of mood on her response to the music:

Participant O: I don't know whether it's a case of liking or disliking, I think it's kind of a case of being able to ... appreciate it, if you know what I mean ... if I was in the mood for it, then yeah, I would really like it.

Participant R found an immediate affinity with the piece due to an association he formed from a small-scale cue in the middle of the piece. This clearly influenced his opinion of the whole piece from the first time he heard it:

Participant R: Only, I did quite like it, 'cos of the Charlie Chaplin thing in the middle.

In contrast, other non-music students were less positive, with Participant S stating that he did not like the piece as much as the Clementi.

Whilst the first interviews largely revealed that participants had an open mind about the piece, responses from the second interviews suggested that participants were beginning to form an opinion of the piece. Music students A and J stated openly that they did not like the piece, although each of them mentioned a positive attribute to the piece immediately afterwards:

Participant A: I don't really like it. 'Cos it's not ... it's an ok piece; it's very dramatic.

Participant J: ... you have to think about, it makes you think about why, why don't I like listening to this piece of music, and that's informative.

Participant F suggested a degree of ambivalence towards the piece:

Participant F: I think as well, because it's not ... I don't necessarily like the piece, but don't dislike it, there's that kind of ... 'whatever', kind of attitude ...

Some of the non-music students became more positive towards the piece after the first week. Participant K, in particular, was generally enthusiastic:

Participant K: Just that I'm liking it a bit more, and I'm getting used to it, and stuff, and it reminds me of a few things that have become related to that, so it's quite interesting.

Participant N, however, though her liking for the piece had increased from the previous week, still disliked the piece considerably:

Participant N: Um, well I don't dislike it as much as I did ...

Participant N: Because this music is basically, my basic response is dislike.

The third interviews revealed considerably more focussed opinions, both positive and negative. Participants A, B, E, and F, who were all music students, suggested that although this piece might not be their favourite piece of music, they liked it rather more than they had at first:

Participant E: I wouldn't pick it as my favourite piece of music to listen to ... I prefer Mozart, but it's alright really.

Researcher: Do you think you've grown to like it more as you've got familiar with it?

Participant E: Yeah. Yeah, I didn't really like it the first time. It was a bit ... too chromatic.

Participant F: It's not as horrendous as I thought it was at first. Because, I didn't dislike it completely, obviously, I was in the middle of liking and disliking, and was quite happy to be completely ambiguous, and mark it in the middle, whereas I do like it more now.

Participants A and B had found ways of appreciating the piece, Participant A enjoying its dramatic content, and Participant B the emotional performance of the recording:

Participant A: It's gone up in my estimation from when we first started ... I think ... I appreciate it more as a dramatic piece, and it gets that across very well.

Participant B: I think I do still like it, actually, even though I moan about it ... I still think it's a very emotional performance, even after listening to it a lot. And I think I'd like to come back and listen to it in about a fortnight's time, rather than ... every day.

Non-music students Participants K and S also became more positive in their liking for the piece:

Participant K: Well I've listened to it again for the last week, and ... I've really enjoyed listening to it. I know I said, in my ... diary ... I'm not ... too sure of ... you know the last piece, last semester, I'm not sure which one I prefer, because like, they're both different, and ... this one's definitely growing on me, because I really didn't like it to begin with.

Participant S: So ... it became more interesting, I think, to listen to, and less abrasive ... because I, I've just got used to ... how it was ... being played. So yeah, it's getting better.

Other participants, G and J, became increasingly negative towards the piece.

Participant G: No, but I really don't like the piece any more! [laughs]

Participant J: ... there's nothing palatable about it. There's nothing that appeals to the senses ... to titillate, or ... to coax, or to ... just very basically to give you something to enjoy. It's not ... enjoyable.

In summary, liking responses to the piece varied considerably between music students and non-music students, and between individuals. Whereas participants initially largely kept an open mind about the piece, by the second interviews, participants were beginning to form opinions of the piece, some of which were a mixture of positive and negative attributes. By the third interviews, many of the participants had found a means by which to enjoy the piece, liked the whole piece more, or had found small parts of the piece that they could appreciate, although other participants really disliked the piece.

4.3.4.4. Colour

In the first experiment, two participants had used colour to describe the piece. In this experiment, no participants did so.

4.3.4.5. Genre or language of the piece

The atonal nature of the piece provoked considerable comment from participants. In terms of the concept of the genre of the piece, music students generally recognised the piece as being 'modern' (Participant C), 'chromatic' (Participant E), 'not tonal' (Participants F and I) or 'atonal' (Participant J). One music student had a little trouble describing the piece:

Participant D: It sounds atonal, but there's another word for it, I think, this type of music, and I can't think what it is, 'cos it's not minimal, it's the other one ...

Non-music students recognised it as 'unusual', hard to listen to, or following unexpected patterns:

Participant P: Overall it was a more difficult piece to listen to, in terms of ... the first listen, especially, was ... you know, it's quite different to a lot of stuff that's out there, and you know, what you associate with Classical music, and especially with the first piece.

Participant S: Like that's what I've ... when I've heard jazz music, it's that sort of feel where the notes, there's a lot of contrast ... between notes, I think, and you can tell the ... as I say, it doesn't follow the pattern that you would expect, so there's all that contrast there.

Every music student participant mentioned the harmony of the piece in at least one of their interviews. Their comments were often in response to specific events in the music. Certain chords in the piece were described as 'interesting' (Participant B), 'dissonant' (Participant C), as 'clashes' (Participant D), or jazzy:

Participant J: A bit jazz, actually, those two chords. Just, a bit like a jazz, what a jazz pianist might use ... as an accompaniment to a soloist or to himself soloing.

Within the non-music student participants, Participants K, Q and R did not mention the harmony of the piece. Participants N, O, P, and S mentioned the harmony, describing it as 'dissonant' (Participant N), 'disharmonious' (Participant O) or 'discordant' (Participant P). Participants P and S were sometimes less sure of the appropriate terminology, but their intentions were clear:

Participant P: ... he was putting chords in it ... that didn't, kind of, match up with it. It sounded like out of tune, like it was just hammering on ... regardless.

Participant S: ... there didn't seem to be like a ... a chord or, or ... I don't know, there was something about it, the contrast in the notes that was almost, they didn't fit together, I thought.

Participant S: It's where ... it's almost as if ... take two notes that deliberately don't go together and put them next to each other.

Both Participants P and S made a specific association between the language of the piece and Les Dawson's deliberate mistakes:

Participant P: ... it sounds like Les Dawson's playing or something, you know, when he does it all wrong.

Participant S: You know Les Dawson played the piano?

Researcher: Yeah, and made deliberate mistakes

Participant S: Yeah. It sounded like that, almost, to me. You know when the notes don't sound right together?

The language of the piece was considered unusual by participants, and was described in many of the interviews.

4.3.4.6. *Ways of listening to the piece*

Many participants discussed the way in which they were listening to the piece. Three participants mentioned having difficulty listening to the piece, suggesting that it prompted them to withdraw from the musical stimulus:

Participant G: I wasn't really listening; I'd switched off ... 'Cos ... it's really hard to listen to, the piece.

Participant N: And I just kind of withdraw, 'cos it's just doing ... fairly random things.

Participant O: ... the music was getting too much for me! I think I was just getting a bit kind of, like, 'No! I'm not taking any more!'

Participant Q: I can't think, literally ... And then when I do go off and think, like I mentioned, then the music just ... leaves, like I don't even hear it.

Participant O also mentioned a positive withdrawal, however, in the form of daydreaming.

Participant O: I slightly started daydreaming ... I have a feeling it was around here somewhere, towards like ... I'll know it when I hear it.

Other participants suggested that the music demanded a certain type of listening style:

Participant S: It's something you've got to ... like, if you have the time, just to listen, to concentrate and to listen to it, then ... without any other distractions, then I think it's more ... you get more out of it. But I don't think it's casual listening.

Participant J suggested a similar concept, believing that the music provided little aesthetic pleasure, and that much of the satisfaction gained from listening most stem from analytical listening:

Participant J: There are sections in it where I'm trying to listen quite abstractly to it, without trying to enjoy the music, where ... more than anything, you want to know what's going on. Why is it being written in this way? What idea is being expressed? Or what theoretical ... technique is being employed to write the music? ... because you can't enjoy it in an aesthetic way, in a purely aesthetic way, or there is very little aesthetic enjoyment to have out of it ... you tune out a little bit, really, at least in ... an emotional way. You tune out, and ... try and appreciate it in a different way. ... you're appreciating the music theoretically, sometimes emotionally, and maybe other ways as well.

Participant F agreed:

Participant F: ... it's not ... beautiful and tonal and pretty, but I don't write it off because of that. I would listen to it in a different way, because you've got to listen to different features, 'cos it, it's not held together by, like, going from I, V, to I. It's held together by different things.

Some participants mentioned listening for the effects provided by the performer, in contrast to the music provided by the composer:

Participant P: ... you can listen to a piece of music and you can admire the musician for his intricate skills in playing it, or ... intricate and novel ways of writing it ...

Participant B, however, succinctly summed up the contribution given by both composer and performer in the formation of emotional responses to music:

Participant B: I think it's the performer's interpretation of what's already there. The slight, the unexpected chords and stuff. And the lack of chords, actually ... I think it's both, though: the performer and the composer.

This piece appeared to prompt some listeners to re-assess their usual ways of listening to music, and to focus on new aspects of the music: the way in which it was constructed, or the way in which the performer was playing the music.

4.3.4.7. The effects of familiarity

Participants made a number of comments describing the effects of familiarity on their responses to the piece. Some participants noticed more detail in the piece as they became familiar with the music:

Participant A: There is actually a tune! The first time I heard it ... I didn't hear the tune coming through, but now I can hear it. And there's fragmented bits throughout the piece; you can just catch a glimpse of it.

Participant D: I'm noticing things that I wouldn't have noticed before ... the ... alternating between two different notes, that's the first time I've noticed that.

Participants reported becoming more aware of repetition in the music:

Participant J: ... it's been written in blocks, and sometimes a block will crop up again, and I'll think, although that's not the same, or maybe it is, I'm not sure, you know, because there's not enough, my memory's not good enough to pick up something that's so difficult, and remember it for later, um, but definitely, there is some repetition of an ... of ... not a tonal idea, but like an atonal idea, some pattern, some sequence that's cropped up again.

Participant N: there are a few places where you realise ... there are some regularities, or there is, you know, in one place it goes '[sings three ascending notes]' and then right after that it goes '[sings three ascending notes]', so there are some patterns within it that maybe I didn't realise at first, 'cos at first it looked like it was completely without patterns.

Some of those who noticed repetition were able to relate it with a developing conception of the musical structure:

Participant E: ... it sounds like the beginning comes back somewhere, but I don't know if it does. But I didn't kind of notice that at the beginning.

Participant F: I think I recognise the markers of the piece now. Like, when I get to a certain bit, I know ... where we are in the piece. And I can, I'm familiar, I'm more familiar with the little sections, like the bustly bit, I quite like ...

For Participant G, the function of some features of the music became apparent after repeated listening:

Participant G: ... you know the bit which goes up the piano? I think the first time I heard it, I thought, it didn't seem like the piece needed it, if that makes sense, so ... I wasn't quite sure about it, so I wasn't really interested in it, but the second time, when I heard it ... I think that I understood ... what that bit's for, so I responded to it. ... The first time, I thought, 'Oh, it's just a random scalic bit', and then the second time, it sounded like notes ... in a scale.

Participant P noticed that the piece appeared to become more normal:

Participant P: ... a piece like this, for me, I have to listen to a few times, before it becomes ... normal, you know. It didn't sound like a normal piece of music at first; it sounded quite avant-garde really. And so all the stuff that's similar to this that I have at home, I'm already very familiar with, and don't really sound avant-garde any more to me, you know.

This idea of increasing normality may be related to the concept of expectancy, which participants also discussed in relation to familiarity. Participant C regretted his increased knowledge of the next events in the piece:

Participant C: ... I know the piece fairly well, so I pre-empt things happening. And ... the first time it changes with ... the random scale bits in it, I know that they're coming. And I know that it's gonna be a bit, 'Whahh!'. ... so ... that's ... I don't know ... it ... just wished that ... I didn't know what was coming.

Participants discussed some clear changes in their responses with familiarity that related to an increased knowledge of details of the music, an increased understanding of repetition and musical structure, and their ability to predict future events in the music.

Data from the interviews revealed that participants responded to the music in terms of sound, utterance and narrative, and that they were aware of the effects of the listening context. There were differences in the terminology used by musicians and non-musicians. Participants were aware of the effects of familiarity on their responses. The following section will examine all the data relating to the three case-study participants.

4.4. The effects of familiarity: Building representations of participants' schemata of the Schoenberg

As in Chapter 3, participants A, J and S will be used as case studies, and all their data (quantitative continuous response data; quantitative mood, familiarity and liking ratings; qualitative interview data; and qualitative diary data) will be examined at each stage of the familiarization process.

4.4.1. Participant A

Participant A was a highly experienced music student.

4.4.1.1. Changes in overall measures

Participant A's mood ratings changed slightly over the three sessions of the experiment. At the first session, she provided a mood rating of [1-1] (i.e. slightly pleasant feelings with slight sleepiness); at the second, her mood rating was [0--1] (i.e. neither positive or negative mood, with slight sleepiness); and at the third, [0--2] (neither positive or negative mood, with some sleepiness). There appears to be no clear link between Participant A's mood ratings and her reported mean levels of emotional intensity (see Table 23).

Table 23 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	1	1	47.11	22.77
A2			52.48	20.52
B1	0	-1	52.20	20.17
B2			45.44	19.57
C1	0	-2	56.54	24.50
C2			45.90	21.38

Participant A's familiarity ratings revealed very few changes between the three sessions, despite the fact that she had not heard the specific piece before the experiment began and she listened to the piece daily during the experiment. Her liking figures decreased slightly between Sessions A and B, but returned almost to the original level by Session C. Table 24 shows these figures for Participant A.

Table 24 Participant A's reported familiarity with and liking for the Schoenberg

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant A	Session		
	A	B	C
Familiarity	29.0	31.0	30.3
Liking	38.6	26.9	36.6

4.4.1.2. Participant A's changes with familiarity: Continuous response data

When examined using a Pearson correlation test, 13 out of 15 of Participant A's traces were correlated at the 0.01 level, and one other pair of traces was correlated at the 0.05 level (see Table 25). The data suggest changes in emotional responses with familiarity here: these correlations decrease in strength with proximity in time (A to C). The mean correlation of traces taken within a session was 0.285; the mean correlation of traces taken between neighbouring sessions was 0.236; and that for distant sessions was only 0.161.

Table 25 Pearson correlations between pairs of traces provided by Participant A

* indicates significance at 0.05 level; ** indicates significance at 0.01 level

Participant A	A1 / A2	B1 / B2	C1 / C2
Correlation	0.285**	0.282**	0.289**
Mean correlations	Within Session: 0.285		

Participant A	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	0.137*	0.122*	0.301*	0.219*	0.238*	0.281*	0.271*	0.319*
	*	*	*	*	*	*	*	*
Mean correlations	Neighbouring Sessions: 0.236							

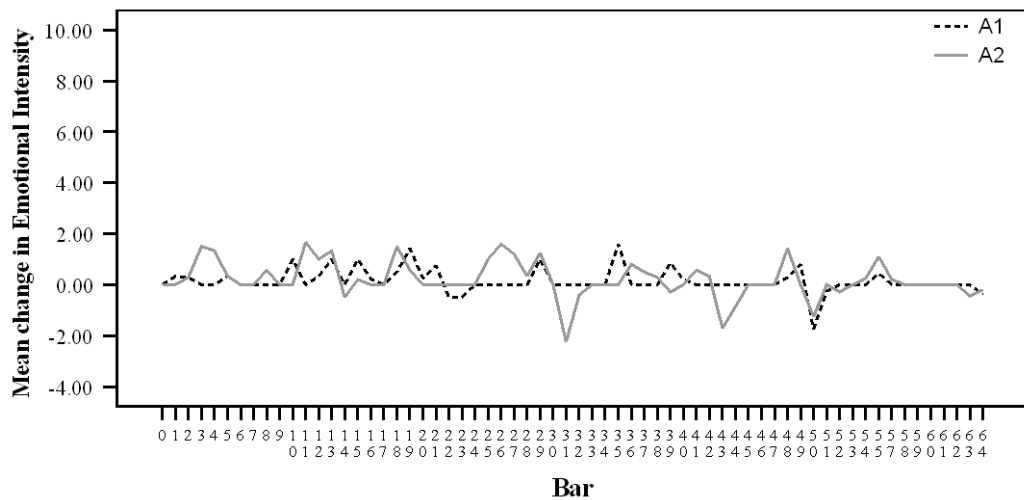
Participant A	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	n/s	0.115*	0.192**	0.176**
Mean correlations	Between distant sessions: 0.161 not including n/s results; 0.120 including n/s results as 0.			

4.4.1.3. Building schemata: Triangulation of continuous response data, interview data, and the music

As in Chapter 3, the schemata discussed here and presented in Appendix 5 emerged from the interview and diary data from each participant.

Participant A's first continuous response trace (see Figure 81) appears to be somewhat complex, with numerous small increases and three main areas of decrease, at bars 31, 43 and 50. The more rapid rate of change shown up to around bar 20 may be reflected in the perceptual schema shown in Appendix 5 (Schema 44), which displays three comments that emerged from those bars. The majority of Participant A's comments in this interview were in the form of descriptions of perceptual cues, although there is one overall mood association with the piece.

Figure 81 Participant A's reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session A



Participant A completed the listening diaries daily, between the three interview sessions. Her first diary entry revealed a purely narrative understanding of the piece, in terms of the music representing a person's emotions over a period of time (see Schema 45). Participant A's second diary entry (Schema 46) revealed a new conception of the structure of the piece. Participant A divided the piece into three sections, perhaps influenced by her previous narrative understanding of the music, although the middle section of the piece differed slightly. Each of these three sections was focused upon and a new perceptual cue was provided. In addition, two mood associations are described for the ending of the piece.

Participant A's third diary entry (Schema 47) was very much focussed on the first 23 bars of the piece. There was considerable detail in her descriptions of her perceptual cues, to the extent of one relying on her absolute pitch, but Participant A also invoked a narrative understanding of one of these cues to help her to understand its function within the piece. She also noted a mood association with the beginning of the piece. The fourth diary entry (Schema 48) was again focused on the beginning of the piece, but Participant A described her perceptual cues and a mood association resulting from the

perception of those cues. She described the opening melody as discordant, and suggested that it leads the listener into a false sense of security. She then described the more active areas of the piece, suggesting that they force the listener to pay attention.

Participant A's fifth diary entry (Schema 49) invoked two narrative ideas and two mood associations. One of the mood associations was linked with the whole piece, in contrast with the other, which specifically referred to the opening of the piece. One of the narrative ideas progressed over the first 14 bars of the piece, and the second, an argument, was referred to during later areas of the piece.

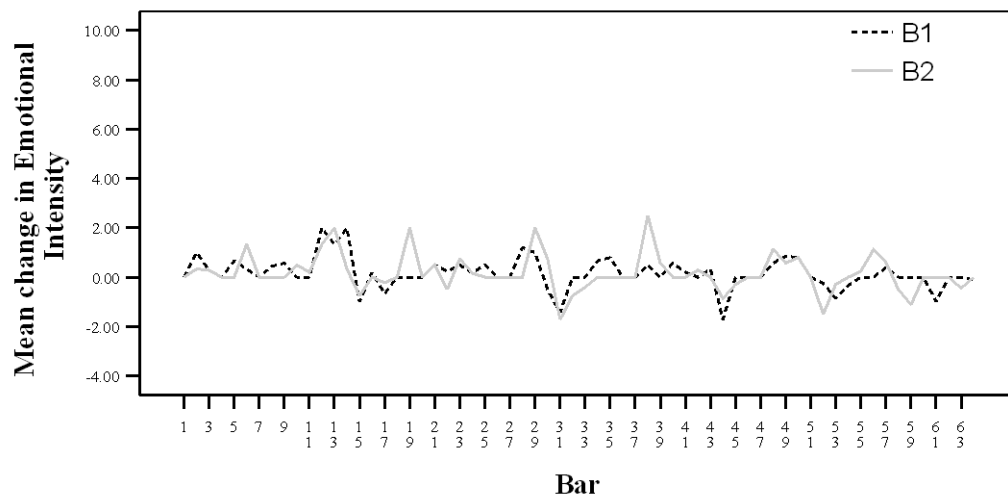
Participant A's sixth diary entry (Schema 50) discussed two perceptual cues and, for the first time, a judgement of the piece. This judgement referred to a specific feature of the piece: the dynamic range. This may have been prompted by Participant A's reaction to the *sforzando* chords in bar 14. By the end of the first week, Participant A described detailed perceptual cues and had developed a tripartite conception of the structure of the piece. She created several mood associations with the piece and began to develop a narrative understanding of the music.

Participant A's second continuous response trace (Figure 82) is similar in many ways to the first, with numerous peaks and troughs, but there are some changes that may be important. The increase in bars 10–14 is slightly larger than that seen in the first session; similarly, the peak at bar 28 is slightly higher. There is greater consistency between the hearings at bars 30 and 43, where both traces show a sharp decrease, and there is greater variation in emotional intensity towards the end of the piece.

The corresponding perceptual schema (Schema 51) is very cue-focused, perhaps partly reflecting the trace-prompted interview setting, but an important shift is seen in the participant's responses from a focus on the beginning of the piece, which was not

mentioned at all, to increasing detail concerning the latter half of the piece. Participant A began to be aware of thematic unity within the piece, noting that an important melody returns at bar 55. She also showed awareness not only of structural features, but also of performance features, such as the performer's articulation.

Figure 82 Participant A's reported changes in emotional intensity (mean levels per bar) in response the Schoenberg: Session B



Participant A's seventh diary entry (Schema 52) continued this awareness of thematic unity and structure of the piece, with an important comment reflecting the similarity between the beginning and the end of the piece. This schema also shows mood associations and an element of narrative understanding relating to the composer's intentions.

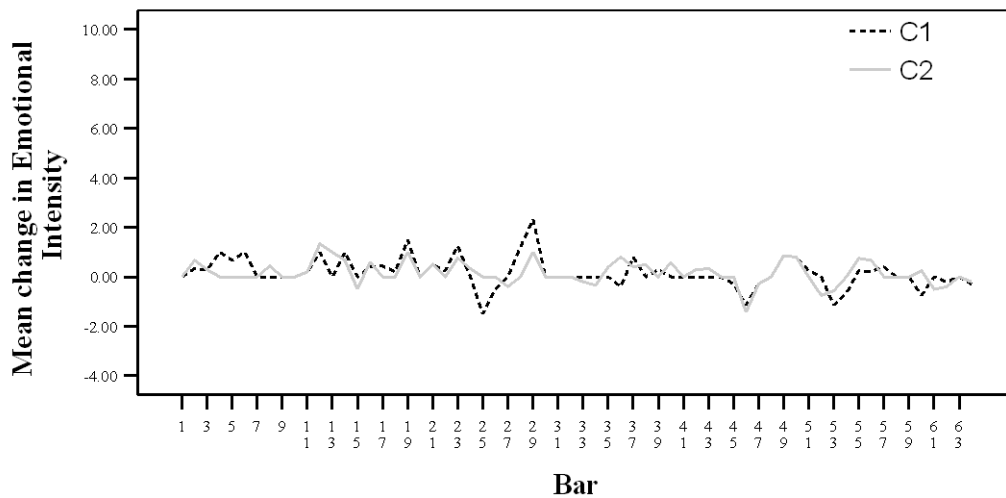
In her eighth diary entry (Schema 53), Participant A outlined a four-part narrative structure, based on a storm, which was closely related to her perceptual cues and structural understanding of the piece. The ninth diary entry (Schema 54), revealed a further narrative conception of the piece, relating to the 'question and answer' nature of the musical features. Participant A also returned to her focus on the beginning of the piece, describing in some detail the musical features occurring at that point. This preoccupation recurred in the tenth diary entry (Schema 55), although not so much in

terms of the details of the musical structure, but in the mood those structures conveyed. Participant A also critically evaluated aspects of the piece, particularly the pitch and dynamic ranges of the piece. Participant A's eleventh diary entry (Schema 56) returned to a more specific appraisal of aspects of the music, as she described events in the music, and the music's effect on the listener. She also linked aspects of the music with external sounds such as ringing church bells (bars 25–27) in a manner that could be described as a Peircian symbolic association.

The final diary entry (Schema 57) was based solely on one narrative understanding of the piece, which happily sits beside Participant A's four-part structural understanding of the piece in the Schema. Though the personification of this narrative is different, the emotions portrayed through it are similar to those described in the narrative structure involving a storm, seen first in the eighth diary entry.

The continuous response traces from the third interview session are slightly flatter than previous traces, but the traces are more consistent with one another (see Figure 83). There are also areas of heightened activity. Participant A makes a far more marked descent in emotional intensity at bars 24–25, for instance, a moment when she later describes a new perceptual cue of the music dying away. There is less of a descent, however, around bar 31, with the participant appearing to respond to the cue of 'quiet and still' music with an unchanging emotional intensity. Additionally, a descent previously seen beginning at bar 43 is here postponed slightly to bar 45. Participant A's perceptual schema for this final interview (Schema 58) is focussed on small-scale perceptual cues and a large-scale four-part narrative structure, on a related theme to one of those seen previously.

Figure 83 Participant A's reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session C



In summary, Participant A's perceptual schema developed greatly between her first and last hearings. She began with a schema based largely on small-scale perceptual cues, and then began to develop her narrative ideas of the music. Her understanding of the structure of the piece developed relatively quickly, and she divided the music into large-scale sections in addition to noticing small- and large-scale repetitions. Towards the end of the experimental period, Participant A created more associations with the music and made judgements of the piece, but most interestingly, began to combine her narrative and structural understandings of the piece.

4.4.2. Participant J

Participant J was a less experienced music student.

4.4.2.1. *Changes in overall measures*

Participant J's mood ratings varied over the time course of the experiment. At the first session, he provided a mood rating of [0–2] (i.e. neutral feelings with some arousal); at the second, his mood rating was [-2–1] (i.e. negative mood, with slight arousal); and at the third, [2,–1] (positive mood, with slight sleepiness). Participant J's lower levels of

emotional intensity in his third interview may reflect his lower levels of arousal, but this link is difficult to establish with this small amount of data (see Table 26).

Table 26 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	0	2	65.11	22.03
A2			66.81	18.97
B1	-2	1	68.19	20.84
B2			68.32	24.93
C1	2	-1	49.28	22.96
C2			52.74	20.68

Participant J's familiarity ratings changed vastly over the three sessions (see Table 27). He began with a familiarity rating of 5.52, and by the third session had increased to 69.7. His liking for the piece decreased between sessions A and B, but increased somewhat by session C.

Table 27 Participant J's reported familiarity with and liking for the Schoenberg

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant J	Session		
	A	B	C
Familiarity	5.52	46.9	69.7
Liking	51.0	24.8	33.8

4.4.2.2. Participant J's changes with familiarity: Continuous response data

When examined using a Pearson correlation test, nine out of a possible 15 of Participant J's traces were correlated at the 0.01 level, and one other pair of traces was correlated at the 0.05 level (see Table 28). There is some evidence to suggest changes in emotional responses with familiarity here: these correlations decrease in strength with proximity in time, if the non-significant correlations are not considered. The mean correlation of traces taken within a session was 0.504; the mean significant correlation of traces taken between neighbouring sessions was 0.443; and that for distant sessions was 0.364.

Table 28 Correlations between pairs of traces provided by Participant J

* indicates significance at 0.05 level; ** indicates significance at 0.01 level

Participant J	A1 / A2	B1 / B2	C1 / C2
Correlation	0.565**	0.492**	0.454**
Mean correlations	Within Session: 0.504		

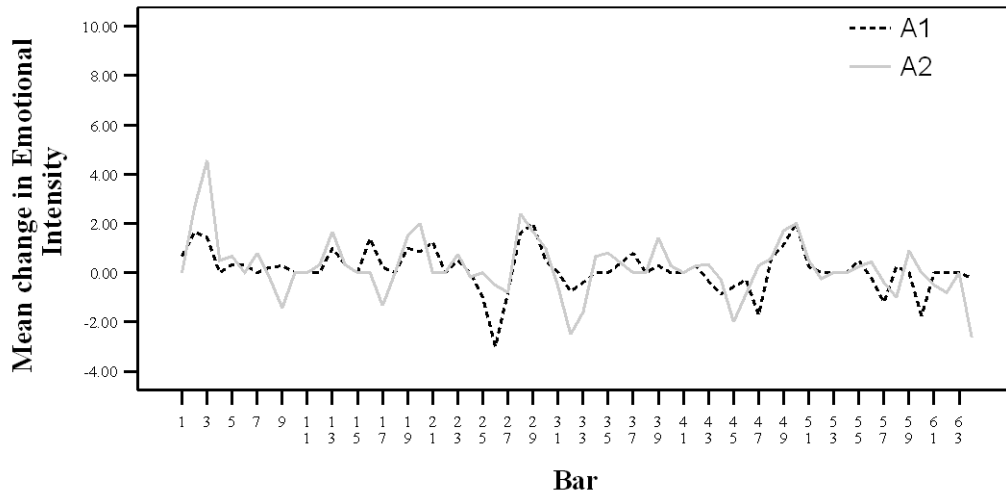
Participant J	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	0.584* *	n/s	0.452* *	n/s	0.326* *	n/s	n/s	n/s
Mean correlations	Between neighbouring sessions: 0.443 not including n/s results; 0.166 including n/s results as 0.							

Participant J	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	0.396**	0.321**	0.284*	0.455**
Mean correlations	Between distant sessions: 0.364			

4.4.2.3. Building schemata: Triangulation of continuous response data, interview data, and the music

Participant J attended all three interview sessions and completed four diary entries between each interview. In his first continuous response trace, Participant J's emotional intensity appears to fluctuate to a greater extent and more rapidly than that of Participant A, resulting in the greater extremes on the graph (see Figure 84). A large increase is seen at the beginning of the piece, and around bars 13, 20, 28 and 50. Large decreases are seen around bars 26, 32, 45 and 47, and towards the end of the piece. The fluctuating nature of the response trace is perhaps reflected in Participant J's perceptual schema, represented in Appendix 5 (Schema 59). Small scale perceptual cues were present throughout the piece, together with associations and judgements about those features. One of these associations could be described in Peirce's terms, as an iconic relationship: Participant J described bar 55 as 'being hit with a hammer'. Participant J also had a clear conception of the piece as a whole, describing it as 'atonal', and suggesting composers, though his suggestion that Schoenberg's music is normally more difficult to listen to than this piece perhaps reveals some interesting stereotypes of that composer's output.

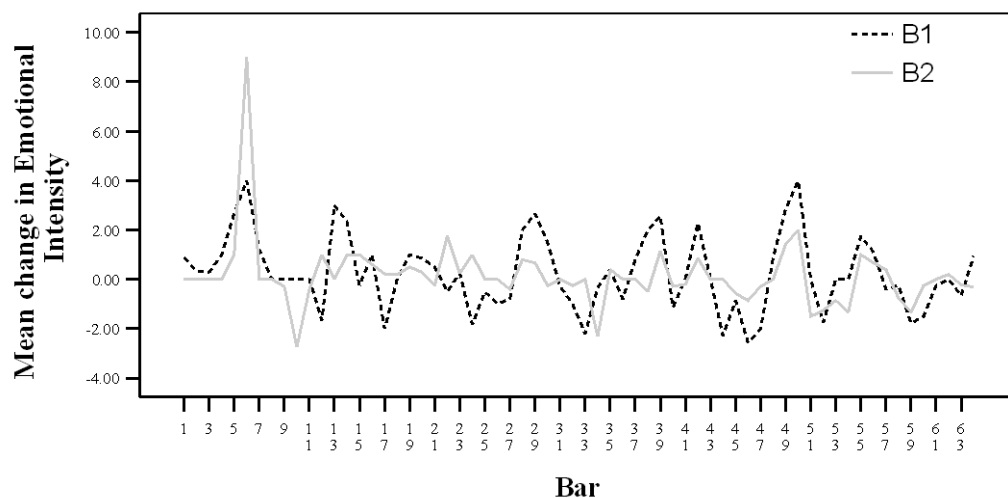
Figure 84 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session A



Participant J's first diary entry (Schema 60) contained only one reference to a small-scale perceptual cue, and otherwise consisted of a judgement of the piece which questions its purpose as a piece of music; a critique of his original assumption that the music is atonal; and an assessment of the structure of the piece. Participant J concluded that although there may be a structure, he had so far found it incomprehensible. This concern for the discernment of some structure behind the piece continues in the second diary entry (Schema 61), in which Participant J made some suggestions regarding the unity of the piece, but was unable to state whether or not there is an underlying structure to the piece. Again, Participant J made a judgement about the piece. He also discussed a narrative idea of trying to understand the meaning behind the piece. In his third diary entry (Schema 62), Participant J focused on only two small details of the piece, and invoked a narrative understanding of the beginning of the piece. He also made musical associations with the piece, trying to work out its composer. Participant J's fourth diary entry (Schema 63) maintained a much wider focus than has been seen before in his responses. He made two judgements of the piece as a whole, and elaborated on an extra-musical association with the piece that he made earlier in the experiment.

Participant J's response trace from his second session shows some extreme and rapid changes in emotional intensity, most obviously in bars 3–7, the first phrase of the piece (see Figure 85). Other increases are seen in bars 27–29, where there is a large crescendo in the music; 33–39, a crescendo and sequential passage that follows the end of a phrase; and 47–50, arguably the climax of the piece. Participant J highlighted small-scale features of the music in his interview (see Schema 64), particularly noting motives in the piece and dynamic changes. He made no large-scale observations on this occasion; instead, his judgement and associative comments related to the small-scale features he described.

Figure 85 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session B

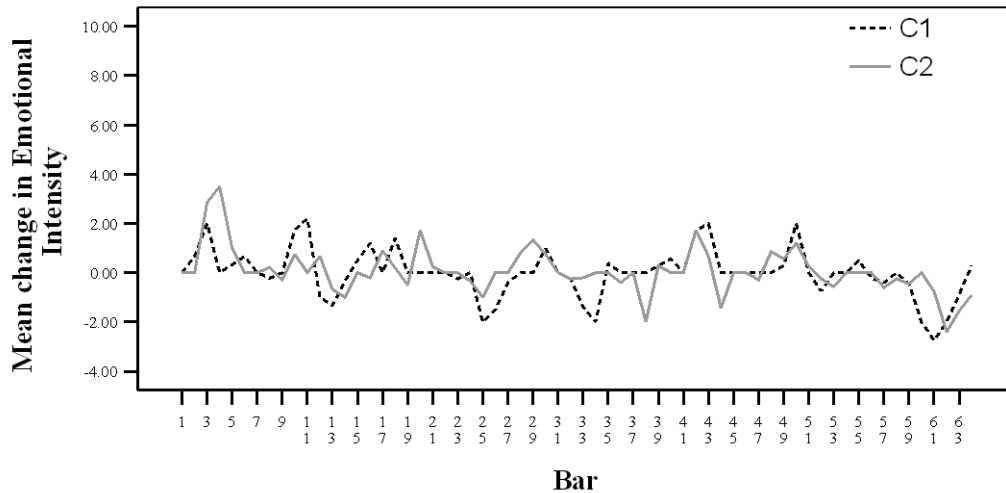


Participant J's fifth diary entry (Schema 65) was short and focused on the piece as a whole. It does suggest, however, that the participant is beginning to understand the piece more fully, as he described motivic connections within the piece. This increased understanding is also evident in the sixth diary entry (Schema 66), in which Participant J described the repetition of an earlier idea in the piece. He also made two negative judgements of the piece, suggesting that this understanding was not necessarily accompanied by liking for the piece.

The seventh diary entry (Schema 67) revealed Participant J's dissatisfaction with the piece, mainly in reference to its structure, which, he felt, is unclear with many discontinued ideas. The participant made a link with a piece he recently saw performed, but suggested that this piece demonstrates that tonality should not be abandoned. The frustration continued in the eighth diary entry (Schema 68), with Participant J again expressing his frustration with the abandonment of successive ideas in the piece. He did manage to find a redeeming feature to the music though, with a positive judgement concerning the tone of the piano.

Participant J's third continuous response trace is rather less variable than that of the second interview, although the increases and decreases in emotional intensity appear to be in similar places (see Figure 86). The corresponding perceptual schema (Schema 69) shows considerable development. Though Participant J had on previous occasions described the repetitions of small-scale ideas in the music, it was only at this point, in his last interview, that he divided the piece into sections and formed a structure. This structure is in four parts, as was that observed by Participant A. Although Participant J's conception of the identity and content of each section was occasionally hazy, there is evidence to suggest that he developed another layer in his understanding of the piece. Within the four sections of the piece he described, he provided considerable detail about the small-scale perceptual cues he used. The majority of the comments in this interview were related to the content of the music itself, but there was also one positive judgement concerning the beginning of the piece and one comment revealing Participant J's use of narrative structures to understand the music.

Figure 86 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session C



In summary, Participant J's perceptual schema appears to develop from small-scale perceptual cues to a more comprehensive understanding of the music. In the first few schemata, he is able to make judgements about the piece and make associations with the music he hears. He remains convinced for a long time that the music has no unifying structure, but eventually identifies a four-part structure similar to that observed by Participant A. His initial conviction that the music is atonal is softened as he listens more to the music, and he begins to create expectations of what he thinks should happen in the music. Unfortunately, this sometimes results in frustration. His final schema is focused less on negative judgements of the music, and more on small-scale perceptual cues and a more overriding structure of the piece.

4.4.3. Participant S

Participant S was a non-music student.

4.4.3.1. *Changes in overall measures*

Participant S's mood ratings remained similar over the experiment. In the first session, he provided a mood rating of [2-1] (i.e. somewhat pleasant feelings with slight arousal); in the second, his mood rating was [2-2] (i.e. somewhat pleasant mood, with some

arousal); and in the third, [2–1] (i.e. somewhat pleasant feelings with slight arousal). There does not appear to be a clear relationship between Participant S's mood and his levels of emotional intensity (see Table 29).

Table 29 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	2	1	31.81	11.94
A2			32.49	10.74
B1	2	2	26.37	9.22
B2			35.11	11.71
C1	2	1	38.31	12.02
C2			40.73	12.22

Participant S's familiarity ratings increased over the three sessions. He began with a familiarity rating of 0, increased to 42.8 by the second session, and by the third session had increased to 66.9. His liking for the piece also increased a little between sessions A and B, but increased more dramatically by session C (see Table 30).

Table 30 Participant S's reported familiarity with and liking for the Schoenberg

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant S	Session		
	A	B	C
Familiarity	0	42.8	66.9
Liking	21.4	27.6	57.2

4.4.3.2. Participant S's changes with familiarity: Continuous response data

When examined using a Pearson correlation test, 14 out of a possible 15 of Participant S's traces were correlated at the 0.01 level (see Table 31). There is some tentative evidence to suggest changes in emotional responses with familiarity here: these correlations decrease slightly in strength with proximity in time, if the non-significant correlations are not considered.

Table 31 Pearson correlations between pairs of traces provided by Participant S

* indicates significance at 0.05 level; ** indicates significance at 0.01 level

Participant S	A1 / A2	B1 / B2	C1 / C2
Correlation	0.502**	0.373**	0.609**
Mean correlations	Within Session: 0.495		

Participant S	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	n/s	0.348**	0.391**	0.455**	0.415**	0.520**	0.412**	0.504**
Mean correlations	Between neighbouring sessions: 0.435 not including n/s results; 0.381 including n/s results as 0.							

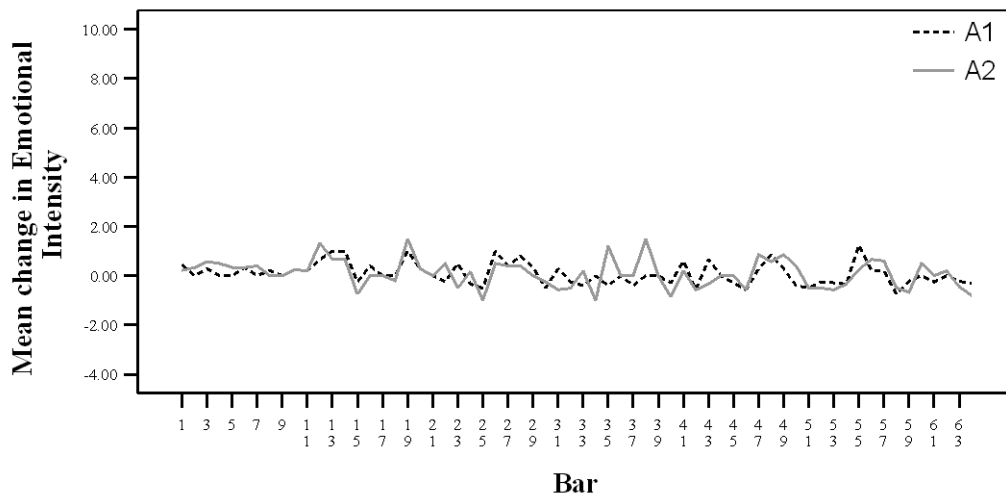
Participant S	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	0.369**	0.373**	0.329**	0.593**
Mean correlations	Between distant sessions: 0.416			

4.4.3.3. Building schemata: Triangulation of continuous response data, interview data, and the music

Participant S attended all three interview sessions, completing six diary entries between sessions A and B and five between sessions B and C.

Participant S's response trace from the first session is shown in Figure 87. The changes in emotional intensity in this trace are relatively small, but they become more varied after bar 11 (the end of the first section of the piece). The two traces are largely consistent. As might be suggested by the large number of small changes on the emotional intensity trace, the corresponding perceptual schema (Schema 70) contains many small-scale perceptual cues. These do not contain the detail of musical features described by Participants A and J, but Participant S did comment on the activity in the music, as well as patterns that he spotted. He also made small-scale associations with and narrative conceptions of the small-scale perceptual cues. Participant S was able to summarize his understanding of the piece, comparing it with the Clementi he had heard before.

Figure 87 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session A

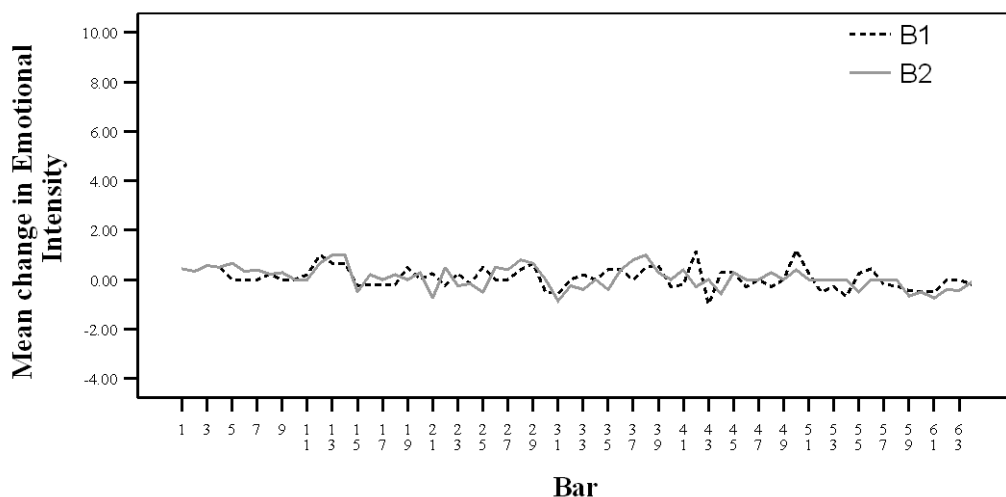


Participant S's first diary entry (Schema 71) was fairly short, and revealed evidence of a small-scale perceptual cue relating to the beginning of the piece, a narrative understanding of the area around bar 12, and an overall judgement of the piece. Participant S's references to a scurrying mouse in bars 12–14 might be described as either an iconic or symbolic relationship in Peirce's terms. The second diary entry (Schema 72) was more detailed, with time references that enabled the precise location of comments to be noted. Almost every comment in this entry was a perceptual cue, though one comment related to the mood of a small-scale feature. Participant S's third diary (Schema 73) was somewhat similar to the first, with a focus on the beginning of the piece and with a few comments relating to the piece as a whole. The fourth and fifth diary entries (Schemata 74 and 75) returned to the style of the second, with time references and short comments related to small-scale perceptual cues. The comment relating the music to breaking glass in Schema 74 could be described as evidence for, in Peirce's terms, an iconic resemblance noted in the music. One interesting difference between the fourth and fifth diary entries is the appearance of the first evidence for Participant S forming a larger-scale idea of the structure of the piece in the fifth diary

entry: he noted the return of an earlier tune at the end of the piece. The sixth diary entry (Schema 76) was very brief, containing only a narrative association and a comment regarding the lack of emotion-evoking features of the piece.

The second continuous response traces are rather similar to those from the first session, with some consistency shown between the individual traces, and a small range of fluctuations apparent (Figure 88). Four important peaks in the change in emotional intensity may be seen here, however: bars 11–15, where the first section of the piece ends and the second begins; 25–29, another section boundary; 41–42, where there are extremely rapid dynamic contrasts; and 49–52, the area leading to the climax of the piece. The corresponding perceptual schema (Schema 77) is rather more detailed than the diary entries, outlining a number of perceptual cues, some of which provide interesting additions to the schema. Participant S referred twice to the use of a narrative understanding of the music, firstly suggesting that the music was not conducive to a narrative or imagery-led understanding, and secondly, that any associated narratives would be negative. His musical associations were related to this negative ‘murder’ theme, reminding the participant of the music from a specific horror film.

Figure 88 Participant S’s reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session B



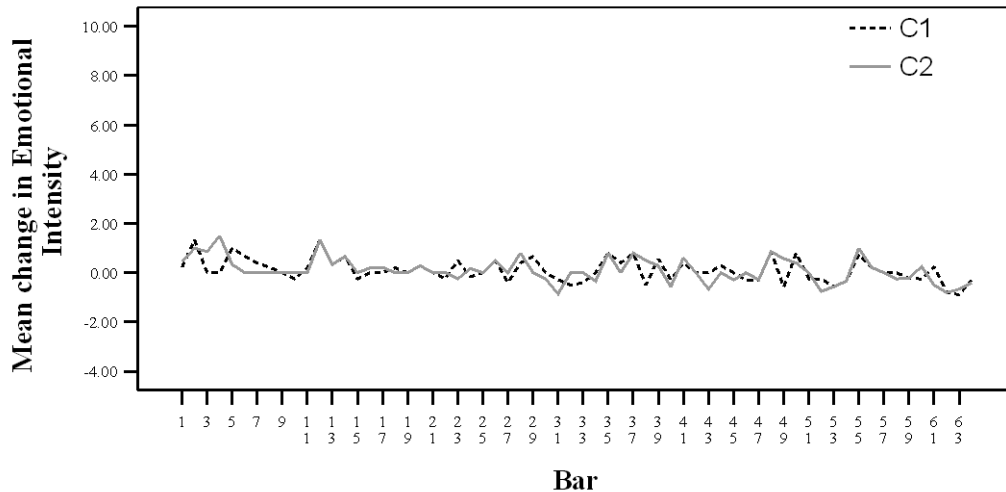
In his seventh and eighth diary entries (Schemata 78 and 79), Participant S referred to a number of small-scale perceptual cues, and some small-scale associations and judgements. In the seventh diary, the perceptual cues were new, while in the eighth diary entry, the perceptual cues had referred to in response to previous hearings. Few small-scale perceptual cues are mentioned in the ninth diary entry (Schema 80), in which Participant S appeared to be gaining some awareness of recurring themes in the piece, showing some evidence of his understanding of the larger-scale structure of the piece. Participant S returned to his focus on smaller-scale features in his tenth and eleventh diary entries (Schemata 81 and 82). In the tenth entry, he was focused on the musical features, whereas in the eleventh he was more focused on the moods and associations carried by those features. He showed evidence of his awareness of the recurrence of themes with his use of ‘dum dum dum dum’ to represent a theme of the piece.

The continuous response traces from the third session appear consistent and relatively flat. There are small undulations throughout the piece, as well as smoother areas (e.g. bars 5–11; 15–21) and areas with more rapid fluctuations (e.g. bars 27–41; 47–55). These appear to correspond with low- and high-activity areas of the piece, respectively.

Participant S’s final schema (Schema 83) is considerably more detailed than many of those seen previously. He described several perceptual cues with some interesting detail, but perhaps the most significant feature is his slightly larger-scale conception of the piece. In this final interview, Participant S divided the piece into small chunks. The first two of these chunks correspond with the first two sections of the piece outlined by Participants A and J. The next two chunks were identified in a previous diary entry. The fifth and sixth chunks were described as ‘peaks’, suggesting a move towards the climax of the piece, and the final chunk begins with a return of the initial theme of the piece.

Participant S suggested, in a judgement comment, that this increased understanding of the piece helped him to enjoy listening to the piece more.

Figure 89 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Schoenberg: Session C



In summary, Participant S's schemata remain focussed on small-scale perceptual cues and associations for the majority of the experiment. In the last interview, however, he reveals a larger-scale understanding of the structure of the piece, dividing the music into seven sections. He also makes some interesting judgement comments about the music, suggesting that it requires the listener's full attention for a complete understanding. Participant S spots relatively small-scale repetitions of themes and ideas, but does not observe the four-part structure described by Participants A and J.

4.4.4. A comparison of the case studies

As in Chapter 3, the three participants varied in their emphasis on each type of comment in their interviews and diary entries. Small-scale perceptual cues were discussed most frequently in the interviews, although these were also discussed in the diary entries, particularly by Participant S. Participant A appeared to discuss structural features of the music earlier than Participants J and S, whose peak discussions of this feature were in the final interview. All three participants conceptualized the piece in terms of a unifying

structure by the end of the experiment. Participants A and J described a four-part structure, whereas Participant S described a less-accurate 7-part structure. All three participants discussed extra-musical plots or narratives. Participant A combined her narrative and structural understandings of the piece by the end of the experiment. Participants J and S made musical associations with the piece, whereas Participant A did not; Participant A, however made more mood associations with the piece than Participants J and S. All three participants made judgements of the piece.

Figure 90 Prevalence of each aspect of the schema over the familiarization period: Participant A

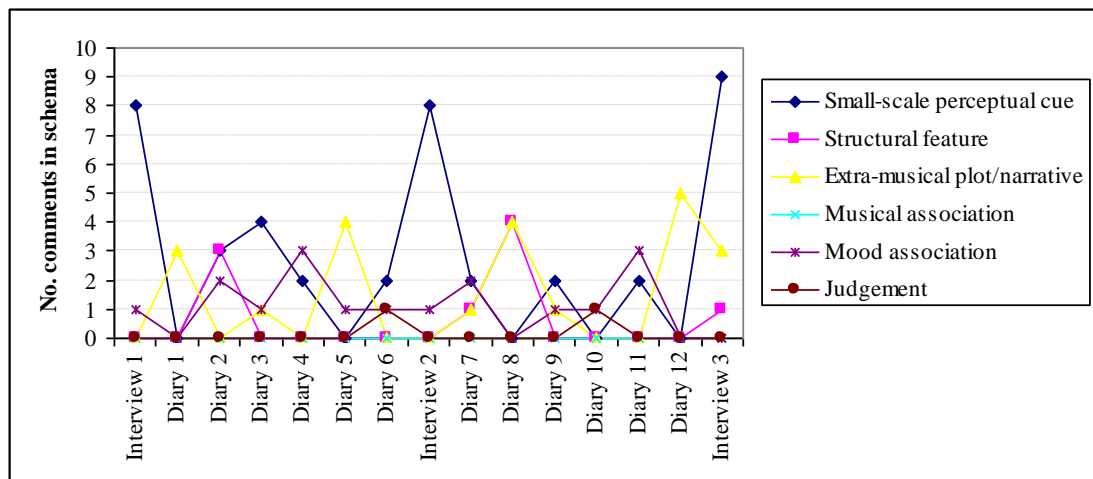


Figure 91 Prevalence of each aspect of the schema over the familiarization period: Participant J

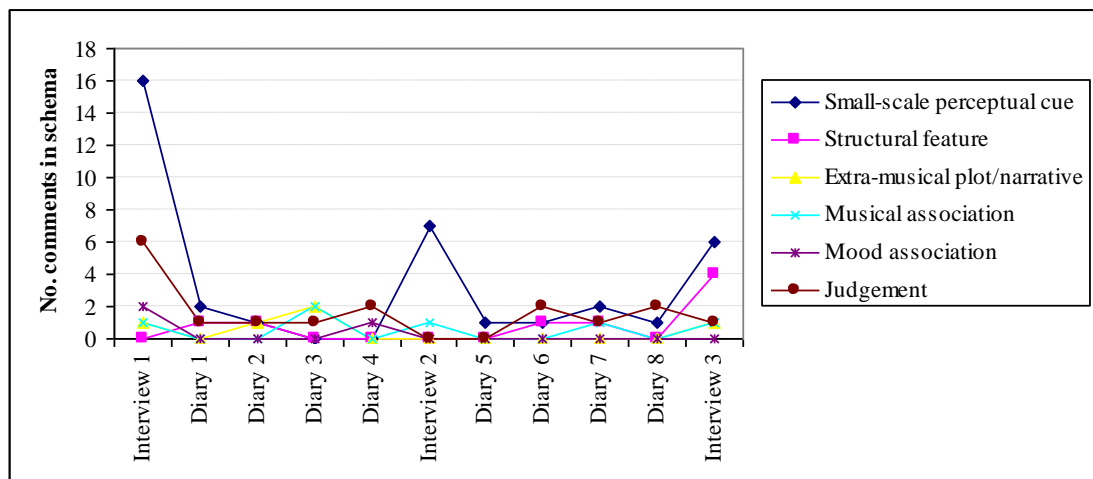
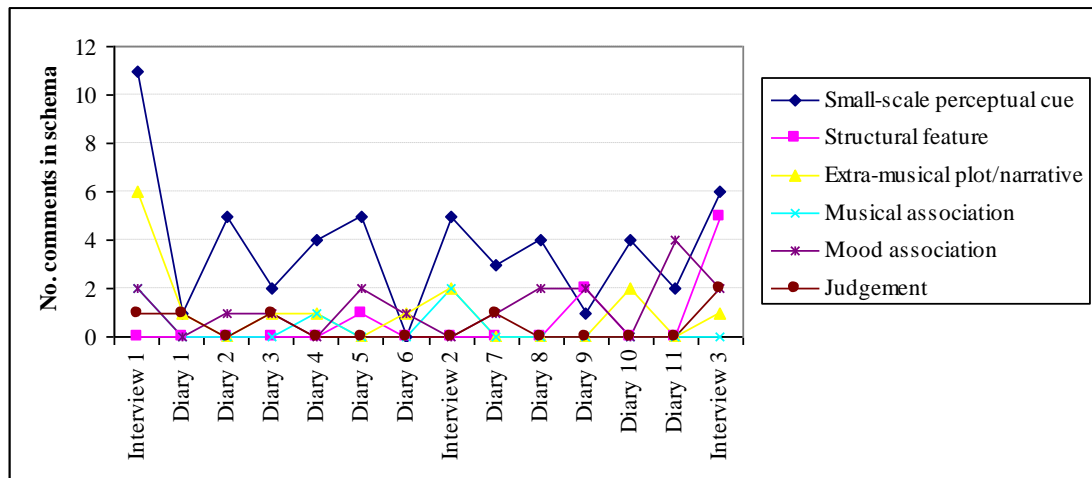


Figure 92 Prevalence of each aspect of the schema over the familiarization period: Participant S



4.5. Preliminary conclusions

The results of this experiment suggest some interesting differences between music students and non-music students that were evident in overall mean traces of emotional intensity, but also revealed a different progression of emotional responses to the music over the experimental period: whereas music students' emotional responses decreased over the three sessions, non-music students' responses rose to a peak, and then decreased. There was also evidence of variation according to the type of student in the use of technical vocabulary when discussing emotional triggers. The two music students used as case studies (Participants A and J) formed a more accurate conception of the musical structure than Participant S, a non-music student.

There was evidence of changes in participants' emotional responses with familiarity. As with the Clementi, the traces gathered within the same session were more strongly correlated than those gathered between neighbouring or distant sessions. Additionally, there were changes in emotional response to specific bars of the piece: it appeared that participants' responses to the start of phrases became more consistent with familiarity. There was also evidence of anticipatory effects of familiarity.

Participants discussed their emotional responses in relation to each aspect of the model. They created narratives in response to the music, but did not discuss the concept of tension in the music. There was evidence that participants were hearing the music as sound and human utterance, and that listeners were aware of the effect of the listening context on their responses. Several participants discussed multiple ways of hearing the piece, prompted by their own listening goals or by their listening context.

The next chapter will discuss participants' responses to music by Berio.

Chapter 5

Experiment 3: Responses to Berio

5.1. Berio's *Rounds* for piano solo

The piece used in this experiment was written by Luciano Berio (1925–2003), one of the most prolific composers of the latter half of the twentieth century (Osmond-Smith, 2007). Luciano Berio originally wrote *Rounds* in 1964–5 for the harpsichord, and subsequently arranged the work for the piano in 1967. Although Berio was an Italian composer, and spent much of his time travelling, his activities around this time were based in the USA (Osmond-Smith, 1991). He taught at Mills College, California, where he met his second wife; later at Harvard University; and then at the Julliard School of Music in New York. Berio had considerable interest in the concept of virtuosity, as exemplified in his *Sequenzas* as well as in *Rounds*. According to Osmond-Smith (2007), Berio understood this ‘not merely as technical dexterity, but as a manifestation of an agile musical intelligence that relishes the challenge of complexity’. His style of this period has also been described as ‘gestural’ (Osmond-Smith, 2007). Berio achieved more widespread popularity than many of his peers (Osmond-Smith, 2007), perhaps suggesting an awareness of the tastes of his audience.

5.1.1. Score-based analysis

As mentioned above, Berio originally wrote *Rounds* for the harpsichord, and later arranged the work for the piano. In the original score for harpsichord, the score consisted of a single sheet of music, with instructions that it should be turned upside down at the end of the first rendition, and returned to the original orientation for the third, which was to be performed slightly faster (Godwin, 1967; Hopkins, 1967). This creates a ternary form structure, with the middle (B) section forming a quasi-retrograde-inversion of the first section. As a result of the construction of the B section of the piece

from an upside-down version of the A section, the piece centres around the pitch of c' sharp, which retains the same position on the stave in both orientations (Thow, 1996).

The score for harpsichord uses an unconventional notation system for both pitch and rhythm, which was in proportional notation, making the rendition of an upside-down score slightly easier (Thow, 1996). In the arrangement for piano, all three sections are written out conventionally, with the return of the A section marked by a '*da capo*' instruction and a faster tempo marking (see Appendix 1 for a score). Berio also alters the 'B' section slightly from its original upside-down version, specifying new rhythms and some new pitches (see Figure 93)

Figure 93 The end of Section A and beginning of Section B, illustrating the changes made by Berio in the piano arrangement

Bars 28–30 as heard at the end of section A

Musical score for bars 28–30 as heard at the end of section A. The score is in piano (piano) and consists of two staves. It begins with a forte (*ff*) dynamic and a piano (*p*) dynamic. The music features a triplet of eighth notes in the right hand and a triplet of eighth notes in the left hand. The tempo is marked *rall.* (rallentando). The piece ends with a *Fine* marking.

Bars 28–30 upside-down

Musical score for bars 28–30 upside-down. The score is in piano (piano) and consists of two staves. It begins with a piano (*pp*) dynamic and a forte (*ff*) dynamic. The music features a triplet of eighth notes in the right hand and a triplet of eighth notes in the left hand. The tempo is marked *rall.* (rallentando). The piece ends with a *Fine* marking.

Bars 30–32 (beginning of section B)

Musical score for bars 30–32 (beginning of section B). The score is in piano (piano) and consists of two staves. It begins with a piano (*pp*) dynamic and a mezzo-forte (*mf*) dynamic. The music features a triplet of eighth notes in the right hand and a triplet of eighth notes in the left hand. The tempo is marked *accel.* (accelerando). The piece ends with a *Fine* marking.

As Thow states,

The rhythmic notation in the piano version is quite precise, and dynamics and pedallings are specified. Beyond these changes, Berio composed the piece to work more effectively on the piano, with a more extended register, greater dynamic range, etc. It is in many ways a new piece, one crafted from the earlier version.

(Thow, 1996, pp. 4–5)

Within each section of the piece, Thow suggests that there are two main parts, surrounded by an introduction and a coda, though in fact the first main part in the A section consists of two phrases, delineated by a double barline that is common

throughout the piece. This double barline is not present at the equivalent point in the B section. According to the score, ‘After every double bar ... a pause follows of the same duration as the bar immediately preceding it’ (Berio, 1968, p. 1). The overall form of the piece is outlined below (see Table 32)

Table 32 Formal structure of Luciano Berio’s *Rounds*

Section	A					B (A section, upside-down)				A (faster)				
Subsection	Intro	Part 1		Part 2	Coda	Intro	Part 1	Part 2	Coda	Intro	Part 1	Part 2		Coda
Phrase	1	2	3	4	5	1	2	3	4	1	2	3	4	5
Bar numbers	1–5	6–9	10–16	17–27	28–29	30–32	33–42	43–51	52–56	1–5	6–9	10–16	17–27	28–29

The content of these sections is varied. Hopkins describes that of the original harpsichord version as follows:

The musical process is one of congelation—linear opening, speeding up to *glissandi* and rapid figuration with chords and clusters becoming increasingly static—which is more or less effectively protracted by means of the mechanical formal scheme described above.

(Hopkins, 1967, p. 62)

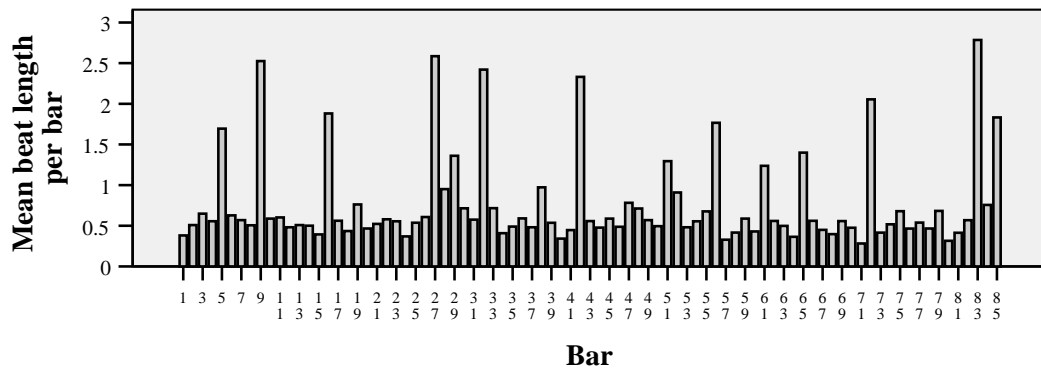
It can be argued, however, that Berio maintains movement throughout the piece. Though the opening of the piece does in fact sound linear, a number of notes are sustained while others are played, creating interesting harmonic effects. Levels of activity in the music increase from bar 10, with more complex rhythms and a greater number of notes being played in each bar, some of which form note clusters. The climactic area of the A section is to be found in bars 17–20, an area with note clusters, rapid and complex figurations, and wide-ranging pitch and dynamic levels. The rest of

this sub-section is followed by relatively quiet and more regular configurations with a slightly simpler texture. A final flourish is provided in bar 28, and the section ends quietly with two *staccato* chords. This structure is, of course, almost mirrored in the B section.

The piece is exciting and varied, and as Thow notes, sounds improvised in places (Thow, 1996). The unity in the piece is evident, however, in the repetition of specific pitches and intervals, and in the mirroring of rhythmic, dynamic and pitch relations. As an atonal work with some consistency and repetition of pitch, yet considerable pitch, rhythmic and formal complexity, this piece offers exciting opportunities to explore the effects of familiarity on listeners' perceptual and emotional responses.

5.1.2. Performance analysis

As in the other two experiments, a professional recording of this piece was used (see Appendix 2). Bar lengths were calculated to assess the performer's use of tempo deviation. The mean bar length was 3.09 seconds, with a standard deviation of 2.30 seconds. This standard deviation is very large, equating to 74.3% of the mean, which may reflect the changes of metre in the piece, or the large number of pauses in the piece. To eliminate the effect of the changes in metre, the average beat length was calculated. The average beat length was 0.773 seconds, and the standard deviation was 0.574, suggesting that the pauses in the piece are likely to be the cause of the large standard deviation. This is confirmed by examination of the longest mean beat lengths (see Figure 94): bars 5, 9, 16, 27, 29, 32, 42, 51, 56, 61, 65, 72, 83 and 85 have the longest bar lengths, all of which have double bars indicating a pause at the end of them.

Figure 94 Mean beat lengths per bar in the recording of the Berio

Bars 38, 28, and 52 are the next longest bars. Bar 38 is in $\frac{3}{4}$ time, containing notes of small durations, a triplet figure, rapidly changing dynamics, large leaps in register, and some rests, and demanding considerable skill from the pianist. More importantly, perhaps, the figure in the right hand at the beginning of the bar is continued from the previous bar, and the rest of the bar leads towards the run of demisemiquavers in bar 39. It could be that the performer perceives there to be a small-scale phrase break in this bar. Indeed, in the equivalent point in Section A, there is a crotchet rest, suggesting the end of a small phrase (see Figure 95).

Figure 95 Bars 37–38 of Berio’s *Rounds*, showing the phrase break between the first and second crotchet beat in bar 38

Bar 28 is the penultimate bar of section A of the piece. It contains a loud and impressive gesture that is wide-ranging in pitch, and rapidly quietens to pianissimo in the following bar. The pianist may have given extra time to the large leaps at the beginning of the bar, but there is also a *rallentando* marked at the end of the bar (see Figure 96).

Additionally, the silence at the end of the bar and at the beginning of bar 29 make it very difficult to judge the bar length.

Figure 96 Bars 28–29 of Berio's *Rounds*.

The musical score for Figure 96 shows two staves (treble and bass clef) for bars 28 and 29. Bar 28 contains a triplet of eighth notes in the right hand, marked with a '3' and a bracket. The dynamic markings are *f*, *ff*, and *p*. Bar 29 features a triplet of eighth notes in the right hand, marked with a '3' and a bracket, and a 'rall.' marking. The dynamic marking is *pp*. The piece ends with a 'Fine' marking.

Bar 52 again has the difficulty that it occurs immediately after a double bar pause, and begins with a crotchet rest. This makes it difficult to be precise when judging the beginning of the bar. The bar also contains a large number of cue-sized notes, which the performer is asked to play as rapidly as possible (see Figure 97).

Figure 97 Bars 51–52 of Berio's *Rounds*

The musical score for Figure 97 shows two staves (treble and bass clef) for bars 51 and 52. Bar 51 contains a triplet of eighth notes in the right hand, marked with a '3' and a bracket. The dynamic markings are *pp*, *p*, and *p*. Bar 52 features a triplet of eighth notes in the right hand, marked with a '3' and a bracket, and a 'poco rall.' marking. The dynamic marking is *pp*. The piece ends with a 'pp sempre' marking and a '1C.' marking.

The bars with the shortest mean beat lengths were 71, 80, 57, 40 and 64, in order of length. All these bars are relatively sparse in texture, and many of them contain rests, although there are also a number of fast cue-sized notes (see Figure 98). Bars 57, 64, 71 and 80 are in the repeat of the A section, which is indicated to be played at a faster tempo. Bar 57 is the first bar of this repeated section, and it may be that the performer played this bar particularly quickly to try to emphasise the increased overall tempo of this section. Bar 40 is within the B section of the piece, and contains an *accelerando*.

Figure 98 Bars with short mean beat lengths in Berio's *Rounds*

Bars 39–40

Bar 57–58 (Return of the A section, 1–2)

(1a II volta ♩ = 72)

Bars 63–65 (7–9)

Bars 70–72 (14–16)

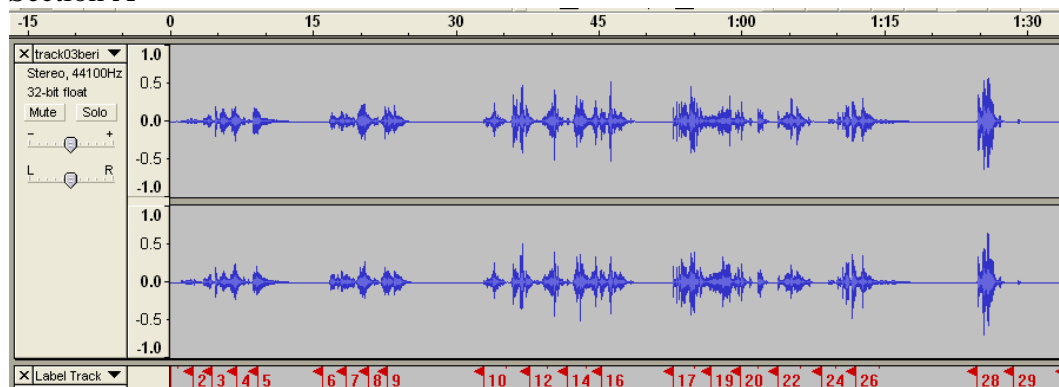
Bars 79–81 (23–25)

A second feature of the music that may correspond more to the recording than the score is the dynamic variation, which has been found to trigger emotional responses in previous research (Sloboda, 1991). The amplitude of the recording, as well as graphs of

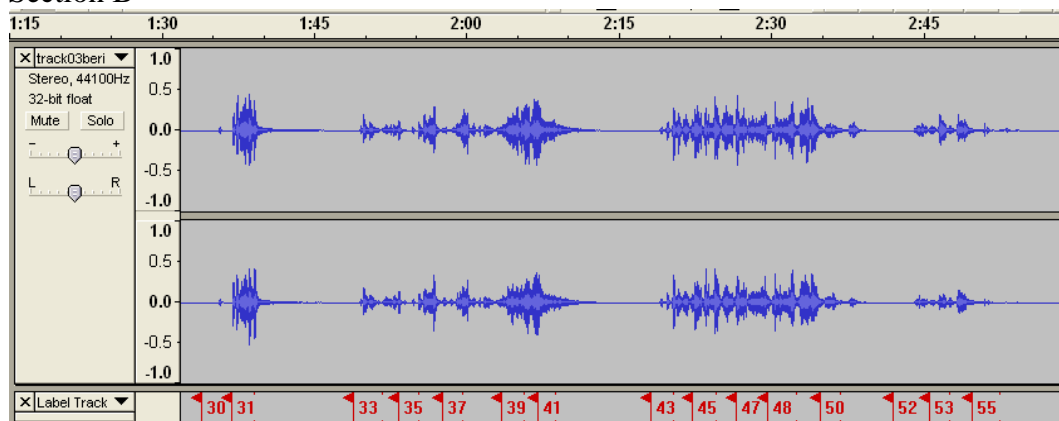
the dynamics and texture of the piece marked in the score show the numerous silences in the piece, as well as the sudden dynamic changes (see Figure 99). Similarity can be seen in each of these representations between the initial rendition of Section A and the *da capo* section. From these representations, it would appear that the performer is conforming to the score remarkably accurately.

Figure 99 Volume changes in Berio's *Rounds*

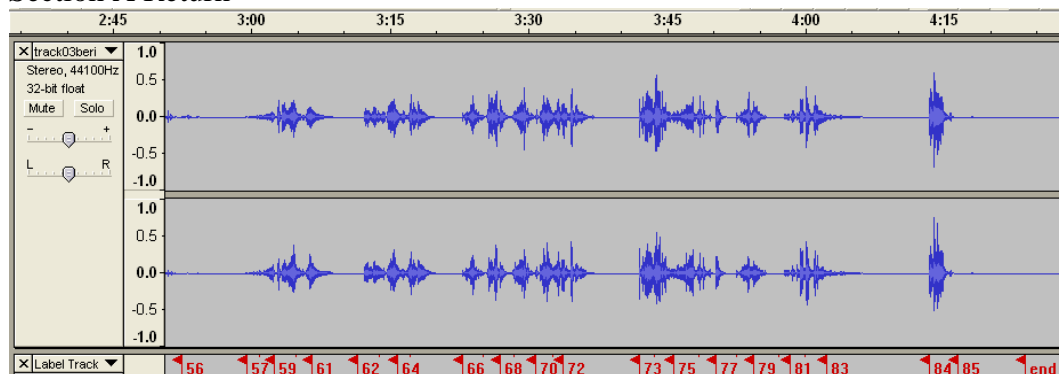
a) Amplitude representation of the recording
Section A



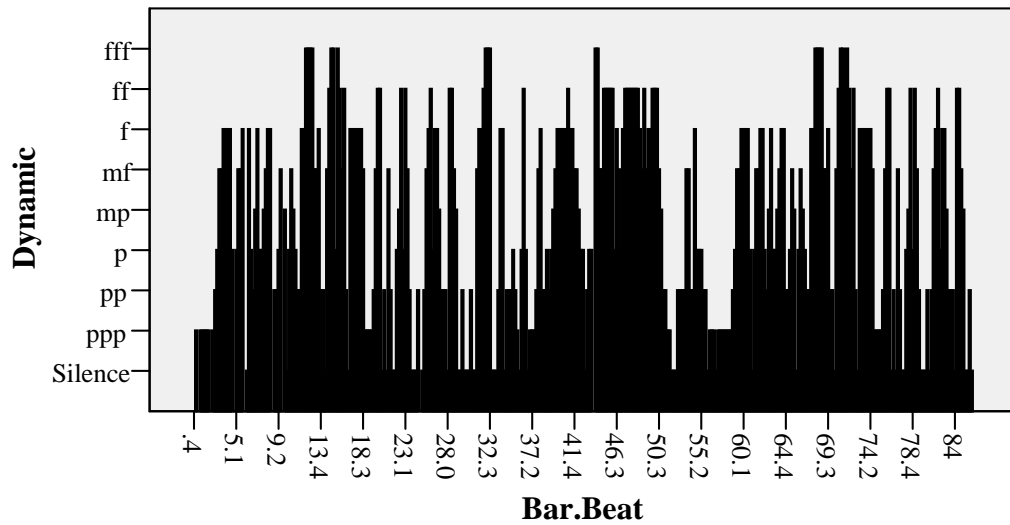
Section B



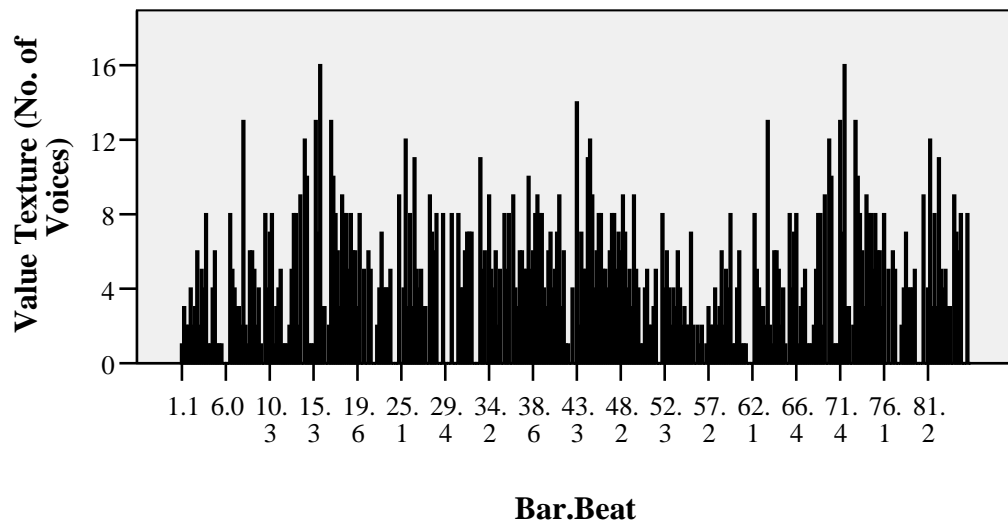
Section A Return



b) Graph of dynamics marked in the score



c) Graph of textural density in the score



The rest of this chapter will examine the quantitative and qualitative data gathered in response to Berio's *Rounds*.

5.2. Analysis of quantitative data: Continuous response traces of emotional intensity

In this section, the quantitative data is examined with the use of Pearson correlations and ANOVAs to discern whether there is a significant effect of musical experience and familiarity on emotional responses. The triggers of these responses are also identified.

5.2.1. Musicians vs. non-musicians

To assess the differences between musicians and non-musicians, six multivariate ANOVAs were conducted on the mean response rate per half-second in each bar (calculated from first-order difference traces). One ANOVA was conducted for each response trace. The between-subjects variable was type of student. This effect was significant in the whole of the second response trace of the first session (A2) ($F(1, 12) = 1391.004, p = 0.021$). There were also some significant differences between the musicians and non-musicians in specific bars of the piece (see Table 33).

Table 33 Significantly different estimated marginal means of music students and other students in ICB figures as a response to the Berio

Bar	Session / trial	ANOVA result and significance		Estimated marginal means	
		$F(1, 15)$	p	Music students	Other students
4	B2	7.2	0.02	1.5714	0.2857
5	A1	8.113	0.015	0.2449	-0.2449
11	A1	12.1	0.005	-0.0714	0.7143
16	A2	6.721	0.024	0.3619	0.0381
24	A1	6	0.031	0.2857	-0.4762
24	B2	4.8	0.049	0.1905	-0.1905
25	B1	7.2	0.02	0.3571	-0.0714
29	B2	5.451	0.038	0.3117	-0.3377
36	A1	4.839	0.048	0	-0.5714
36	A2	7	0.021	4	0
48	B1	5.261	0.041	0.5238	0
69	C2	6.827	0.023	0.5143	-0.4571
74	C1	5.444	0.038	1.2857	0.2143
75	B2	9.346	0.01	0.5143	0
83	A2	9.633	0.009	-0.5455	-0.1039
84	B2	5.121	0.043	1.8095	0.5714

These areas with significant differences are frequently located at structural boundaries of the piece, which are indicated by silences (bars 5, 16, 24–5, 29 and 83). With the exception of bar 83, at these points, the music students' ICB figures are always greater than those of the non-music students. Other common locations of these differences appear to be particularly eventful areas of the piece with varying dynamics (bars 4, 11,

36, 48, 69, 74–5 and 84) (see Figure 100 for examples). Again, music students' ICB figures are generally greater than non-music students' at these points (with the exception of bar 11).

Figure 100 Examples of areas of the piece causing significantly different reactions in music students and non-music students

Structural boundary: bar 5

The musical score for Figure 100, Structural boundary: bar 5, consists of two staves. The top staff is in treble clef and the bottom staff is in bass clef. The music features a variety of dynamics including *p*, *mf*, and *f*. There are also articulation marks (>) and structural markers labeled *Péd.* and *IC1*. A triplet of eighth notes is marked with a '3' above it in the first measure.

Varying dynamics: bar 11

The musical score for Figure 100, Varying dynamics: bar 11, consists of two staves. The top staff is in treble clef and the bottom staff is in bass clef. The music features a variety of dynamics including *pp*, *mf*, and *f*. There are also articulation marks (>) and structural markers labeled *IC1*. A triplet of eighth notes is marked with a '3' above it in the first measure.

The greater consistency of these differences, in comparison with those found in response to the Clementi and the Schoenberg, suggests more conclusively that music students and non-music students differed in their emotional responses to this piece. It is important, however, to bear in mind that only one trace (A2) showed an overall difference between the emotional responses of music students and non-music students. The particular trace on which this difference has occurred may be coincidence; however it is possible that the music students gained more from their initial hearing of the piece (trace A1) than the non-music students, but that this difference evened out over the course of the experiment.

5.2.2. Familiarity and musical Structures

To assess the effects of familiarity, first-order differences of the continuous response data were analysed. In order to minimise the likelihood of significant results occurring

by chance, the mean intensity differences at each individual point in time were found for all participants for each trial. These mean difference traces were then subjected to Pearson correlation tests. Correlations between traces nearest in time (in terms of data collection) were expected to be stronger than those further apart. All these correlations were very significant, and were mostly substantial associations (see Table 34).

Table 34 Pearson correlations of mean difference traces according to session and trial

Session		A		B		C	
	Trial	1	2	1	2	1	2
A	1	1	0.373 <i>p</i> <0.001	0.426 <i>p</i> <0.001	0.411 <i>p</i> <0.001	0.412 <i>p</i> <0.001	0.447 <i>p</i> <0.001
	2	0.373 <i>p</i> <0.001	1	0.348 <i>p</i> <0.001	0.440 <i>p</i> <0.001	0.386 <i>p</i> <0.001	0.460 <i>p</i> <0.001
B	1	0.426 <i>p</i> <0.001	0.348 <i>p</i> <0.001	1	0.539 <i>p</i> <0.001	0.448 <i>p</i> <0.001	0.504 <i>p</i> <0.001
	2	0.411 <i>p</i> <0.001	0.440 <i>p</i> <0.001	0.539 <i>p</i> <0.001	1	0.509 <i>p</i> <0.001	0.498 <i>p</i> <0.001
C	1	0.412 <i>p</i> <0.001	0.386 <i>p</i> <0.001	0.448 <i>p</i> <0.001	0.509 <i>p</i> <0.001	1	0.490 <i>p</i> <0.001
	2	0.447 <i>p</i> <0.001	0.460 <i>p</i> <0.001	0.503 <i>p</i> <0.001	0.498 <i>p</i> <0.001	0.490 <i>p</i> <0.001	1

To assess the effects of familiarity, the correlation coefficients were subjected to a univariate ANOVA, with the three levels of closeness in time being the ‘between-subjects’ variable. Although there were differences between the strength of the correlation, and the strongest correlations were those closest in time (see Table 35), these differences were not significant ($F(2, 12) = 0.453, p = 0.646$).

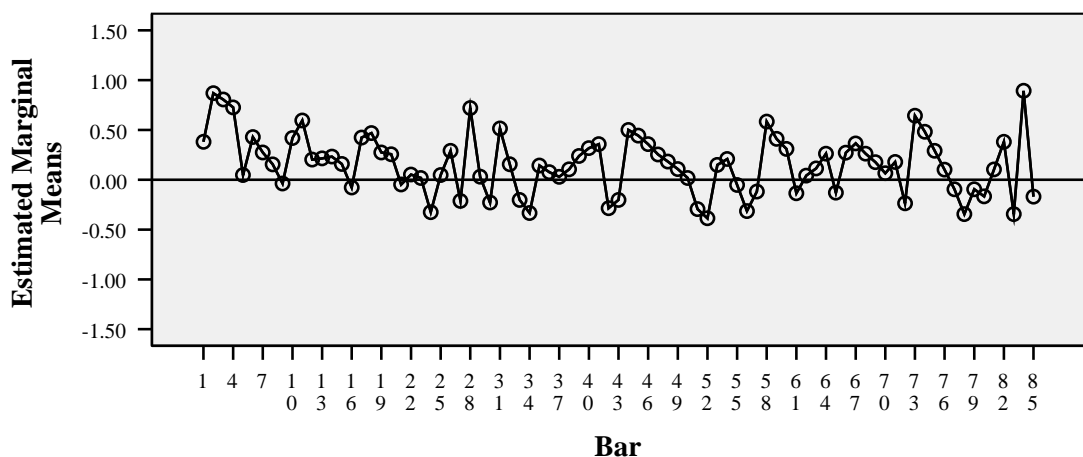
Table 35 Means of correlations at each level of closeness

Closeness	Mean	Std. deviation	N
1.00	.4673	.08529	3
2.00	.4479	.05498	8
3.00	.4263	.03363	4
Total	.4460	.05481	15

To assess the effects of musical experience and familiarity further, and to identify the musical structures that triggered participants’ emotional responses, ICB figures were

used in a repeated-measures ANOVA. Within-subjects variables were session (3), trial (2), and bar (85); the between-subjects variable was type of student (2). There was a significant main effect of bar ($F(84, 1008) = 4.633, p < 0.001$) (see Figure 101). The changes seen here are smaller and more rapid than those seen in response to the Clementi and the Schoenberg; however, there are many sustained areas of increase, and numerous shorter periods of decrease in emotional intensity. These will be discussed in further detail, in relation to comments made by participants. There were no other significant main effects or interactions.

Figure 101 Estimated marginal means for the significant effect of bar



5.2.2.1. Areas with important increases

The first major increase was in bars 2–4, (and 58–60, the repeat of those bars) (see Figure 102). This part of the piece is quiet, but has a *crescendo* to *forte*. The rhythmic features of these bars are fairly complex.

Figure 102 Bars 1–6 of Berio’s *Rounds*. Bars 2–4 caused increases in emotional intensity

Participants referred to the dynamic increase as a prompt for their increase in emotional intensity:

Participant C: ... there's a feeling of crescendo ...

Participant G: It was like some ... sort of swell in it, in the music.

Participants also referred to the articulation of the notes being played:

Participant K: It gets like ... the actual music, the notes increase ... It's like, some of the notes are held, and kind of create ... like, 'what's coming next' ... a bit of tension.

Participant C: See, this bit was quite interesting, because it was bouncy, and ... coming out of nothing.

Several participants (three music students and one non-music student) noticed the return of the beginning of the piece in bars 58–60, suggesting their response was due to the return of a familiar theme following a major structural boundary:

Participant A: This is the bit, it's basically a repeat of the beginning bit, in a way.

Participant B: That's where the beginning bit comes back, isn't it?

Participant C: This is what I've come to describe as the recapitulation ... because it's like the beginning.

Participant P: I think that's because that's pretty much a repetition of the very start of the piece, and it seems very familiar, therefore you kind of know what it's doing.

It is clear that dynamics, articulation and the recognition of large-scale structural repetition all contributed to participants' increases in emotional intensity at this point.

Bars 17–19, (and their repeat, bars 73–76) also caused increases in emotional intensity. This area of the piece has complex textural and rhythmic features, as well as rising pitch and wide-ranging dynamics (see Figure 103).

Figure 103 Bars 17–19 of Berio's *Rounds*, which caused increases in emotional intensity

Participants commented on the rising pitch:

Participant F: And it got pretty, and it got higher up the piano, and that's nice.

Participant K: I quite like that high-pitched, kind of, I don't know, the fairy-ish kind of ... there's something about it.

Comments also referred to the building texture and rhythmic complexity, and the way in which these features combined to create a feeling of suspense or direction:

Participant B: ... there's bits of surprise in there and bits of suspense, and 'what's gonna happen'-ness. And the texture's building here.

Participant G: I think it was going up the piano, and there were more and more notes getting played ... it was getting higher. So it felt like it was going upwards, and moving on somewhere, instead of just pauses.

Participant O appeared to refer to these features and the change in dynamic, as a change of the style in which the piece was played:

Participant O: ... maybe it was just the change of the ... way it was being played, in a way, it kind of goes from being soft to ... the change in kind of form, like I say, I don't know the ways to say it, but ... the change from one thing to another, from one way of playing to another, kind of makes an impact on the listener.

Here, rising pitch and increases in texture and rhythmic complexity appear to have provoked increases in emotional intensity. Participants referred to similar triggers of emotions in response to bars 38–40, which contained considerable increasing dynamics, small rhythmic durations, and a wide pitch range (see Figure 104).

Figure 104 Bars 37–40 of Berio's *Rounds*. Bars 38–40 caused increases in emotional intensity

Participants described the increasingly complex texture of the music here, as well as specific small-scale features:

Participant A: It's sort of swapping between the two hands, in a way, which makes it more interesting. And that trill ...

Participant J: I suppose it's the frantic excitement that's going on. There's a gradual build up in kind of activity.

Participant F appeared to be referring to similar musical features through her bubbling water analogy:

Participant F: It sounds like bubbles. It's like it's welling up, whatever it is, it's beginning to well up and almost, expand and grow all over the piano. It starts really low, and there's a bit of energy. It's like the whole analogy of water boiling. That bit reminds me of it, because it starts small, and then does little bubbles, and then gets really energetic, and so it's moving a lot, and then it goes quiet again.

Participant P described the texture as scalic, as well as referring to the low pitch of some of the notes:

Participant P: It just sounded a bit more like a scale there. And ... that seemed a little less random, and ... again it was the low end of the keyboard, and I kind of prefer, you know, in amongst all that jumble that he's playing, that kind of scale, type bit of the piece kind of stands out a bit more.

It appears that textural and rhythmic features that convey energy acted as triggers for participants' increases in emotional intensity at this point.

Bars 44–49 also caused increases in emotional responses. These bars contain dynamic variation, small rhythmic durations, and have a complex texture (see Figure 105).

Figure 105 Bars 43–49 of Berio’s *Rounds*. Bars 44–49 caused increases in emotional intensity

The musical score for Berio's *Rounds*, bars 43–49, is presented in three systems. The first system (bars 43–45) begins with a 3/8 time signature and a piano (*pp*) dynamic. It features a complex texture with multiple voices and dynamic markings including *ff*, *p*, *f*, and *mf*. A quintuplet is marked in bar 45. The second system (bars 46–47) continues the complex texture, with dynamic markings *p*, *f*, *ff*, and *mf*. A 3/4 time signature is introduced in bar 47. The third system (bars 48–49) features a 2/4 time signature and dynamic markings *ff*, *mf*, and *ff*. The score includes various musical notations such as triplets, quintuplets, and pedal points (*Ped.*).

Participants did observe the complex texture and small rhythmic durations in the music:

Participant B: I think it's just getting louder and more frantic.

Participant F: There's just so much going on.

Participant H: Well, it goes on, and it's sort of building up, isn't it.

Participant K also described the wide pitch variations, in addition to the complex textural features:

Participant K: ... the shrill note at the beginning. And then it's a bit more jam-packed, but it doesn't actually sound as clumsy. It's like, you've got the deeper notes, and the high pitch, but although parts of it are together ... at each point, one of them stands out a bit more than the other. And it just doesn't sound as clumsy, it sounds like there's actually something to it, like it's actually building up to something. And then it goes quiet again.

Again, textural and pitch-based features of the music acted as triggers of emotional intensity. The final areas of increase were in bar 28 and in bar 83, the corresponding bar in the repeat of the first section of the piece. This bar contained very loud chords after a silence (see Figure 106).

Figure 106 Bars 27–29 of Berio’s *Rounds*. Bar 28 (and its repeat, bar 83) caused increases in emotional intensity

Participant A was very succinct about the cause of her emotional response:

Participant A: The big chords.

Participants described the sound of the chords in more detail, some of them using metaphor and descriptive language:

Participant G: ... the big explosion.

Participant Q: It must be the vibration-like sounds that I find intense.

Participant S: I thought that was quite impressive, you could hear the vibration of the ... piano, or, I don't know what it was, that sort of echoey sound, I thought that was quite good.

Participant B described the chord as greater than the event she had expected, suggesting surprise as the reason for her large increase:

Participant B: That was surprising, because what happened was more than I thought was going to happen.

The loud, sudden chords were clear triggers of emotional increases.

In summary, the increases here were caused by dynamic variation, increased activity or complex rhythmic or textural features, the return of important melodic or structural features, and rising or wide pitch.

5.2.2.2. Areas with important decreases

The vast majority of the decreases corresponded with structural breaks and/or silences in the piece. Bars 55–57 are an extreme example of this (see Figure 107). Here, there are three bars of decreasing emotional intensity in response to the return of section A of the piece.

Figure 107 Bars 54–58 of Berio's *Rounds*. Bars 55–57 triggered a sustained decrease in emotional intensity

The figure displays two systems of musical notation for Berio's *Rounds*. The first system, covering bars 54 to 58, is written for piano. It begins with a treble clef and a key signature of one sharp (F#). The dynamics are marked as *mf*, *p*, *pp*, and *ppp*. There are three measures of decreasing intensity. The first measure (bar 54) has a forte (*f*) dynamic. The second measure (bar 55) has a mezzo-forte (*mf*) dynamic. The third measure (bar 56) has a piano (*p*) dynamic. The fourth measure (bar 57) has a pianissimo (*pp*) dynamic. The fifth measure (bar 58) has a pianississimo (*ppp*) dynamic. The score includes a 'Red.' (ritardando) marking under bars 55-57 and a 'da capo al fine' instruction at the end of bar 58. There are also 'IC.L' (first ending) markings under bars 56 and 57. The second system, covering bars 59 to 62, is also written for piano. It begins with a treble clef and a key signature of one sharp. The dynamics are marked as *ppp*. The time signature is 2/4. There are three measures of decreasing intensity. The first measure (bar 59) has a piano (*p*) dynamic. The second measure (bar 60) has a mezzo-forte (*mf*) dynamic. The third measure (bar 61) has a piano (*p*) dynamic. The fourth measure (bar 62) has a pianissimo (*pp*) dynamic. The score includes 'IC.L' (first ending) markings under bars 60 and 61.

Although only some participants recognised the return of the opening of the piece (see above), the long silence was noted:

Participant K: Then there's that pause ...

Other participants did not mention the effect of this silence specifically, but referred earlier to the effect they felt the silences generally had:

Participant C: ... always falling for the silences ...

Participant N: The long rests are painful because you just don't know where you are with it.

Participant Q: I think it's a rule of thumb for me now, no music equals zero intensity

A similarly long period of decrease in emotional intensity was seen in bars 77–80. These are the only bars of the piece that appeared to trigger a decrease in emotional response that were not a structural boundary or a silence. Their texture is relatively sparse, however. The dynamics range from *pianissimo* to *fortissimo*.

Figure 108 Bars 77–80 of Berio's *Rounds*, which caused a decrease in emotional intensity

Participant G struggled to find a purpose behind this area of the piece in her first interview:

Participant G: I think I went down around about here because it was just random notes again, and I didn't quite understand the sentiment, or whatever, for them. There seemed to be no purpose for them, they just seemed to be notes ... Notes for the sake of notes.

Later in the experimental process, however, she observed the quieter dynamics, as did other participants:

Participant G: it goes very low, and very quiet, and very ... as if it's about to stop, and you ... I don't know.

Participant K: It dies down, and then ... a little random, sort of bit, and it ... increases right at the end, and then it just dies down.

Participant S: The way that tails off there ...

Decreases in emotional intensity appeared to be triggered by structural boundaries and silences, sparse texture and decreasing dynamics.

A repeated-measures ANOVA was undertaken on the maximum levels of participants' ICB figures. This was intended to assess any change in the magnitude of participants' greatest increases in emotional intensity due to familiarity. Within-subjects variables were session (3) and trial (2); and the only between-subjects variable was type of student (2). There were no significant main effects or interactions. The ANOVA was repeated for the minimum ICB figures, and had no significant main effects or interactions. A similar repeated-measures ANOVA was conducted on the mean levels of increases and decreases in ICB figures, with no significant main effects or interactions.

The form of this piece, with its exact repetition of its opening section (albeit at a faster tempo) allows an examination of participants' responses to repeated sections of music. Whilst in some ways, it would be logical to assume that responses to two identical sections of music would be identical, there are several reasons why this might not be the case. Firstly, any music heard in between the two sections of repeated music (in this case, section B of the piece) may have an effect on the way in which participants respond to the repeated section. Secondly, it may be that recognition of the repetition in the music has an effect on emotional responses, perhaps making the participant more likely to respond in a similar way as before. This recognition and awareness of form is likely to develop with familiarity and may therefore not be present in traces from the first experimental session.

As this hypothesis suggests, there were strong correlations between participants' responses to section A of the piece and the return of this section. In the first and second sessions (A and B), there was a moderate correlation between responses to the opening section of the piece and its return (Session A: $r = 0.546$, $p = 0.002$; Session B: $r = 0.578$, $p = 0.001$). In the third session however, the correlation was very strong (Session C: $r = 0.804$, $p < 0.001$). This suggests that as participants became more aware of repetition in

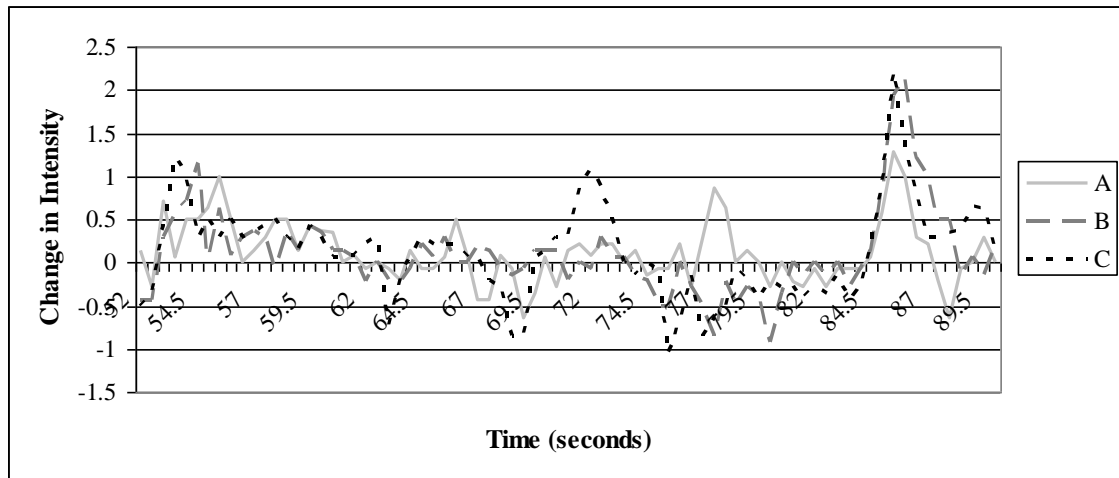
the piece and its formal structure (as indicated by the content of interviews), their responses to specific features of the music became more consistent.

5.2.3. Anticipatory responses

As seen in the previous two chapters, the mean difference traces for each experimental session were converted into graphs so that any anticipatory responses that developed with familiarity could be observed. There were some anticipatory responses to the Berio. Between 54 and 56 seconds (bars 17–19), for instance, the peak increases from the second and third experimental sessions occur before that from the first session. Bars 17–19 are very active bars of the piece, and begin with short chords that are wide-ranging in pitch. The texture of bar 17 becomes thicker as each hand's rhythm becomes more complex. Four more chords are heard at the beginning of bar 18, before a sharp *diminuendo* to *pianississimo* occurs to mark the beginning of a series of oscillating demisemiquaver figurations. These continue (with some rhythmic variation) in bar 19, which also contains a *crescendo* to *fortissimo*. Participants appear to expect and anticipate the wide-ranging dynamics and complex content of these bars only with familiarity.

A further interesting effect is seen between 85 and 89 seconds (bars 28–30), where greater increases are seen in the second and third traces than in the first (see Figure 109). Bars 28–30 mark the end of the first section of the piece and the beginning of the second. These bars contain a number of short chords that are marked with accents or *staccato* indications and interspersed by rests. They rise in pitch from the lowest parts of the piano, at the same time as decreasing in dynamic from *forte* and *fortissimo* to *pianissimo*. Participants clearly responded more sensitively to this feature once they were familiar with the music. There was little other evidence of anticipatory responses with familiarity.

Figure 109 Mean changes in emotional intensity in each of the three experimental sessions in response to the Berio: 52–90 seconds



The quantitative data has suggested some interesting differences in emotional responses to the Berio according to musical experience. Although relevant ANOVAs were not significant, there were also some developments in participants' responses with familiarity: participants responded more consistently to repeated sections of the music and showed some evidence of anticipatory responses to specific musical features. Triggers of increases in emotional responses were related to dynamic increases, powerful articulation, extremes of pitch, building texture and rhythmic complexity, and thematic recognition. Decreases were prompted by structural boundaries, sparse texture and decreases in dynamic. The next section will examine the interview data in greater detail.

5.3. Analysis of qualitative data: Interviews

As in the first and second experiments, the interviews will be analysed in accordance with areas of the model outlined in Chapter 1 (see Figure 2 or Figure 11).

5.3.1. Narrative

The identification of the use of narrative by participants will provide evidence for participants understanding music as narrative.

5.3.1.1. Emplotment

As in Experiments 1 and 2, both musician and non-musician participants attempted to assign extra-musical plots or stories to the music. Interestingly, some of the non-musician participants felt thwarted in their attempts to do so because of the ‘disjointed’ nature of the music:

Participant O: With the other pieces of music, I’ve been able to give it a mood, or a scenario, or equate it to a book, or a film or something, but I’ve found this really hard. No, I can’t really relate it to anything ... when it’s put into a scenario that I find easier to understand, like a pictorial scenario, or a linguistic scenario or something like that, I can analyse it easier. And I find this really tricky, and I’ve been really trying hard.

Participant S: It didn’t seem coherent; it didn’t seem to be telling a story to me.

Some participants were able to assign plots to the music, including Participant O, despite her suggestion that it was difficult to do so:

Participant O: It was a bit like a phone conversation from the point of view of someone who’s only listening to one side. You get all the anger from one side, and you’re anticipating what’s happening on the other side of the phone ...

Participant B was able to create a mental cartoon strip to accompany the piece:

Participant B: I’ve invented a cartoon strip in my head; it’s all there. Well, not quite all the way through, but it does sound like a cartoon strip backing thing.

Participant A’s plot was similar in nature to a cartoon:

Participant A: It sounds like a lot of animals in a zoo, just nattering to everybody. And then when, I just got this funny picture in my head, that when someone taps on the window of their cage or something, they all stop, and they all stare and look at them until they move on, and they all start again, which is the pause.

Evidence for complete narrative structures in response to this piece was rare. One participant did, however, refer to the climax of the piece:

Participant G: It’s like some kind of interlude before the big climax.

There was evidence that some participants were successfully using emplotment to aid their narrative understanding of the music, but such references were less common than in Experiments 1 and 2, and some participants reported having difficulty in doing so.

5.3.1.2. *Metaphor*

Participants did use similes and metaphors when describing the music. Several participants described the music in relation to animals:

Participant A: There was one little bit that sounds like a dog barking at one point. A very high-pitched dog ...

Participant B: It might be a bird, actually, because of the two little things. They sound more like a bird than a mouse.

Participant B: That sounds like someone roaring or jumping or something, that bit. It's mildly scary. The bit that goes 'grr' at the bottom, in the left hand.

Researcher: Anything in particular roaring, or just a sound?

Participant B: Probably some form of cat, as that seems to be my theme.

Participant O: It's like a really delicate rat scurrying around.

Participants occasionally used metaphors when describing the performer playing the music:

Participant C: Then up, where someone's just whacked their hands on the piano.

Participant F: It just sounds like somebody crashing about.

Participant P: Yeah, it makes me think that he's dropped the piano down a cavern or something ... yeah, it does sound quite ... cavernous, like a big echo. Um ... it sounds like an aftermath of something. I think that's why I like it. An echo is like an aftermath of something that's happened, and it's like the ramifications of something, so literally, it could be an echo, or ... it could be something ...

Music student participants once again used movement words, referring to the music 'building' or 'rising':

Participant C: The beginning's just rising up from nothing.

Participant F: It's starting to build up again to something else.

Participant G: It was building upwards again, up the piano again, so it felt like it was going somewhere.

Participant H: Well, it goes on, and it's sort of building up, isn't it.

Participant J: There's a gradual build-up.

Participant K was the only non-music student to refer to the music 'building up':

Participant K: It sounds like there's actually something to it, like it's actually building up to something.

Participants also conceived the music in terms of suspense, often in responses to the silences in the piece:

Participant B: That's suspense, the going up bits, because I'm not quite sure what's going to happen.

Participant F: And then you're left in suspense.

Participant J: I suppose that's a key signature of the whole piece, actually, that it's all about suspense. At least a large part is about suspense.

Participant S: I would anticipate it coming down to something, but it sort of was almost suspended, for some reason. I don't know whether that was intentional, to create some sort of suspense, but ... it didn't seem to follow a nice melodic pattern.

Participants also used the word 'tension', as they did in response to the Clementi:

Participant B: This feels like it's building, and sort of gathering tension.

Participant G: So ... I think it cut the tension. I think there was some tension there, and obviously, normally if you have a pause it increases the tension but I think by stopping playing it cut the tension.

Participant N: Tension building up for no good reason, not, for example, to escape a carnivore. Just tension for tension's sake, which is unhealthy.

Participants also discussed the concept of expectancy, sometimes in response to the silences in the piece, and sometimes in response to the musical content:

Participant B: I think the first time ... I'm wondering whether it's finished, so I'm kind of ... expecting ... but the second time I know it's not.

Participant G: Maybe I'm expecting it to go somewhere, and it obviously doesn't.

Participant J: Yeah, maybe because you're expecting more of the same ...

Participant Q: I really expected the music to go crazy loud and fast so my intensity rating went up.

Other participants also discussed their anticipation of events in the music or surprise, suggesting that they too had created expectations of what was going to happen in the music:

Participant B: That [bar 28] was surprising, because what happened was more than I thought was going to happen.

Participant F: Yeah. And then I got a surprise and thought, ‘Whoa!’.

Participant Q: I was anticipating a lot more first time around.

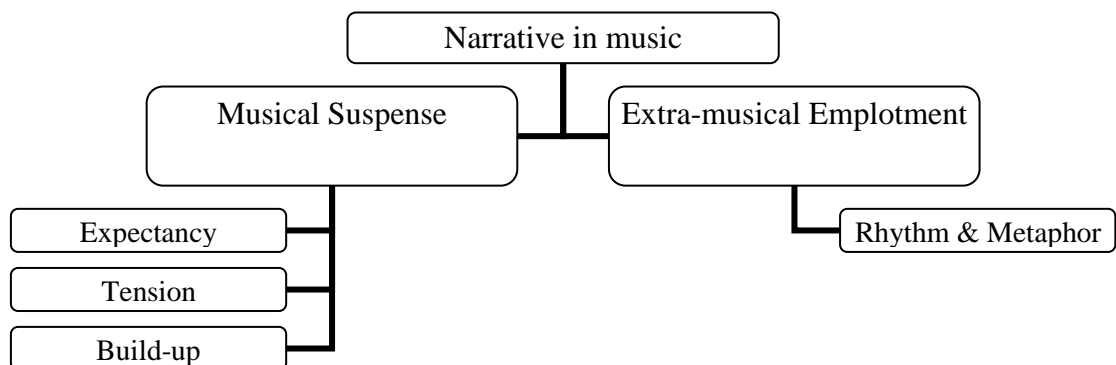
Participant S: You’re waiting for something to happen, and then when it does, I suppose you’re, because you’re anticipating it, you maybe react more. No matter what happened, you maybe would have reacted.

Participant N had difficulty in relating with the piece, because of its frequent silences, but interestingly, described her difficulty in understanding the piece by using narrative:

Participant N: Like if you were looking at a Jackson Pollock painting, even if it were just splashes of paint (admittedly Pollock splashes), would it really be improved by finding one part of it on the sidewalk, the next piece in the gutter half way down the street, the next one ... you’re not sure where you’ll find it?

Participants appeared to use narrative concepts to aid them in their understanding of this piece. Their ability to use emplotment in this process appeared to be more problematic than in response to the Clementi and Schoenberg, and there was no indication of human agency or suffering. Instead, participants focused on the creation of suspense, and its subcategories: expectancy, tension and build-up. The creation of suspense was, however, often discussed with reference to the silences in the piece, rather than the musical content, suggesting links with earlier findings in response to the Schoenberg. A model of participants’ responses to this piece is shown in Figure 110.

Figure 110 Aspects of a narrative understanding of the Berio



5.3.2. Mood or character of the music: Evidence for hearing music as sound or human utterance

As suggested in Chapter 3, participants' conception of the piece portraying different moods or a particular character may be considered to be a listener hearing the music as human utterance. Participants often perceived the piece to be portraying anger:

Participant A: It ... now, it strikes me as being quite an angry piece.

Researcher: What do you think makes it angry?

Participant A: I don't know, it's just ... despite the fact that there are quiet bits, it's almost constantly loud. And it's very fast and very ... you know, always moving. And just, with me, that just, I associate that with anger.

Participant G: I think this piece is quite aggressive, so that's the thing that triggers off a reaction in my mind. So when it's aggressive, I'm quite, into it, but obviously in other pieces it's a different emotion.

Participant P: It just sounds really quite ... angry, suddenly.

Participant J found some aspects of the music amusing:

Participant J: I find it quite funny, actually, listening to it ... especially on the second occasion.

Participant O described it as sad:

Participant O: I do find it kind of eerie in a way, kind of poignant, a bit sad ...

None of these participants separated the music from the performer in these comments: it seemed that the sound they were hearing was the stimulus for the interpretation of the emotion they perceived. The relatively small number of comments relating to the emotions portrayed in the music may suggest less of a tendency to hear the music in terms of human utterance, and perhaps more as sound.

5.3.3. Music heard in context: Evidence for the influence of contextual and listener features

Comments regarding the context of participants' listening experience were rare, even though they had shown awareness of the importance of the listening context in previous experiments. Participant N did, however, comment on the differences between listening

to the piece through headphones and speakers, and Participant J also referred to this issue in a more substantial comment:

Participant N: It makes a difference what music system you listen to. The computer is quite different from headphones.

Participant J: When you're listening to it on the headphones ... and because of the situation you're in here, I think you listen harder, and you pay more attention to the music than you do when you're listening to it on your own. I think that probably goes for whatever situation you're listening to music in, that the situation itself can have a large effect on how you appreciate the music. Like ... if you go into a busy bar, and there's somebody playing really difficult Beethoven Sonatas in the corner, and everyone in the bar's drinking, no-one's going to listen or pay attention, whereas if you're in a concert hall, it's really, ... it's the centre of your attention and you listen to every note, and here it's the same kind of effect, in that you're here to listen to the music, and so you listen harder, you pay more attention and you think harder about it, whereas if you're in your bedroom, you're a bit more easily distracted and you kind of drift off and don't quite involve yourself in the music as much. But maybe that's the nature of the music, that's got something to do with it; it's a two-sided coin, if you see what I mean. If it were more listenable, you might pay attention more, to it, in private.

Two other participants commented on the musical context of specific events:

Participant P: ... even though you may like a specific chord that he plays, or a note, you don't like it in terms of what's come before it.

Participant P: Just one or two chords, or something like that that I like. And I think that because they're within this mass of mess, you know, they seem quite, even nicer, almost, you know, they stand out quite a lot.

Participant S: Definitely not very rounded off, which I suppose represents what the whole piece is like ... it's not unusual in the context of what's happened before, I suppose.

This relative dearth of comments regarding the listening context may reflect participants' focus on other aspects of the music.

5.3.4. Other holistic issues

5.3.4.1. Difficulty expressing oneself

Participants did not appear to have difficulty expressing themselves in response to this piece of music.

5.3.4.2. Terminology

The percentage of interviews containing technical terms varied between music students and non-music students (see Table 36). Overall, in the third study, non-music students used more technical terms than music students, but some of these were inaccurate descriptions of the music, such as references to major or minor keys. Non-music students referred to ‘notes’ more frequently than music students. Music students were the only participants to use the terms ‘diminished’, ‘cadence’, ‘phrase’, ‘imitation’, and ‘*rubato*’.

Table 36 Technical terms used by participants (music students and non-music students) in Experiment 3

	Percentage of interviews containing at least one instance of a term		
	Music students	Non-music students	All
All technical terms	25.64	32.69	28.46
1. Harmony	0	0	0
1.1 Suspension	0	0	0
1.2 Modulation	0	0	0
1.3 Arpeggio	0	0	0
1.3.1 Spread	0	0	0
1.4 Diminished	1.28	0	0.77
1.5 Major	2.56	3.85	3.08
1.6 Minor	0	3.85	1.54
1.7 Dissonant	1.28	1.92	1.54
1.8 Cadence	3.85	0	2.31
1.9 Pedal Point	0	0	0
1.10 Ostinato	0	0	0
1.11 Key	6.41	3.85	5.38
1.12 Atonal	5.13	0	3.08
2. Melody	5.13	1.92	3.85
2.1 Sequence	0	0	0
3. Phrase	5.13	1.92	3.85
4.1 Ornament	0	0	0
4.2 Trill	2.56	1.92	2.31
4.3 Decoration	0	0	0
5.1 Left or right hand	3.85	3.85	3.85
5.2 Imitation	1.28	0	0.77
5.3 Octaves	2.56	1.92	2.31
6. Expression	1.28	1.92	1.54
6.1 Crescendo	2.56	3.85	3.08
6.2 Diminuendo	0	0	0
6.3 Forte	0	0	0
6.4 Rubato	1.28	0	0.77
7. Texture	0	0	0
8. Note	14.1	26.92	19.23
9. Pitch or register	10.26	11.54	10.77
10. Structure	0	0	0

5.3.4.3. Colour

No participants referred to the music portraying any particular colour.

5.3.4.4. *Genre or language of the piece*

There was considerable comment regarding the genre, language and style of the piece.

Three non-musician participants commented on the unusual content of the piece:

Participant O: But I can't emphasise enough how hard I found it to attribute an intensity to it, because it was so kind of ... ground-breakingly against the kind of clichés of ... I don't want to say clichés, but the things we always associate with intense music, that it was hard for me to find a part of me that could listen to something ... I'd never heard before, like totally never heard before, and like, try and attribute the kind of emotions that I would normally attribute to a Disney song, or something.

Participant P: ... it's a very different piece ... like I say, it's quite confusing to know what you're keying in to ... when you're listening to it ... there's so many things that are different about it, from what, you know ... I know I said I have things, that it reminds me of stuff that I listen to, but still, the majority of stuff that I listen to is quite conventional.

Participant Q: well, the second piece was very untraditional for classical music right?
Researcher: Go on ...

Participant Q: This piece also doesn't sound like a very common piece of music. I hear music that goes up and down in tone/tempo but all the pauses ... can't say I remember that. Probably wrong but more used to the changing tones & tempos rather than breaks in music. Well, the number of breaks in this piece seems like a lot.

Participant F, a music student, was frustrated by the content of the piece:

Participant F: ... the piano's such a nice instrument, and you can have such a nice sound on it, and such a kind of pure, beautiful sound, why spoil it by crashing around ... I mean I can understand that it's making the most of the instrument's ability and the things that it can do, and that it's using the pedal and the extremes of the pitch and all of that, but why, when it can be so nice?! That's my ... I think that's my greatest difficulty with the piece.

Other participants commented on the harmonic language of the piece. Participant A commented that tonal harmonic features were rare:

Participant A: You actually hear ... a major third. It's only briefly; it goes [sings] and then it's left off but then you hear the remnants of it. And I think that's about the first time you can actually hear it properly, any sort of tonal harmony.

Participant B commented on some chords of the piece that were unusual:

Participant B: I think that's probably because there are some recognisable chords in that. Or semi-recognisable.

Participant B: there are some kind of jazzy chords in there that make me listen.

Participant C was frustrated by some tonal-sounding intervals in the context of the atonal language:

Participant C: And then this bit [bars 49–51] really bothered me. These intervals ... were really out of place. It feels like a fifth or a fourth, or something, but they're just ... after having all of this ... atonal stuff beforehand, to then suddenly get a perfect interval, it just sounds a bit ... it kills the atmosphere.

Participant F found the piece difficult to listen to because of the language and the lack of melody; she consequently became critical of the piece:

Participant F: ... if I understood why it had been written and what it was trying to get across, I would be less critical of it. But as I don't, and as I've not got a clue what's going on, still, after two weeks of listening to it, it just ... to a certain extent, it's got everything that a piece of music should have, because it's got contrast between different pitches, and it's got contrast between dynamic, and it's got contrast between, like, the different textures that are there, but I think it's just not having any tunefulness.

Participant N described the piece as lacking in harmony, while Participants K and S found the language of the piece peculiar:

Participant K: ... it just sounded to me like all the notes were just jumbled up.

Participant S: It had some of the same features as the last one, I thought. In the, sort of, the way the notes went together. It was different ... They didn't seem to go together very well, the notes, so that's the first thing I noticed. And, sort of extremes, jumping from one part of a scale to another, sort of thing. That's the impression I got, anyway. It was just a bit bizarre.

In summary, the harmonic content, language and style of the piece were considered unusual by participants and prompted considerable comment.

5.3.4.5. Ways of listening to the piece

No participant mentioned deliberately exploiting different ways of listening to this piece of music; however, several participants mentioned that the piece caused them to withdraw their attention, and hence become unresponsive to the music:

Participant N: Being unresponsive is a state of being fed up I suppose, when further response seems too much of a bother.

Participant O: I found that when there was too much going on, I kind of disconnected from it, I felt a bit kind of brainwashed, in a way, there's just too much noise, in a way, so I ended up making them less intense.

Participant S: I didn't feel ... that I was feeling much in terms of emotion.

This piece of music prompted participants to respond in many different ways. There was evidence of participants exploiting a narrative understanding of the music, although this narrative was less commonly in the form of emplotment or an extra-musical narrative, and more commonly in the creation of suspense. There was some evidence for participants hearing the music as sound or human utterance, and some evidence that participants were aware of the effects of contextual features on their emotional responses. Many participants commented on the unfamiliar (atonal) language of the piece, and this may have been a reason for some of the less extensive comments regarding other aspects of their responses to the music.

5.3.4.6. Familiarity

Participants made some interesting comments regarding their increasing familiarity with the piece. Participants commented frequently on their lack of familiarity with the genre of the piece:

Participant C (Session 3): I think ... when you grow up playing classical music, and music like that, music like this just sounds really odd ... and incorrect. And ... especially when you play a lot of ... orchestral playing ... and to a certain extent, chamber music, you don't get that much stuff that frequently that's really out there, like this. So ... I think it's partly it's that I'm just not accustomed to it, although I've listened to some bits and played some weird stuff.

Participant O (Session 2): ... it's unlike anything I've heard before, so I find it hard to compare it to anything, which is normally what I do.

Several participants appeared to find that structural features of the music and repeated perceptual cues only became apparent after repeated listening.

Participant A (Session 3):

Researcher: You're more definite about the structure than you were last week. Was that something you listened out for deliberately?

Participant A: Not deliberately, I just pick up on it. I think it was because of the

accented notes that I knew that we were listening to the first part again when I was listening to it. And then it just falls into place.

Researcher: When was it that you first noticed it?

Participant A: Last week sometime.

Researcher: So it took quite a while to ...

Participant A: Yeah, it took about a week and a bit.

Participant B (Session 3): I never noticed that it had any sort of structure or form before ... recently. I was noticing bits coming back, a few days ago. I think there was more change in the first week of listening. I think I'd formed pictures and ideas about it in my head, and they stuck for this week. But yeah, I thought it had absolutely nothing at all when I first listened to it, and then I started recognising it, and then ...

Participant G (Session 3): Because the first couple of times, the first week or whatever, of listening to it, I didn't realise that there were repeated bits in it. And now I've been listening to it quite a lot, you can tell that there are ... that it's not all original material, that it's all repeated and stuff.

Participant J found certain parts of the piece very memorable, and these parts appeared to form perceptual cues for him:

Participant J (Session 3): There's some bits of it which you remember when you hear them, 'Oh, I've heard that bit before, and it's easily identifiable', and if you played it with ... if you were walking down the street and heard that little bit coming out of a bedroom window, or something, I'd go, 'Oh, that's that piece I've been listening to', and I'll probably remember elements of it in years.

Similarly, Participant O felt that she knew what to expect in the music by her third session:

Participant O (Session 3): Maybe because I know what's coming ... I suppose I'm just thinking about the fact that I've been listening to it for the last two weeks and I know it fairly well, and so I kind of know when something's coming ...

Participant P also commented on the effects of genre and piece-specific familiarity on expectancy and anticipation of events in the music:

Participant P (Session 2): If it's more ... conventional, like the previous two pieces, or you know it better, or it's easier to remember, then a piece that starts, then you can anticipate where it's going, and therefore enjoy it more, but with this you can't.

Even by the third session, Participant H was slightly unsure of his ability to recognise the piece in an unexpected setting. He did suggest that he had an increased awareness of repetition in the piece, however, and that he would easily recognise 'landmarks' or perceptual cues:

Participant H (Session 3): I'm familiar with it in the sense that ... I'm familiar ... basically with how it goes ... I'd recognise it if it was played somewhere, I think. I think. But ... you begin to see landmarks in the music, a sort of sustained one note that holds on at the end of different phrases that must have something to do with something. It sounds like a bell or something, to me. But ... you know, things like that, so you sort of know where you are in it from where they are, and the pauses, and then the repeated chords we mentioned before, so a picture begin to form, but again, I'd probably need longer of listening to ... well, no, I don't think I would, because I think if I haven't realised it by now, I'm not going to; I'd have to have some outside help in the form of a study aid ... or a lecture on the piece of music.

Participant Q still felt very unfamiliar with the piece in the third session:

Participant Q (Session 3): Even listening right now, I know there are pauses but its almost like I'm listening to it for the first time every time.

Participants varied in their familiarity with the genre of this piece, and in the extent to which they felt familiar with the piece after two weeks of listening. The qualitative data suggest that participants understood the music in relation to each aspect of the model, though perhaps less commonly as utterance in comparison to previous pieces. There were differences in the vocabulary used according to musical experience. Participants discussed the unusual language of the piece, and some participants reported emotional withdrawal from the music. The effects of familiarity were also discussed. The next section will use a case study approach to all the data to examine this and other issues in more depth.

5.4. The effects of familiarity: Building representations of participants' schemata of the Berio

As in Chapters 3 and 4, Participants A, J and S will be used as case studies, and all their data (quantitative continuous response data; quantitative overall measures of mood, familiarity and liking; qualitative interview data; and qualitative diary data) will be examined at each stage of the familiarization process.

5.4.1. Participant A

Participant A was a highly experienced music student.

5.4.1.1. Changes in overall measures

Participant A's mood ratings remained similar over all three sessions. At the first session, she provided a mood rating of [1-0] (i.e. somewhat pleasant feelings with little arousal); at the second, her mood rating was [1-1] (i.e. somewhat pleasant mood, with some arousal); and at the third, [1-2] (i.e. somewhat pleasant feelings with considerable arousal). There may be a tentative positive correlation between Participant A's arousal levels and her mean level of emotional intensity (see Table 37).

Table 37 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	1	0	62.87	16.71
A2			51.85	19.94
B1	1	1	66.05	24.10
B2			43.20	27.58
C1	1	-2	47.78	20.68
C2			45.76	20.75

Participant A's familiarity ratings increased over the three sessions, with the largest increase occurring between sessions B and C. Her liking for the piece decreased, with the largest decrease occurring between the second and third sessions (see Table 38).

Table 38 Participant A's reported familiarity with and liking for the Berio

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant A	Session		
	A	B	C
Familiarity	13.0	13.7	28.8
Liking	59.6	52.7	39.7

5.4.1.2. Participant A's changes with familiarity: Continuous response data

Participant A's continuous response difference traces were generally relatively weakly correlated when subjected to a Pearson correlation test (see Table 39). Eleven out of 15 traces were correlated at the 0.05 level, and eight out of 15 at the 0.01 level. The

correlations decreased slightly in strength with the distance of time between data collection, suggesting tentative evidence for changes with familiarity.

Table 39 Pearson correlations between pairs of traces provided by Participant A

** = significant at 0.01 level; * = significant at 0.05 level

Participant A	A1 / A2	B1 / B2	C1 / C2
Correlation	0.167**	0.053	0.302**
Mean correlations	Within Session: 0.194 not including n/s results; 0.185 including n/s results as 0		

Participant A	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	0.075	0.192*	0.149*	0.095*	0.086*	0.047	0.149*	0.070
Mean correlations	Neighbouring Sessions: 0.134 not including n/s results; 0.083 including n/s results as 0							

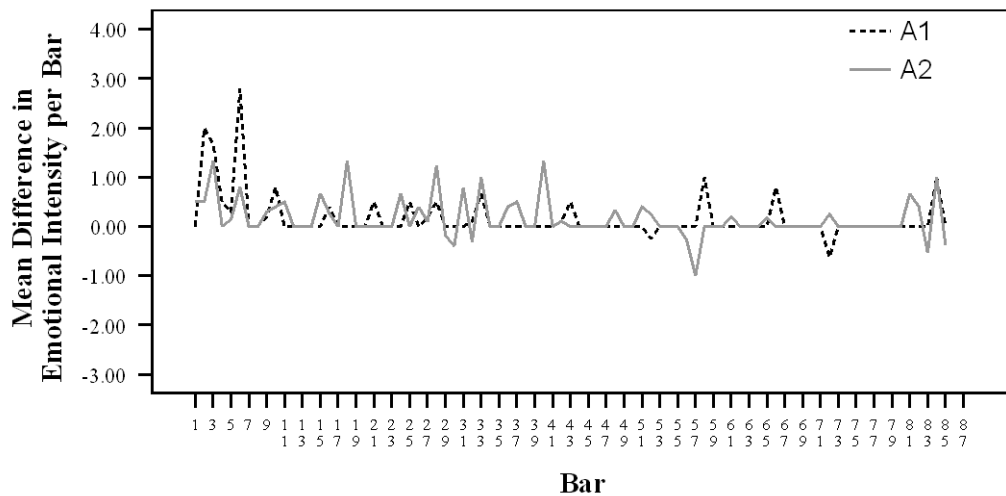
Participant A	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	0.088*	0.170**	0.117**	0.139**
Mean correlations	Between distant sessions: 0.129			

5.4.1.3. Building schemata: Triangulation of continuous response data, interview data, and the music

As in Chapters 3 and 4, the schemata shown in Appendix 6 and discussed here emerged from the interview and diary data from each participant.

Participant A's first continuous response traces (see Figure 111) show a series of increases in emotional intensity, followed by sections of no change in emotional intensity. There are few areas of decrease in emotional intensity. The steep increases in bars 1–9 of the piece may reflect the perceptual schema, as the participant focuses on the beginning of the piece as an area of comment (see Appendix 6, Schema 84). Participant A's comments from the interview were relatively small in number, and mostly referred to perceptual cues. Two related comments, however, revealed a narrative understanding of the piece, and these, which referred to noises made by animals, might be described in Peirce's terms as evidence for an iconic resemblance.

Figure 111 Participant A's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session A



Participant A completed six listening diaries between each interview. In her first diary entry (Schema 85), she mentioned a more specific perceptual cue concerning the beginning of the piece, and added a new small-scale perceptual cue. She also noted two large-scale features of the pieces, the accented notes and the pauses, and used narrative to help her to understand the reasons for their presence. In her second diary entry, (Schema 86) Participant A added three new perceptual cues to the middle of the piece, one of which related to the technique required of the pianist, and the other two to quasi-tonal elements of the piece. She also added a positive judgement of the piece.

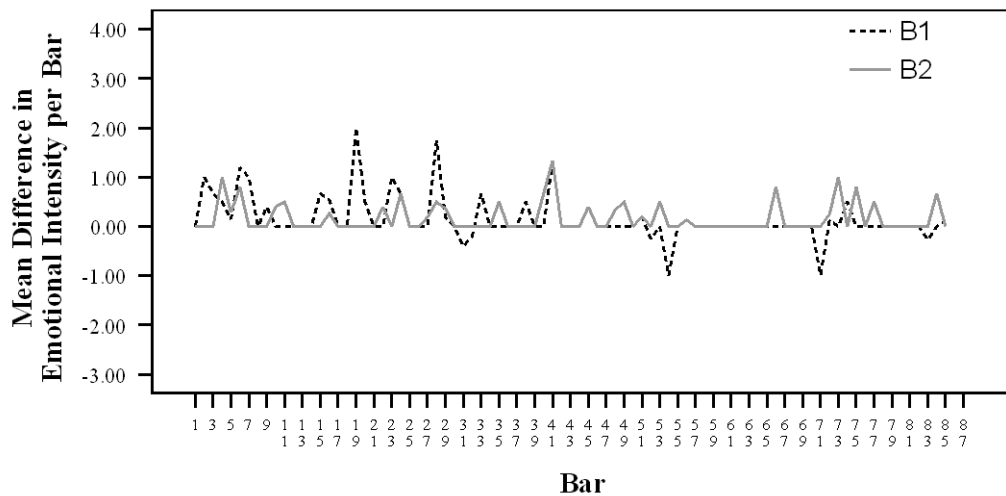
Participant A's third diary entry (Schema 87) showed evidence of her awareness of the structure of the piece: she noted the repetition of aspects of the music she had heard before. Interestingly, she did not add any new perceptual cues to the piece, but expanded on the areas of the piece she had commented upon previously. Many of her comments related to small-scale features of the piece, including her narrative comment concerning a barking dog.

Participant A's fourth diary (Schema 88) is focused much more on the large-scale narrative of the piece, although she did relate her newly-observed repetition in the piece to this narrative. She also added a new perceptual cue in the middle of the piece. In her fifth diary entry (Schema 89), Participant A added two large-scale perceptual observations and a new small-scale perceptual cue. In contrast, Participant A's sixth diary entry (Schema 90) is focused on relatively general features of the music: the pauses, the end, and the use of the piano's range and dynamics. Two of these comments were judgements of the piece.

By the end of the first week, Participant A had begun to map out the structure of the piece and had utilized several narratives to aid her understanding of the piece. She had described numerous small-scale perceptual cues and had begun to form judgements of the piece.

Participant A's continuous response traces from the second interview show some interesting developments. The initial rises in emotional intensity are less pronounced, and she responded more to features of the piece around bars 19 and 28, which are loud, relatively climactic areas of the piece. There are also more noticeable decreases in her response, in bars 31, 54 and 72, all of which are near section boundaries of the piece (see Figure 112).

Figure 112 Participant A's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session B



Participant A's perceptual schema for this interview (Schema 91) highlighted her understanding of the structure of the piece, with her comments regarding repetition of areas of the piece. She included a large number of small-scale perceptual cues, but also made one judgement and one narrative comment. This narrative comment, which discussed the 'pitter patter of feet', could be described as evidence for a Peircian iconic relationship.

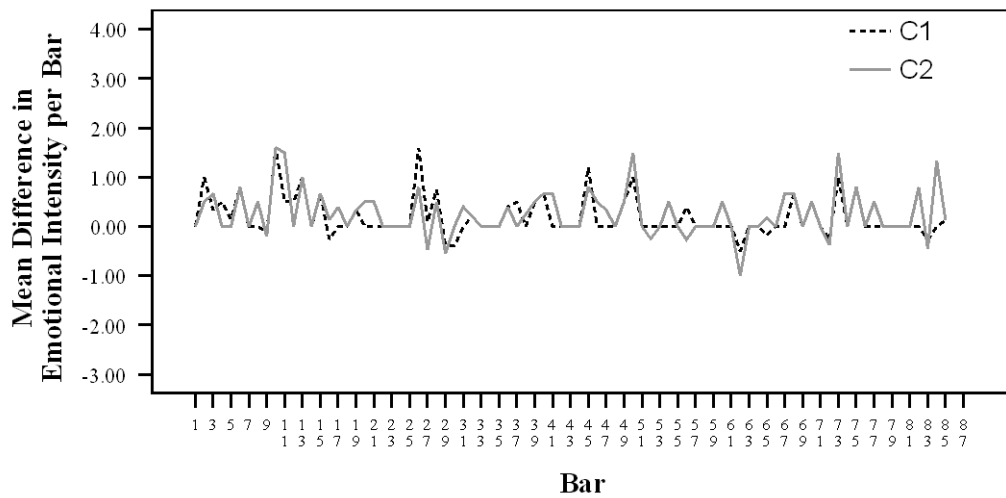
Participant A's seventh diary entry (Schema 92) is focused once more on perceptual cues. She commented on the accented notes, a feature common to much of the piece; the beginning and end of the piece; and a prominent feature of the piece in bar 32, in which the pianist plays a loud chord and then uses the sustain pedal. In her eighth diary entry (Schema 93), Participant A made one overall comment relating to the high activity rate of the piece, and two comments relating to earlier judgments of the piece. She also highlighted the way in which these features contribute to the overall mood of the piece. Participant A again commented on the mood of the piece in her ninth diary entry (Schema 94), this time in relation to a new perceptual cue. She also added to earlier

perceptual cues, and made an appreciative judgement concerning the composer's use of the range of the piano.

Participant A's tenth diary entry (Schema 95) suggests her awareness of the larger-scale features of the piece. She described a pattern in the entries concerning the dynamics, which, though not correct for the whole of the piece, may be applied to some of the central areas of the piece. She also made a negative judgement of the pauses in the piece, suggesting that they became annoying. In her eleventh diary entry (Schema 96), Participant A returned to her habit of focusing on the end of the piece and general features. In contrast, her twelfth diary entry (Schema 97) focused solely on two small-scale perceptual cues.

Participant A's emotional response traces from the final interview appear to show considerably more change than those seen previously (see Figure 113). There also appears to be a somewhat similar pattern between her responses to bars 1–29 and 57–85, the section of the piece that is repeated, perhaps revealing her awareness of the musical structure. Indeed, in her interview, Participant A made it very clear that she knew that the piece was in ternary form (see Schema 98). Her comments regarding small-scale perceptual cues in the piece are reflected in the emotional response traces. Despite her more intricate emotional response trace, however, there is some suggestion of frustration in her judgement comment relating to the pauses.

Figure 113 Participant A's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session C



In summary, Participant A's perceptual schemata developed considerably over the experimental period. She began with a number of small-scale perceptual cues and a few generalized features of the music, and developed an awareness of repetition in the piece by the third diary entry. Her conception of the formal structure of the piece was clear and accurate by the end of the experiment. She rarely used an overall narrative structure to aid her understanding of the piece, but identified small-scale features that were understood in narrative terms.

5.4.2. Participant J

Participant J was a less experienced music student.

5.4.2.1. Changes in overall measures

Participant J's mood ratings varied slightly over all three sessions. In the first session, he provided a mood rating of [2--2] (i.e. somewhat pleasant feelings with low arousal); at the second, his mood rating was [1-0] (i.e. somewhat pleasant mood, with some arousal); and in the third, [2-1] (i.e. somewhat pleasant feelings with a little arousal). There appears to be no clear link between Participant J's mood rating and emotional responses (see Table 40).

Table 40 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	2	-2	44.85	20.44
A2			55.20	25.32
B1	1	0	42.90	18.96
B2			55.83	25.01
C1	2	1	35.63	14.27
C2			45.04	13.12

Participant J's familiarity ratings increased dramatically over the three sessions, with increases occurring between all three sessions. His liking for the piece decreased between sessions A and B, but increased once more between sessions B and C (see Table 41).

Table 41 Participant J's reported familiarity with and liking for the Berio

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant J	Session		
	A	B	C
Familiarity	6.85	42.5	70.5
Liking	54.8	43.8	48.6

5.4.2.2. Participant J's changes with familiarity: Continuous response data

Many of Participant J's continuous response difference traces were not significantly correlated when subjected to a Pearson correlation test (see Table 42). Six out of 15 traces were correlated at the 0.05 level, and three out of 15 at the 0.01 level. The correlations decreased slightly in strength over the experiment period, if the non-significant results were included as 0. The relatively small number of significant correlations suggests that it would be unwise to suggest important systematic changes as a result of familiarity.

Table 42 Pearson correlations between pairs of traces provided by Participant J

* indicates significance at the 0.05 level; ** indicates significance at the 0.01 level.

Participant J	A1 / A2	B1 / B2	C1 / C2
Correlation	n/s	0.308**	n/s
Mean correlations	Within Session: 0.308 not including n/s results; 0.103 including n/s results as 0.		

Participant J	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	n/s	n/s	0.227*	n/s	0.549**	n/s	0.285**	n/s
Mean correlations	Between neighbouring sessions: 0.354 not including n/s results; 0.133 including n/s results as 0.							

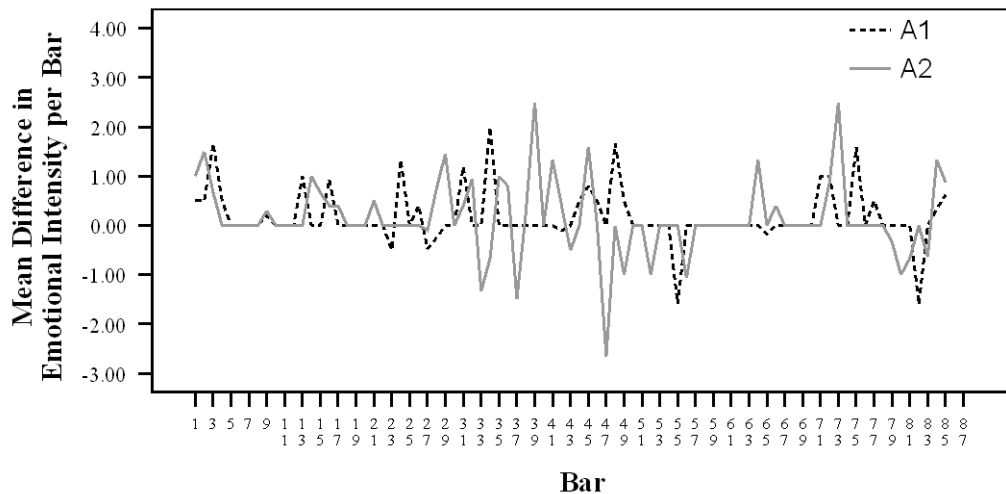
Participant J	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	n/s	n/s	0.276*	0.231*
Mean correlations	Between distant sessions: 0.255 not including n/s results; 0.127 including n/s results as 0.			

5.4.2.3. Building schemata: Triangulation of continuous response data, interview data, and the music

Participant J's continuous response trace from the first session suggest wide and frequent changes in emotional intensity, particularly around the middle of the piece (see Figure 114). This is reflected in his perceptual schema (Schema 99), which reveals that he commented relatively little on perceptual cues from the beginning of the piece, but commented in considerably more detail on the middle of the piece. Interestingly, Participant J was already able to comment on repetition in the piece, though this was not transferred to an understanding of the form of the piece at this stage. He had intriguing ideas concerning the compositional structure of the music, suggesting that each section of music might incorporate the last: clearly he felt that the piece is unified, even if his conception of the structure was slightly misguided. As well as his extensive perceptual cues, he also invoked a narrative understanding of the piece, highlighting the importance of suspense in the music. It is interesting that one of these narratives

involved a barking dog, as did a narrative of Participant A: again, this might be described as Peircian iconic resemblance.

Figure 114 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session A

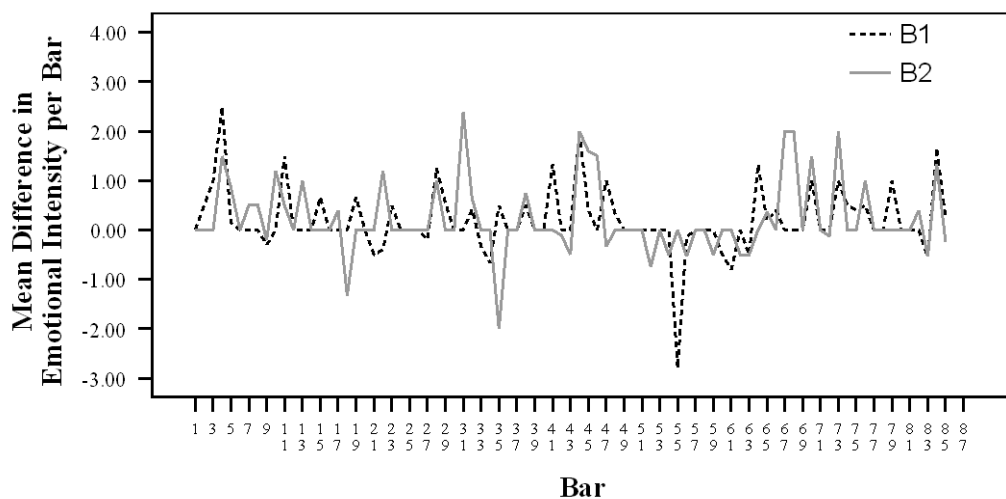


Participant J completed four diary entries between each session. Participant J's first diary entry (Schema 100) was considerably less complicated than his interview. He created no new perceptual cues, but elaborated on some of those he described earlier. Interestingly, he made a musical association with that used in horror movies, and described the music as 'quite violent'. In his second diary entry (Schema 101), Participant J moved away from perceptual cues, instead focusing on a narrative conception of the piece resulting from anticipation, the mood of the piece, and a judgement of the piece. His comments were less enthusiastic towards the piece than previous comments. Participant J retained his large-scale focus in his third diary entry (Schema 102): though he commented on the beginning of the piece, he did not mention any other perceptual cues, but made a comment regarding the self-referencing or repetition in the piece. He also noted his waning enthusiasm towards the piece. In his fourth diary entry (Schema 103), Participant J discussed his response to the piece, in terms of emotion and suspense, elaborating on the narrative comments he had made

earlier. He also suggested a function for the loud chords, in bringing his attention back to the music.

Participant J's continuous response traces from the second session again appear to show rapid and large fluctuations in emotional intensity (see Figure 115). He responded more to the beginning of the piece, and the large decrease at bar 55 may suggest some awareness of the end of a section. The interview data, however, did not explicitly show this awareness of the sections of the piece (see Schema 104). Instead there was a new musical association, to a piece by Messaien, as well as a few perceptual cues.

Figure 115 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session B

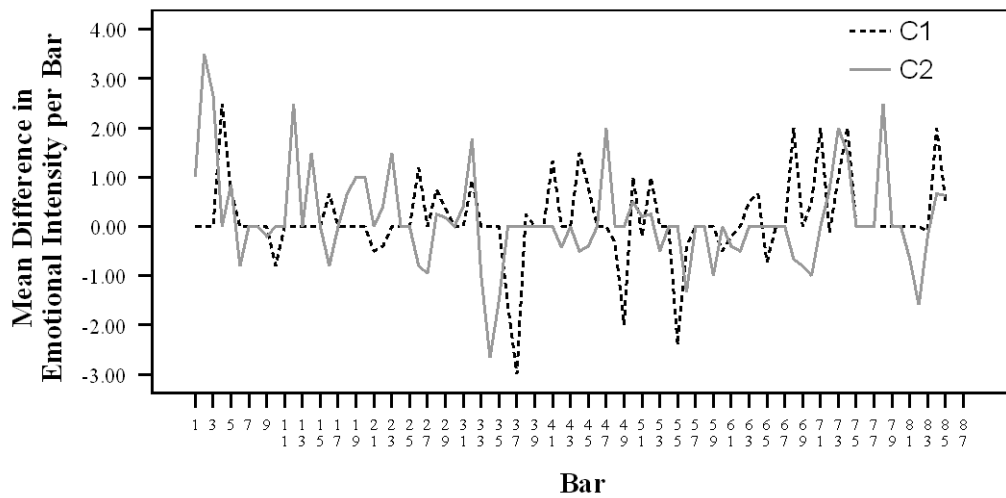


Participant J's fifth diary entry (Schema 105) was brief, and focused on the first half of the piece. He suggested two perceptual cues, and used narrative ideas to aid his understanding of the piece. These narrative ideas, one of which concerned elves and pixies, and the other, a raindrop, might be described in Peircian terms as having an iconic relationship with the music. In his sixth diary entry (Schema 106), Participant J noted two perceptual cues relating to loud chords, as well as his difficulty in understanding the formal structure of the piece. Interestingly, he suggested that the

piece may have some element of improvisation as a part of its construction. The brevity of these diary entries may suggest an increasing lack of attention in listening to the music. The seventh diary entry (Schema 107) was rather similar to the sixth, with references to loud chords, as well as thoughts concerning the construction of the piece. Participant J suggested that the score may not be conventional, or perhaps that it is not notated at all, as an explanation of his self-confessed inability to grasp the structure of the piece. He also mentioned a previous cue, concerning the repetition of notes at the beginning of the piece. Participant J was still puzzling over the piece's construction in the eighth diary entry (Schema 108), and suggested an improvised element to the piece, in conjunction with some specified parameters that the performer must obey.

Participant J's continuous response traces from the third interview appear to be more extreme than those seen previously. It shows rapid increases and decreases in emotional intensity, and perhaps a greater similarity between the two traces. Participant J's schema for this interview (Schema 109) is more complex than those relating to his diary entry, and he showed evidence of a clear conception of the surface cues of the piece. He realised that there is some repetition in the piece, and suggested a formal structure with one repeated section. He recognised the return of the first section of the piece, but did not notice that his first section was longer than his second. Participant J maintained that there is an element of improvisation in the piece. He made few other comments, but did associate the music with film music about elves and pixies.

Figure 116 Participant J's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session C



Participant J's perceptual schemata appeared to develop considerably over the experimental period. He provided considerable detail of his small-scale perceptual cues, and noticed some large-scale repetition in the piece, eventually dividing the piece into two repeated sections. He noted some similarities in the music with other pieces he knew. He used narrative conceptions of the music in a variety of ways, firstly conceptualizing the music in terms of suspense, and then associating small-scale perceptual cues with narrative ideas.

5.4.3. Participant S

Participant S was a non-music student.

5.4.3.1. Changes in overall measures

Participant S's mood ratings varied slightly over the three sessions. At the first and second sessions, he provided a mood ratings of [2–1] (i.e. somewhat pleasant feelings with a little arousal) and at the third, [3–1] (i.e. pleasant feelings with a little arousal). There appears to be no clear link between Participant S's mood and emotional responses (see Table 43).

Table 43 Comparison of mood and emotional intensity (mean of continuous emotional response traces)

Session/trial	Valence	Arousal	Mean level of emotional intensity	Standard deviation of emotional intensity
A1	2	1	31.60	9.00
A2			38.96	9.90
B1	2	1	28.53	6.89
B2			29.75	7.04
C1	3	1	29.65	8.21
C2			30.12	8.26

Participant S's familiarity ratings increased over the three sessions, with increases occurring between all three sessions. His liking for the piece remained relatively low.

Table 44 Participant S's reported familiarity with and liking for the Berio

All Figures are reported to 3 significant figures in terms of a maximum figure of 100.

Participant S	Session		
	A	B	C
Familiarity	0	30.8	43.8
Liking	26.0	25.3	27.4

5.4.3.2. Participant S's changes with familiarity: Continuous response data

The vast majority of Participant S's traces were significantly correlated. Those between traces in the same session were the most strongly correlated, but surprisingly, those between distant sessions were more strongly correlated than those between neighbouring sessions. It is difficult to suggest systematic changes in the strength of these correlations with familiarity for this participant.

Table 45 Pearson correlations between pairs of traces provided by Participant S

** = significant at 0.01 level; * = significant at 0.05 level

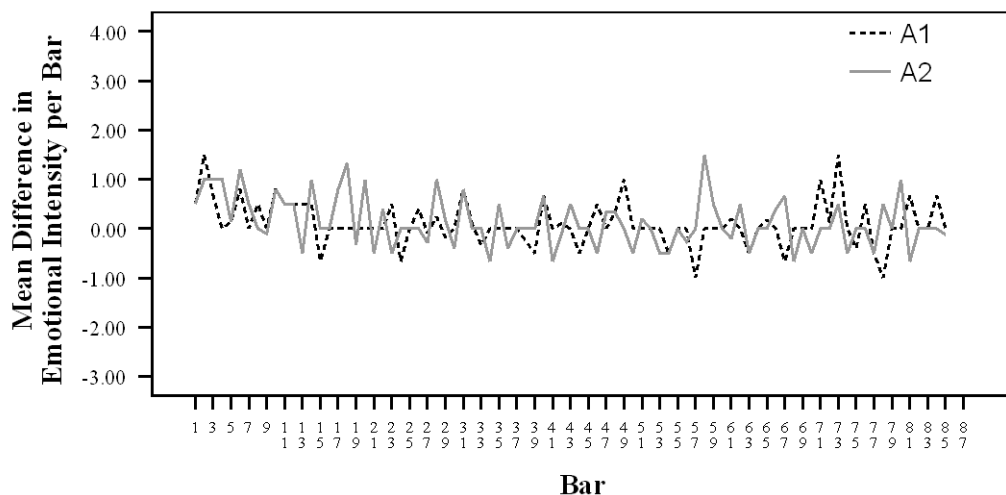
Participant S	A1 / A2	B1 / B2	C1 / C2
Correlation	0.239*	0.598**	0.284**
Mean correlations	Within Session: 0.374		

Participant S	A1 / B1	A1 / B2	A2 / B1	A2 / B2	B1 / C1	B1 / C2	B2 / C1	B2 / C2
Correlation	0.260*	0.393**	n/s	0.281**	0.385**	0.230*	0.371**	0.246*
Mean correlations	Between neighbouring sessions: 0.271 not including n/s results; 0.309 including n/s results as 0.							

Participant S	A1 / C1	A1 / C2	A2 / C1	A2 / C2
Correlation	0.540**	0.296**	0.296**	0.293**
Mean correlations	Between distant sessions: 0.347			

5.4.3.3. Building schemata: Triangulation of continuous response data, interview data, and the music

Participant S's first response traces show rapid fluctuations in emotional intensity (see Figure 117). It is difficult to assess the causes of these changes without examining the interview data (Schema 110). This showed evidence of small-scale perceptual cues in the first 42 bars of the piece, and some more general comments regarding the harmony and pauses in the piece. Additionally, Participant S made a comparison between this piece and those used for the previous experiments.

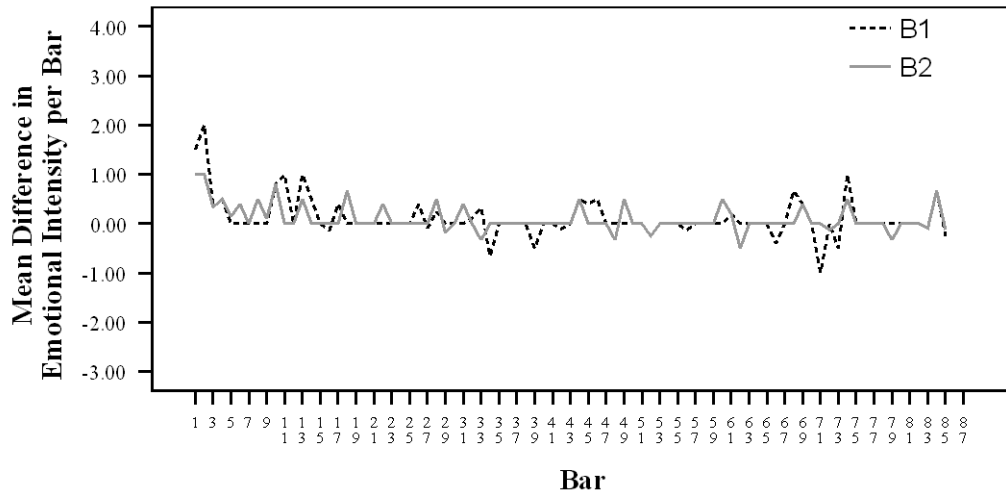
Figure 117 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session A

Participant S completed six diary entries between the first and second interviews, and five between the second and third interviews. His first diary entry (Schema 111) revealed his observations of small-scale perceptual cues, as well as an attempt to use narrative to further his understanding of the piece. Participant S's second diary entry (Schema 112) again revealed an attempt to use narrative to understand the piece. He also noted some general features of the piece, one of which seemed to clarify the function of the small-scale perceptual cues. In his third diary entry (Schema 113), Participant S continued to try to invoke a narrative understanding of the piece. He also became more specific in his perceptual cues. Participant S's fourth diary entry (Schema 114) did not include any reference to small-scale perceptual cues, instead remaining brief and focussing on the attempt to invoke a narrative structure. Participant S continued to struggle with the narrative and unity of the piece in the fifth diary entry (Schema 115), but added perceptual cues at the beginning and the end of the piece. He also added a general comment about the final notes of each section of music, commenting that they seemed 'unresolved'. Similarly, the sixth diary entry (Schema 116) also focused on the 'unresolved notes', the lack of tune, and only one small-scale perceptual cue that the participant had mentioned before.

Participant S's continuous response traces in the second session were less varied than those in the first. There were more areas indicating no changes of emotional intensity, and the changes made were smaller in size (see Figure 118). Participant S's perceptual schema for this interview (Schema 117), however, is relatively complex. He still found it impossible to identify a structure in the piece, to invoke a narrative understanding of the piece, and to hear a tune. He elaborated on the 'unresolved notes' mentioned in his diary entries, and described some small-scale perceptual cues in some detail. His

association of cymbals or a gong with the c²-sharp in bar 49 might be described as a symbolic association, in Peirce's terms.

Figure 118 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session B

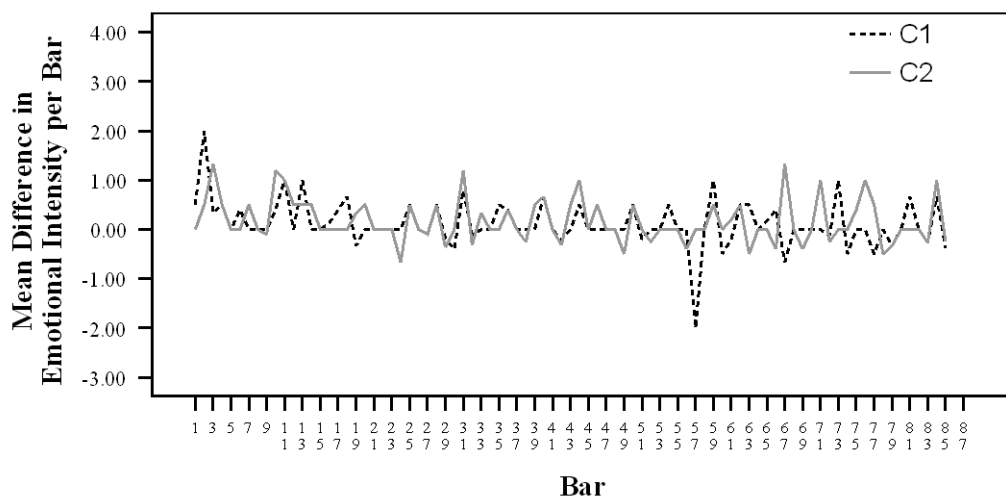


In his seventh diary entry (Schema 118), Participant S began to notice an element of repetition in the piece, the c²-sharp mentioned previously. He still described the piece as disjointed, and did not describe any other small-scale perceptual cues. In his eighth diary entry (Schema 119), Participant S again avoided small-scale perceptual cues, and instead focused on general comments about the piece, in terms of metaphor and larger-scale cues. Participant S did include some references to small-scale perceptual cues in his ninth diary entry (Schema 120). Fascinatingly, from not being able to find a structure to the piece, Participant S commented at bar 56 that the music sounded ‘almost like being played backwards’. This is the moment at which the music returns to the first section of the piece, which would sound like a quasi-retrograde-inversion of the end of the second section. In his tenth diary entry (Schema 121), Participant S continued to try to understand the structure of the piece by finding and describing common elements in different areas of the piece. He commented on the repeated note, and remained

disappointed by the lack of melody in the piece. The eleventh diary entry (Schema 122) was very similar, focussing mostly on the repeated note.

Participant S's continuous response traces from the third interview are more changeable than those from the second, and there are some consistencies between the two traces. His perceptual schema from the third interview (Schema 123) is again more complex than the diary entries, and incorporates perceptual cues, observation of the repeated note, and a further disappointed attempt to use narrative in an attempt to understand the piece. Participant S made an interesting suggestion of the piece ending at 56, the moment before it returns to the opening of the piece, which suggests an understanding of this moment as a large-scale structural boundary.

Figure 119 Participant S's reported changes in emotional intensity (mean levels per bar) in response to the Berio: Session C



Participant S provided some detail of his small-scale perceptual cues, and attributed some structure to the piece, including an introduction to the piece. He attempted to use narrative to aid his understanding of the piece, but found this difficult, if not impossible. He made a few musical and mood associations, as well as a judgement of the piece.

5.4.4. A comparison of the case studies

There are both similarities and differences between the three participants' schemata in response to the Berio. Participant A was able to formulate clear perceptual cues and an accurate understanding of the structure of the piece. Participant J began by trying to understand the piece's structure, and suggested several possible explanations for the features he was hearing. He came close to an accurate conception of the structure of the piece by the end of the familiarization period. Participant S did not gain an accurate conception of the structure and repetition in the piece, although he did suggest that the return of the opening section sounded 'upside down', and he did notice the repetition of individual notes. Participants A and J used narratives to aid their understanding of the piece, but mainly in the first week of the familiarization period (see Figure 120 and Figure 121). Participant S attempted to use narratives throughout the familiarization period (see Figure 122), but many of his comments related to the impossibility of constructing one, because of the pauses in the music and because of the lack of regular melody in the piece.

All three participants discussed small-scale perceptual cues most frequently in their schemata, although Participant J did, on occasion, not discuss them at all (see Figure 121). There were peaks in the discussion of this and other features in the interview setting, as opposed to the diary setting. This is likely to relate to the nature of the interview situation, as participants were asked to comment on the triggers of their emotional responses.

Figure 120 Prevalence of each aspect of the schema over the familiarization period: Participant A

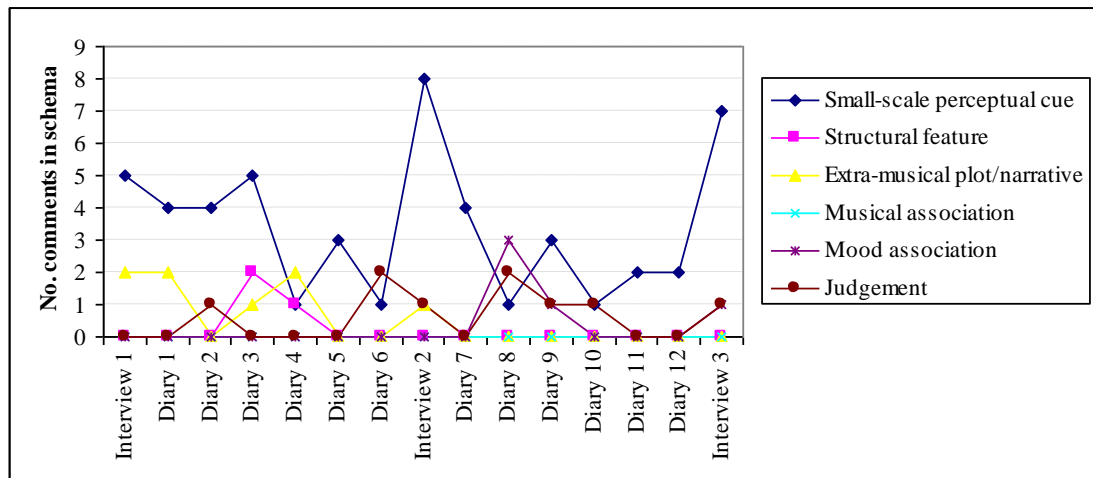


Figure 121 Prevalence of each aspect of the schema over the familiarization period: Participant J

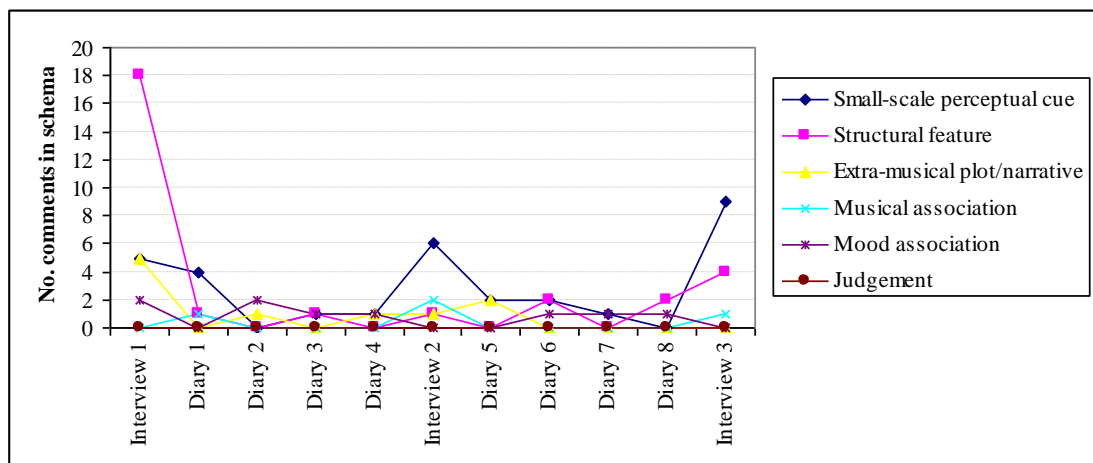
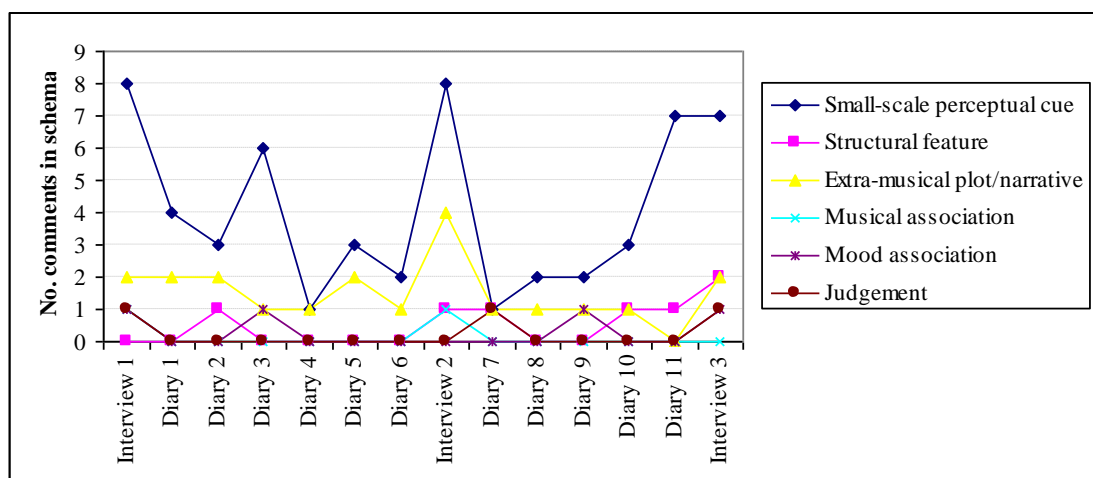


Figure 122 Prevalence of each aspect of the schema over the familiarization period: Participant S



The similarities and differences shown here between the three sets of perceptual schemata are interesting and may relate to their musical status. In particular, the difference between the three participants' abilities to attribute a coherent musical structure to the piece may be related to their knowledge of musical styles and their experience of aural analysis. The differing use of a narrative understanding of the piece may also relate to musical experience: Participant S, a participant with very little musical experience, found this very difficult in response to this piece.

5.5. Preliminary conclusions

The results of this experiment suggest some interesting differences between perceptual and emotional responses to the Berio that relate to musical experience. The case studies suggested differences in participants' ability to perceive large-scale musical structure, and possibly the ability to use narrative processes to understand the piece, although it was evident from the interviews that other non-music students were able to do so. There were some differences between music students' and non-music students' emotional responses to structural boundaries of the piece.

There were also differences in perceptual and emotional responses with familiarity. Firstly, the interview data and case-study approach highlighted participants' considerable increases in the detail they were able to perceive in the music and the ways in which the expectations they created while listening to the music changed with familiarity. Secondly, emotional response traces gathered closest in time were more strongly correlated than those gathered in distant sessions, suggesting consistent changes over the experimental period. Thirdly, the large-scale repetition in the form of the piece allowed a comparison to be made between participants' responses to the same musical material in two different contexts. The correlation between participants' responses to the two sections of the piece was strongest when participants were most

familiar with the music, suggesting that their responses became more consistent with familiarity. Finally, there was also some evidence for the development of anticipatory responses to the Berio with familiarity.

There was evidence to suggest that participants responded to the Berio in each of the ways suggested by the model outlined in Chapter 1, and also that they employed different ways of listening to the piece. The following chapter will compare the results of these three experiments, and try to assess the differences in responses to tonal and atonal music.

Chapter 6

A comparison of the three experiments

This chapter aims to form both a summary of the findings reported in Chapters 3, 4 and 5, and to compare the data from each experiment. As reported earlier, 14 participants completed all three experiments, and new statistical comparisons made in this chapter will only consider data from those participants.

6.1. The music

The three pieces used in the experiments were Clementi's Sonata in F-sharp minor (II), Schoenberg's Three Piano Pieces (I) and Berio's *Rounds*. The Clementi is tonal, in a modified sonata form, with conventional harmonic, melodic and rhythmic features. Schoenberg's Three Piano Pieces (I) is one of his earliest free atonal works, but maintains many conventional features of form, melody, rhythm, and texture. Berio's *Rounds* is less conventional: though it has a ternary form structure, the piece is atonal (although one note, c'-sharp, may be considered to be a pitch centre in the work), and has very complex rhythmic and textural features, as well as frequent silent pauses.

All three of the recordings used deviated from the score to a certain extent, particularly in terms of timing. Phrase and section endings were lengthened; a device used by the performer to emphasis the structure of a piece. The performers' use of dynamic variation was clear from an examination of the amplitude of each recording, and this appeared to conform largely to those specified by the composer in the score.

The next section will examine the quantitative data gathered in response to these three pieces.

6.2. Quantitative data

6.2.1. Overall measures

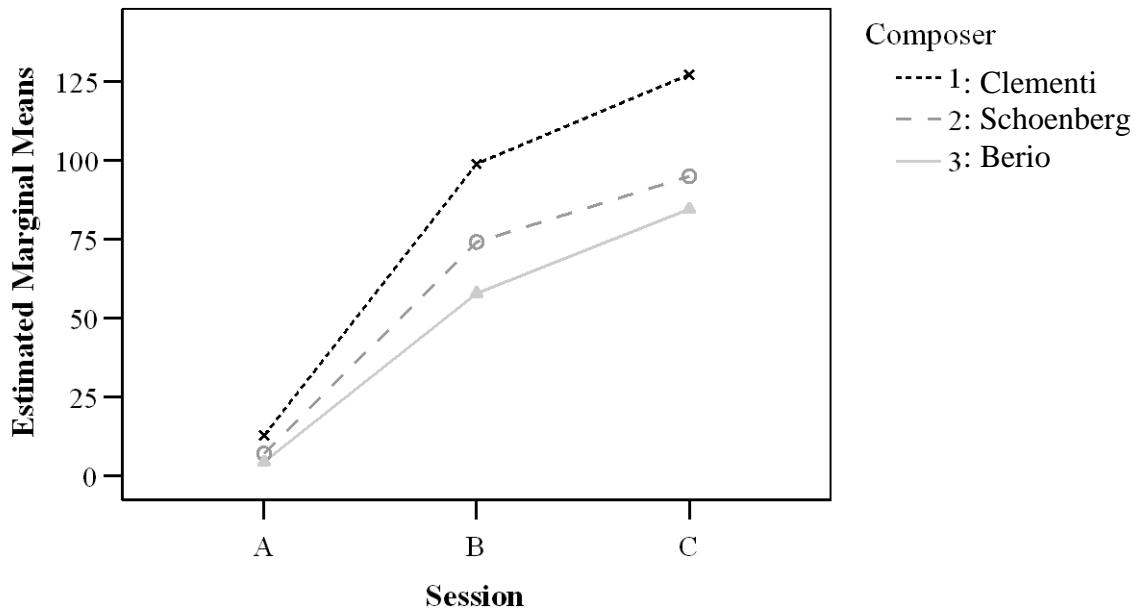
In each experimental session, measures of familiarity and liking for the piece were taken in between the two continuous response listening trials. To compare these results over the three experiments, a repeated-measures ANOVA was undertaken on the measures of familiarity and liking with within-subjects variables of composer and session and a between-subjects variable of type of student.

The measure of familiarity showed some strong effects. There was a highly significant effect of composer ($F(2, 22) = 20.0, p < 0.001$): participants reported feeling most familiar with the Clementi, followed by the Schoenberg, and then the Berio (see Table 46). This difference might be taken to relate to the perceived difficulty of understanding the music, or complexity.

Table 46 Mean familiarity ratings for all participants for each piece

Composer	Mean familiarity
Clementi	79.525
Schoenberg	58.600
Berio	48.833

There was also a significant effect of session ($F(2, 22) = 116.966, p < 0.001$). Participants' reported familiarity was least in the first session, and greatest in the final session, as anticipated. More interestingly, there was a significant interaction between composer and session ($F(4, 44) = 3.526, p = 0.014$). The estimated marginal means of this effect suggest a widening difference between participants' reported familiarity with each piece over the two-week familiarization period (see Figure 123). This effect, however, must be considered in light of the fact that as no participant knew any of the pieces before the experiment began, the available range of familiarity was lessened in the first session.

Figure 123 Estimated marginal means for the interaction between composer and session on familiarity ratings

There was also a highly significant effect of composer ($F(2, 22) = 11.6, p < 0.001$) on the measure of liking (see Table 47). The Clementi was best-liked by the participants, followed by the Schoenberg and then the Berio.

Table 47 Estimated marginal means of the effect of composer on liking ratings

Composer	Mean liking
Clementi	90.871
Schoenberg	53.817
Berio	45.796

There was no significant effect of session, and no significant interaction between composer and session on liking ratings, although liking ratings were not stable, particularly between the first and second sessions (see Table 48). There were also no significant correlations between the measures of familiarity and liking used here, suggesting that the relationship between these two variables is complex.

Table 48 Estimated marginal means of the (non-significant) interaction of composer and session on the variable of liking¹⁸

Composer	Liking		
	Session A	Session B	Session C
Clementi	97.775	86.388	88.450
Schoenberg	55.788	52.163	53.500
Berio	56.038	38.650	36.450

In summary, participants recorded the highest levels of both familiarity and liking for the Clementi, followed by the Schoenberg and the Berio. This may be related to the perceived complexity (or conventionality) of the music. Levels of familiarity increased significantly between the three sessions, but the extent of this increase was dependent on the composer: increases were largest in response to the Clementi and smallest in response to the Berio. Liking for the pieces decreased between the first and second sessions, but there was no overall significant effect of session on liking, and no correlation was found between participants' familiarity and liking.

6.2.2. Continuous response data

In the vast majority of the examinations of these data, difference figures have been used for statistical tests. Using difference figures, as mentioned previously, reduces the risk of serial correlation when applying correlation tests, and reduces the variance of the data for use in ANOVAs. These tests have shown a variety of interesting effects.

6.2.2.1. *Musicians vs. non-musicians*

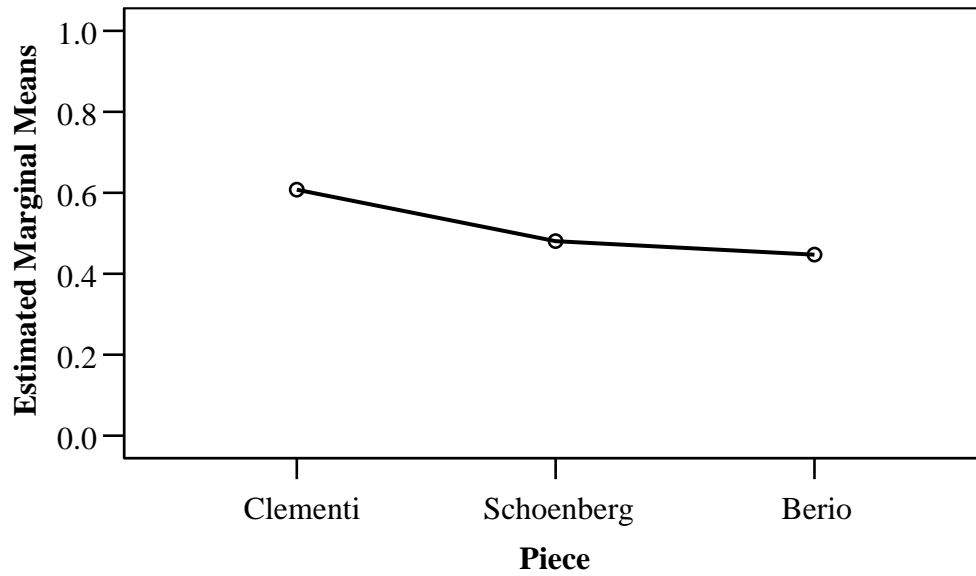
As reported earlier, multivariate ANOVAs were conducted on mean response rates per half-second in each bar for each set of response traces to each piece of music. The small number of significant differences found between music students and non-music students in relation to the Clementi and the Schoenberg occurred in response to specific bars of the piece, which frequently marked section boundaries. There were more marked

¹⁸ There is little variation in the changes in reported liking in the Schoenberg, but larger differences can be seen between sessions in the Clementi and the Berio. In both pieces, a sizeable drop is seen in liking between the first and second sessions. In the Berio, this drop continues to fall, but in the Clementi and Schoenberg, it recovers slightly.

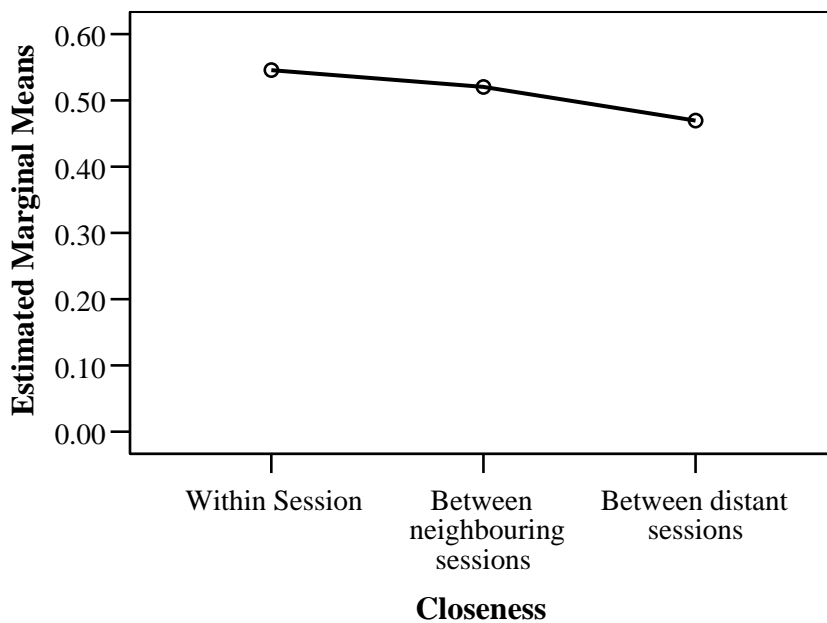
differences in emotional responses between music students and non-music students in response to the Berio: the second response trace from the first session showed significant differences between these two groups of students; in the other traces, differences were seen in response to structural boundaries or rapid dynamic change. These results suggest that musical training might affect the way in which listeners respond emotionally to specific pieces of music as a whole when slightly familiar with those pieces; and the way in which listeners respond to structural boundaries in a piece of music.

6.2.2.2. Familiarity and musical structures

In all three experiments, the strongest correlations were seen between continuous response traces that were taken within a single session. The weakest correlations were seen between traces taken in distant sessions (e.g. between sessions A and C). The differences in the strength of these correlations were not found to be significant in individual ANOVAs, but their appropriate directional change suggests that there may be interesting and systematic changes in emotional responses to music with familiarity that merit further investigation. Additionally, a repeated-measures ANOVA with the within-subjects variable of composer and the between-subjects variable of closeness gave a significant effect of composer ($F(2, 24) = 26.54, p < 0.001$), with the Clementi prompting the strongest correlations (and therefore consistency in response) and the Schoenberg and Berio prompting the weaker correlations (and less consistent responses) (see Figure 124).

Figure 124 Significant effect of piece on strength of correlations between traces

There was also a significant effect of ‘closeness’ on the combined data ($F(2, 12) = 4.031, p = 0.046$), with the correlation between traces decreasing, as expected, with distance in time, suggesting that familiarity may have a significant effect on emotional responses (see Figure 125).

Figure 125 Significant effect of closeness in time on strength of correlations between traces

In all three experiments, participants' changes in emotional intensity varied over the course of the piece, as revealed by the significant effects of bar in the repeated-measures ANOVAs of the ICB figures in each case. Triggers for increases in emotional responses were similar for each piece, and included dynamic variation, rhythmic and textural complexity, pitch range and contour, chordal or harmonic features, repeated patterns or sequences, or the recognition of motivic features. These differed in importance for each piece, but this is likely to be idiosyncratic (see Table 49).

Table 49 Triggers of increases in emotional intensity in response to each piece

Most common triggers	Clementi	Schoenberg	Berio
1	Dynamic variation	Increasing dynamics/powerful articulation	Dynamic variation
2	Rhythmic complexity	Unexpected chords/harmony	Wide pitch range or rising pitch
3	Pitch contour	Pitch contour	Small rhythmic durations/complex textures
4	Chord/harmony	Repetition/motivic features	Recognition of return of opening
5	Repeated pattern/sequences	Rhythmic complexity	Chords/harmony

Triggers of decreases in emotional intensity also varied slightly between the three pieces (see Table 50). In response to the Clementi, participants most commonly suggested structural boundaries as triggers of decreases in emotional intensity. In response to the Schoenberg and the Berio, decreasing dynamics, structural boundaries and sparse texture prompted decreases in emotional intensity. For the Schoenberg, the principal trigger of decreases were dynamic decreases, which may be explained by the piece's relatively unclear structural boundaries, caused by some overlapping phrases.

Table 50 Triggers of decreases in emotional intensity in response to each piece

Most common triggers	Clementi	Schoenberg	Berio
1	Structural boundaries	Decreasing dynamics	Structural boundaries/silences
2		Structural boundaries	Decreasing dynamics
3		Sparse texture	Sparse texture

Responses to the Clementi revealed only one other effect from this ANOVA (a complex three-way interaction between session, trial and bar); similarly, responses to the Berio revealed no other significant effects or interactions from this ANOVA. Responses to the Schoenberg, however, revealed an interesting interaction between session and bar, suggesting that there were changes in emotional responses to specific musical structures (the start of a phrase) with familiarity. Unfortunately, this effect was complex and difficult to interpret; however, it would be interesting to investigate this effect in future experiments. Additionally, an interaction between session and type of student suggested that there were differences in the changes in emotional responses with familiarity according to the background of the participant. Whereas the magnitude of music students' responses decreased over the three sessions, that of non-music students rose to a peak in the second session.

A similar ANOVA on maximum ICB figures revealed that, in response to the Clementi, participants' maximum increases in emotional intensity decreased over the three sessions. There were no significant results from this test in response to the Schoenberg or the Berio. This may suggest differences in the ways in which participants' emotional responses to music change with familiarity, according to the language and style of the piece. One of the most common triggers of emotional responses to all three pieces, for instance, was dynamic variation. Usually, in the Clementi, dynamics increase or decrease gradually (with the exception of bars 18–19 and 36–37, which contain more

rapid changes from *rinforzando* to *piano*). The Clementi also had a narrower range of dynamics than the Schoenberg or the Berio, which contained numerous sudden changes in dynamic. It may have been that the immediacy of the changes in the Schoenberg and Berio continued to prompt large increases in emotional responses, whereas the slower nature of the dynamic variation in the Clementi allowed more gradual responses as participants became familiar with the music and developed more concrete expectations. There were also no significant results from ANOVAs on the maximum decreases in ICB figures. Emotional responses, though they may begin rapidly, usually take time to subside, therefore changes in the maximum decrease in ICB figures are unlikely to change with familiarity.

The Berio allowed a brief examination of participants' responses to repeated sections of music through its exact repetition of the opening section of the piece. Pearson correlation tests revealed that the strength of the correlations between the responses to the opening and final sections of the piece increased over the three sessions, suggesting that the increased awareness of the overall musical structure and repetition revealed in participants' interviews may have affected their emotional responses.

6.2.2.3. Anticipatory responses

There was some evidence for anticipatory responses to all three pieces, although these were more prominent and frequent in response to the Clementi than the Schoenberg or Berio. All these anticipatory responses were found to have been prompted by important emotional triggers with which participants had become familiar.

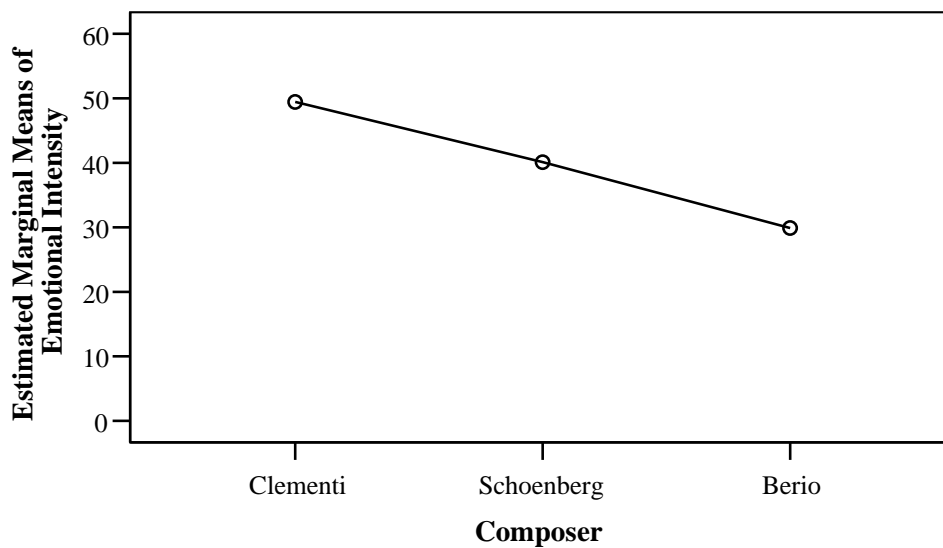
6.2.2.4. Mean levels of emotional responses to each piece

Previous studies have used mean levels of emotional intensity over the entire trace in order to compare continuous and summative ratings of emotional intensity, and these

measures may be useful in examining the differences in the levels of listeners' responses to different pieces of music.

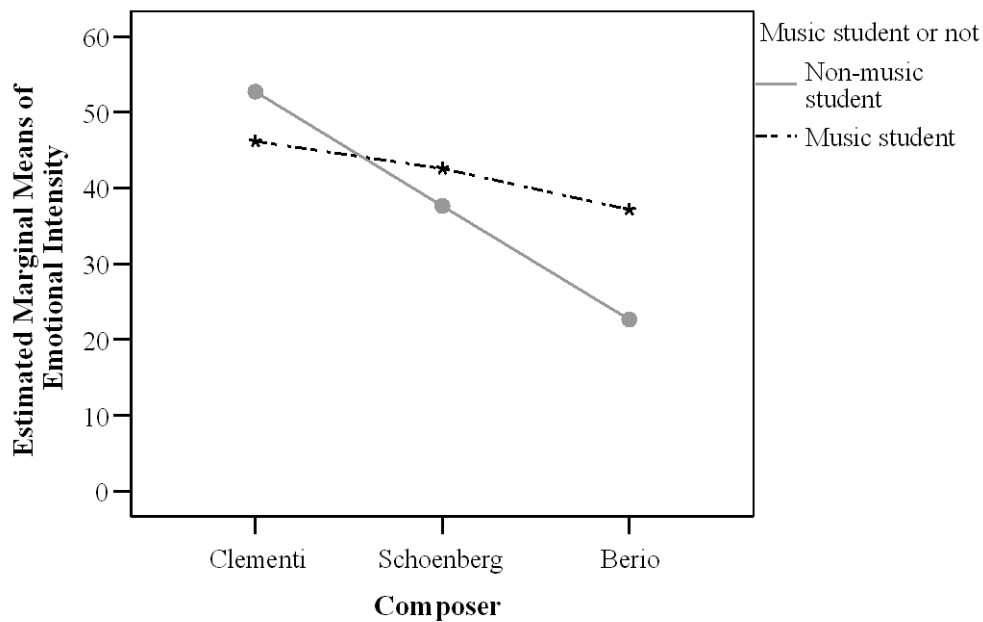
A repeated-measures ANOVA was carried out on the overall mean levels of emotional response, with within-subjects variables of composer (3), session (3) and trial (2), and a between-subjects variable of type of student (2). There was a highly significant effect of composer ($F(2, 24) = 18.78, p < 0.001$), with the Clementi triggering the highest levels of emotional intensity, and the Berio the lowest (see Figure 126). Responses to the tonal music were therefore higher than those to the atonal music.

Figure 126 Estimated marginal means of emotional intensity overall levels: significant effect of piece



There was also a significant interaction between composer and type of student ($F(2, 24) = 5.46, p = 0.011$), with non-music students reporting more intense emotional responses to the Clementi than music students, but less intense emotional responses than music students to the Schoenberg and Berio. There was also little overall difference between music students' responses to the three pieces; in contrast, there was a marked difference between non-music students' responses to the three pieces. There were no other significant effects or interactions.

Figure 127 Estimated marginal means of emotional intensity overall levels: significant interaction between type of student and piece



Overall levels of emotional intensity were also tested for correlations with the overall levels of liking and familiarity. No significant correlations were found.

There do appear to be significant differences between participants' responses to the three pieces: overall levels of the continuous emotional intensity measure, liking, and familiarity were all lower for the two atonal pieces than for the Clementi. The data indicate that musical background also influences the extent of the difference in this response.

6.2.2.5. Effects of mood

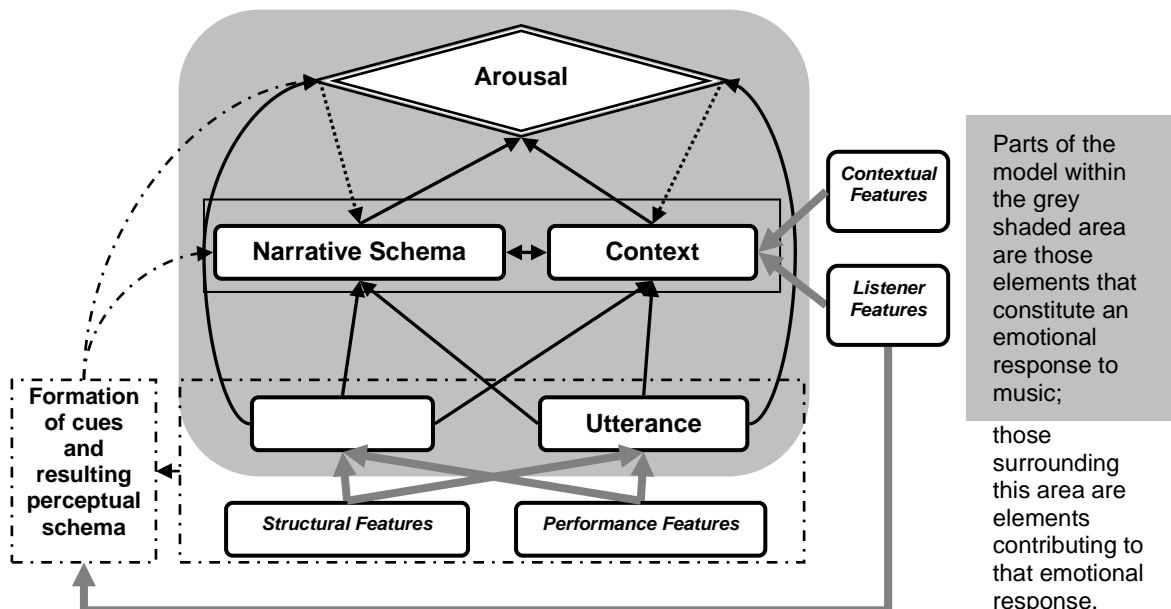
A further factor that may have influenced participants' responses was their mood, which was measured before each experimental session in terms of participants' arousal and valence. Repeated-measures ANOVAs revealed no significant differences between participants' moods in any of the three experiments or in any of the experimental sessions. Pearson correlation tests revealed no significant correlations between participants' mood and their overall levels of emotional response in response to the

Clementi or the Schoenberg. There were significant strong positive correlations between participants' arousal in response to the Berio in the second experimental session, and their overall levels of emotional response in that session (first trace, $r = 0.561$, $p = 0.037$; second trace $r = 0.662$, $p = 0.010$). This correlation suggests that the higher participants' arousal, the higher their mean level of emotional intensity in response to the piece. The fact that no other correlations were apparent between mood and emotional response suggests that these correlations should not pose difficulties when interpreting results.

6.3. Qualitative data: Interviews

The interviews from all three studies were analysed according to the areas of the model outlined in Chapter 1 (see Figure 128).

Figure 128 Combined model of emotional responses to music

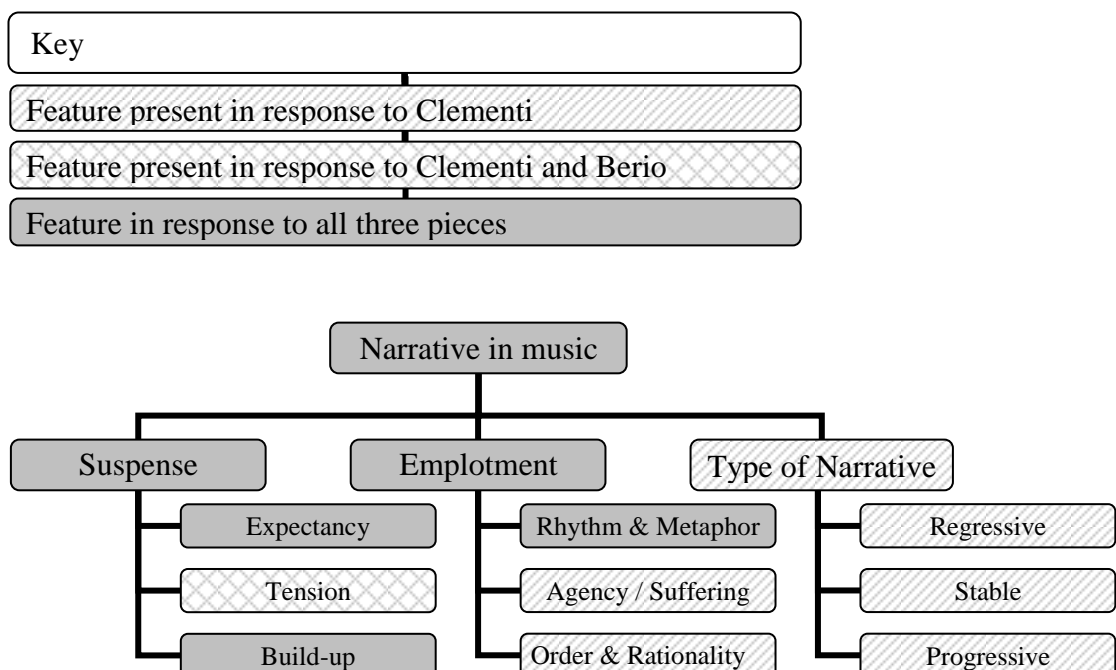


In all three experiments, participants appeared to show evidence for each aspect of the model, though to different extents.

6.3.1. Narrative

Participants appeared to find it easier to use emplotment in response to the Clementi and the Schoenberg than the Berio, reportedly because of the pauses in the Berio, and because of their inability to know what to expect. Participants did use emplotment in response to each piece; however those described in response to the Clementi were sufficiently sophisticated to allow the identification of regressive, stable and progressive narratives. Participants discussed the concept of suspense, and used the terms ‘expectancy’ and ‘build-up’ in response to all three pieces. Participants discussed the concept of tension in response to the Clementi and the Berio, but not the Schoenberg. Many of the aspects of a narrative understanding of music were in evidence in participants’ responses (see Figure 129).

Figure 129 Aspects of a narrative understanding of music



6.3.2. Mood or character of the music: evidence for listeners hearing music as sound or human utterance

In all three studies, participants showed evidence of understanding the mood or character of the music as sound, responding with heightened emotion to louder aspects of the piece, for example. Participants also appeared to respond to the music as human utterance, although the identification of the mood of the music was less common in response to the Schoenberg and the Berio than in response to the Clementi.

6.3.3. Music heard in context: evidence for the influence of contextual and listener features

Participants displayed evidence for the context of their listening playing an important role in their emotional responses in response to all three pieces, but most commonly in response to the Clementi. There was some evidence that listener features affected emotional responses.

6.3.4. Other holistic issues

Participants did occasionally appear to have some difficulty expressing themselves in response to the Clementi, but this was less apparent in response to the Schoenberg and Berio. This may be because participants became accustomed to the experimental context, and to the experimenter.

The use of technical terms varied between musicians and non-musicians, and over the three pieces. In response to the Clementi and the Schoenberg, music students responded using more technical terms than non-music students, as would be expected. In response to the Berio, however, non-music students used technical terms more commonly. This was surprising, but could be explained by inaccurate use of words such as ‘major’ or ‘key’, and their more common use of the word ‘note’.

In response to the Clementi, two participants mentioned the piece having a particular colour, but no participants suggested this in response to the Schoenberg or the Berio. The small number of participants mentioning this feature makes any systematic differences in responses to the three pieces difficult to ascertain.

Participants did not discuss the genre or language of the piece in response to the Clementi, but did in response to both the Schoenberg and the Berio. This was probably due to the relative unfamiliarity of the atonal language of the piece.

Participants discussed different ways of listening to all three pieces, but particularly in response to the Schoenberg and the Berio. Participants described listening analytically, hearing the music as background music, or listening for specific musical features. A few participants also reported withdrawing from the atonal pieces and feeling overwhelmed by the music. Participants were also sometimes distracted from the music.

Participants commented on the effects of familiarity with the music they were hearing on their perception of the pieces and on their emotional responses. These comments appeared to suggest that participants were mindful of an increase in their awareness of musical features, particularly those relating to repetition or the musical structure.

6.3.5. Content analysis of the interviews: Investigating familiarity and the differences between responses to tonal and atonal music

The coding of the interviews was examined to investigate whether there were any effects of familiarity on the topics discussed by participants at each interview, and to identify any differences between the content of the interviews according to the piece used. Many of the relevant topics for discussion may be represented with the aid of modified versions of the model of emotional responses discussed in Chapter 1. The model is sufficiently flexible to allow for the representation of a sample of participants' responses to different pieces of music at different stages of familiarity, yet the emphasis

on each area of the model may change. This different emphasis may be shown by the relative size (area) of each box. In the models discussed here, the number of comments coded into each category of the model was divided by 10; factors of this number were then used to provide the length and width of each box in the model. These models are shown in Appendix 7, and usefully illustrate the differences between the three pieces and the developments that occurred with familiarity that are discussed here.

The content of the interviews that provided evidence for listeners hearing the music as sound was a prominent category in each interview in response to each piece. This category also showed some interesting developments in each of the three experiments. In the first experiment, the number of comments relating to this category decreased markedly (see Appendix 7, Models 1–3). In the second experiment, those comments increased in number over the three sessions (see Appendix 7, Models 4–6). In the third experiment, the comments rose to a peak at the second interview, and decreased slightly by the third interview (see Appendix 7, Models 7–9).

The number of comments relating to music being heard as human utterance also varied with both the piece of music heard and the experimental session. There were relatively few comments relating to this category in response to the Berio. In response to the Clementi, the number of comments showing evidence of the music being heard as human utterance decreased with the participants' familiarity with the music. In response to the Schoenberg, these comments increased in number; and in response to the Berio, the number of comments increased to a peak before dropping again. These trends are somewhat surprising, as it would be expected that hearing music as human utterance would be a means of accessing emotional information that would be obvious from the first hearing of a piece. It may have been, however, that participants were able to access

this information, but refrained from making comments concerning it, as they may have been distracted by other features of the music.

Several participants made comments concerning the context in which they were listening to the music, and the way in which this affected their emotional responses. These comments were always lowest in number in the first session of each experiment, and highest in the third, suggesting that a degree of familiarity was necessary before participants began to consider the effect of the listening context upon their responses. The two stimulus-based features that contribute to this understanding of music in context are contextual features and listener features. Comments relating to listener features were more numerous than those relating to contextual features, a feature that may reflect the experimental setting. There was a general increase in the number of comments relating to these subcategories with familiarity.

The number of comments suggesting that participants were hearing the music as narrative also varied over the course of the experiments. Responses to the Clementi suggested a strong decrease in this mode of hearing with familiarity. Responses to the atonal pieces appeared to remain more stable, however, showing relatively small fluctuations. It may have been that participants used narrative as a means of understanding the Clementi, but found other ways of hearing the music later, or perhaps became less conscious of the narrative process. The increase shown in response to the Schoenberg in the use of narrative processes between the first and second sessions may suggest that there is an optimum point of familiarity with the musical language or a specific piece that prompts a narrative response. Additionally, it may be that specific pieces prompt a narrative response to different extents.

The final two categories of the model that provided coding groups were performance features and structural features. The discussion of performance features did not vary in number a great deal, but decreased with familiarity in response to the Clementi and displayed an inverted-U trend in response to the other two pieces. Comments regarding structural features revealed an inverted-U pattern in response to the Clementi, a U pattern in response to the Schoenberg, and an increase in response to the Berio.

A more detailed look at the features discussed under these headings may reveal some more informative trends. There were some systematic changes in participants' responses to all three pieces.

Participants discussed the dynamics of the piece¹⁹ to a great extent in the first session of experiment one, but less so in subsequent sessions. In experiment two, participants discussed dynamics equally in the first two sessions, and then less commonly in the third session. There was a later peak in response to the Berio, with the second session having the most comments concerning dynamics. It is interesting that participants' responses concerning a very accessible feature of the music should lessen with familiarity.

Table 51 Number of times content was coded as 'dynamics or volume'

Session	A	B	C
Experiment 1 (Clementi)	40	27	21
Experiment 2 (Schoenberg)	54	54	51
Experiment 3 (Berio)	15	29	18

¹⁹ It is debatable whether dynamic features constitute a structural or a performance feature; here, they were considered as both, and contributed to both categories.

Participants also discussed the texture of the music less frequently with familiarity. Again though, the peak of the responses in Experiment 3 was in the second session. The texture of music is relatively accessible.

Table 52 Number of times content was coded as ‘texture’

Session	A	B	C
Experiment 1 (Clementi)	9	8	6
Experiment 2 (Schoenberg)	11	7	6
Experiment 3 (Berio)	2	4	1

There were increases in the number of times participants mentioned ‘repetition’ in the music as they became familiar with each piece. In response to the Clementi, the peak number of comments was in the second session, although the third session had considerably more comments than the first. In response to the Schoenberg and the Berio, there was a straightforward increase in the number of comments concerning repetition in the music with familiarity. This suggests that participants were becoming more aware of thematic similarity within the music and that their emotional responses were related to the features they were observing.

Table 53 Number of times content was coded as ‘repetition’

Session	A	B	C
Experiment 1 (Clementi)	8	16	11
Experiment 2 (Schoenberg)	2	3	14
Experiment 3 (Berio)	13	15	16

Comments concerning the structure of the pieces showed a similar pattern, with a peak occurring in the second session in response to the Clementi, and increases in the number of times participants mentioned the structure of the Schoenberg and Berio with familiarity. Again, this would indicate that participants were becoming aware of the

structure of the piece, it was influencing their emotional responses, and that this developed with familiarity.

Table 54 Number of times content was coded as ‘structure’

Session	A	B	C
Experiment 1 (Clementi)	33	38	35
Experiment 2 (Schoenberg)	19	15	31
Experiment 3 (Berio)	6	10	17

There were some interesting differences in the number of comments relating to the harmony of each piece. In response to the Clementi, there was a decrease in the number of comments relating to the harmony of the music over the three sessions. The Schoenberg prompted a large number of comments concerning harmony in the first interview, fewer in the second interview, and more in the third interview. In response to the Berio, there was an increase in the number of comments concerning harmony between each interview. This difference may reflect the tonal language of each piece. The Clementi has tonal language with interesting harmonic features that participants clearly felt able to comment upon from their first interview. The Schoenberg has atonal language, but sufficiently regular features for the participants to comment upon the harmony at the first interview, and then return to the subject later. The Berio, however, is more complex, and many participants clearly required a period of familiarization before they could comment upon the harmony of the piece.

Table 55 Number of times content was coded as ‘harmony’

Session	A	B	C
Experiment 1 (Clementi)	31	26	23
Experiment 2 (Schoenberg)	43	31	45
Experiment 3 (Berio)	14	22	28

Overall, these trends within the categories of structural and performance features suggest a shift from the observation of, and emotional response to, accessible features of the music such as dynamics and texture, to deeper and more detailed features, such as repetition, musical structure, and harmonic features of the music.

One aspect of participants' musical understanding that was expected to increase with familiarity is the development of associations with the music. These did largely increase in number over the three sessions, with only responses to the Berio showing a slight decrease between the second and third sessions. This suggests that as participants become familiar with a piece of music, they are able to link it more with existing knowledge through schemata.

Table 56 Number of times content was coded as 'musical association', 'extra-musical association', or 'images'

Session	A	B	C
Experiment 1 (Clementi)	13	32	37
Experiment 2 (Schoenberg)	16	38	47
Experiment 3 (Berio)	10	18	17

6.3.6. Summary

In summary, there appeared to be some differences in the ways in which participants responded to the atonal pieces in comparison with the tonal piece. Participants appeared to form more complex narratives in response to the Clementi than the atonal pieces, and were less inclined to attribute a mood to the atonal pieces, suggesting a lesser, but still present, understanding of the music as human utterance. Again, participants displayed less awareness of the context of their listening in response to the atonal pieces. There were also some interesting differences between participants' attribution of colour to the music, their discussion of the language of the music, and their awareness of ways of listening to the music in response to the three pieces.

There were differences in the terminology used by musicians and non-musicians in the experiments, with music students using more sophisticated and accurate technical terms.

6.4. The effects of familiarity: Building representations of participants' schemata

Participants A, J and S were used as case studies for all three experiments. All their data (quantitative continuous response data; qualitative interview data; and qualitative daily diary data) was examined at each stage of the familiarization process.

Participant A was accurate and detailed in her descriptions of perceptual cues, and developed her conception of the structure of the piece quickly and accurately. She used narrative structures to aid her understanding of the music she heard, but used these more frequently and on a larger scale in response to the Clementi and the Schoenberg than the Berio.

Participant J also provided considerable description of his perceptual cues, and was able to attribute a partially- or fully-accurate structure to each piece by the end of the experimental period. Participant J usually used a narrative understanding of the music in terms of expectancy and suspense, but also associated small-scale musical features of the music with narrative ideas. He was keen to associate the music he heard with other music he knew well, perhaps using this technique to aid his understanding of the music he heard.

Participant S did describe his perceptual cues in response to each piece, but in less detail than Participants A and J. He sometimes noticed large-scale repetitions in the music and sometimes divided the music into sections. He tried to use a narrative understanding of the music he heard, and succeeded in doing so in response to the Clementi and the Schoenberg. He found this difficult in response to the Berio, however, because of the

silences in the music. He made more musical associations with the music he heard in response to the Clementi and the Schoenberg than the Berio.

There did appear to be considerable differences in the three participants' responses to all three pieces, and between the different pieces. Musical experience appears to enable participants to discuss perceptual cues in more detail and to aid their understanding of the musical structure. All participants appeared to conceive the music in terms of narrative, although this was less common in response to the Berio. Participant A made fewer musical associations than the other two participants, perhaps suggesting that her understanding of the piece did not rely as heavily upon mental comparison with other pieces. All three participants conceptualized the piece in terms of associated moods, and occasionally made judgements of the music they heard. All three participants made associations with the music that could be described in Peircian terms, and there appeared to be a particular emphasis on the music having an iconic relationship with non-musical sounds.

Chapter 7

Concluding discussion and summary

This chapter will clarify the findings of this study in relation to its aims and research questions. Furthermore, it will compare these findings to those of existing research, discuss the limitations and potential applications of this work, and suggest areas for related future research. Firstly, the relevance of the combined model of emotional responses to music, which was put forward at the outset of this thesis, will be considered. The three main research questions of the study will then be addressed in turn and the main findings of the thesis discussed. Finally, concluding remarks will be made and a summary of the thesis will be given.

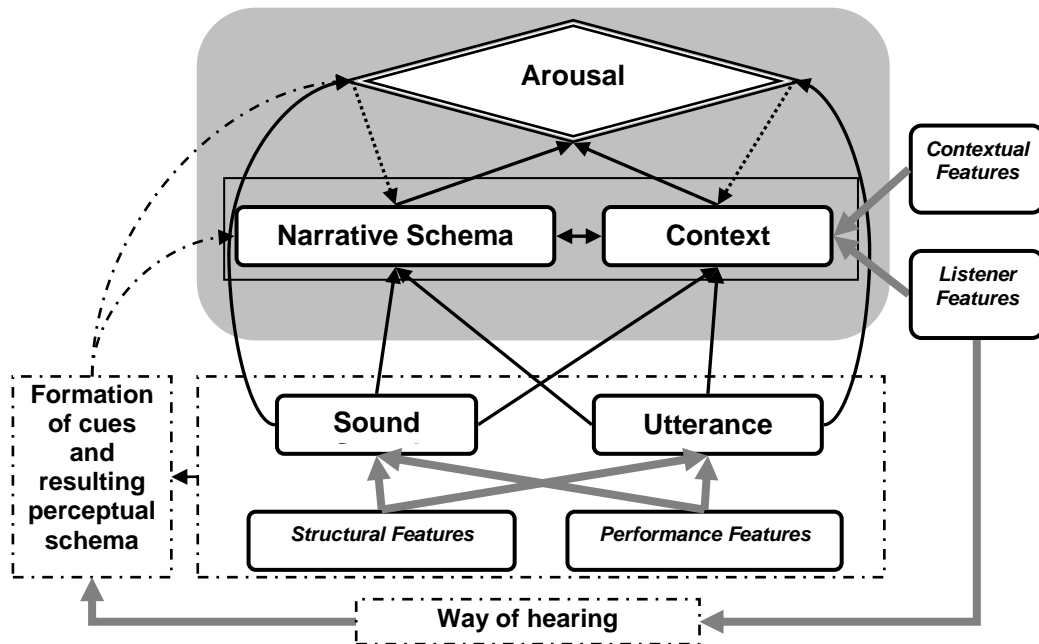
7.1. Reconsideration of the combined model

The combined model of emotional responses articulated at the start of this thesis (see Figure 2) provided a comprehensive framework through which to examine listeners' responses to music. Every category of the model was reflected in the listeners' responses and this facilitated the analysis and understanding of the data generated in this study. Listeners themselves appeared to be aware of the impact of each of the stimulus-based aspects of the model, namely structural features, performance features, listener features and contextual features, and were certainly aware of utilizing a narrative understanding of the music. There is one aspect of the listeners' responses, however, that did not appear to be represented by any part of the model: the way in which participants were listening to the music. Several participants mentioned listening to the atonal pieces in a variety of different ways: analytically; in order to conform to a particular existing narrative; or in a distracted manner. The triggers for these different ways of listening are contained within the context area of the model. Within the

subcategory of contextual features, the location and event of a hearing of a piece is likely to affect not only the listeners' emotional responses, but also the way in which they hear the piece, and as a result, their perceptual schema. Equally, listener features such as their current motivation and mood state, their stable disposition, and their musical expertise, will affect the way they are hearing the music, and the resultant perceptual schema. This is related to Clarke's (2005) emphasis on the importance of the environment in influencing music perception from the very beginning of the process, and also to other existing literature (Pople, 1994, pp. 111–112).²⁰ Consequently, I suggest an additional intermediary link in the model, between contextual and listener features and the formation of cues and a perceptual schema, encompassing a listener's ways of hearing the music.

²⁰ Clarke's suggestion of the perceptual process being direct, without any mental representation, however, was not supported by evidence of the resurgence of specific and idiosyncratic perceptual cues and associations.

Figure 130 Revised combined model of emotional responses to music



Parts of the model within the grey shaded area are those elements that constitute an emotional response to music;

those surrounding this area are elements contributing to that emotional response.

This model is able to provide a generic representation of the factors influencing emotional responses to any piece of music at any given time. In this research, however, the model was also used to represent a specific set of qualitative responses to specific pieces of music, and has therefore provided a practical, as well as a theoretical framework through which to examine emotional responses to music.

7.2. Research findings

7.2.1. Aim 1: To examine the effects of familiarity on listeners' perceptual and emotional responses to music

Research Question 1: How do listeners' perceptual and emotional responses to music change with familiarity?

There were several important and interesting findings in this study relating to the effects of familiarity on listeners' responses to the music. In terms of listeners' perceptual responses to the music, the case studies of listeners' diary and interview data allowed

the creation of visual representations of schemata. These suggested a progression from the perception of small-scale structural features or perceptual cues, to the recognition of small- and large-scale repetition in the piece, to a formation of a conception of the structure of the music, which increased in accuracy with further familiarity with the music. Although existing perceptual cues resurged in later hearings of the piece, new perceptual cues were also added, providing additional detail within the perceptual schema. Participants were able to spot aspects of the character of the music on their first hearing, and were able to invoke a narrative understanding of the music. These narratives became more complex with greater familiarity with the music. Musical associations were made after the first hearing, particularly in response to the tonal music, but some participants became more accurate in identifying similar pieces with familiarity. In summary, familiarity with the music allowed participants to add further detail and increase the accuracy of their perceptual schema of the music, in terms of both small- and large- scale features of the music.

Supporting evidence for this process was also found in the interviews of all participants. There was evidence that participants heard music as sound, human utterance, in context, and as narrative in varying amounts with familiarity and in response to the specific pieces of music. Over the course of the experiments, there were decreases in participants' comments concerning triggers of their emotional responses that were related to readily accessible structural features, such as dynamics and texture. There were some increases in participants' comments concerning deeper features, such as repetition and the musical structure, and of the detailed structure of the piece, such as harmonic features, although these trends did vary slightly with each piece. The number of comments concerning associative responses to the music showed increases over the

three sessions. These data suggest that there is a relatively systematic development of observed perceptual cues and emotional triggers with familiarity.

The acquisition of knowledge relating to structural features of the music is closely linked with the idea of thematic recognition, as investigated by Pollard-Gott (1983). As discussed above, the participants became aware of repetition and large-scale structure of the music with varied amounts of familiarity, which echoes and consolidates the findings of Pollard-Gott. The work of Deliège and Mélen (1997) suggested that an increase in detail in perceptual schemata occurs with familiarity, a further finding corroborated here.

Familiarity was found to have a significant effect on listeners' continuous emotional responses to all three pieces when the data for all three experiments was combined. Although the overall intensity levels of participants' emotional responses did not change over the three experimental sessions, there was evidence for some systematic changes in emotional responses. Correlations between traces gathered within the same session were strongest, followed by those gathered between neighbouring sessions; the weakest correlations were between traces gathered in distant sessions, suggesting that listeners' emotional responses did change with familiarity. There were also suggestions of other changes in participants' emotional responses to the Schoenberg with familiarity: participants appeared to respond less to specific triggers, namely the beginning of phrases. This is surprising, as it does not correspond with the aforementioned increase in awareness of structural features of the music suggested by listeners' perceptual responses. These effects therefore merit further investigation.

Familiarity is a listener feature considered by various researchers when studying music and emotion: researchers frequently request that participants provide at least one

familiar piece that they know will cause an emotional response (Craig, 2005; Goldstein, 1980; Grewe et al., 2007; Kallinen & Ravaja, 2004; Panksepp, 1995); other studies (Scherer, Zentner, & Schacht, 2002; Sloboda, 1991) rely on music familiar to participants. Few existing studies, however, have considered the effects of familiarity on emotional responses in a systematic manner. Iwanaga, Ikeda, and Iwaki's (1996) findings suggested that listeners' heart rates decrease with familiarity, and therefore that emotional responses may lessen with repeated exposure to music. These results are comparable with the finding in the Schoenberg that listeners' emotional responses to specific musical triggers lessened in magnitude with familiarity. The more general finding that the correlations between traces collected within one experimental session were more strongly correlated than those from neighbouring and distant traces suggests systematic changes in emotional responses with familiarity. This point corroborates research by Iwanaga, Ikeda and Iwaki for continuous response traces of self-reported induced emotional intensity, although this work reports the effects of familiarity gained in a more ecologically valid way, over a period of weeks, rather than minutes.

The lack of differences found in the overall intensity of emotional responses over the three experimental sessions supports the ideas put forward in expectation theories (Cone, 1977; Lavy, 2001; Meyer, 2001; Ockelford, 2006) which suggest that we continue to form expectations concerning the music even though we are familiar with its content. Indeed, there was some evidence for anticipatory responses to all three pieces with familiarity, suggesting that as participants became more familiar with the music, they anticipated forthcoming musical events and responded earlier to them. This suggests that findings of previous studies relating to the effects of familiarity gained through performance on perceived tension levels (Fredrickson, 1999) and perceived

emotion levels (Sloboda & Lehmann, 2001) may be extended to the effects of familiarity gained through listening on induced emotional responses to music.

There was no clear link in this study between familiarity and liking for the piece. This contradicts the findings of some previous research that indicates a positive correlation between familiarity and liking (Gaver & Mandler, 1987; Mull, 1957; Ritossa & Rickard, 2004; Schubert, 2007), or research suggesting an inverted-U relationship (Gaver & Mandler, 1987; North & Hargreaves, 1997), although this relationship is rather too complex to be reliably observed with only three ratings.

Although this research does appear to suggest systematic changes in self-reported emotional intensity with familiarity, it is possible that the differences between the strength of correlations between traces gathered within the same session and those gathered between more distant sessions could have occurred because of situational factors rather than the effects of familiarity. If this was the case, however, it seems unlikely that the trend of decreasing correlations with increasing distance in time would have been quite as clear cut. The anticipatory changes noted in response to the pieces with familiarity also strengthen these findings. To confirm this, however, further studies are needed with more trials. The distance-participation method that was developed in response to potential participant drop-out in this study may prove a useful tool for other researchers investigating the effects of familiarity on emotional responses, or those that wish to investigate emotional responses to music in a more ecologically valid listening setting. This methodology could allow participants to record their emotional responses on a daily basis instead of, or as well as, completing a listening diary.

7.2.2. Aim 2: The effects of musical experience on listeners' perceptual and emotional responses to music

Research Question 2: What are the effects of musical experience on perceptual and emotional responses to music?

There appeared to be clear differences in the perceptual responses of individual listeners, specifically as shown by the creation of schemata for three participants selected for case study here. Participant A, a highly experienced music student with absolute pitch, observed the large-scale formal structures in each piece considerably more rapidly and accurately than Participant J, a less experienced music student, and Participant S, a non-music student with very little musical experience. This would appear to support and extend the findings of Pollard-Gott (1983), who suggested that musicians are able to judge thematic similarity more rapidly and successfully than non-musicians. This ability enables listeners to judge large-scale form based on thematic similarity. This result also conforms to the findings of other researchers (Deliège & Mélen, 1997; Koniari et al., 2001), who also suggested that musicians were more efficient at creating schemata than non-musicians.

This study found interesting differences between the emotional responses of music students and non-music students. There were differences in responses to section boundaries according to the type of student, a finding that mirrors the point about the perception of large-scale structure described above. There were also interesting differences between music students' and non-music students' overall levels of emotional intensity in response to each piece. For the Clementi, non-music students reported higher levels of emotional intensity than music students. In contrast, in response to the Schoenberg and Berio, non-music students reported lower levels of emotional intensity than music students. Previous studies have found conflicting results

concerning the effect of musical experience on emotional responses to music: some researchers have found no differences (Kallinen, 2005; Rickard, 2004); some have found differences in the willingness and ability to describe the triggers of responses (Sloboda, 1991; Waterman, 1995); others have found differences in the triggers of emotional responses (Timmers et al., 2006); while some have found differences in physiological aspects of emotional responses (VanderArk & Ely, 1992, 1993). This study supports the findings of VanderArk and Ely (1992; 1993), who found differences in specific physiological responses to music between musicians and non-musicians. It may be that the particular repertoire chosen for this study highlighted differences between these two types of student: most existing research focuses on tonal classical music and occasionally popular music, which may not highlight these clear-cut differences. VanderArk and Ely's (1993) study used Holst's 'Venus' from *The Planets Suite* and Penderecki's *Threnody for the Victims of Hiroshima*, and suggested that the differences in emotional responses to the pieces between music and biology students might be associated with the extent to which participants liked the music: the biology students did not like the Penderecki, whereas the music students did. The lack of correlation between liking and emotional responses here, and the lack of differences between music students' and non-music students' levels of liking for the pieces however, does not support this hypothesis, and also conflicts with other existing research (Schubert, 2007).

A suggested reason for the higher intensity levels reported by music students in comparison to non-music students in response to the atonal music might be explained by genre familiarity. If the music that listeners perceive is similar to an existing schema, this may make it easier to process and therefore generate higher levels of induced emotional responses. Indeed, Gaver and Mandler's (1987) suggestion of the comparison

process between an existing schema and that formed by a new piece of music causing some emotional responses may provide a clue to this result. If the schema being compared with the perceived music is too distinct in nature or content, the comparison seems unlikely to produce an emotional response. There may be a particular similarity/novelty position for a new piece of music in comparison with an existing schema that produces an optimum level of emotional intensity. No correlation was found between overall levels of emotional intensity and familiarity, suggesting that this relationship is complex. This also suggests that genre familiarity and familiarity for a specific piece may be considerably different in nature, and thus have different effects. These points merit further investigation.

The examination of differences between the emotional responses of music students and non-music students requires replication with a wider array of musical repertoire and with a larger number of participants in future. It would be interesting to discover exactly which pieces of music will trigger higher levels of emotional intensity for each type of student. The pattern suggested here, that tonal music triggers higher levels of emotional intensity for non-music students and that atonal music triggers higher levels of emotional intensity for music students, is simplistic, and might have been explained by music students' probable greater familiarity with the genre of atonal music, not only the music itself, but also its surrounding history. The extent to which prior knowledge about music affects listeners' emotional responses and judgements of a performance or piece is an area deserving of future research, not least because of the high usage of programme and sleeve notes by listeners. It may also prove interesting to examine the effects of specific words and phrases on listeners' perceptual, emotional and liking responses to music. Preliminary work has already been carried out in relation to

listeners' responses to a lecture (see Hayes & Orrell, 1993), and such research could be usefully extended.

7.2.3. Aim 3: To examine listeners' perceptual and emotional responses to tonal and atonal music

Research Question 3: What are the similarities and differences between listeners' perceptual and emotional responses to tonal and atonal music?

The three case-study participants appeared to show varying differences in their perceptual responses to the three pieces used in this study. One of the most obvious differences was the participants' ease in conceptualizing the structure of the music. Participant A always managed this within the first week of the experiment, though she correctly identified the structure of the Clementi after her first two hearings. Similarly, Participant J identified the correct structure of the Clementi in his third diary entry. Participant S was also able to identify structural sections in the Clementi and to notice the recapitulation of the opening theme. In response to the Schoenberg, Participant A identified a structure in her second diary entry; Participant J expressed conscious difficulty in identifying a structure, but managed to do so in his third interview; and Participant S identified repetition and divided the piece into multiple sections. In response to the Berio, Participant A identified repetition in her third diary entry and the correct ternary form structure in her final interview; Participant J did conceptualize the structure by his final interview, but conceived a binary rather than ternary structure; and Participant S again noticed repetition but did not form a clear conception of the structure of the piece. It appears that these participants found it more difficult to correctly identify the formal structure of the atonal pieces than the tonal piece, and the ability to do this was related to musical experience. Interestingly, this corresponds with Scruton's (1997) assertion that large-scale form is more difficult to identify in atonal music. If this is the

case, there may be several reasons for this. Firstly, it may be that, as Scruton suggests, the lack of diatonic intervals in atonal music makes that music less memorable, and therefore makes the process of identifying formal structure more difficult than it is in tonal music. Secondly, though, classical tonal music carries the expectation of a coherent musical form: indeed, the tonal system and its functional harmony is inherently intertwined with traditional musical structures (Grout & Palisca, 1996; Salzman, 2002). Perle (Lansky, Perle, & Hedlam, 2007), for instance, notes the ‘high degree of interdependence between the various dimensions of a [tonal] composition, such as pitch, rhythm, dynamics, timbre and form’. Thus the overriding schema for tonal music contains possibilities of formal structures and relevant repetitions, allowing the listener to make a relatively easy classification based on the expectation of a coherent form. The early twentieth century not only saw the emancipation of dissonance and the breakdown of tonality in music, but also the increased flexibility in the use of other aspects of music (Grout & Palisca, 1996; Salzman, 2002), and the undefined relations between musical dimensions (Lansky et al., 2007). Therefore the schema for atonal music is less concerned with the expectation of a coherent formal structure, making the identification of such forms more difficult. Even for the inexperienced listener, the absence of one standard feature of the music (tonal or consonant harmony) may make another feature common in all forms of tonal music, such as clear repetition and formal structure, less expected, and therefore less easy to identify.

The fact that all three participants commented on the repeated c[♯]-sharp in the Berio and other repetitions in the Schoenberg suggests that, as Dibben (1996) found, salience plays an important role in the perception of atonal music. Her theory of a semiotic role for salient features is also validated, as participants frequently made associations between the sounds they heard and extra-musical sounds, such as bells.

The three pieces of music triggered significantly different overall levels of emotional intensity in participants. The Clementi, the tonal piece, triggered the most intense emotional responses, followed by the Schoenberg and then the Berio. This trend may reflect the levels of familiarity felt by participants: they felt most familiar with the Clementi, and least familiar with the Berio; their familiarity with the Clementi increased the most over the course of the experiment, and the least for the Berio. The Clementi was also most liked by participants, followed by the Schoenberg and then the Berio. There were no clear correlations between familiarity or liking levels and overall levels of emotional responses, however, raising questions about this assumption. As mentioned previously, it may be that, in some circumstances, genre familiarity has more of an effect than the specific familiarity a listener gains with a certain piece.

In the continuous response data, some interesting effects were found across the pieces. When comparing the data between each piece, the correlations found in response to the Clementi were stronger than those found in response to the Schoenberg and the Berio, which were at similar levels. This suggests that participants responded more consistently to the Clementi, which may reflect their higher levels of perceived familiarity with the piece.

Triggers of increases in emotional intensity in the three pieces were similar to triggers found by other researchers (Sloboda, 1991; Waterman, 1995), with dynamic features being the most commonly mentioned trigger. Pitch-based features were also cited as triggers, and included pitch range and contour, and chordal or harmonic features. In the Clementi, these also included repeated patterns or sequences; in the Schoenberg and Berio, motivic or large-scale structural features were triggers. The fact that these motivic and structural features were mentioned as triggers of emotional responses to the atonal music may reflect their lowered salience in atonal music: the recognition of a

motive in tonal music may be taken for granted, when in atonal music, it will provoke a response. The similarity between the triggers in the three pieces indicates that the perception of atonal music invokes the same processes as that of tonal music. Rhythmic and textural complexity was also an important trigger of emotional responses in both tonal and atonal music.

The finding that anticipatory responses to musical triggers of emotional responses were more common in response to the Clementi than the Schoenberg and the Berio is interesting. This may reflect the lower levels of perceived familiarity with the atonal pieces as reported by listeners. If listeners are unable to predict the next event in a piece of music, they are unlikely to respond to that event in an anticipatory manner. This hypothesis could be confirmed through further empirical study with a similar approach to Deliège and Mélen's (1997) mental line procedure, in which participants were asked to familiarize themselves with a piece of music and state the order in which segments of the music are heard. If this procedure was undertaken with a range of tonal and atonal works, the ability of listeners to anticipate future events in the music could be judged. To gather more specific information about the aspects of music allowing anticipation of future events, pieces could be modified or specially composed.

The qualitative data revealed detailed findings concerning the listeners' perceptual and emotional responses to the three pieces. Participants discussed their use of a narrative understanding of the music in response to all three pieces, but differed in the extent to which they discussed the possible facets of a narrative understanding according to the piece. Although some participants experienced a sense of emotional withdrawal from the atonal music, many participants discussed the 'build-up' of the music, the generation of suspense, and the formation of narrative. Scruton's (1997) suggestion that tension is not created by atonal music was not wholly supported: although participants

did not discuss tension in relation to the Schoenberg, they did in response to the Berio. Participants found the process of emplotment more difficult in response to the Berio than the other pieces, but this was deemed to be a result of the frequent and relatively lengthy silences, rather than the atonal language. Participants also appeared to understand the music in terms of what Peirce would describe as indexical, iconic or symbolic associations with non-musical sounds or objects. There appeared to be particular emphasis on iconic resemblance, though this may have been partly due to the more straightforward identification of such associations. Further empirical research could clarify this issue.

Participants did appear to respond to all three pieces as sound, supporting Lavy's (2001) assertion that this is an essential part of music perception. Interestingly, participants appeared to respond less to the atonal music as human utterance, exemplified by their lack of description of the mood of these pieces. Many aspects of music specify the mood of a piece: the amplitude envelope of the sound; articulation, loudness and variation in loudness; range of pitch; melodic direction or pitch contour; the type of melodic motion (stepwise or leaps); pitch level; pitch variation; rhythm; tempo; timbre; tonality; and musical form; in addition to those features affected by the tonal or atonal language of the piece, which would include harmony, intervals, and mode (Gabrielsson & Lindström, 2001). It may be that the differences in the harmony and intervals used in atonal music, and the lack of (clear) modal indicators, means that listeners are not prompted to consider the music in terms of human utterance, or its mood. This is not to suggest that they would not be able to identify the mood of the piece if asked, merely that the listener's focus within atonal music may be different to that in tonal music. Simple empirical research would enable the confirmation of the hypothesis that the mood of the piece is identifiable in atonal music, and the refutation of Scruton's (1997)

claim that atonal music lacks meaning. Additionally, Cooke's (1959) claim that only painful emotions may be expressed through atonal music may be assessed.

Participants were aware of the impact of contextual and listener features on their emotional responses to all three pieces. They were also aware of their approach to the music, particularly in response to the atonal pieces, commenting on ways of listening to the music, and in some cases, the need to withdraw (emotionally) from the music.

7.3. Research limitations

This study has some limitations, which relate to the chosen approaches to the study and to its participants. The first of these concerns the limited aspect of emotion studied. Though an emotion consists of several facets, such as physiological responses, expressive behaviour and a person's subjective experience, this study only focussed on the subjective experience of participants, using self-report mechanisms. Although, in some ways, this provided data that was more controlled (participants would be able to filter out extraneous or unrelated emotions), other aspects of the emotional response were not studied: future research may explore a similar approach but with the addition of physiological measures or measures of expressive behaviour.

A second limitation of the study is the relatively small number of participants used, which was partly a consequence of the mixed-methodology design of the study. The statistical tests chosen for the analysis of the quantitative data are very robust, and are likely to provide conservative results with a small sample; nevertheless, the small sample of participants suggests that the generalisation of their responses should be undertaken with caution. Moreover, the case study approach to examining the differences between the perception of tonal and atonal music sacrifices the generalization of the findings for the sake of the depth of response for each participant.

Future studies should expand the sample size and, in so doing, use a broader cross-section of the population. It would be interesting to investigate the responses of younger or older participants and of adults with amateur or professional musical status. Such replication of the study would help to clarify whether or not these results pertain to the general population.

Thirdly, the initial analyses of each piece of music used took a similar approach, whereas current musicologists would undoubtedly analyse these pieces in greater depth with varying methodologies. This was intended to give some idea of the perceivable features of the music, and also to suggest the similarity of a listener's approach to tonal and atonal music. It would, however, have been possible to analyse the pieces using other approaches, such as Schenkerian analysis or voice-leading analysis where appropriate, or for the atonal pieces, Pitch Class Set analysis, particularly at moments when participants were unable to explain their response fully. This may have revealed a greater range of musical triggers, and perhaps greater differences between the triggers contained within the tonal and atonal pieces. Further insight could also be gained by using a wider range of pieces to understand precisely which musical features within atonal music provide consistent responses.

Finally, the nature of the tasks undertaken by the participants may have had an effect on the results produced. Having undertaken the continuous response mechanism and interview, for instance, participants may have responded in the listening diaries in a similar way to the interview, perhaps subconsciously reflecting their perceptions of the researcher's interests. The instructions on the diaries did explicitly state, however, that there were no 'right or wrong' answers and the diversity of the style participants' responses suggests that there was little consistent bias in these results.

Overall, the limitations of this study are relatively minor, but should be given due consideration when interpreting or generalising its results. The overall design of the study was effective, and its longitudinal approach allowed for a systematic investigation of the effects of familiarity on responses to music. Minor adjustments could be made to the design in order to investigate different aspects of the model of emotional responses in greater detail. For example, the listener feature of the participant's mood did not appear to have a large impact on the levels of participants' emotional responses, but may have affected the way in which their mental schemata were formed. If a mood grid had been completed at the same time as each listening diary, this effect could have been assessed. The listening diaries are also sufficiently portable to allow a systematic investigation of the effects of contextual features on emotional responses to music. The increasing portability of musical and computer equipment will also enable the more sophisticated investigation of this aspect of the model.

The range of approaches used in the analysis of the data allowed both an understanding of general trends of participants' responses, and of specific features of individual participants' responses. In particular, the creation of schematic representations of the qualitative data enabled a clear progression to be observed in participants' understanding of the pieces of music with familiarity. The schemata also made clear the variety of different relationships contained within schemata: some of these relationships are hierarchical, such as those relating small-scale perceptual cues to larger-scale sections of the piece; other relationships are associative and may combine with other schemata to form networks of knowledge. The use of schemata also highlighted the participants' creation of indexical, symbolic, and in particular, iconic resemblance between the music and non-musical sounds or objects. A further useful approach was the use of the combined model of emotional responses to represent the varying

emphasis of participants' comments in response to the different pieces of music and stages of familiarity.

7.4. Research applications

This study investigated listeners' emotional responses to tonal and atonal music with a particular emphasis on examining the effects of familiarity and musical experience. The findings suggest that there are important differences between listeners' responses to tonal and atonal music; that familiarity has important effects on those responses; and that musical experience has a bearing on the ways in which listeners respond to music, particularly atonal music. In addition, this thesis reviewed several models of emotional responses to music, some of which were listener-centred while others were stimulus-centred, and usefully synthesized such work alongside existing theoretical and empirical research to enable an enhanced understanding of emotional responses to music. It is hoped that this new combined model may be used as a means of further investigating emotional responses to music, not least because it provides a framework through which to understand listening approaches, as well as to evaluate categories of external triggers and variables influencing emotional arousal in listeners. The model also combines aspects of perception with emotional response, enabling the researcher to consider these two closely related issues simultaneously.

The findings concerning the differences in perception and emotional responses between tonal and atonal music have wide-reaching implications. Listeners frequently engage in musical activity for its emotional benefits (DeNora, 2000; Juslin & Sloboda, 2001), and therefore the lower reported emotional intensities in response to the atonal pieces make the function of this music have a different focus. This may be one reason contributing to the relatively small audiences of atonal music and low sales figures for atonal recordings (Burkholder, 1991). As one reviewer states,

The evidence is not all in yet, but it does seem that claims for the eventual mass popularity of atonal music – to use a broad and not entirely accurate term – are optimistic.

(Page, 1986)

A consideration in this argument is the intention of the composer. If a composer is intending his or her output to be heard in order to provoke an intense emotional response, the success of that music can be judged by its ability to do so. If, however, a composer does not intend his or her music to be used for that reason, failure to provoke an intense emotional response cannot be deemed unsuccessful, any more than Penderecki's *Threnody for the Victims of Hiroshima* would be deemed a failure for its lack of portrayal of positive emotion. Schoenberg, however, was writing in accordance with trends in expressionism, expressing his innermost intuitions and emotions, suggesting that he wished for this emotion to be portrayed to, or experienced by, the listener. Clearly the intensity of this emotion is not communicated with equal success to all listeners, as shown by the differences between the reported emotional intensity of music students and non-music students. It would be interesting to discover exactly which aspects of musical training have this effect. If musical training increases listeners' emotional responses to certain music, and emotional responses to music are a primary motivator for engagement with music, then this would appear to provide additional justification for music-education activities such as pre-concert talks or the provision of programme notes. The identification of the aspects of musical training that contribute to this effect would enable providers of these activities or information to tailor their material to provoke the greatest possible emotional involvement with the music in each listener.²¹

²¹ This is not to suggest that the provision of information in pre-concert talks or programme notes would provide the equivalent musical training of a music student, merely that additional information concerning

This study investigated select aspects of the combined model outlined above, namely musical structural features, and the listener features of familiarity and musical experience. It is evident, not least from the model itself, that other factors play a role in listeners' emotional responses. Existing research investigates the effects of performance features (Juslin, 1997, 2001; Juslin et al., 2002; Juslin & Madison, 1999), and future research may investigate the combination of structural and performance features on emotional responses to music, and the relative importance of performance features in the context of varying musical features.

Further influences on listeners' emotional responses include additional listener features, including a listener's stable disposition and their current mood state. Although this study measured listeners' mood in each experimental session, this was done to control for any effects (which were not systematic), rather than to investigate the effect of mood on emotional responses. Additionally, personality, or a listener's stable disposition, may influence emotional responses (Grewe et al., 2007; Kallinen & Ravaja, 2004; Nater et al., 2005; Rickard, 2004), as discussed earlier. Again, the extent to which each of these components contributes to listeners' emotional responses and a study of the combined effects of stable disposition or personality and mood would be a fruitful area for future research.

The final area of the model, contextual features, also merits further study. Interesting studies have been conducted concerning the attitudes of audience members to live performances (Pitts, 2005) and the determinants of enjoyment of a musical performance (Thompson, 2007), an important aspect of which was the listener's engagement with the music. Studies of emotional responses to music have focussed on responses to recorded

the piece may promote emotional engagement with the music and in turn, encourage future interaction with similar repertoire.

performances, rather than live performances. Although there are difficulties with recording continuous emotional responses to a live performance, technological advances may make this possible: future studies could therefore compare listeners' responses to an audio recording, an audio-visual recording, and a live performance, to assess the extent to which visual stimuli and the live aspect of the performance contribute to listeners' emotional responses. Several participants suggested that seeing visual aspects of a performance would be particularly helpful when hearing the atonal pieces, and therefore it may be fruitful to compare the importance of each factor with varying (tonal and atonal) repertoire. Burkholder's suggestion that atonal music is unlikely to receive mass popularity is linked to the levels of concert audiences for atonal music, which are generally perceived to be low.

The systematic investigation of familiarity on emotional responses demonstrated here has implications for much research in this area. Many studies consider familiarity in a dichotomous manner; this study, however, has investigated the effects of familiarity in a continuous dimension that may be affected not only by exposure to the music but also by musical experience. The use of schema theory in conjunction with familiarity allowed the identification of the aspects of the schema that developed with familiarity for each participant. It is especially interesting that overall levels of emotional intensity did not change with familiarity, but that participants became more aware of the triggers of their responses. It is hoped that future research in music and emotion will consider familiarity as an important variable in emotional responses to music.

Future research may also address wider issues concerning familiarity. North and Hargreaves (North & Hargreaves, 1997) discuss the role of radio plugging in the popularity or liking of popular music; future research could investigate the effects of familiarity through radio plugging or background listening (as opposed to concentrated

listening) on emotional responses to, and liking for, a wider range of music. Additionally, it would be interesting to investigate whether the plugging of a specific performance of a work would result in increased sales of only that performance, or increased sales of all versions of the work. This may, to some extent, be dependent on genre and the type of publicity given to the plugged work.

Existing research in music psychology frequently considers musical experience as a main or intervening variable. It is particularly striking to note the differences found in levels of emotional responses to tonal and atonal music between musicians and non-musicians here. Future research in music and emotion should clearly continue to consider musical experience as a factor influencing emotional responses. Specifically, it would be interesting to consider the type of effects of different types of musical experience more closely on emotional responses to music. Studies could investigate the effects of instrumental tuition, historical knowledge of the composer, knowledge of performing style, and different modes of presentation (written information in the form of programme notes; pre-concert talks; undergraduate-level lectures) on listeners' engagement and emotional responses.

7.5. Summary

This thesis examined a number of listener-based and stimulus-based models of emotional responses to music, and amalgamated these models with key aspects of existing research on music emotion and perception into a new, combined model. Two specific areas of the model, namely listener features and structural features, were then examined in more detail through empirical enquiry. For listener features, the listener's familiarity with the musical stimulus and their musical experience were considered as independent variables; for structural features, the tonal or atonal language of the music was considered. In contrast to previous research, listeners' emotional responses were

thus examined over a period of several weeks and in response to repertoire from classical and twentieth century idioms, thereby taking crucial steps to advance knowledge about the way in which we respond emotionally to music.

Three experiments were conducted, using a mixed-methods design, and three musical works were selected for the studies: Clementi, Schoenberg and Berio. The results indicated that all three variables, familiarity, musical experience, and musical language, influenced perceptual and emotional responses to music. Specifically, the following findings emerged from the data:

Familiarity

1. Participants showed evidence of greater understanding of the structure of the music they were hearing and greater awareness of details of the music with increased familiarity with the music.
2. Triggers of emotional responses changed across the familiarization period, with participants commenting to a greater extent on structural features of the music and on associative sources of emotional responses.
3. Overall levels of emotional intensity were not affected by familiarity, but there were some changes to responses to the beginning of phrases in response to the Schoenberg.
4. Anticipatory responses were seen with increasing familiarity, particularly in response to the Clementi.

Musical experience

1. Music students appeared to be more efficient than non-music students at creating schemata in response to the music.

2. Music students appeared to be more effective than non-music students at identifying the structure of the piece.

3. Overall levels of emotional responses to the tonal piece were higher in non-music students than music students, but this effect was reversed in response to the atonal pieces.

Musical Language

1. Participants found it easier to identify the musical structure of the tonal piece than the two atonal pieces.

2. All the participants felt more familiar with the Clementi than the Schoenberg and the Berio.

3. Participants' overall levels of emotional responses were highest in response to the Clementi, followed by the Schoenberg and then the Berio

4. Triggers for these responses were similar, but differed in importance in each piece, indicating that individual pieces, whether tonal or atonal, will arouse emotional responses in listeners in specific ways.

It is evident from the work undertaken in this thesis that both musical experience and familiarity should be taken into account in future studies of emotional responses to music, and that further research is needed to consolidate and extend our understanding of the differences between listeners' responses to tonal and atonal music. Nevertheless, the findings of this empirical enquiry make an important contribution to research on music emotion and perception, and a valuable insight has been gained into the ways in which listeners respond – emotionally and perceptually – to different musical genres over a period of time.

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- Clementi, Muzio (1995), *Sonata in F-sharp minor, II*, Op. 25 No. 5. Balázs Szokolay, piano. London: Naxos, 8.550452
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VOLUME II

Appendices

Appendix 1

Scores

Muzio Clementi's Piano Sonata in F-Sharp Minor, Op. 25, No. 5, II:
Lento e patetico

6

cresc. *f* *fz*

11

f *dim.* *ten.*

15

rf *p*

19

rf *p* *ff* *dolce*

23

cresc. *rf* *tr* *pp*

2

28

Musical score for measures 28-33. The piece is in D major and 2/4 time. The right hand features a melodic line with eighth-note patterns and slurs. The left hand provides a steady accompaniment with eighth-note chords and some sixteenth-note runs.

34

Musical score for measures 34-38. The right hand has a melodic line with slurs and accents. The left hand features a rhythmic accompaniment with eighth-note chords. Dynamics include *cresc.*, *f*, *rf*, *p*, and *ff*.

39

Musical score for measures 39-42. The right hand has a melodic line with slurs and accents. The left hand features a rhythmic accompaniment with eighth-note chords. Dynamics include *fz*, *dim.*, and *f*.

43

Musical score for measures 43-47. The right hand has a melodic line with slurs and a triplet in measure 44. The left hand features a rhythmic accompaniment with eighth-note chords. Dynamics include *p*.

48

Musical score for measures 48-50. The right hand has a melodic line with slurs and accents. The left hand features a rhythmic accompaniment with eighth-note chords. Dynamics include *ff*.

51

Musical score for measures 51-54. The right hand has a melodic line with slurs and a trill in measure 53. The left hand features a rhythmic accompaniment with eighth-note chords. Dynamics include *cresc.* and *pp*.

Arnold Schoenberg's Three Piano Pieces, Op. 11 No. 1

Mäßige ♩

7 *rit.* *langsamer* *p*

12 *viel schneller* *ppp* *ppp*
mit Dämpfung bis (3. Pedal)

14 *Die Tasten tonlos niederdrücken!* *Flag.* *langsamer* *p* *p*
ohne Pedal..... *ohne Pedal.....*

18 *sehr langsam* *f* *p* *f* *p* *f*

24 *rit.* *Mäßig.*

p *p* *p*

This system contains measures 24 through 28. It begins with a piano (*p*) dynamic and a *rit.* (ritardando) marking. The tempo is marked *Mäßig.* (moderate). The music is in a key with one flat and a 3/4 time signature. The right hand features a melodic line with slurs and ties, while the left hand provides a harmonic accompaniment with chords and moving lines.

29

f *f* *pp* *pp*

This system contains measures 29 through 33. The dynamics are *f* (forte) for measures 29-31 and *pp* (pianissimo) for measures 32-33. The right hand has a more active, rhythmic texture with slurs, while the left hand continues with a steady accompaniment.

34

pp *ppp*

This system contains measures 34 through 36. The dynamics are *pp* (pianissimo) for measure 34 and *ppp* (pianississimo) for measures 35-36. The right hand features a series of chords and moving lines, while the left hand has a more sparse accompaniment.

37

p *cresc.*

This system contains measures 37 and 38. The dynamic is *p* (piano) for measure 37, which then increases through a *cresc.* (crescendo) marking in measure 38. The right hand has a melodic line with slurs, and the left hand has a rhythmic accompaniment.

39

This system contains measures 39 and 40. The right hand features a long, sweeping melodic line with a slur that spans across both measures. The left hand has a rhythmic accompaniment with chords and moving lines.

40

ppp

Musical score for measures 40-41. The system consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The time signature is 4/4. The key signature has one flat (B-flat). The music features a complex rhythmic pattern with many slurs and ties. The dynamic marking *ppp* is placed below the first measure.

41

pp sf pp sf

Musical score for measures 41-42. The system consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The time signature is 4/4. The key signature has one flat (B-flat). The music features a complex rhythmic pattern with many slurs and ties. The dynamic markings *pp*, *sf*, *pp*, and *sf* are placed below the first, second, third, and fourth measures respectively.

42

f pp f pp

Musical score for measures 42-43. The system consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The time signature is 3/4. The key signature has one flat (B-flat). The music features a complex rhythmic pattern with many slurs and ties. The dynamic markings *f*, *pp*, *f*, and *pp* are placed below the first, second, third, and fourth measures respectively.

44

pp

Musical score for measures 44-45. The system consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The time signature is 3/4. The key signature has one flat (B-flat). The music features a complex rhythmic pattern with many slurs and ties. The dynamic marking *pp* is placed below the second measure.

46

pp

Musical score for measures 46-47. The system consists of two staves. The upper staff is in treble clef and the lower staff is in bass clef. The time signature is 3/4. The key signature has one flat (B-flat). The music features a complex rhythmic pattern with many slurs and ties. The dynamic marking *pp* is placed below the second measure.

49 *accel.* *f* *ff*

51 *pp*

54 *cresc.* *f*

58 *p* *sf dim.*

61 *pp*

Detailed description: This page contains five systems of musical notation for piano. The first system (measures 49-50) features a treble clef with a key signature of two sharps (F# and C#) and a 3/4 time signature. It includes dynamic markings *f* and *ff*, and an *accel.* instruction. The second system (measures 51-53) is in the same key and time, marked *pp*. The third system (measures 54-57) changes to a 3/4 time signature and includes a *cresc.* marking leading to a *f* dynamic. The fourth system (measures 58-60) is in 3/4 time, marked *p* and *sf dim.*. The fifth system (measures 61-63) is in 3/4 time, marked *pp*. The score uses various musical notations including slurs, ties, and dynamic hairpins.

Luciano Berio's *Rounds* for Piano Solo

♩ = 60
(la II volta ♩ = 72)

I Scorrevole e nervoso

ppp
IC.

3
p mf f p mf f
Ped. IC.

7
p pp f p p mf f pp
Ped. p

10
pp mf pp f
IC.

12
fff mf f pp p
Ped. 3

14

pp fff p ff pp p pp

mf fff Ped. Ped.

rall. 3

a tempo

17

f sempre p ppp p pp

Ped. Ped. 3 Ped.

19

ff ff pp

Ped. Ped.

21

mf p pp p ff ff pp pp

Ped. Ped. Ped.

25

pp mf f fff p f rall.

Ped. Ped. Ped.

Musical score for measures 27-30. Measure 27 begins with a piano (*pp*) dynamic and a triplet of eighth notes. Measure 28 features a fortissimo (*ff*) dynamic and a triplet of eighth notes. Measure 29 includes a *rall.* marking and a triplet of eighth notes. Measure 30 ends with a piano (*pp*) dynamic and a triplet of eighth notes. The system concludes with the word "Fine".

Musical score for measures 30-34. Measure 30 starts with a piano (*pp*) dynamic and a triplet of eighth notes. Measure 31 includes an *accel.* marking and a triplet of eighth notes. Measure 32 features a fortissimo (*ff*) dynamic and a triplet of eighth notes. Measure 33 includes a piano (*pp*) dynamic and a triplet of eighth notes. Measure 34 ends with a piano (*p*) dynamic and a triplet of eighth notes.

Musical score for measures 34-37. Measure 34 begins with a piano (*pp*) dynamic and a triplet of eighth notes. Measure 35 includes a piano (*p*) dynamic and a triplet of eighth notes. Measure 36 features a pianissimo (*ppp*) dynamic and a triplet of eighth notes. Measure 37 ends with a piano (*p*) dynamic and a triplet of eighth notes.

Musical score for measures 37-39. Measure 37 starts with a piano (*pp*) dynamic and a triplet of eighth notes. Measure 38 includes a mezzo-forte (*mf*) dynamic and a triplet of eighth notes. Measure 39 ends with a piano (*pp*) dynamic and a triplet of eighth notes.

Musical score for measures 39-40. Measure 39 begins with a piano (*p*) dynamic and a triplet of eighth notes. Measure 40 includes an *accel.* marking and a fortissimo (*ff*) dynamic. The system concludes with a piano (*p*) dynamic and a triplet of eighth notes.

41

fff mf p

Ped.

43

3/8 pp p ff f ff mf ff sempre

Ped.

46

p f p f ff

Ped.

48

ff mf ff

p

Ped.

49

2/4 mf ff mf pp poco rall. p

Ped.

52

pp sempre
mf
pp
IC.

Detailed description: This system contains measures 52 and 53. Measure 52 features a piano introduction with a tremolo in the right hand and a steady bass line. Measure 53 begins with a triplet in the right hand and continues with a similar texture. Dynamics range from *pp* to *mf*. A first ending bracket labeled 'IC.' spans the end of measure 53.

54

f
mf
p
pp
ppp
da capo al fine
Ped.
IC.

Detailed description: This system contains measures 54, 55, and 56. Measure 54 starts with a forte (*f*) chord and continues with a melodic line. Measure 55 includes a piano (*p*) section and a first ending bracket labeled 'IC.'. Measure 56 concludes with a pianissimo (*ppp*) section. The instruction 'da capo al fine' is placed at the end of the system. A pedal point is indicated by 'Ped.' under measure 55.

Appendix 2

Recordings

The following recordings were used in the experiments, and are reproduced on the attached CD (see inside back cover).

Experiment	Composer (b.-d.)	Piece	Performer	Recording
1	Muzio Clementi (1752–1832)	Sonata in F Sharp Minor, Op. 25 No. 5 (Mvmt II: Lento e patetico)	Balázs Szokolay	Naxos 8.550452
2	Arnold Schoenberg (1874–1951)	Three Piano Pieces, Op. 11 (Mvmt I: Mässig)	Maurizio Pollini	Deutsche Grammophon 423 249-2
3	Luciano Berio (1925–2003)	<i>Rounds</i> for Piano Solo	David Arden	New Albion Records NA089CD

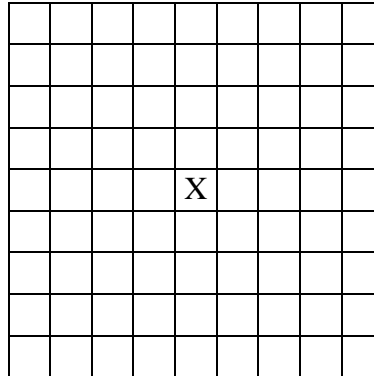
Appendix 3

Research Materials

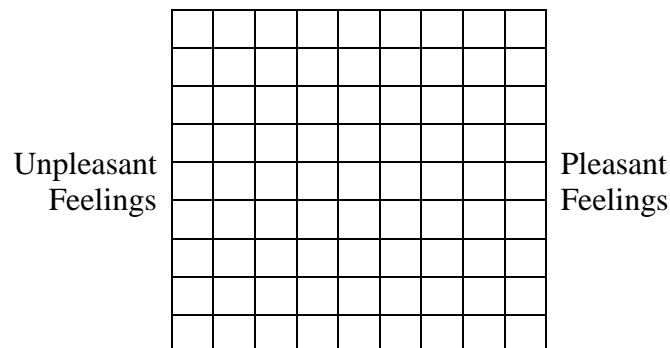
A. The Affect Grid and accompanying instructions for participants (Reproduced from Russell, Weiss, & Mendelsohn, 1989)

The Affect Grid

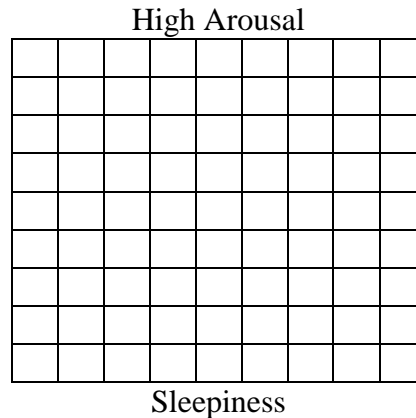
You use the “affect grid” to describe feelings. It is in the form of a square—a kind of map for feelings. The centre of the square (marked by X in the grid below) represents a neutral, average, everyday feeling, and is neither positive or negative.



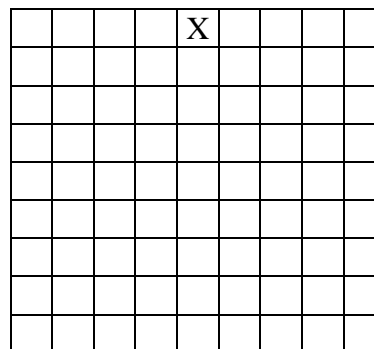
The right half of the grid represents pleasant feelings. The farther to the right, the more pleasant. The left half represents unpleasant feelings. The farther to the left, the more unpleasant.



The vertical dimension of the map represents degree of arousal. Arousal has to do with how wide awake, alert, or activated a person feels—independent of whether the feeling is positive or negative. The top half is for feelings that are above average in arousal. The bottom represents sleep, and the higher you go, the more awake a person feels. So, the next step up from the bottom would be half awake/half asleep. At the top of the square is maximum arousal. If you imagine a state we might call frantic excitement (remembering that it could be either positive or negative), then this feeling would define the top of the grid.

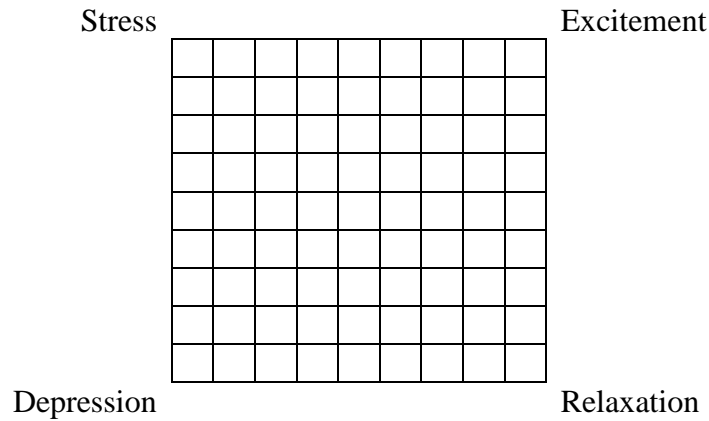


If the “frantic excitement” was positive it would, of course, fall on the right half of the grid. The more positive, the farther to the right. If the “frantic excitement was negative, it would fall on the left half of the grid. The more negative, the farther to the left. If the “frantic excitement” was neither positive nor negative, then it would fall in the middle square of the top row, as shown below.



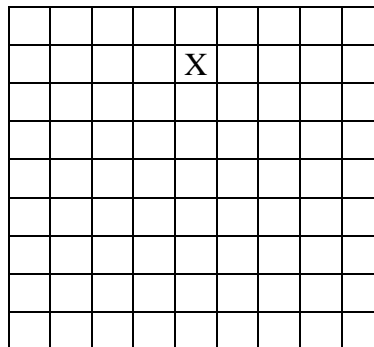
Other areas of the grid can be labelled as well. Up and to the right are feelings of ecstasy, excitement, joy. Opposite these, down and to the left, are feelings of depression, melancholy, sadness and gloom.

Up and to the left are feelings of stress and tension. Opposite these, down and to the right, are feelings of calm, relaxation, serenity.

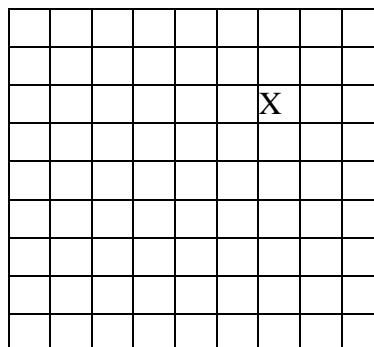


Feelings are complex. They come in all shades and degrees. The labels we have given are merely landmarks to help you understand the affect grid. When actually using the grid, put an X anywhere in the grid to indicate the exact shade and intensity of feeling. Please look over the entire grid to get a feel for the meaning of the various areas.

EXAMPLE: Suppose you were just surprised. Suppose further that the surprise was neither pleasant nor unpleasant. Probably you would feel more aroused than average. You might put your mark as shown.

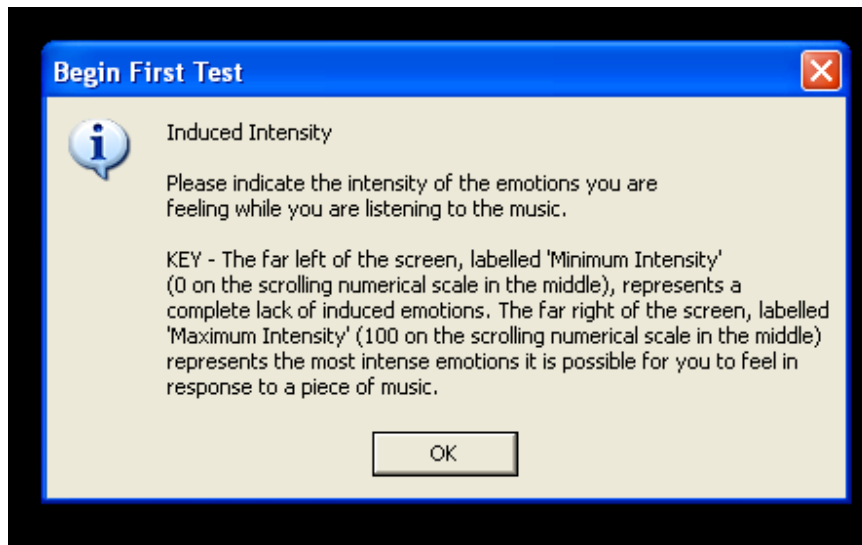


EXAMPLE: Suppose, instead, that you were only mildly surprised but that the surprise was a mildly pleasant one. You might put your mark as shown below.



B. Screenshots of 'Intensity v. 1.0'

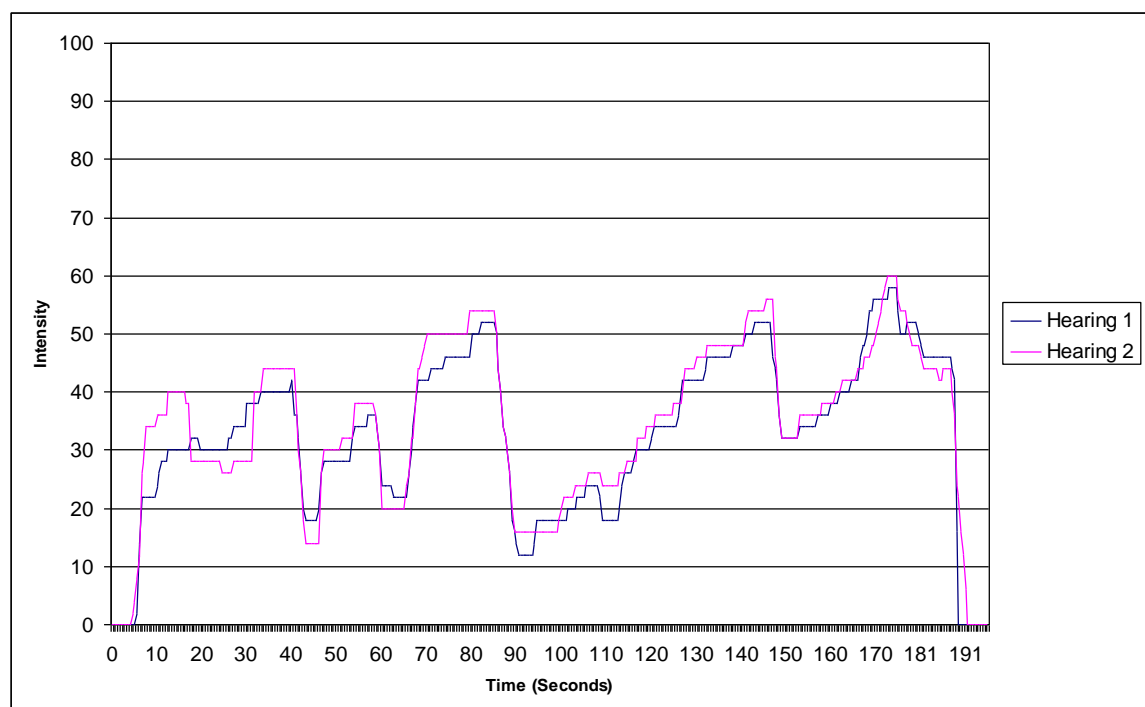
On-screen instructions given to participants



Visual feedback of intensity level during music listening



Example of a resultant graph used to prompt interviews



C. Participant Questionnaire

Name: _____ Age: _____

Email Address: _____ Mobile Phone Number: _____

Degree Subject: _____

For questions 1 and 2, please mark a point on the line that best corresponds with your answer.

1. How familiar are you with the piece of music you have just heard?

← Totally Unfamiliar Very familiar →

2. How much do you like the piece you have just heard?

← I hate it I love it →

3. What music tuition have you received? (please tick)

- Class tuition in school up to the age of 14 (year 9)
- 0-2 years of instrumental tuition
- 2-4 years of instrumental tuition
- 5 or more years of instrumental tuition

4. Please tick any of the following music qualifications that you have gained:

- G.C.S.E Music
- A Level Music
- Grades 1 or 2 in any instrument
- Grades 3 or 4 in any instrument
- Grades 5 or 6 in any instrument
- Grades 7 or 8 in any instrument

D. Listening Booklet

Participant Listening Diary

Participant Name: _____

Thank you for agreeing to take part in this study.

Please use this booklet to write down any thoughts you have as you listen to the accompanying CD. I am interested in anything – so please don't restrict what you write down! These might include features of the music that come to your attention, any comparisons with other music, any pictures, memories or emotions you have in your mind, or apparently unrelated thoughts or feelings you have while listening.

Please listen to the CD once every day (a total of 6 times before the next session). If you miss a day, however, it is very important that you do not make any results up! If you wish to listen more often, you can, but please record your responses every time you listen. It is particularly important that you fill in the date and time on the response sheet each time you complete it.

Your results will be made anonymous as soon as the data collection process has been completed.

Happy listening!

Date of listening _____
Time of listening _____

Your responses:

E. Sample Interview Transcript

This is a complete transcript of Participant E's second interview in the second experiment (in response to the Schoenberg).

[Plays music from beginning]

Participant E: I don't know why I've got a big rise at the beginning, I just wanted to start not at zero.

Researcher: Ok. What about that rise? [Bar 6-7]

Participant E: Hmm. I think it was just 'cos it was like, going up the scale. And getting louder.

Researcher: You increase here [Bar 12]. What is it about this bit that makes you rise up? [Stops music]

Participant E: It's like, scurrying, and it's a bit ... it makes you feel like, a bit, 'Ooh, what's gonna happen next? Is it gonna go louder?' But no, it just goes quiet. Oh no it doesn't, it goes loud, doesn't it, this bit? But yeah, you know what I mean.

Researcher: Does it create expectations?

Participant E: Yes. Like a bit, it makes you anxious.

Researcher: [Plays music from bar 12]. Here [Bar 17] you level off slightly.

Participant E: Yeah, it kind of stays at the same level at this bit.

Researcher: And then [Bar 18] you come down.

Participant E: And then it goes quiet again. And just ... I think the silences make it lose its excitement.

Researcher: Really?

Participant E: Yeah. Some people might think it keeps you in suspense, mightn't they, but I think it just makes me think [blows]

Researcher: Why? In other pieces, do you think the silence creates suspense, or do you think it makes it drop?

Participant E: In other ones, no, it like, makes, keeps you in suspense. I think they're a bit long, to be honest. If they'd have been like a chord, and then a tiny bit of silence, and then another chord, it would have kept you in suspense, but it just seems to die away. Or if it was louder and immediately quiet. But it goes quiet first, doesn't it. And then ... there's nothing. I think it just loses its ... it doesn't sound like it's going anywhere.

Researcher: Ok. 57. [Plays music from bar 19] You're rising now.

Participant E: Oh, yeah, the loudness of the chords makes it a lot more exciting. But then when it goes to the quiet bits, like that bit [Bar 24], it just kind of stays.

Researcher: Tell me what happens here. [Bar 26]

Participant E: I go back up again. Um ... I think it's just ... the first time it's like, quite loud, and [music stopped at bar 33] usually it's just the odd bit of movement, do you know what I mean, but this time, it was like '[sings bar 30]'. Yeah, then it goes, like, quiet again.

Researcher: Ok. 108, 1.50. [Bar 33] So it's purely the quietness that brings you down?

Participant E: Um ... yeah, there doesn't seem to be anything there. This bit [Bar 36] is a little more exciting.

Researcher: What makes it exciting?

Participant E: There's just more to it, like, the other bits are just like, '[sings slow passage]', like, little bits and then that bit's like, faster, and it's got a bit more oomph to it. The rest of it sounds like ... some little mouse looking round for something, and like, them bits are just ... I don't know ... maybe the mouse has found something! [laughs] I don't know where that came from! But yeah.

Researcher: Has he found something good, or something bad?

Participant E: Don't know.

Researcher: Let's hear it again.

Participant E: Well instead of being sniffing around on the slow bits, he could be running across a road, or something.

Researcher: I'll start from 2.00. [Bar 34]

Participant E: Like this bit, it doesn't sound like it's doing anything. And then it builds up. [Bar 39] It could be getting chased by a cat.

Researcher: Poor mouse. I think you start decreasing about now. [Bar 44]

Participant E: Yeah, that's that stupid silence that they do put in. And then it just seems to fade away. It's like it's had its moment, and that's it. And then it starts getting busy again now. [Bar 49]

Researcher: So you increase?

Participant E: Yep.

Researcher: And now [Bar 52] you start decreasing again.

Participant E: It goes back to nothing. And then this bit's where the chords build up, isn't it.

Researcher: So the chords directly make you feel more intense?

Participant E: Yeah, 'cos it feels like it's going somewhere. It feels like it's actually getting to the goal, finally! [Bar 57]. But it's not much of a goal, is it? I think that one's better, like, ... in the middle.

Researcher: The one around 40 to 60

Participant E: Yeah. And then, 'cos it just fades to nothing, and the end is just ridiculous. It would have been better finishing on a big chord at the end, like at the top of that scale or something. Then it would have been more exciting.

Researcher: Maybe he didn't want it to end in an exciting way.

Participant E: Well maybe he didn't, but I do!

Researcher: Ok.

Participant E: It's just very, I don't know, an odd ending, I think. 'Cos usually, you get to the exciting bit, don't you, and then it finishes. Or it kind of ... ends still a bit more exciting than that.

Researcher: The climax is normally closer to the end.

Participant E: Yeah. Whereas I think it's in the middle.

Researcher: Yeah. You do talk quite a lot in your diary about there being a lack of goals, and no direction.

Participant E: Yeah, it doesn't feel to me like it's going very far at all. It seems like every time it gets to go somewhere, like at this bit, where it's building up at the beginning, and then at 110, or whatever, it feels like it's getting there, and then it goes away again. But that might have been his idea. But rather than keeping me in suspense, I'm just like 'Oh, just get there!'

Researcher: [Laughs] Um ... have you got any other general comments?

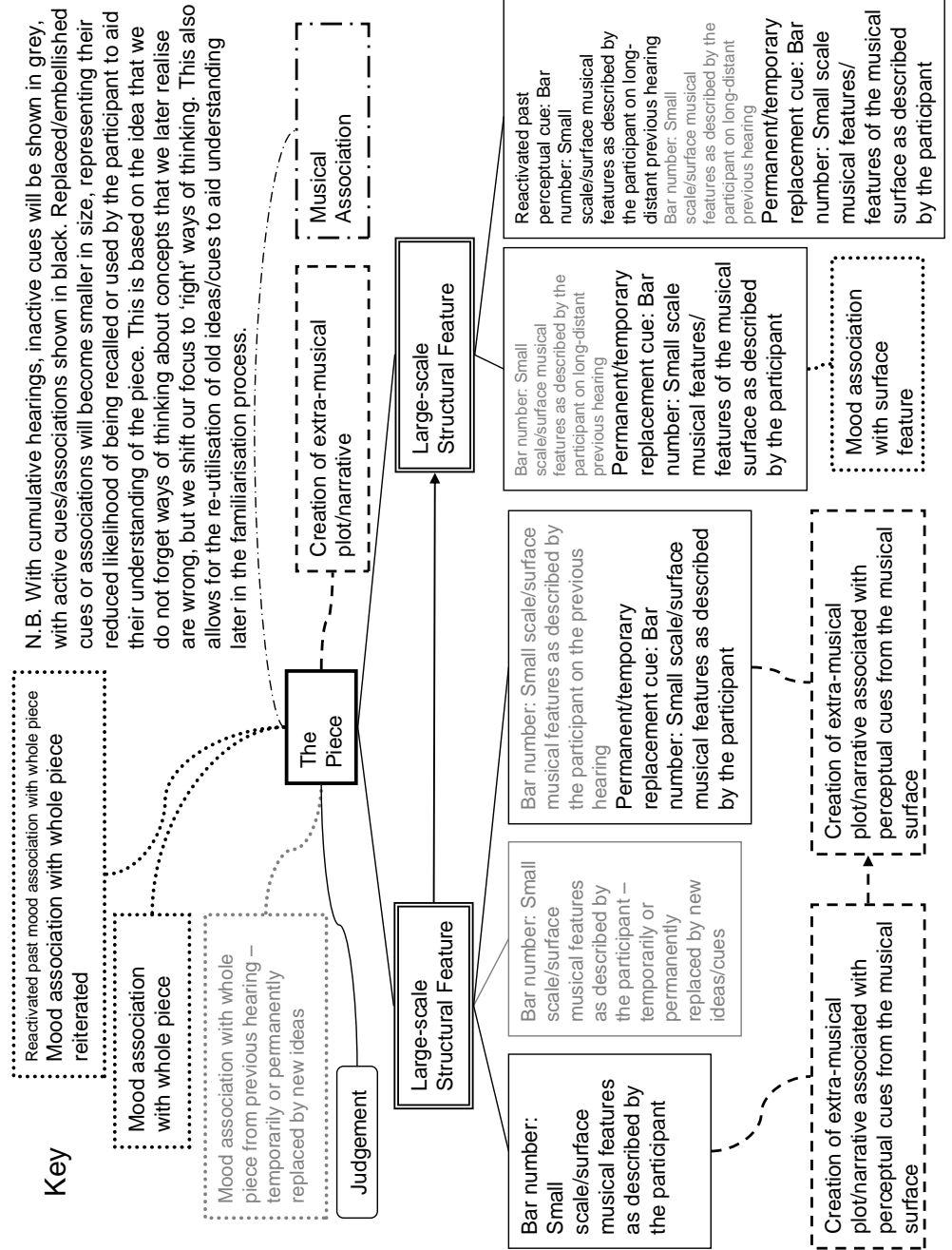
Participant E: Not really. Maybe I'm just used to ... the music I listen to maybe is just ... like more ... building up. Like Mozart, wouldn't do that. Or Beethoven. Well, not in the pieces I've heard, anyway. And they kind of build up from the beginning, hit the climax, and then finish, whereas he's done it all different. Or she, I don't know who it's by. So, no that's it.

Researcher: Thank you very much.

Appendix 4

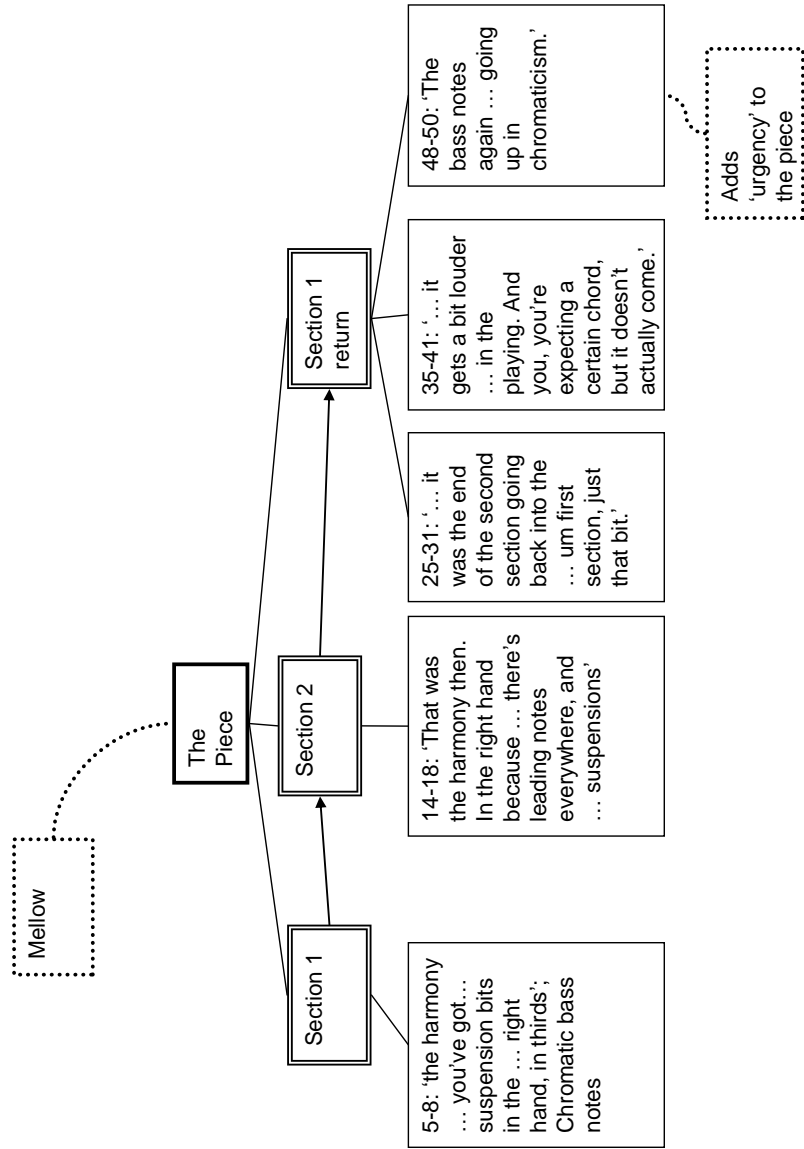
Schemata: Responses to Clementi

Key to Schemata



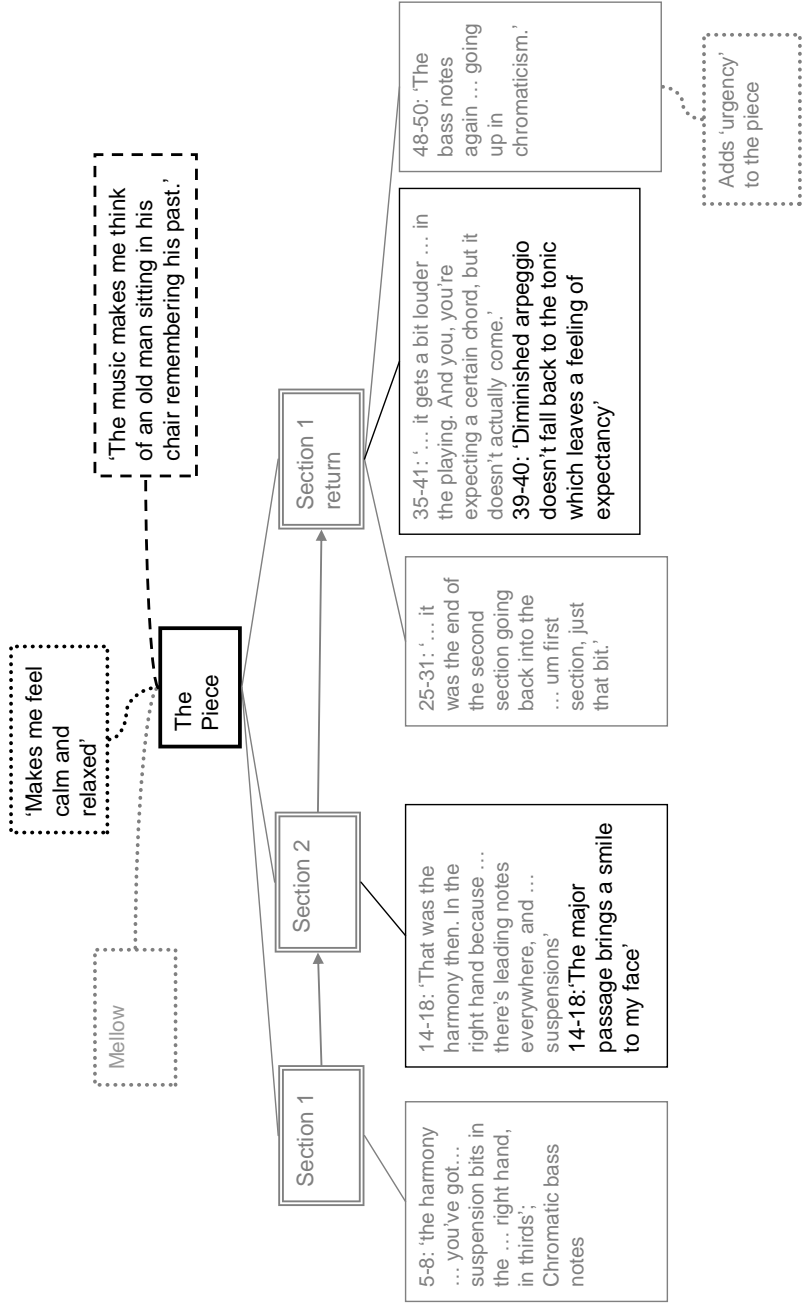
Schema 1 Clementi - Participant A: Interview 1

Interview 1



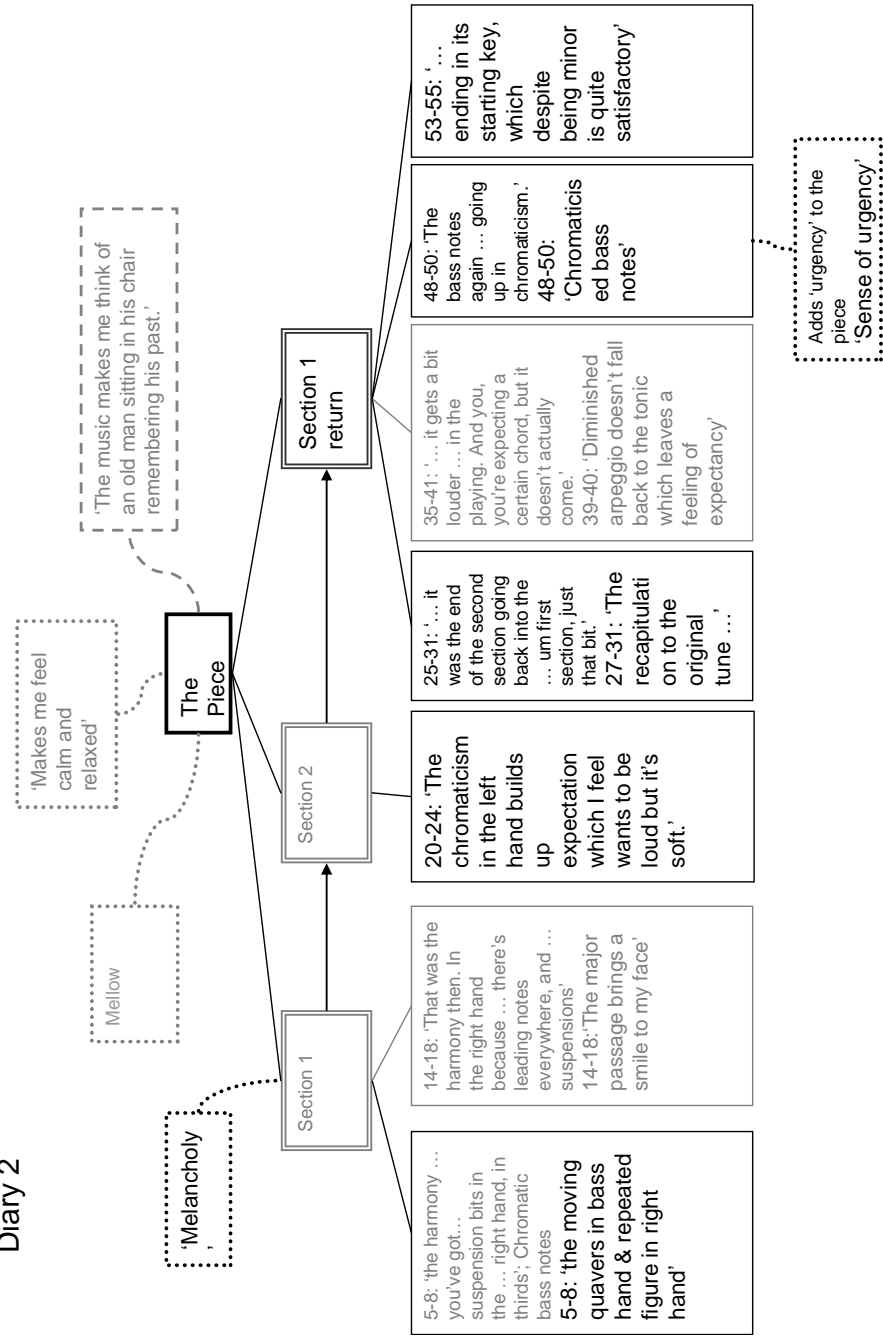
Schema 2 Clementi - Participant A: Diary 1

Diary 1

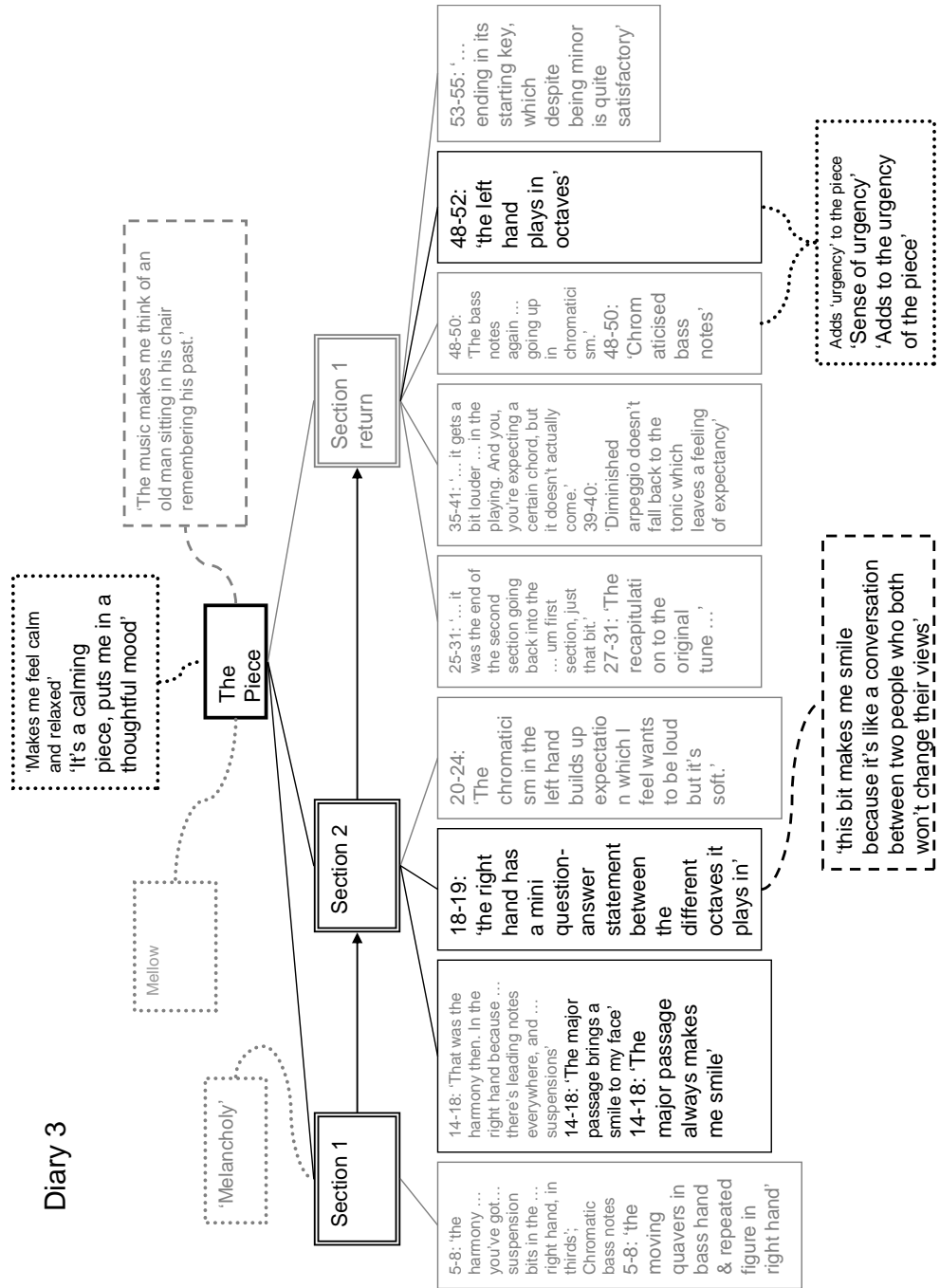


Schema 3 Clementi - Participant A: Diary 2

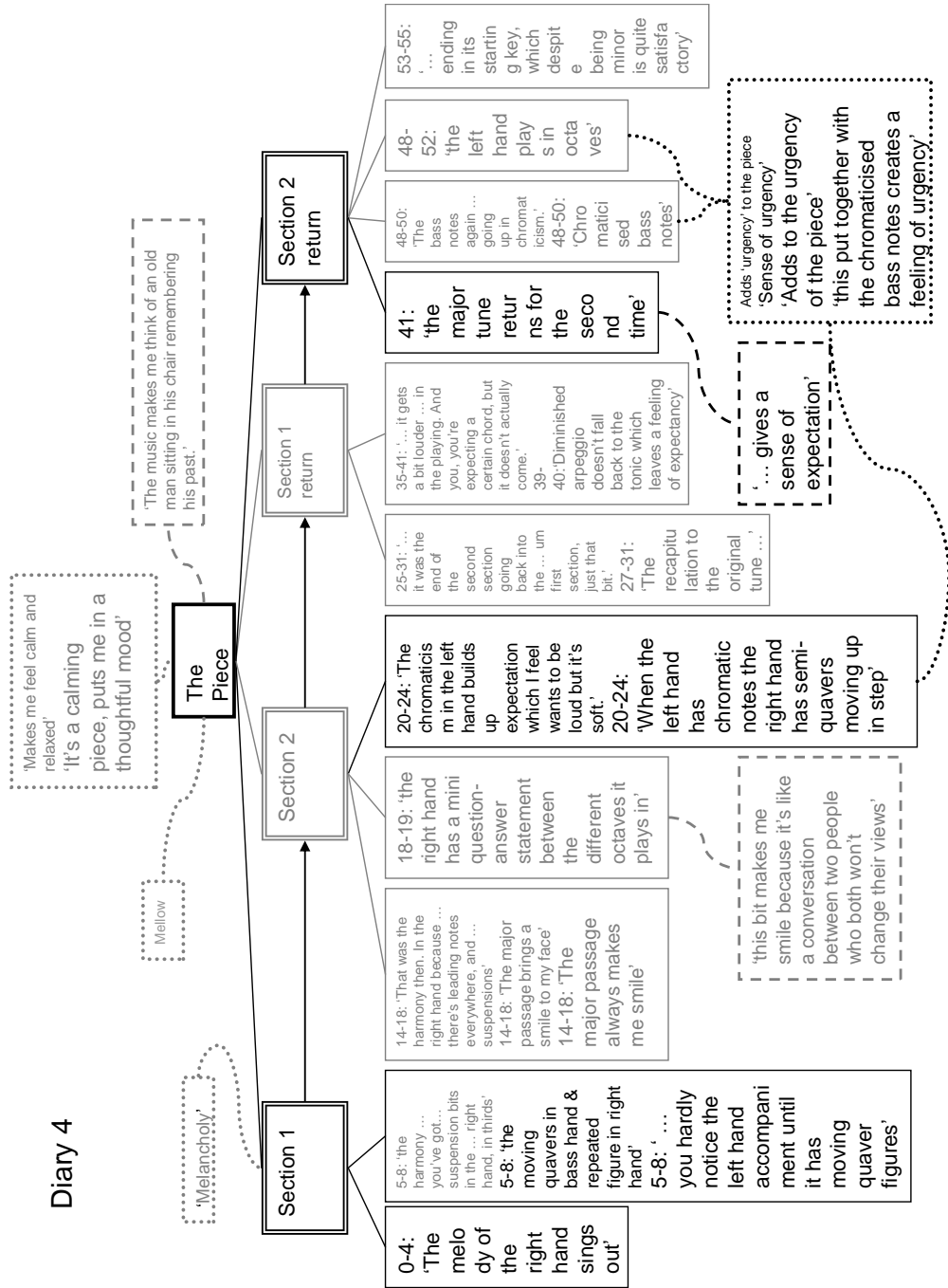
Diary 2



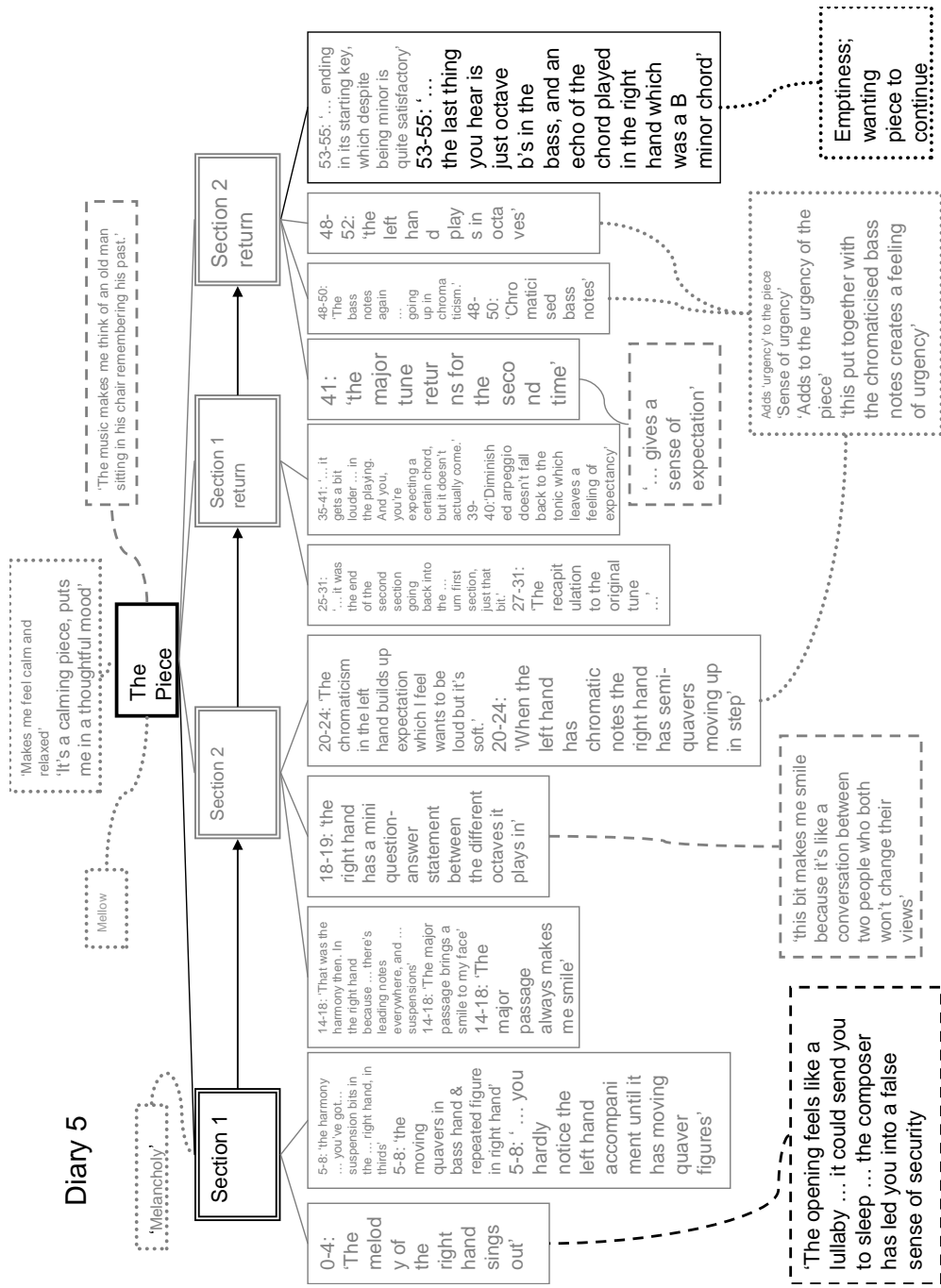
Schema 4 Clementi - Participant A: Diary 3



Schema 5 Clementi - Participant A: Diary 4

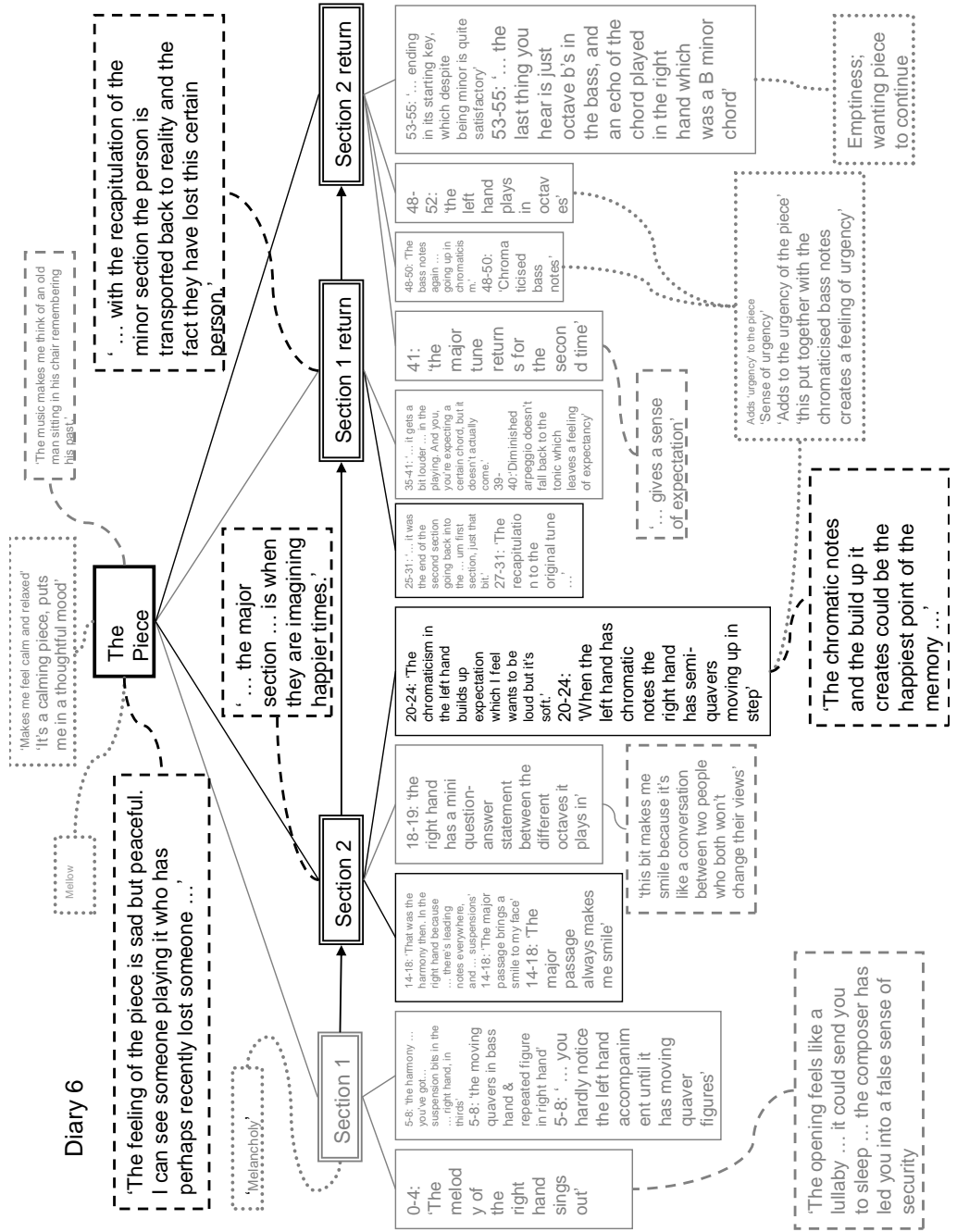


Schema 6 Clementi - Participant A: Diary 5



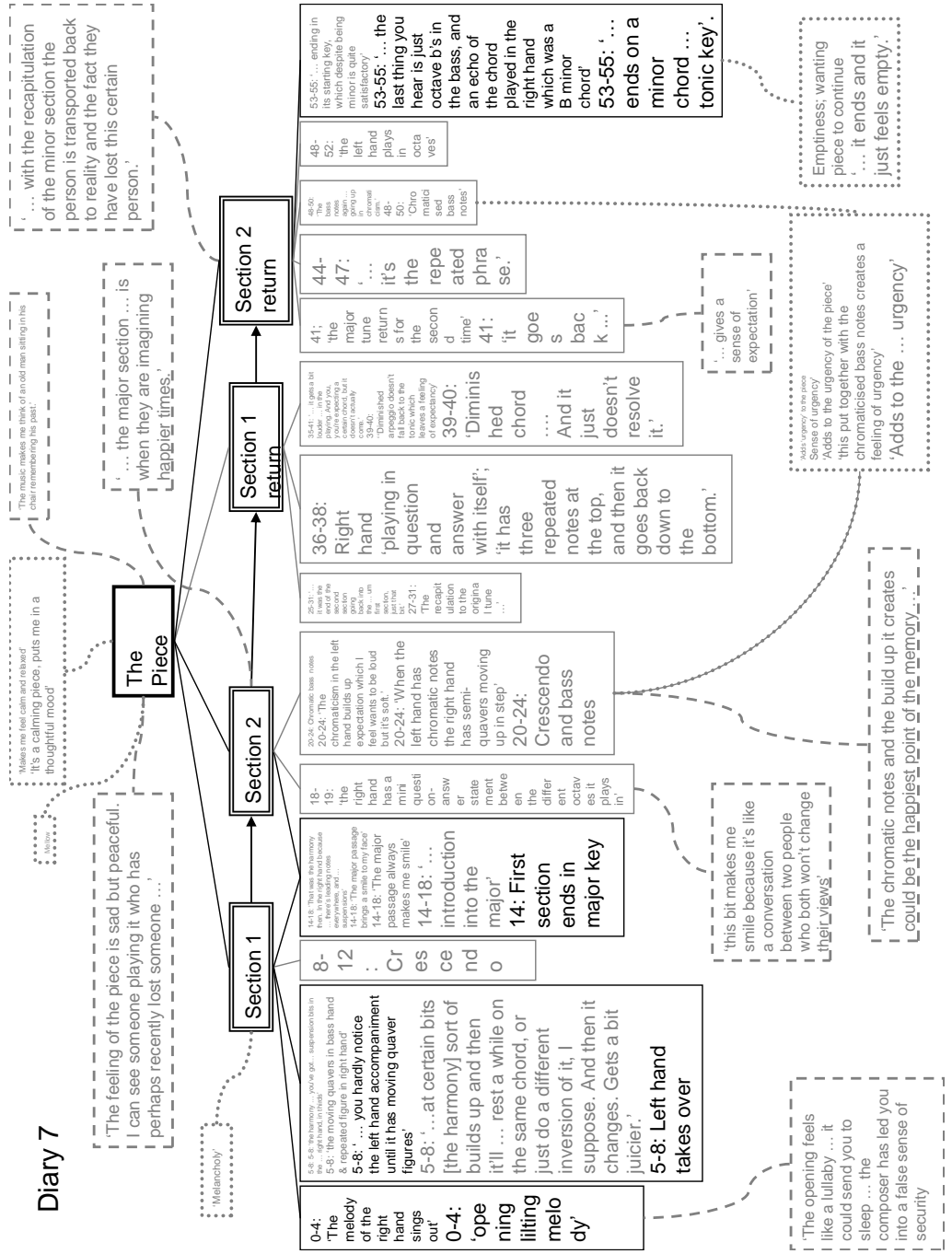
Schema 7 Clementi - Participant A: Diary 6

Diary 6



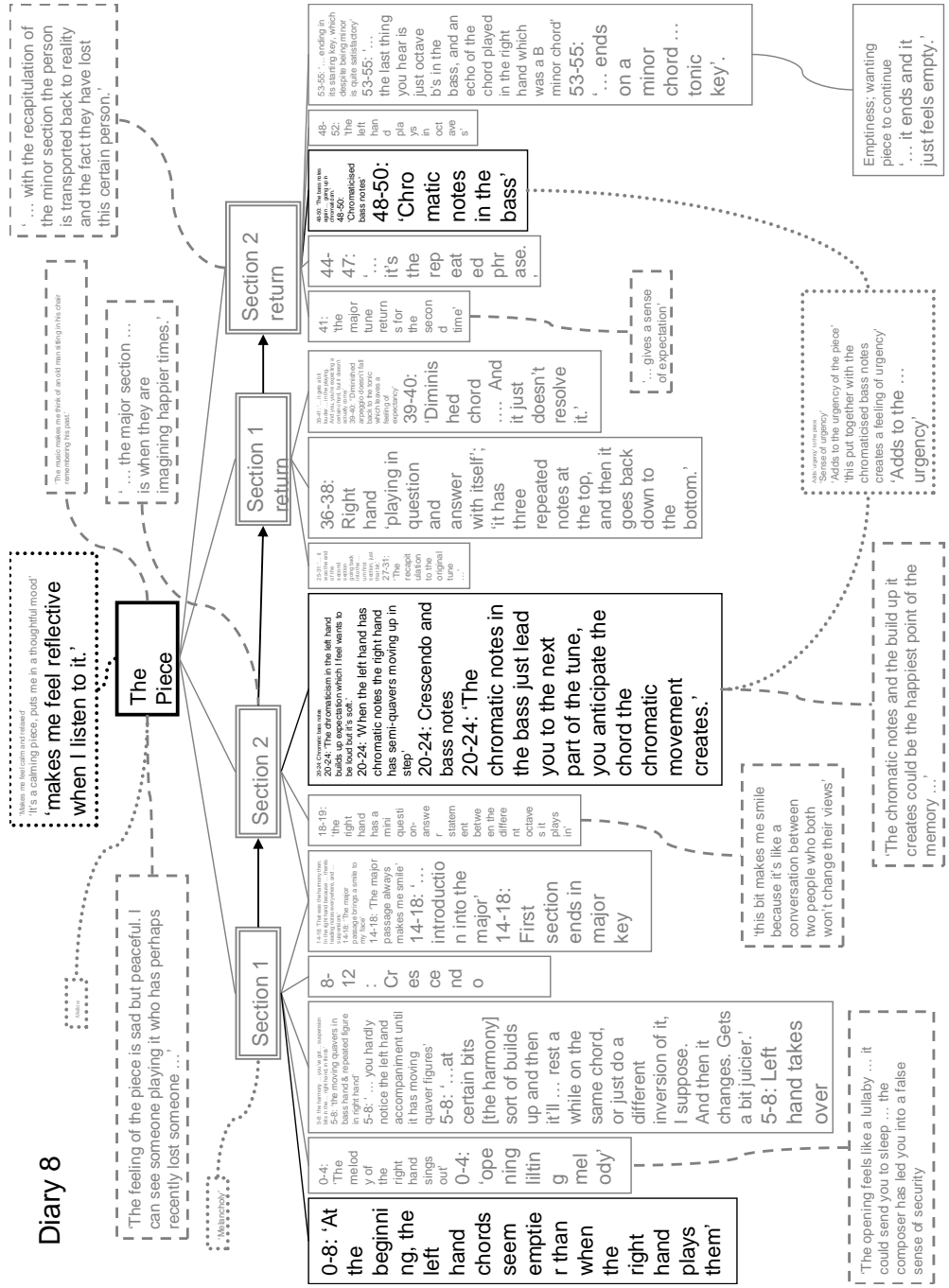
Schema 9 Clementi - Participant A: Diary 7

Diary 7



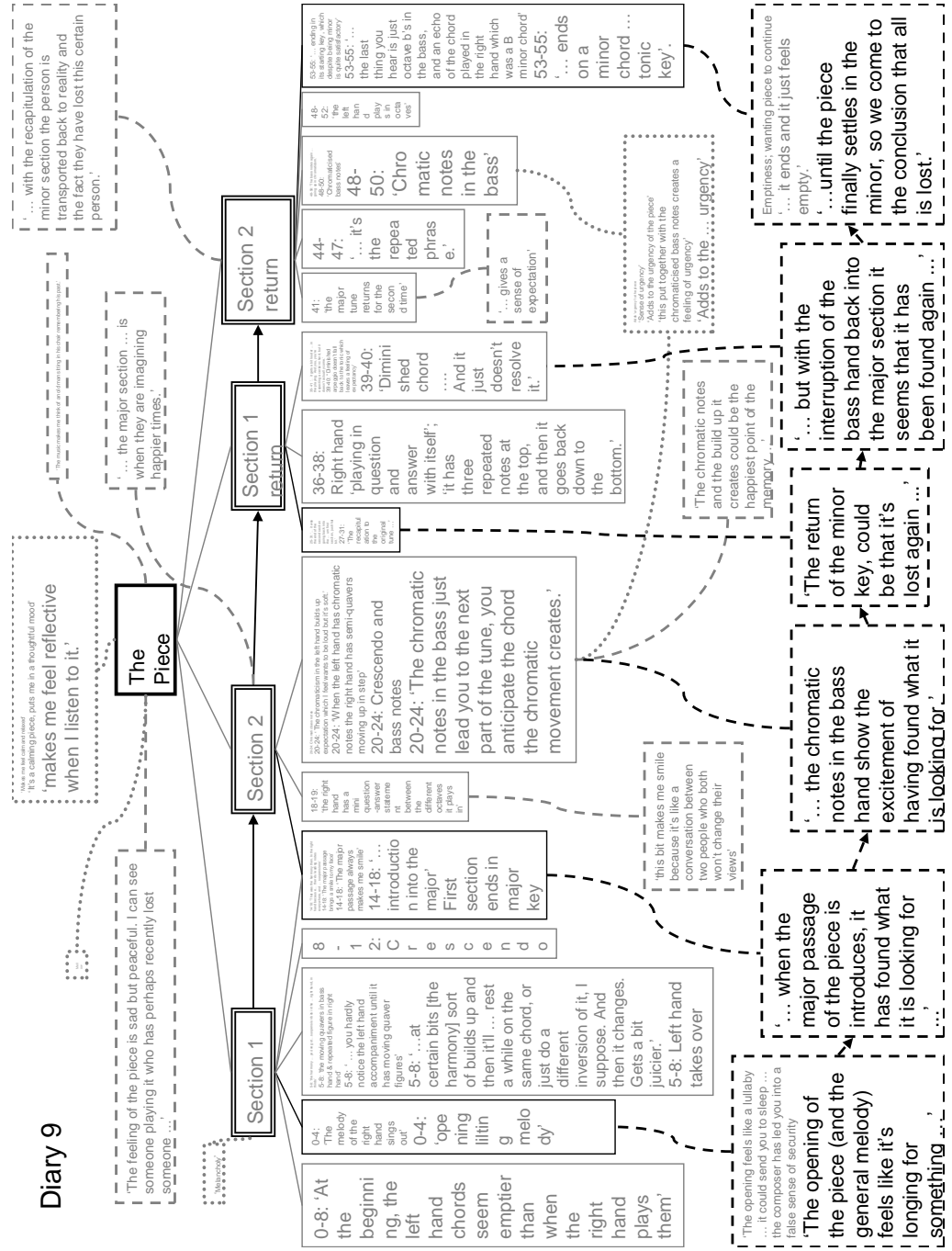
Schema 10 Clementi - Participant A: Diary 8

Diary 8



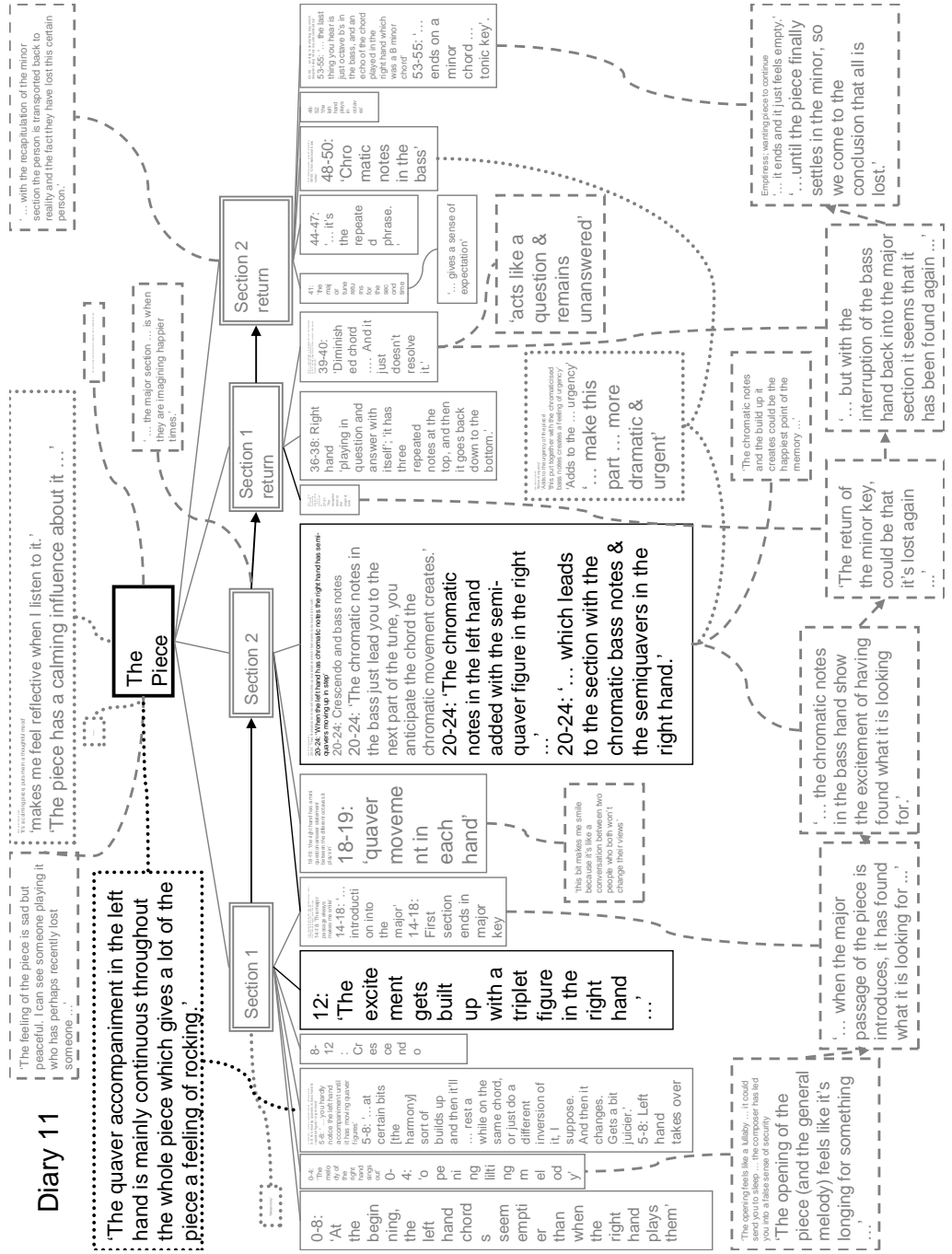
Schema 11 Clementi - Participant A: Diary 9

Diary 9

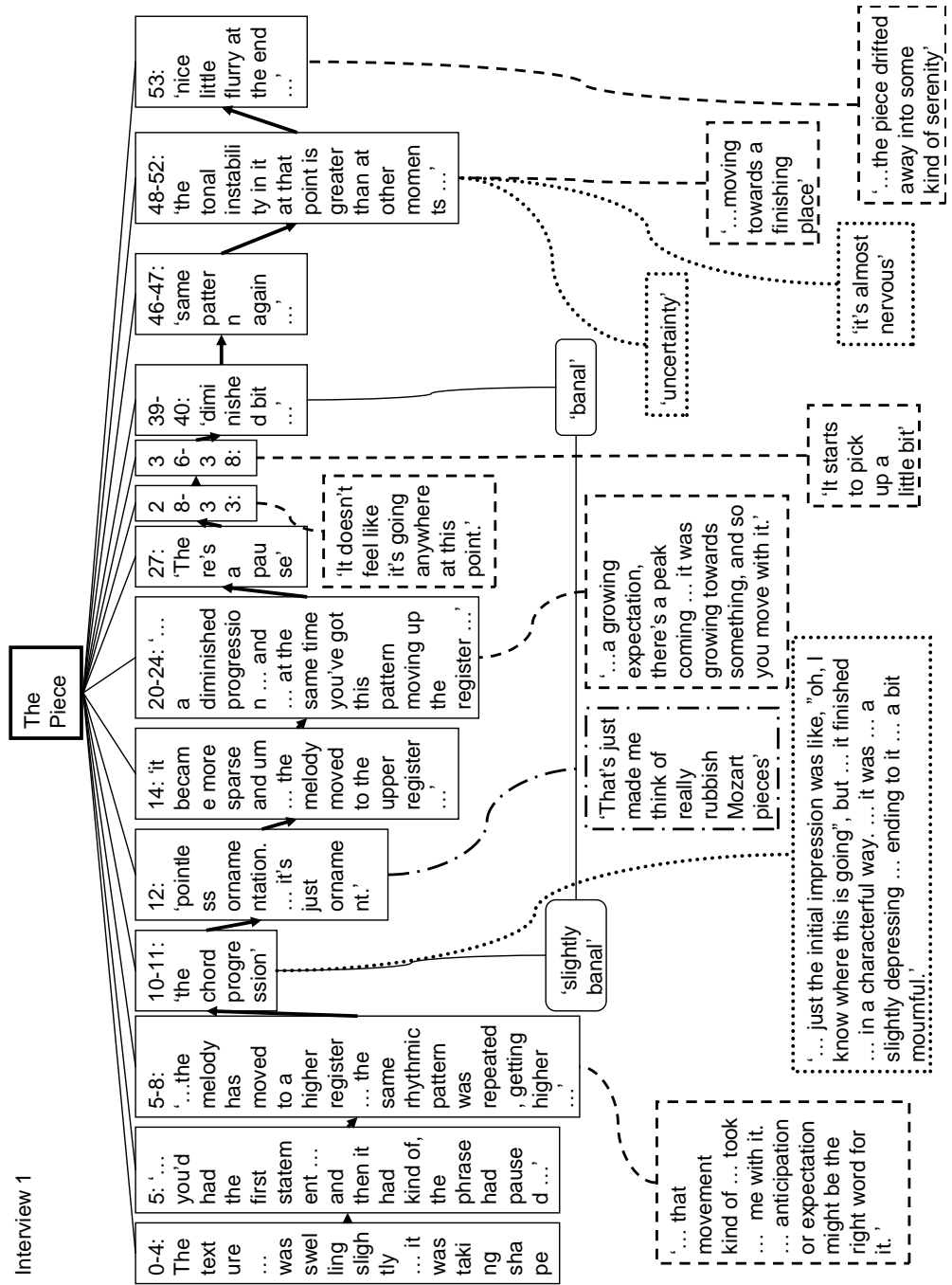


Schema 13 Clementi - Participant A: Diary 11

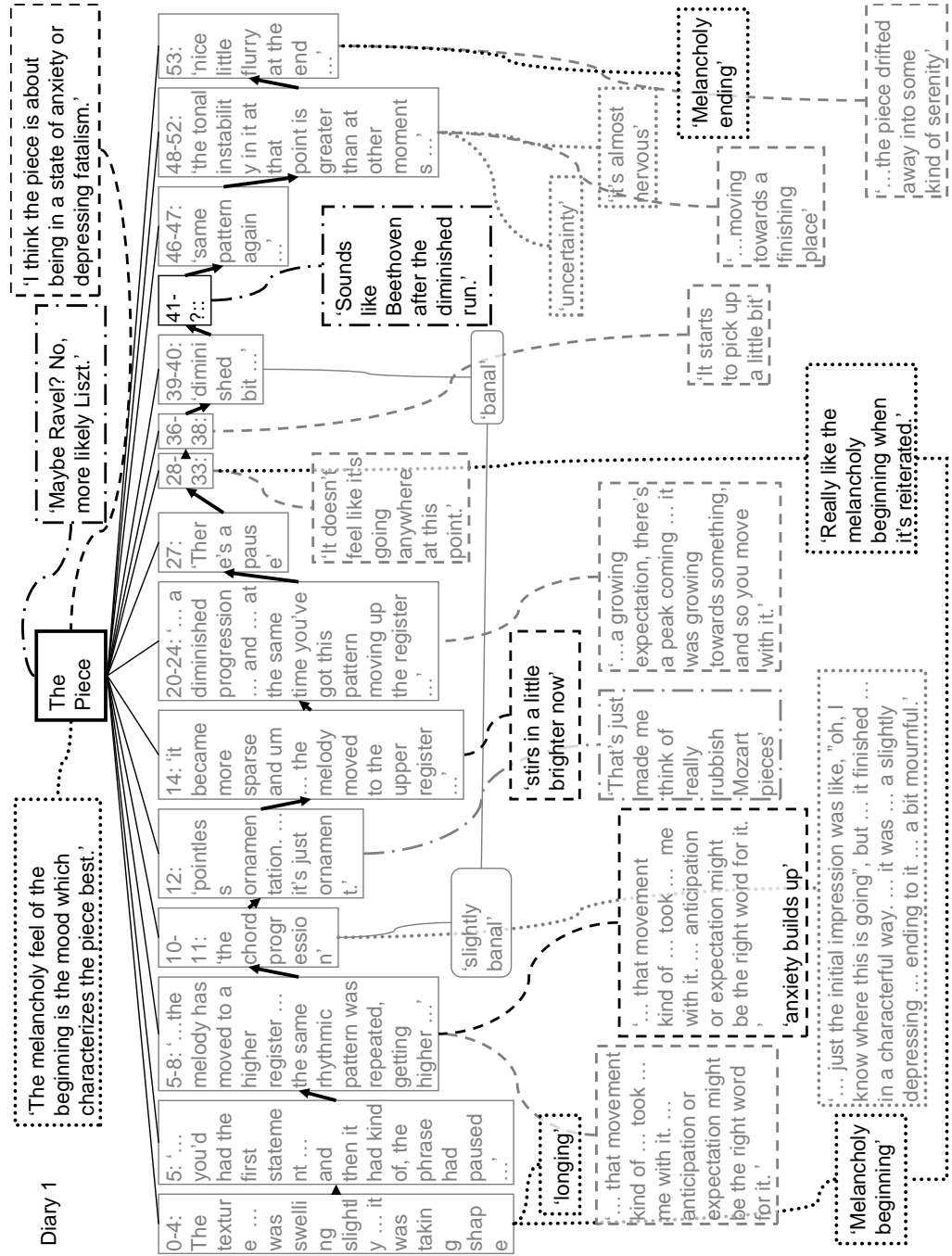
Diary 11



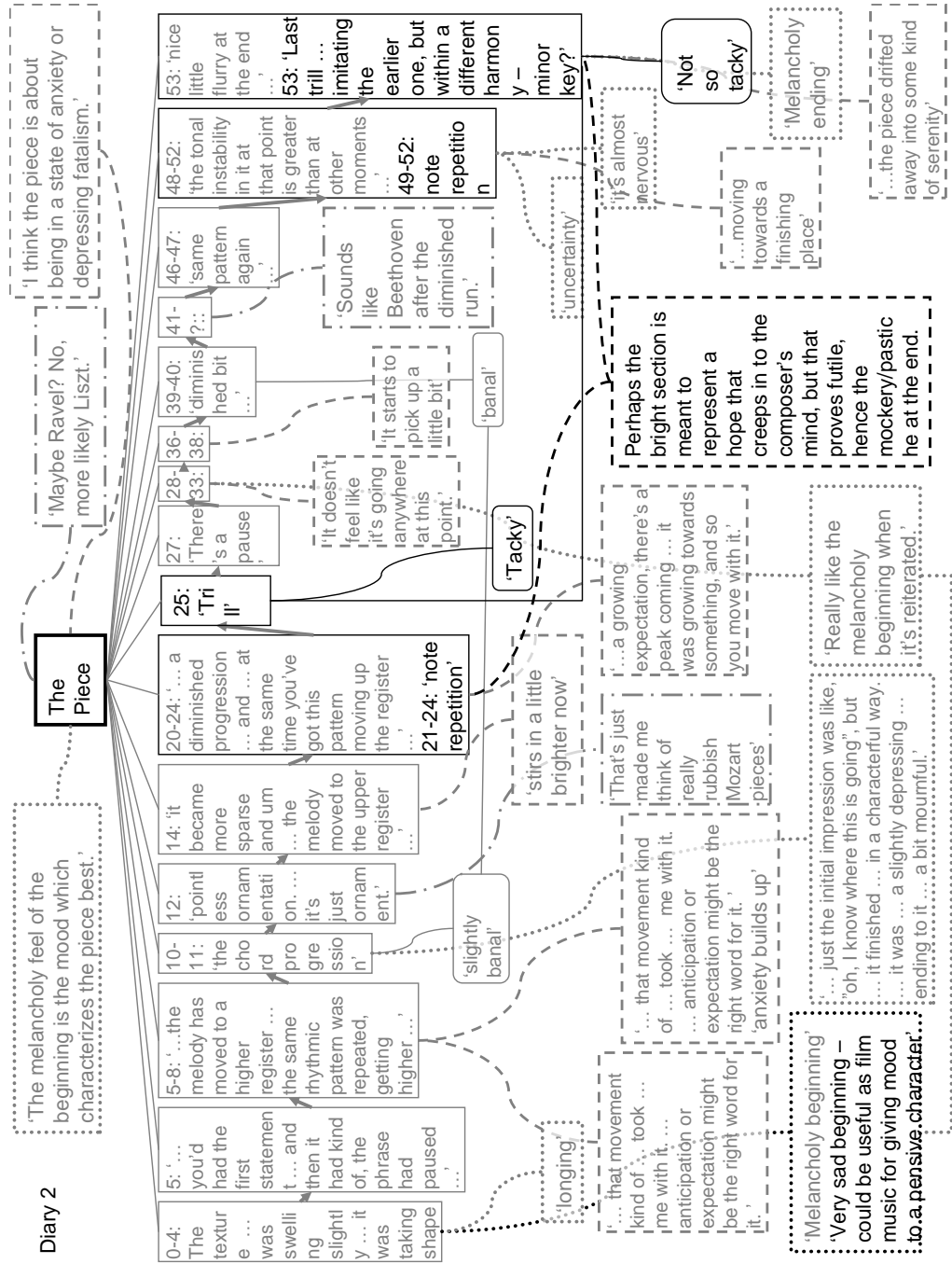
Schema 16 Clementi - Participant J: Interview 1



Schema 17 Clementi - Participant J: Diary 1

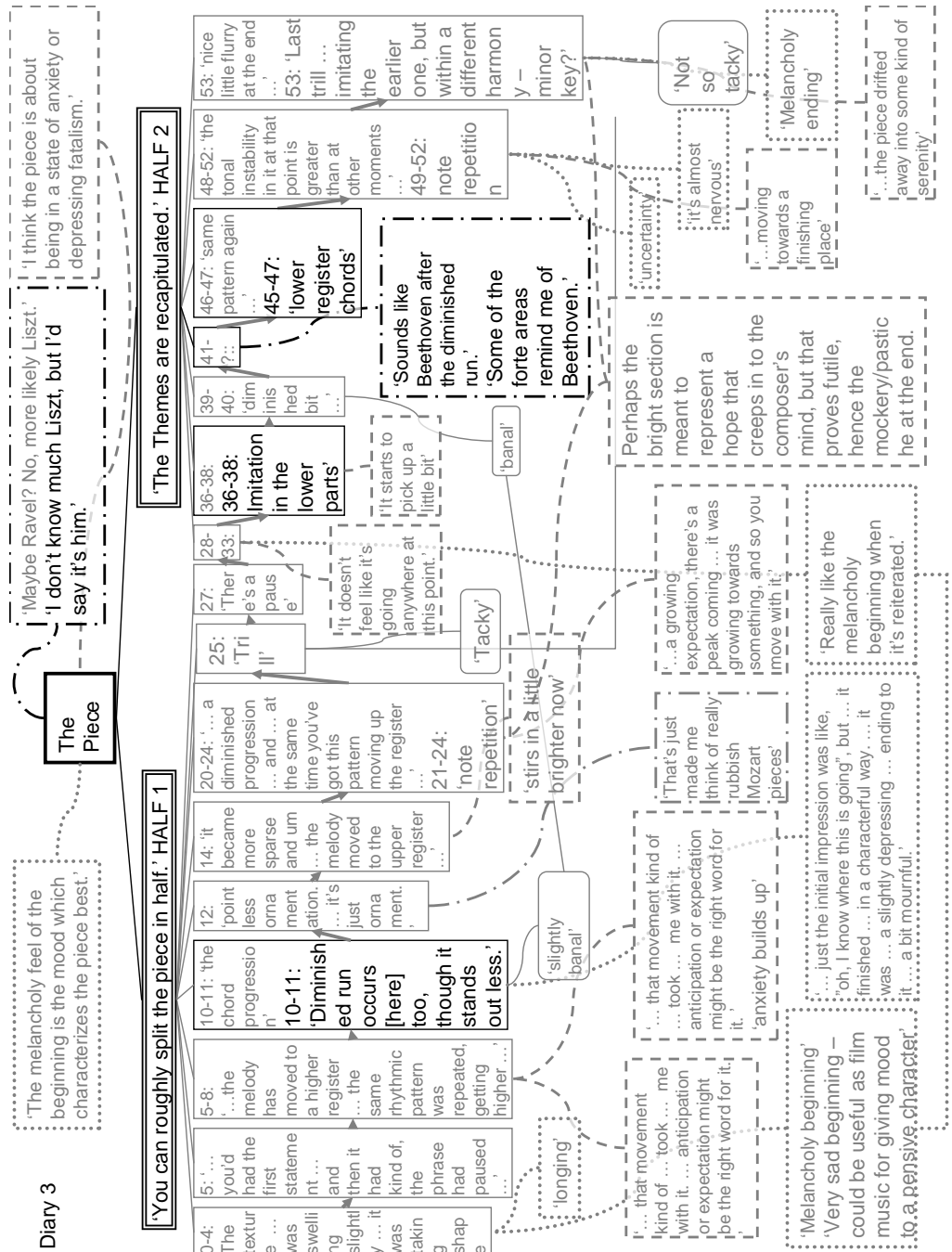


Schema 18 Clementi - Participant J: Diary 2

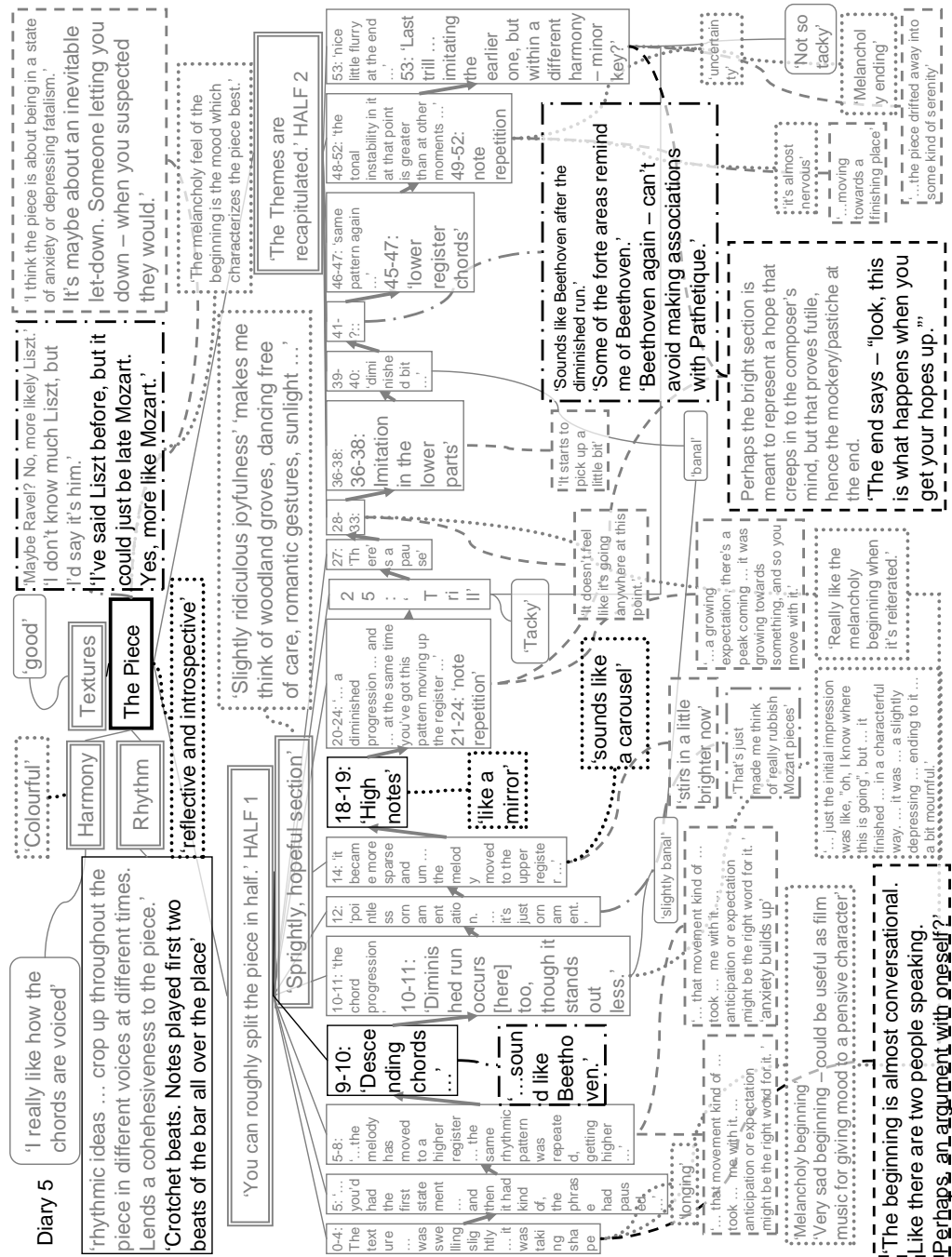


Schema 19 Clementi - Participant J: Diary 3

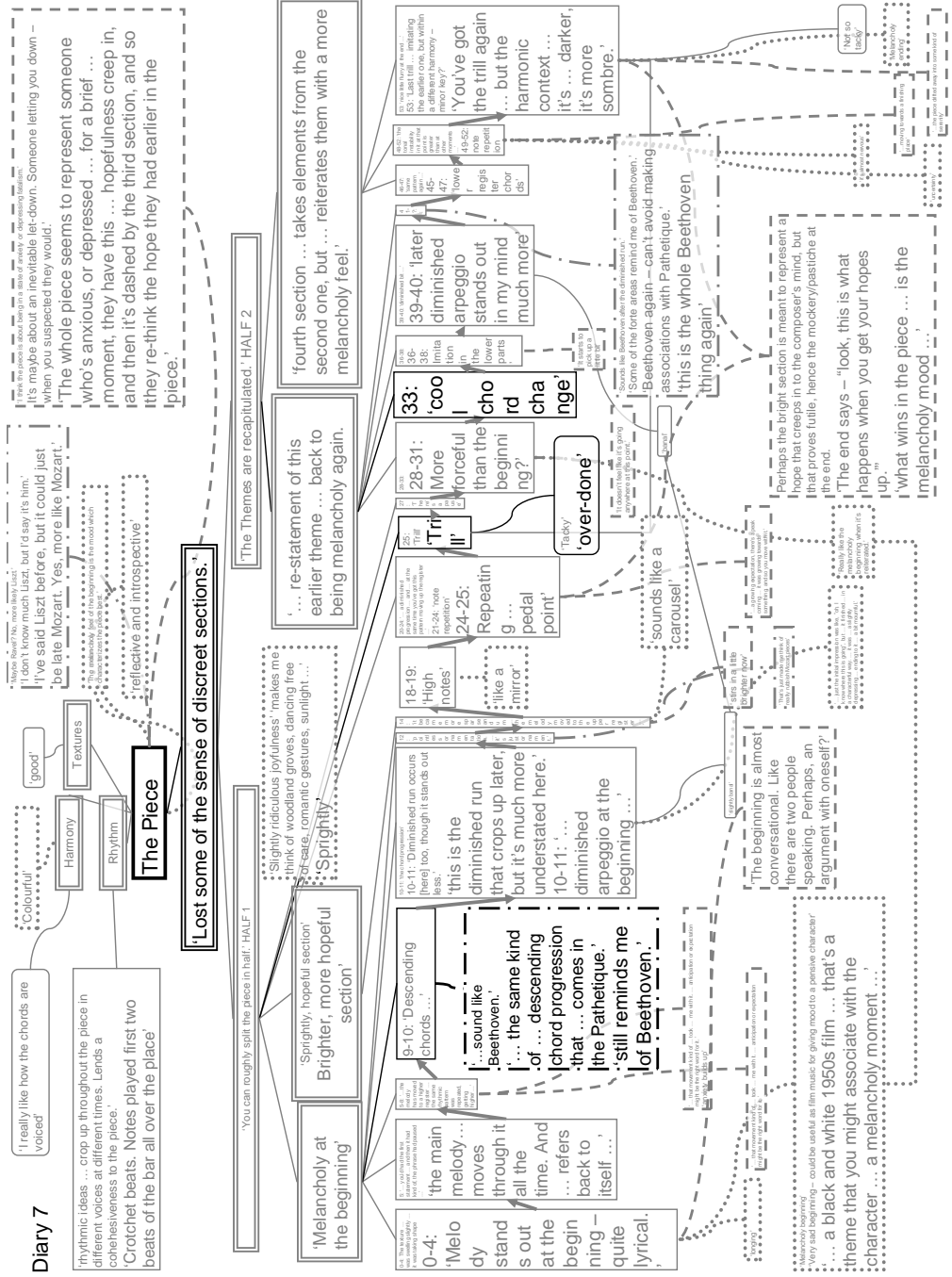
Diary 3



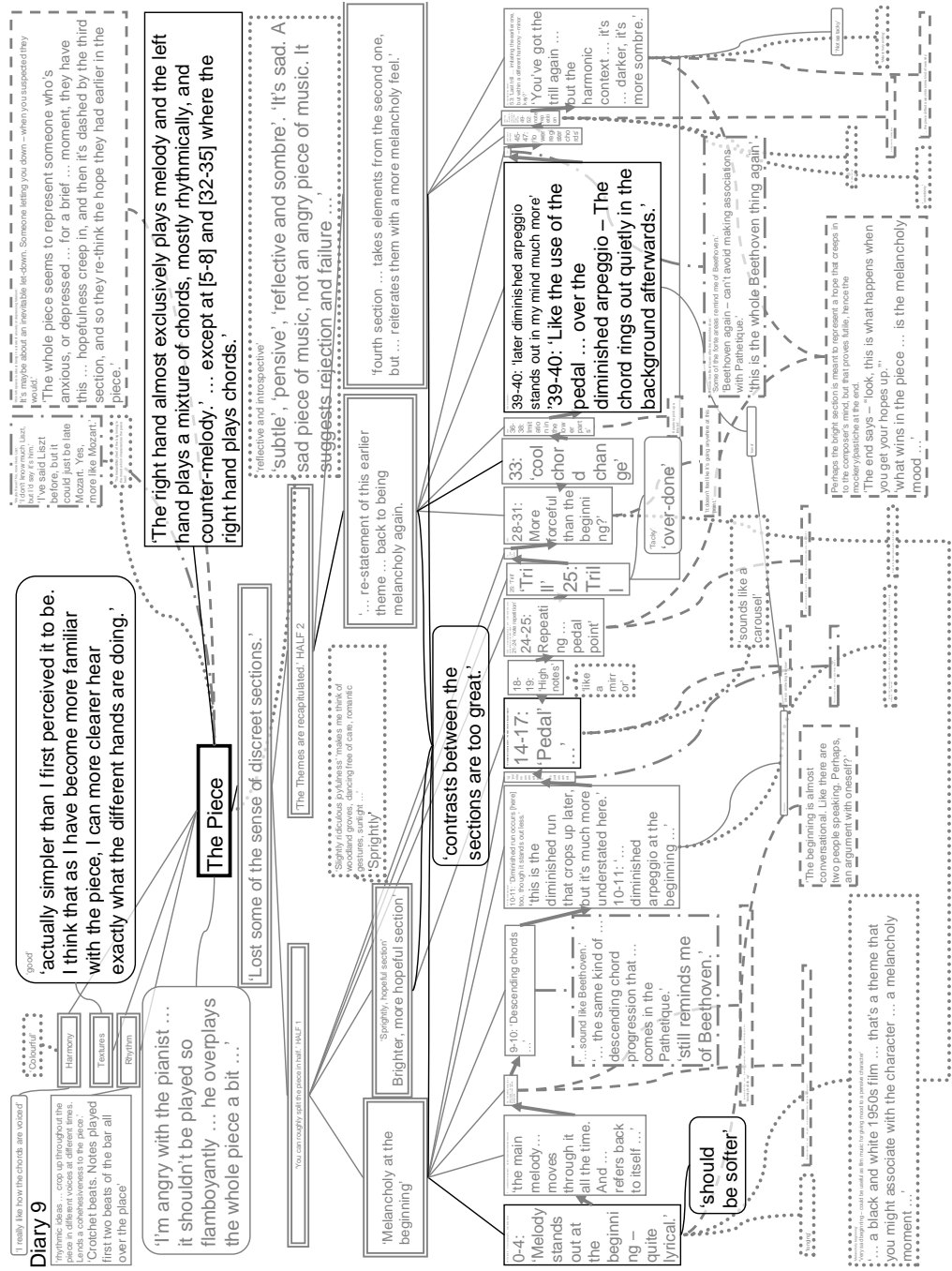
Schema 21 Clementi - Participant J: Diary 5



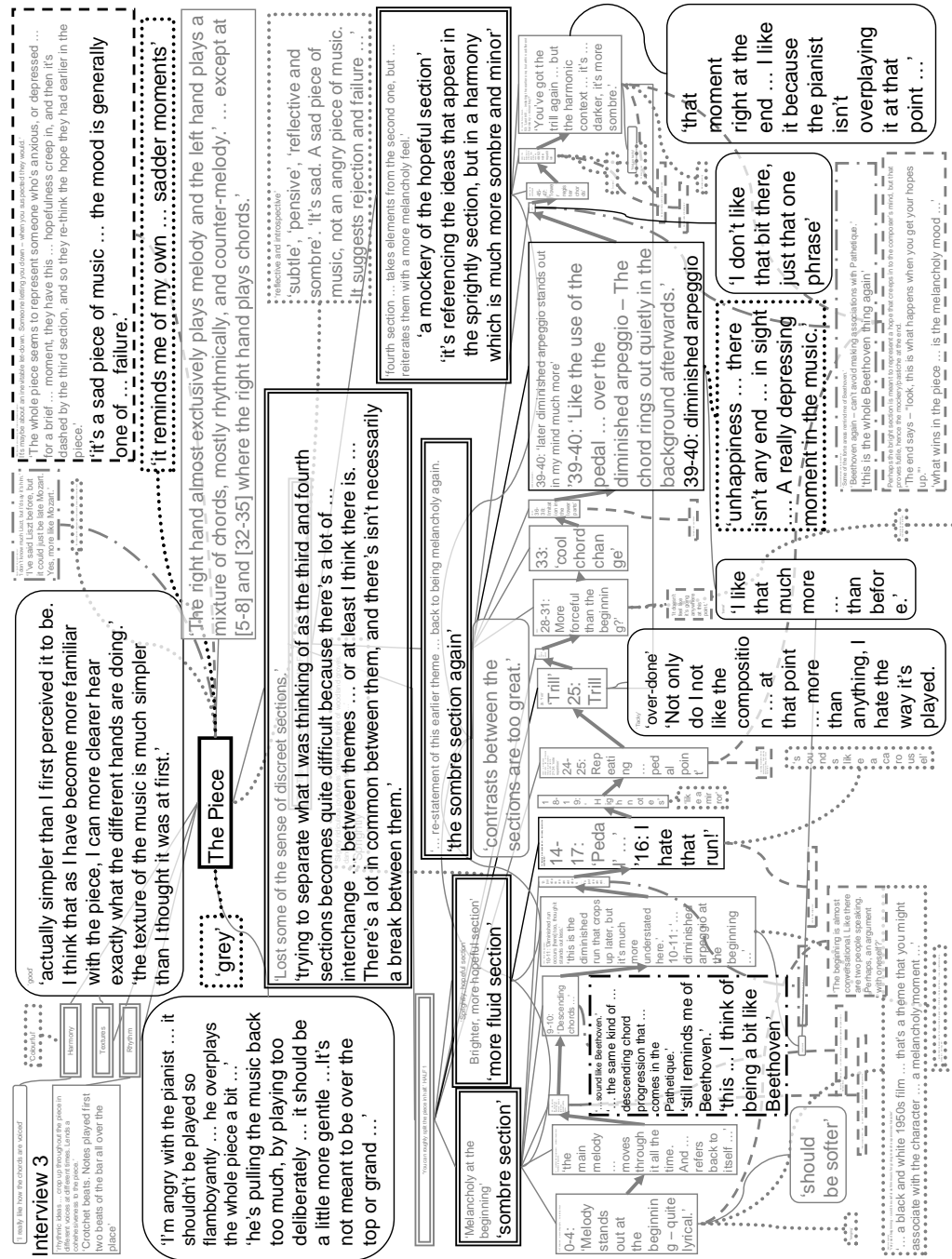
Schema 24 Clementi - Participant J: Diary 7



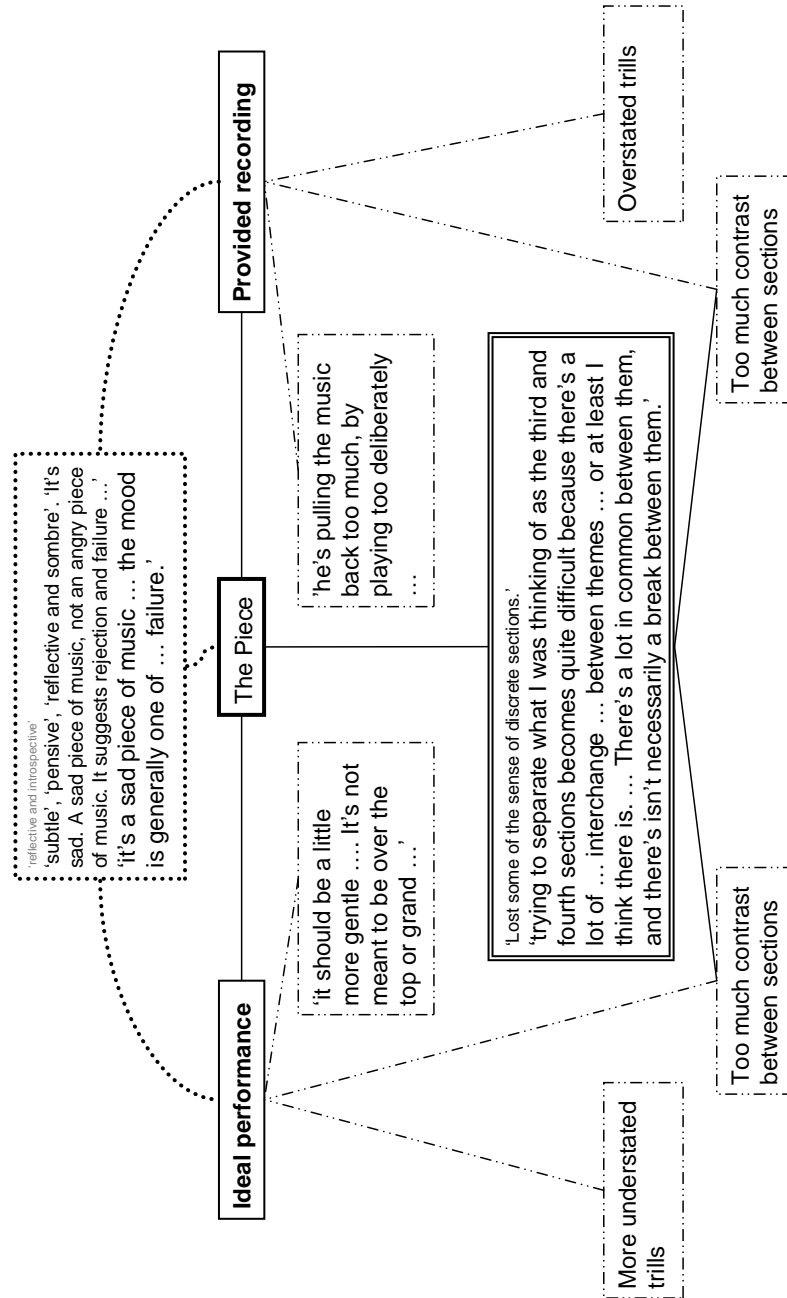
Schema 26 Clementi - Participant J: Diary 9



Schema 27 Clementi - Participant J: Interview 3

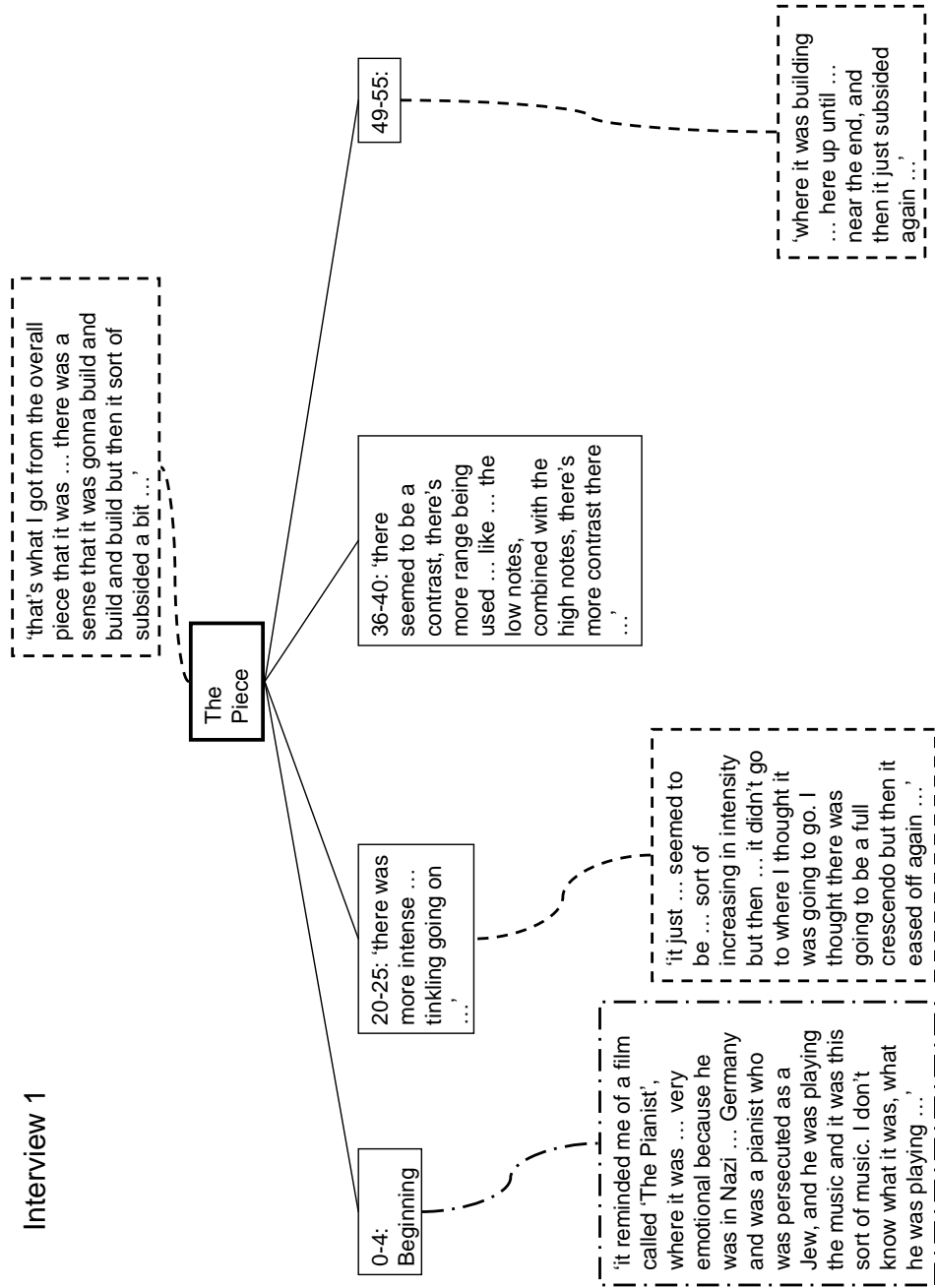


Schema 28 Clementi - Participant J: An Alternative Schema

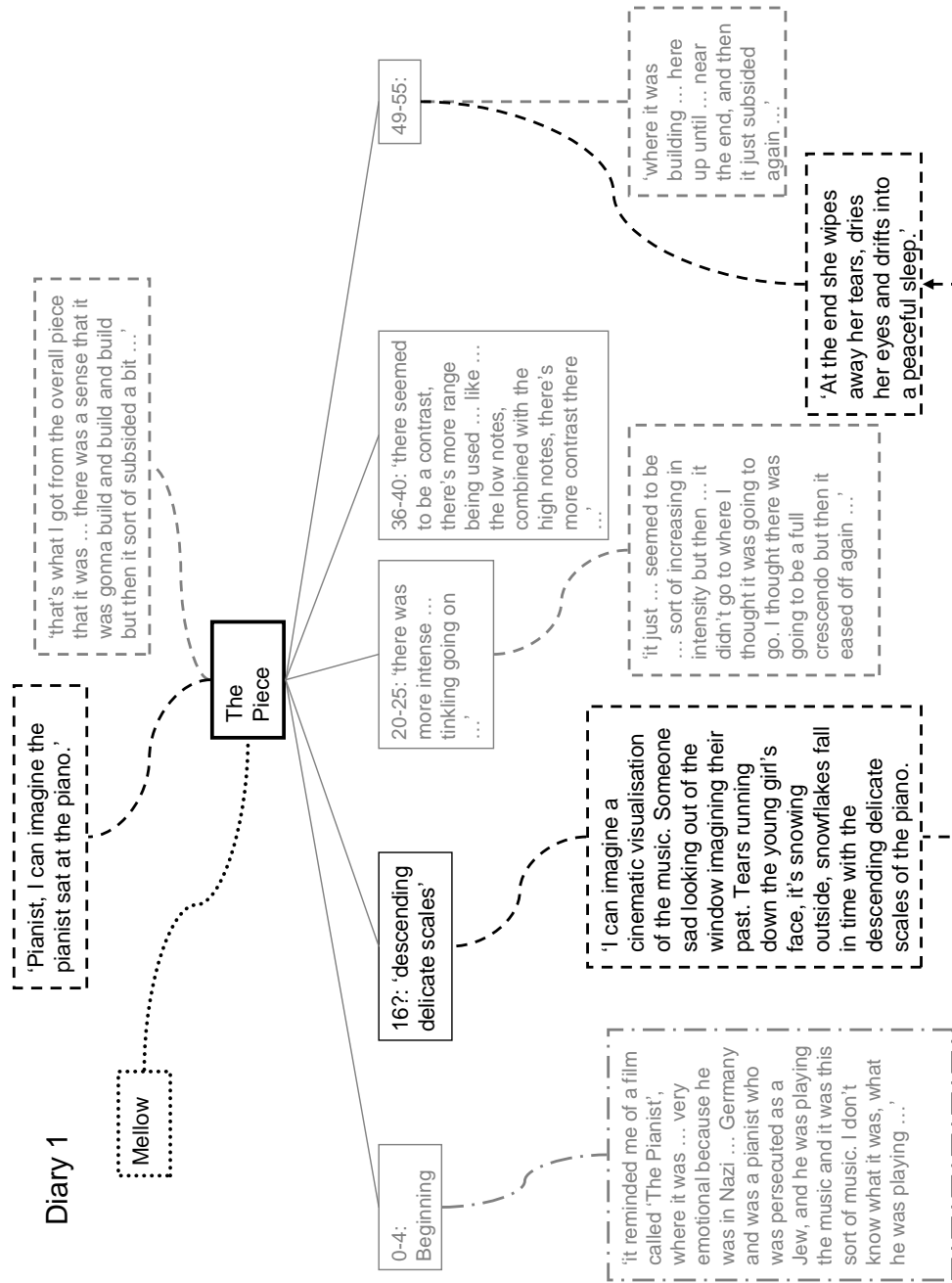


Schema 29 Clementi - Participant S: Interview 1

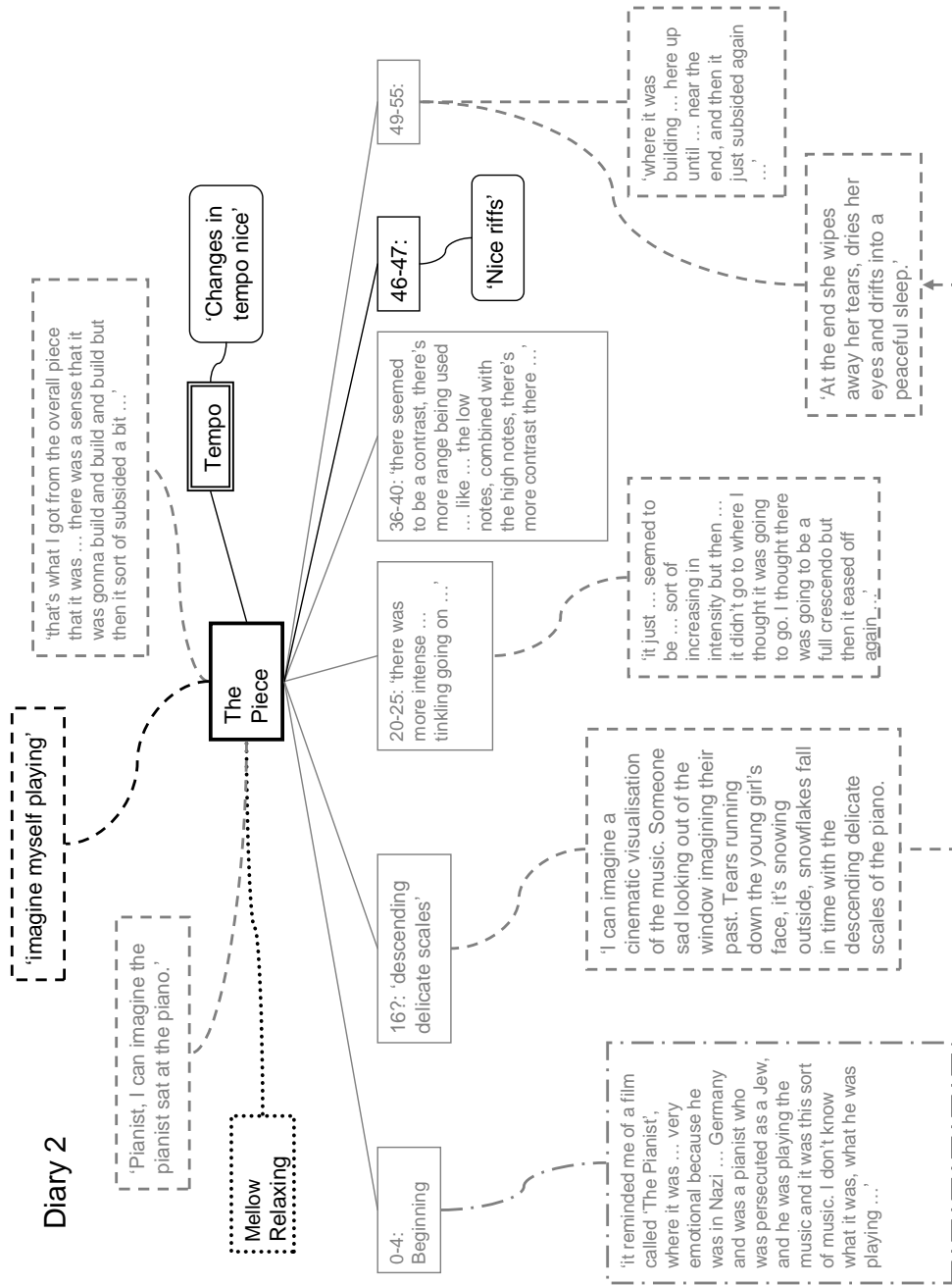
Interview 1



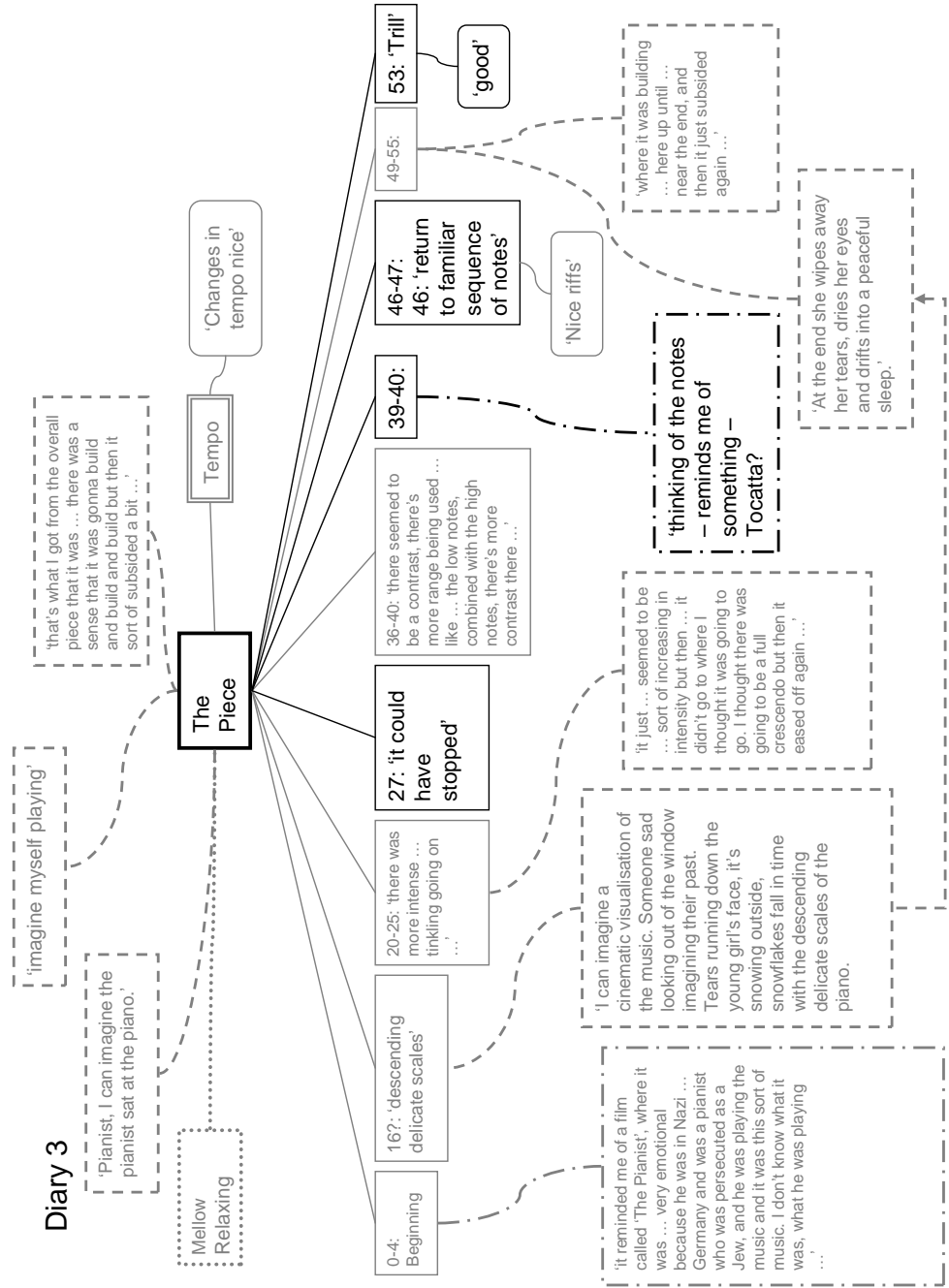
Schema 30 Clementi - Participant S: Diary 1



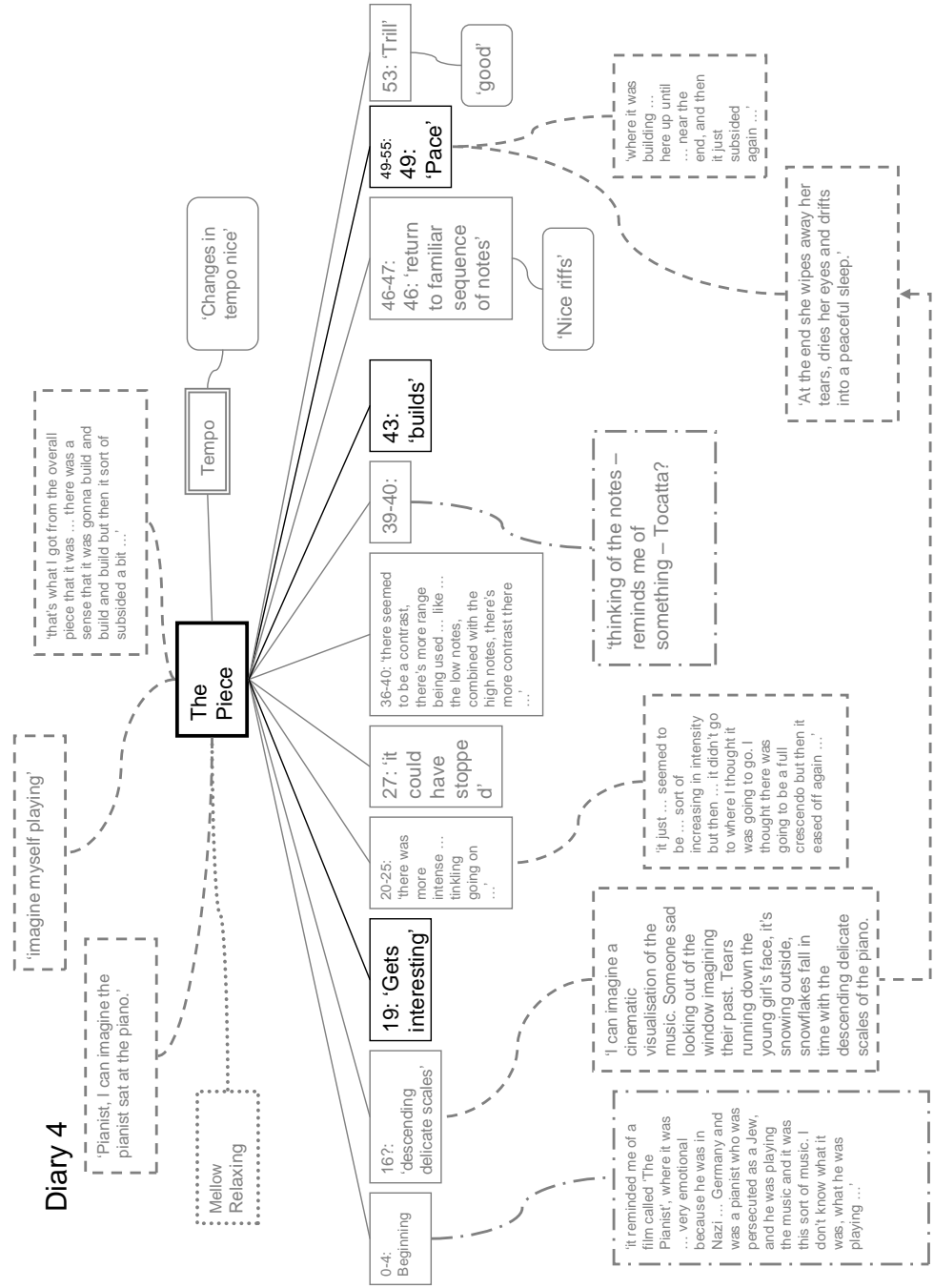
Schema 31 Clementi - Participant S: Diary 2



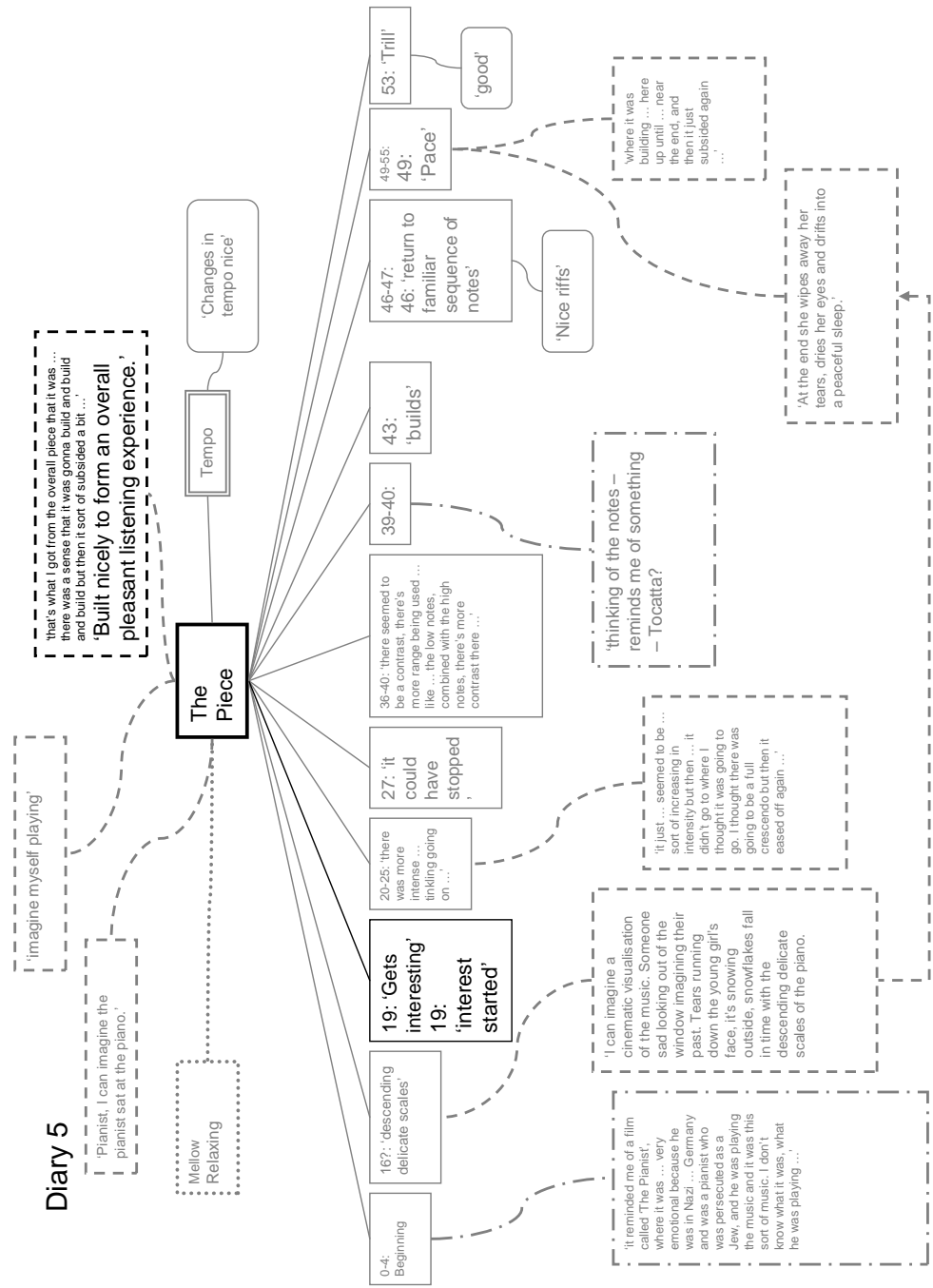
Schema 32 Clementi - Participant S: Diary 3



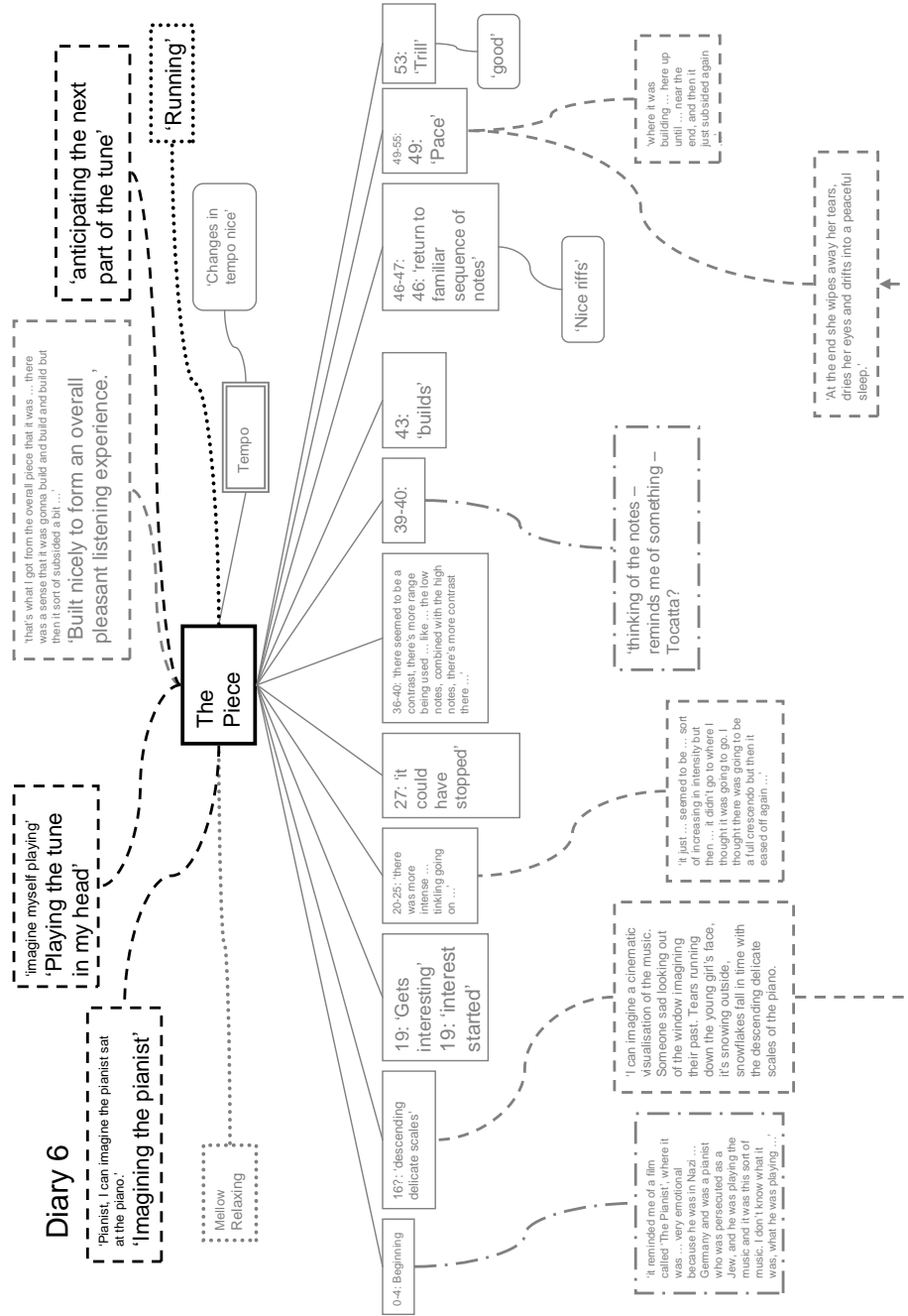
Schema 33 Clementi - Participant S: Diary 4



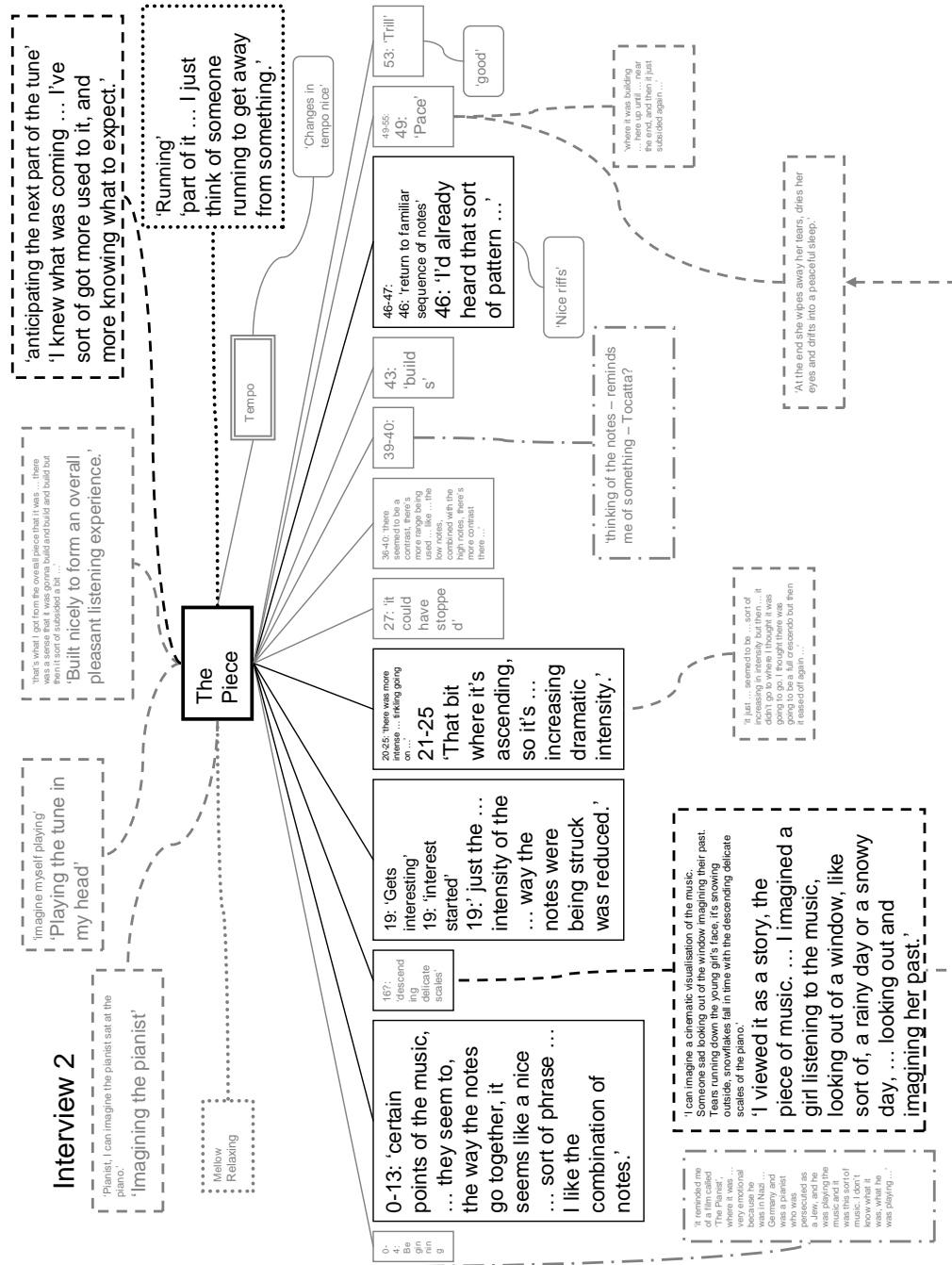
Schema 34 Clementi - Participant S: Diary 5



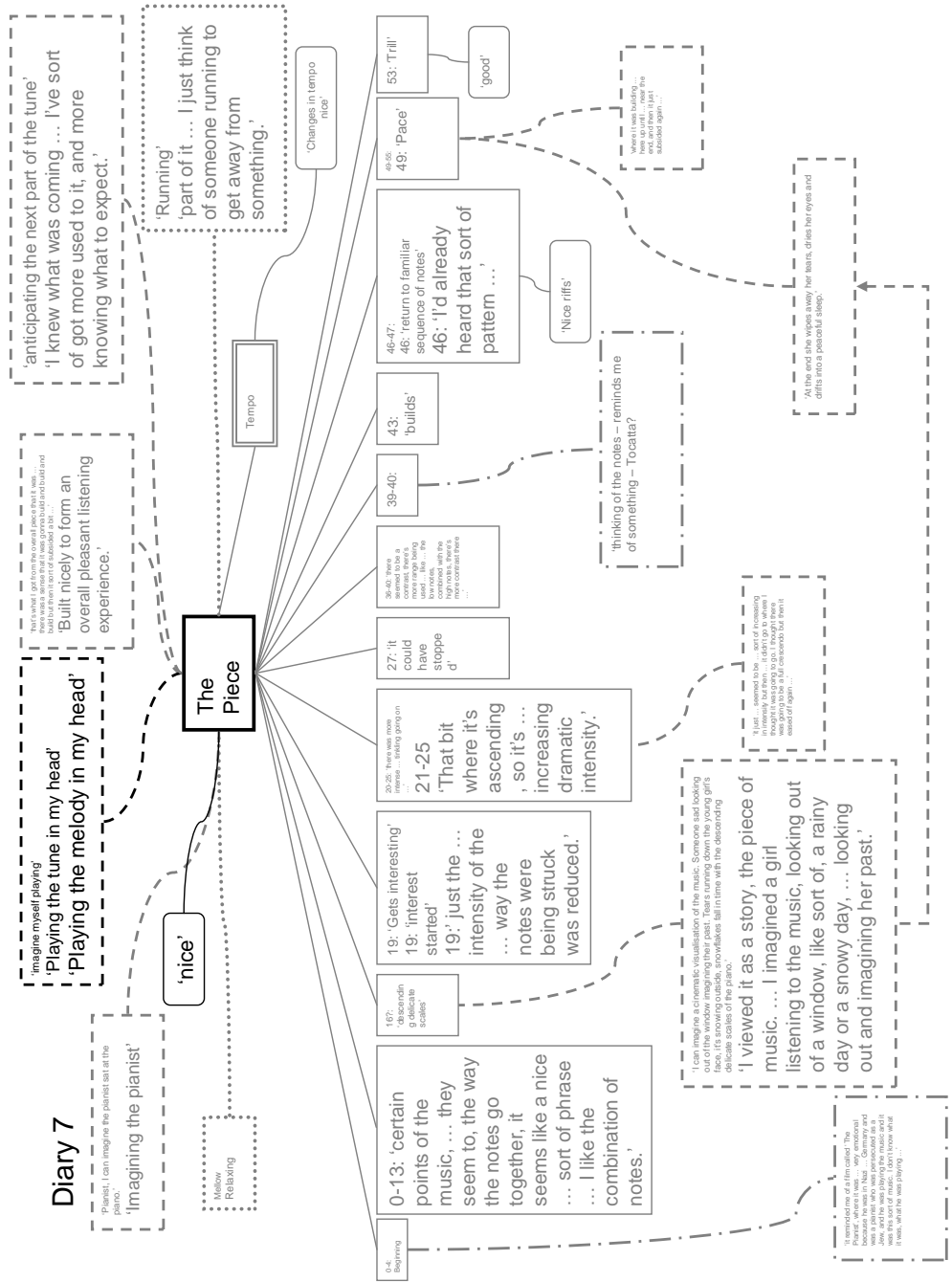
Schema 35 Clementi - Participant S: Diary 6



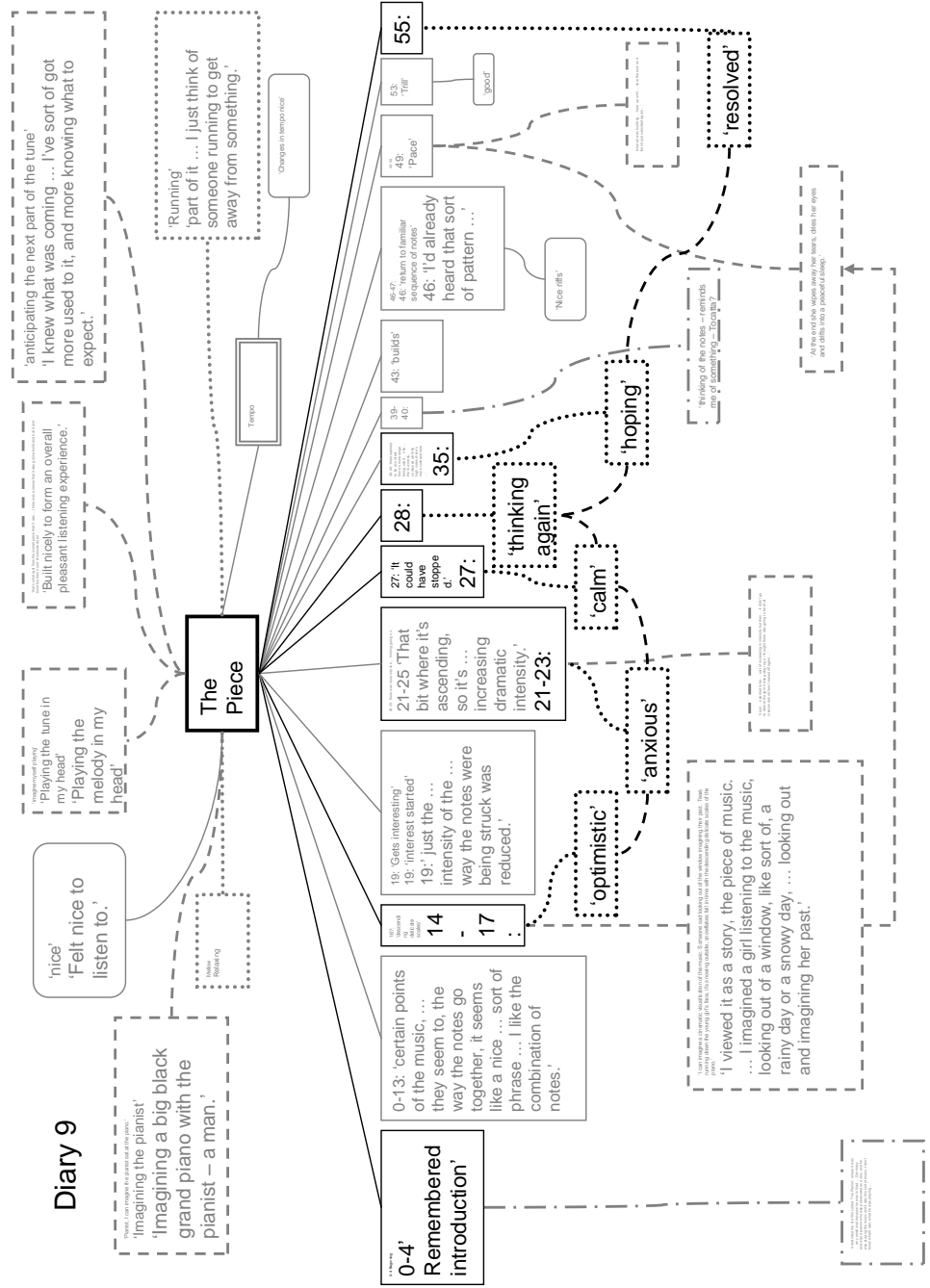
Schema 36 Clementi - Participant S: Interview 2



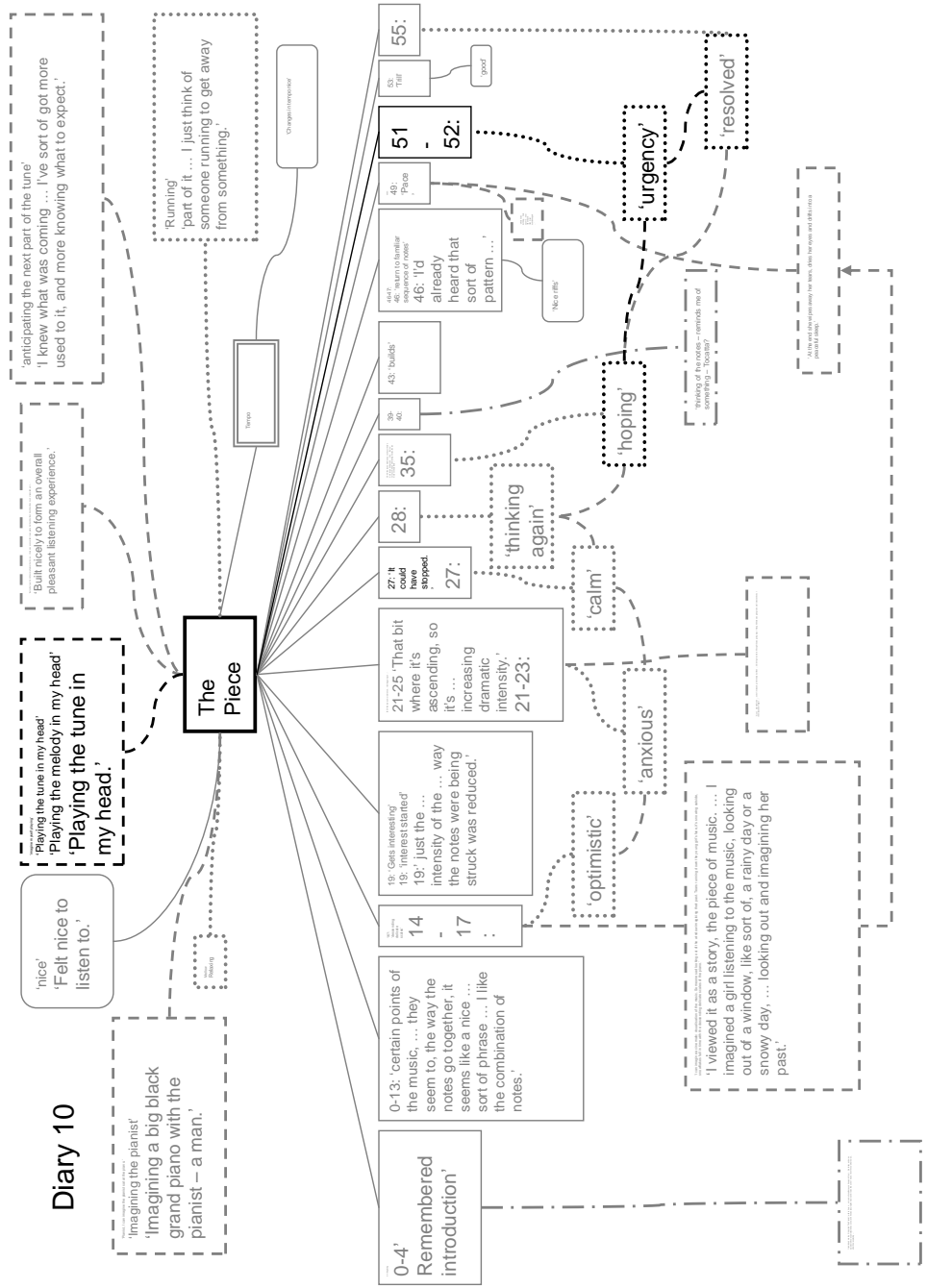
Schema 37 Clementi - Participant S: Diary 7



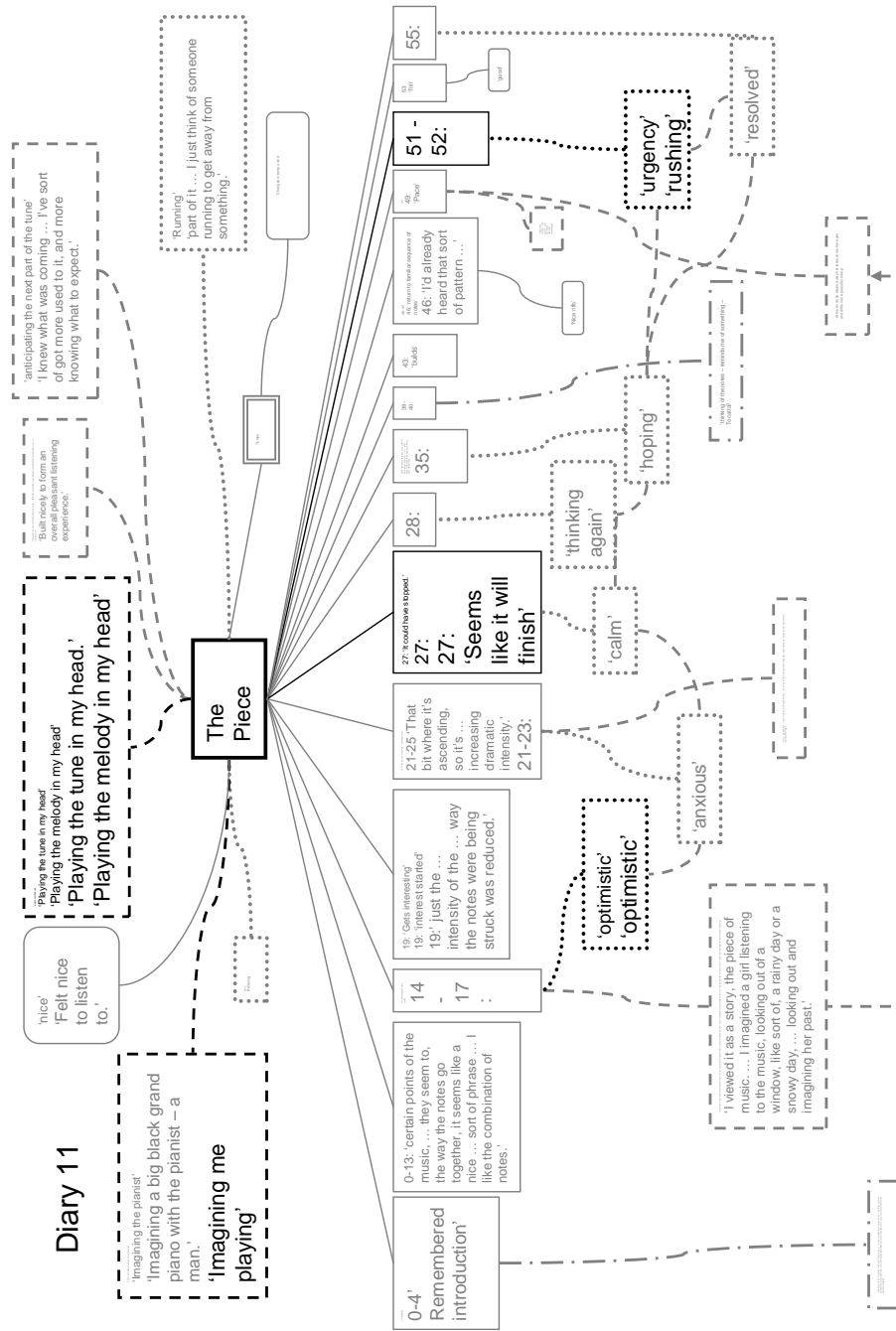
Schema 39 Clementi - Participant S: Diary 9



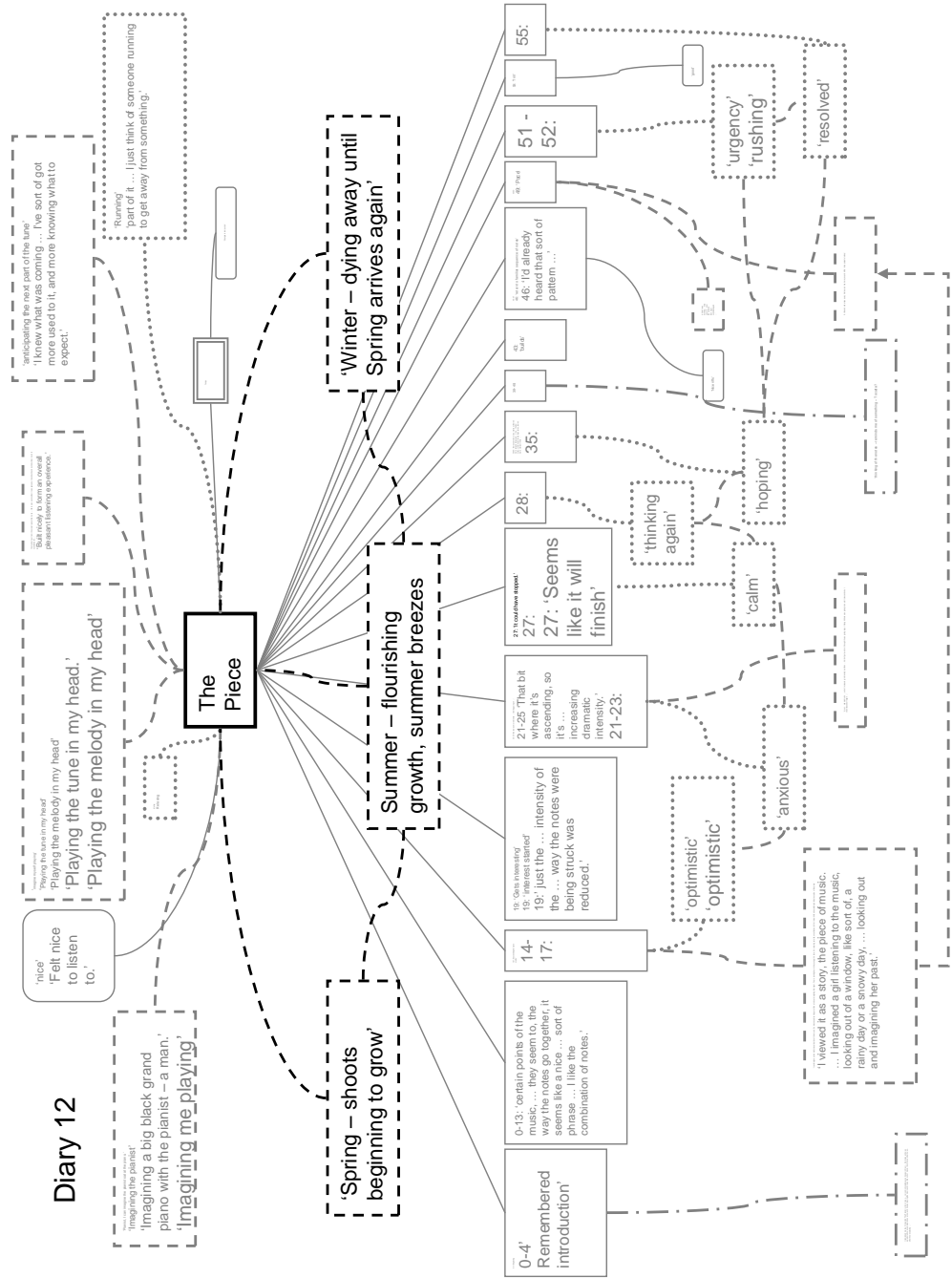
Schema 40 Clementi - Participant S: Diary 10



Schema 41 Clementi - Participant S: Diary 11



Schema 42 Clementi - Participant S: Diary 12

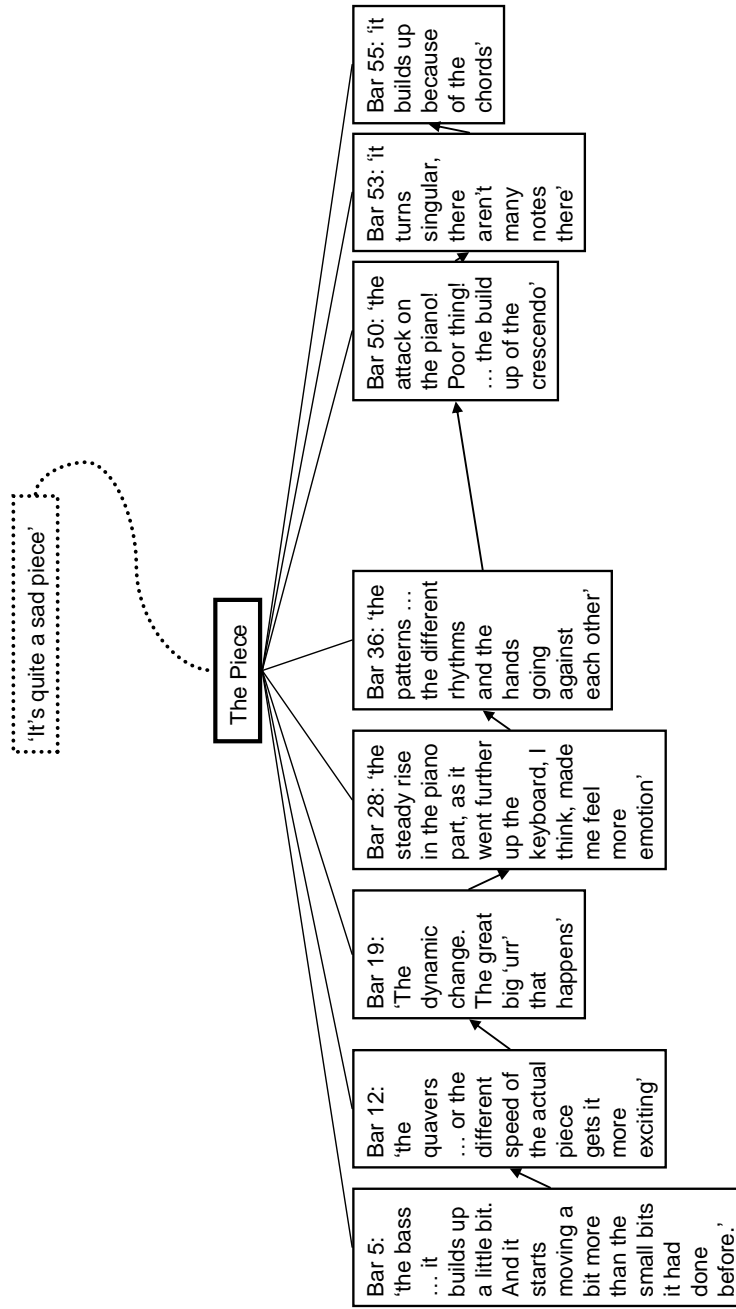


Appendix 5

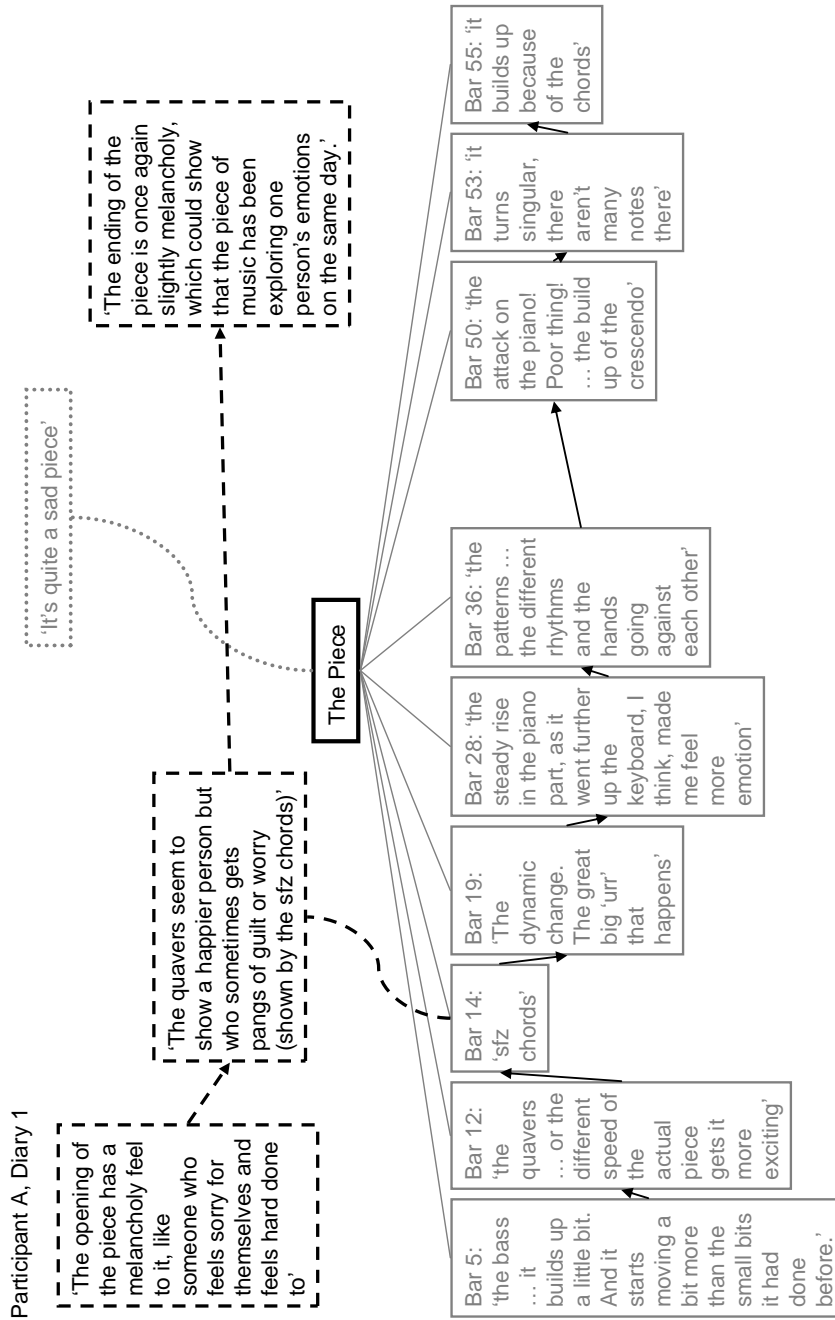
Schemata: Responses to Schoenberg

Schema 44 Schoenberg - Participant A: Interview

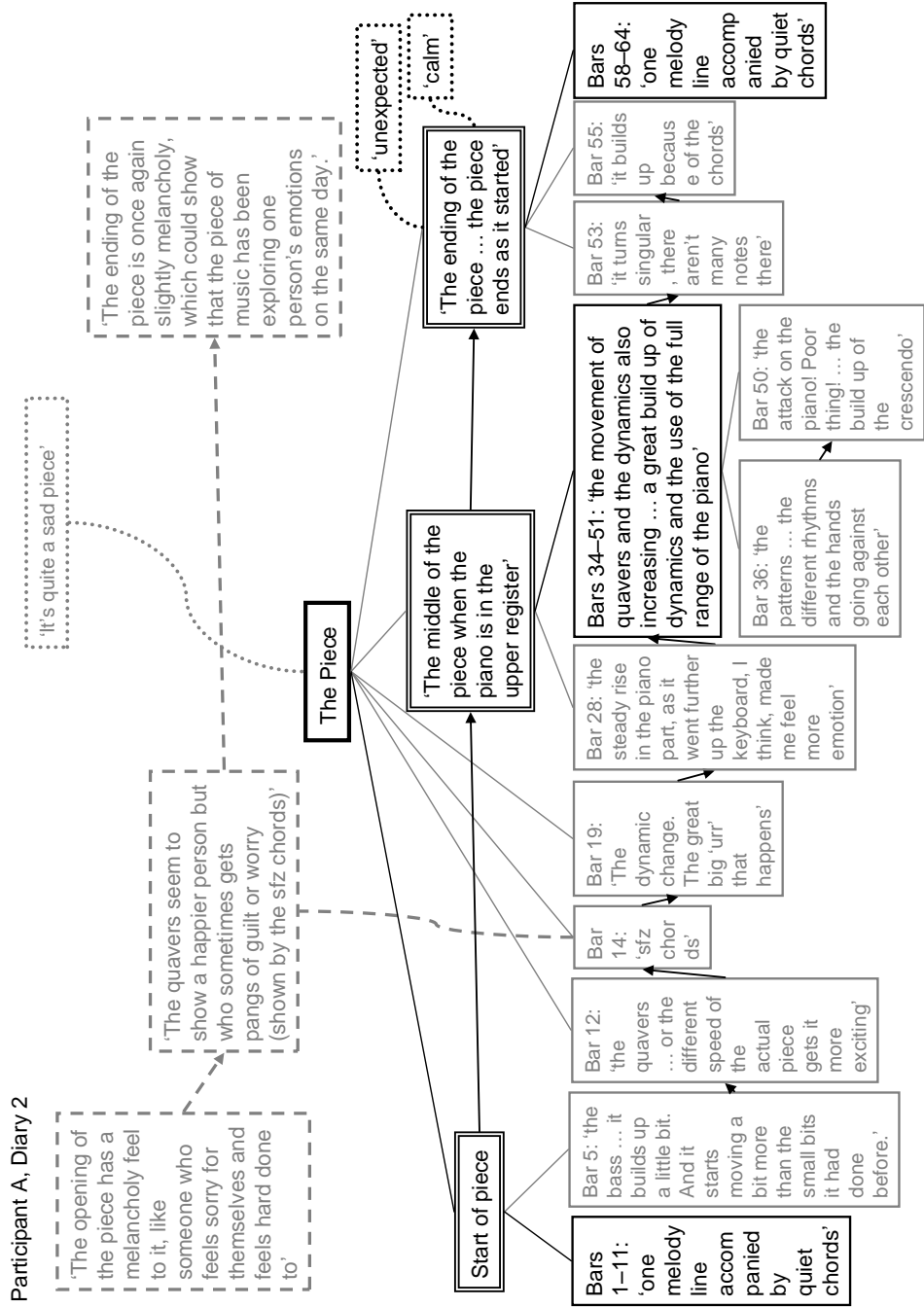
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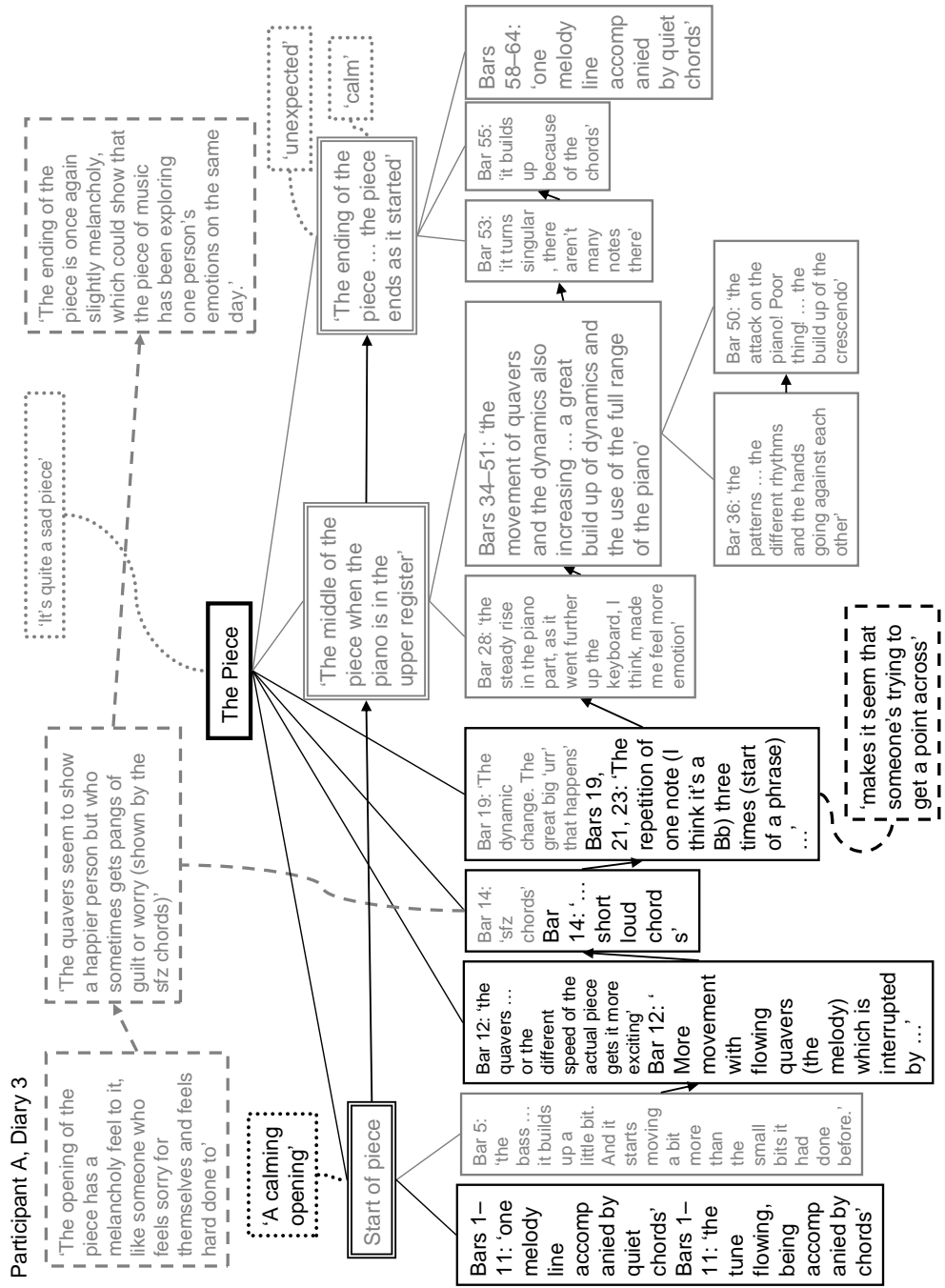
Schema 45 Schoenberg - Participant A: Diary 1



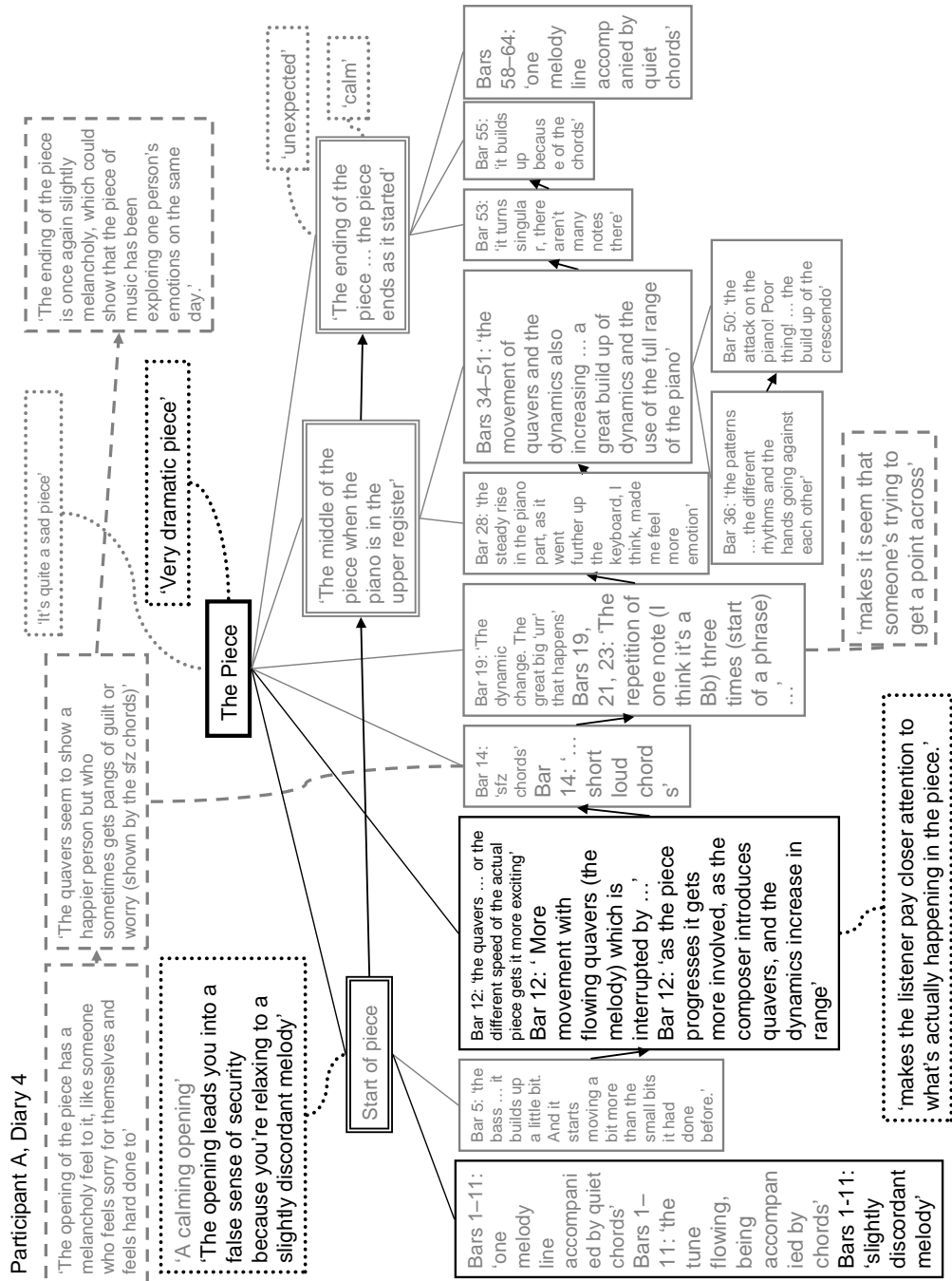
Schema 46 Schoenberg - Participant A: Diary 2



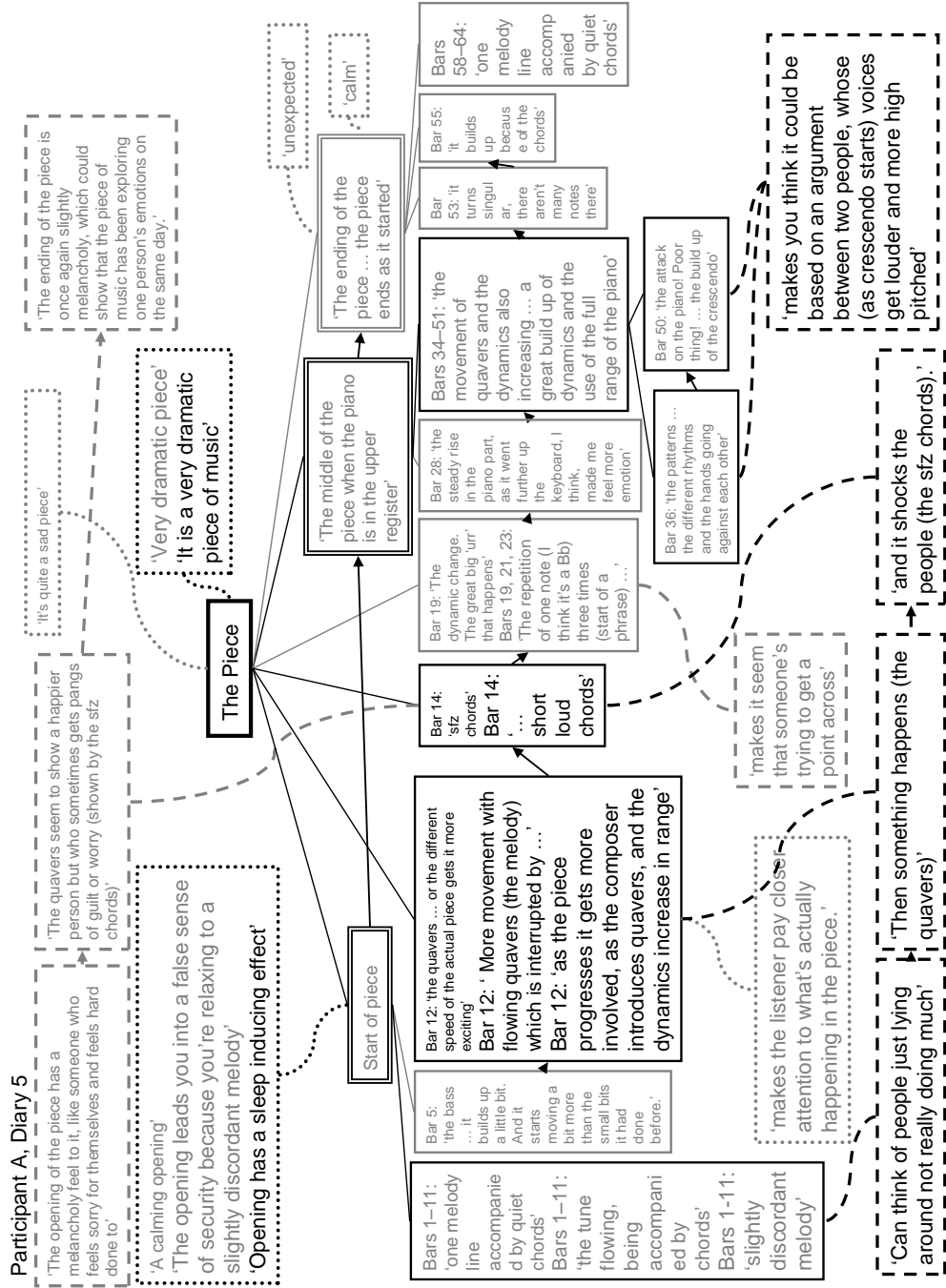
Schema 47 Schoenberg - Participant A: Diary 3



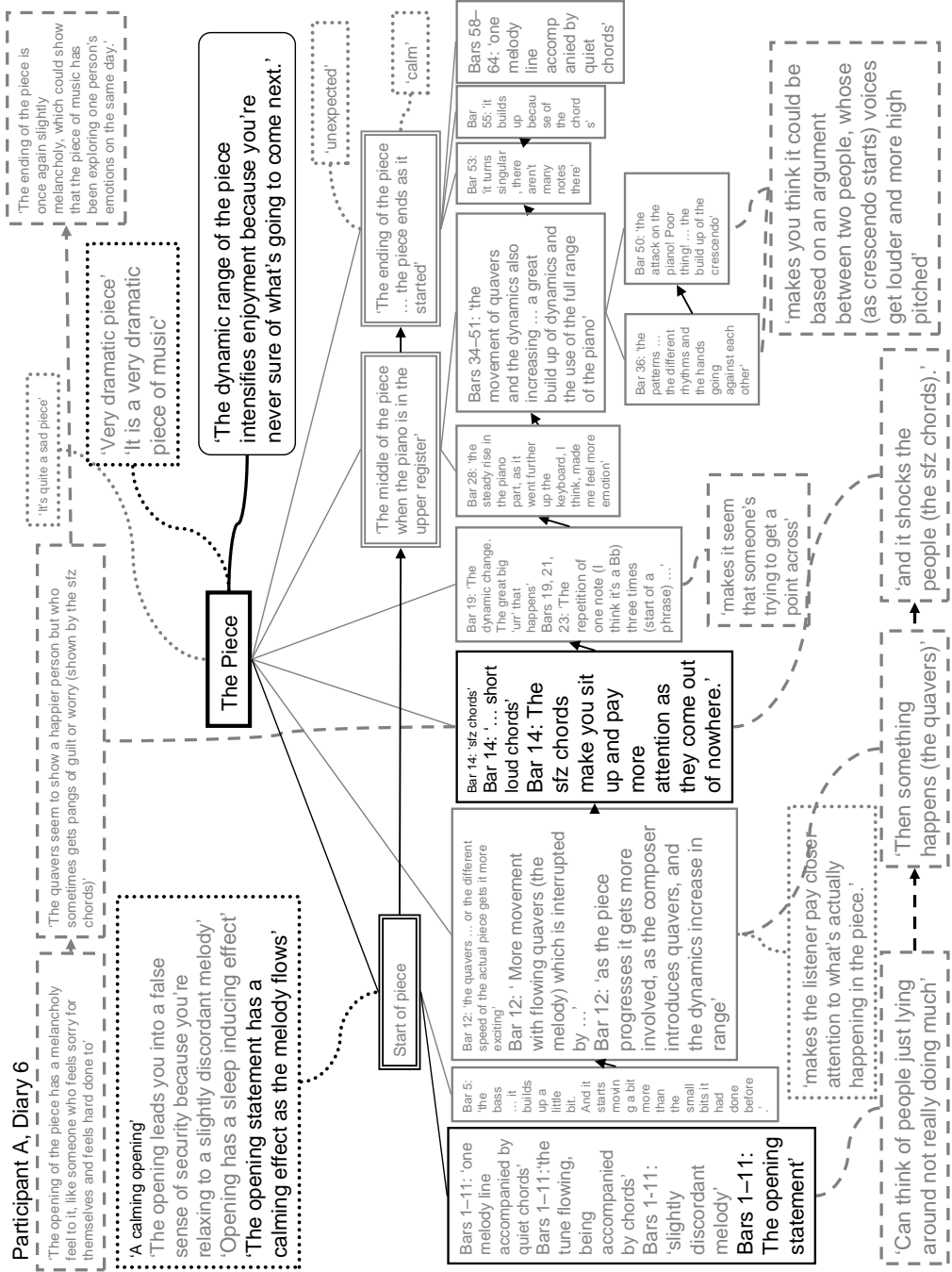
Schema 48 Schoenberg - Participant A: Diary 4



Schema 49 Schoenberg - Participant A: Diary 5

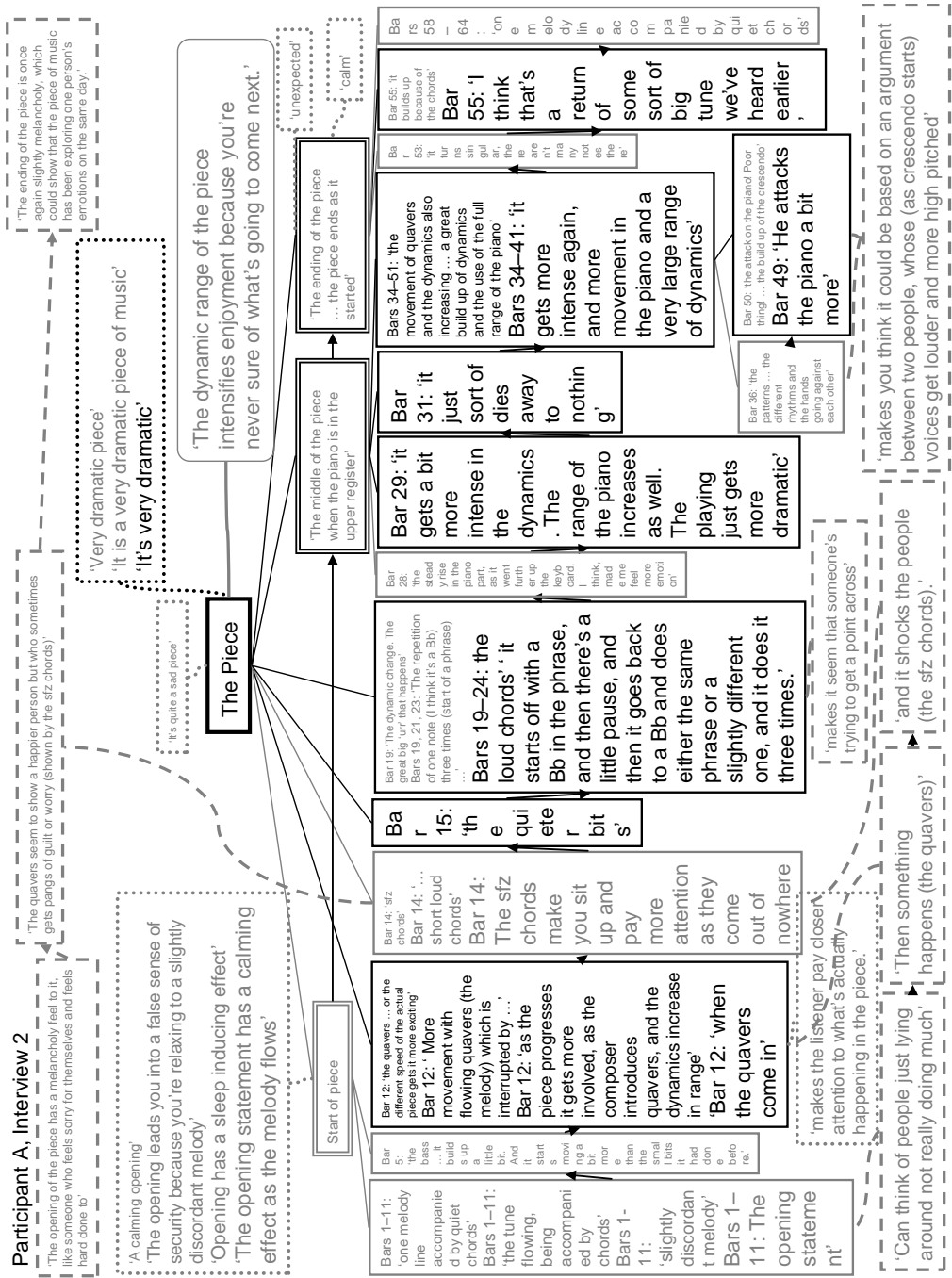


Schema 50 Schoenberg - Participant A: Diary 6

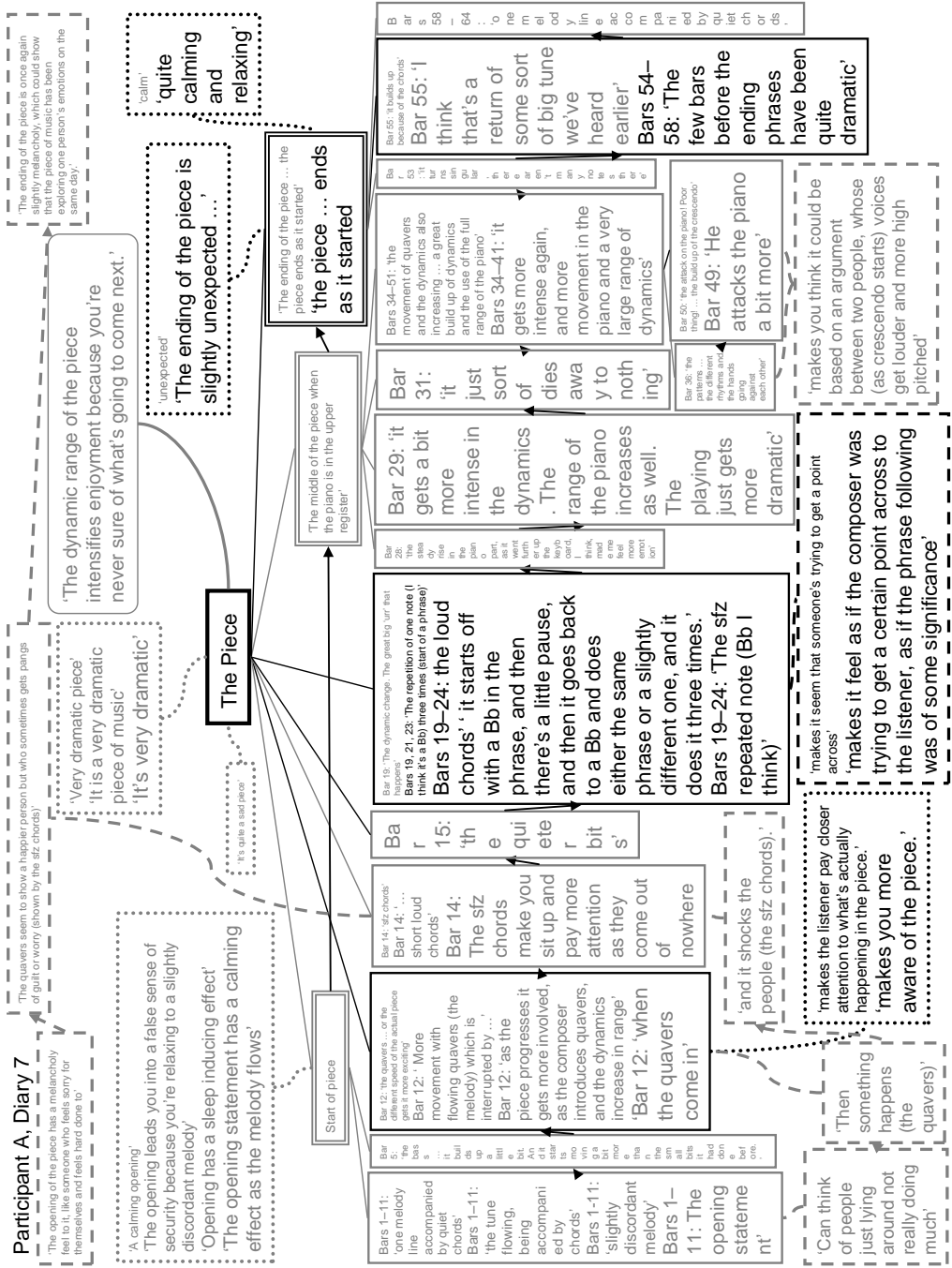


Schema 51 Schoenberg - Participant A: Interview

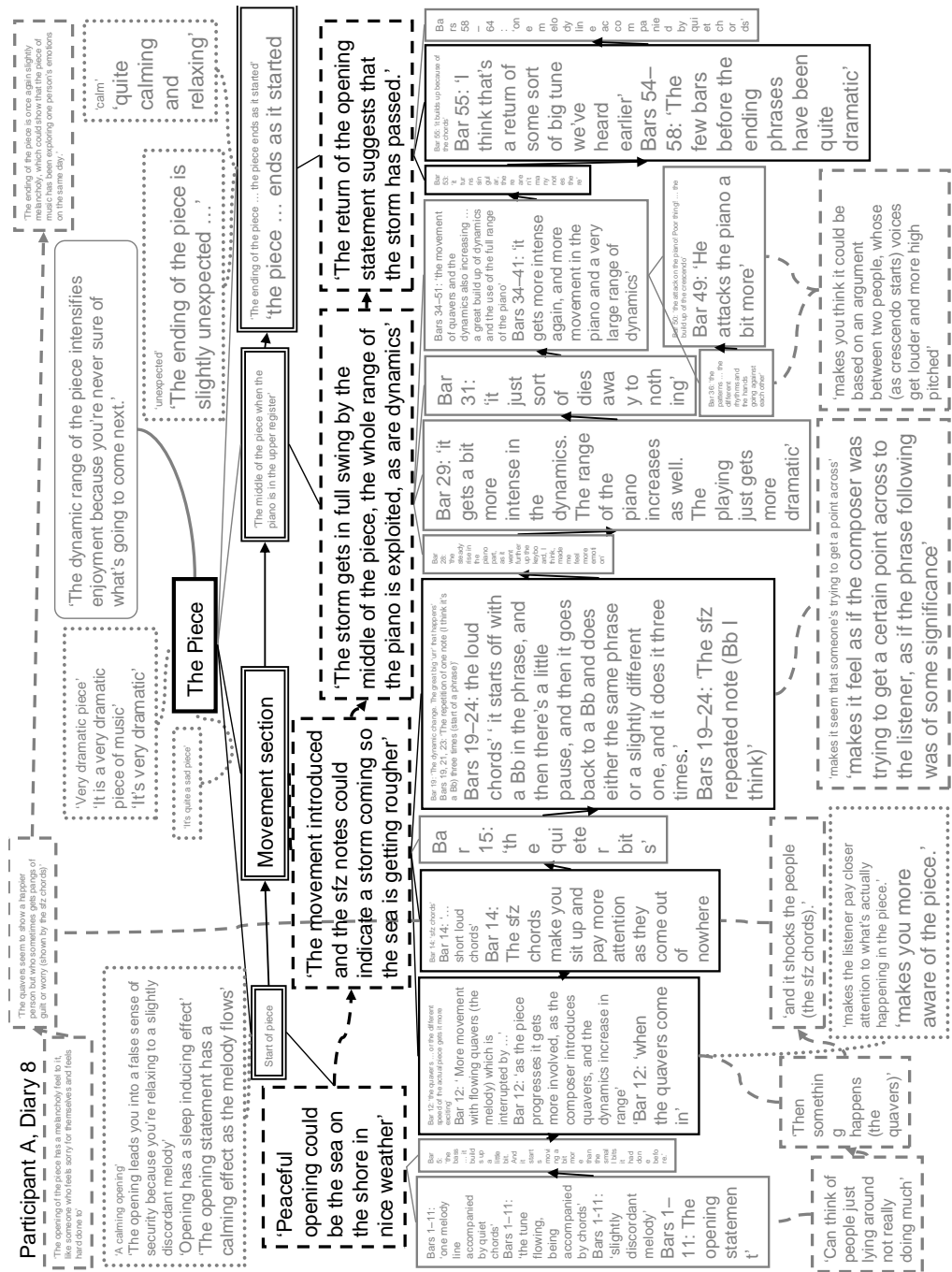
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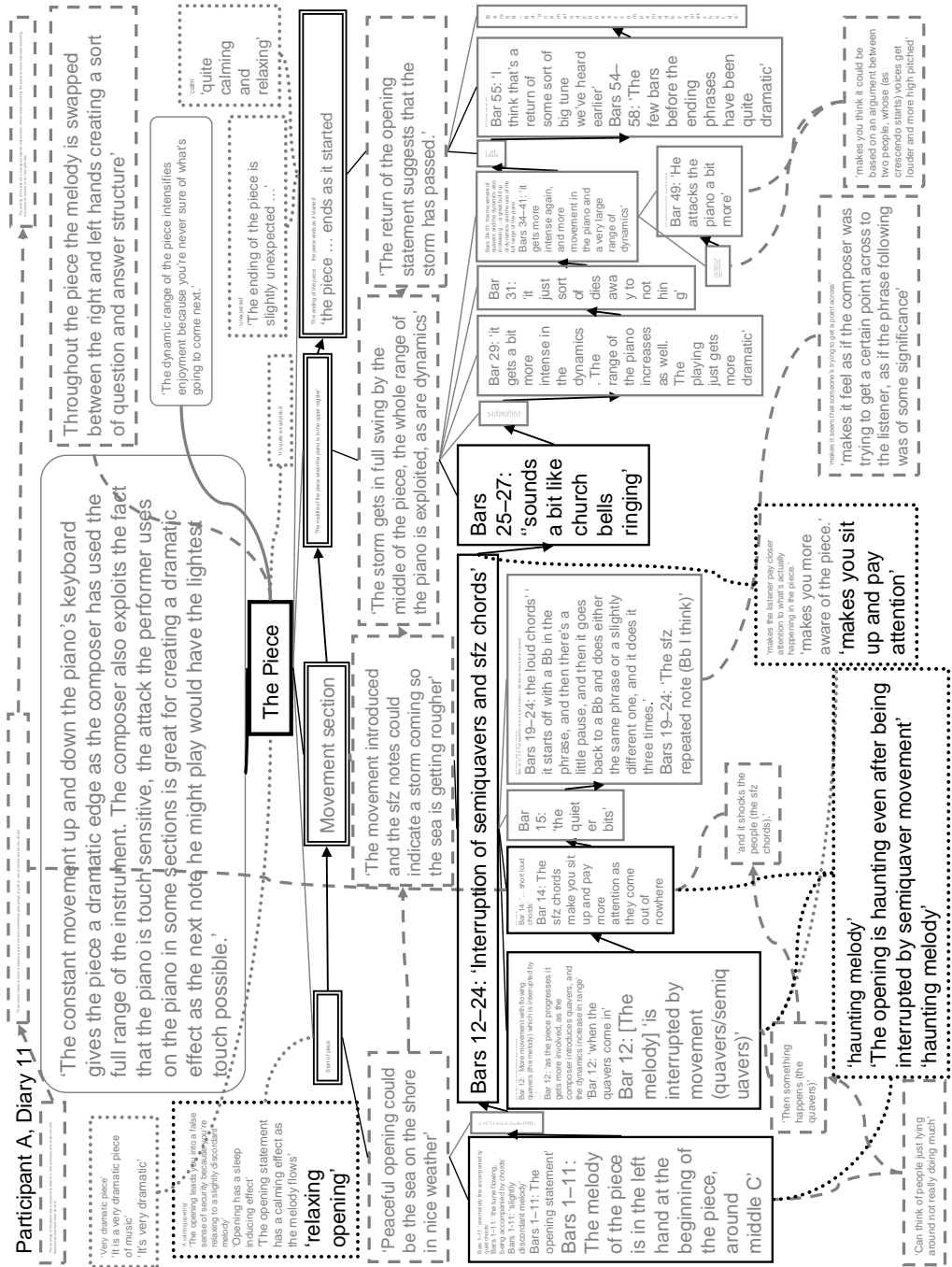
Schema 52 Schoenberg - Participant A: Diary 7



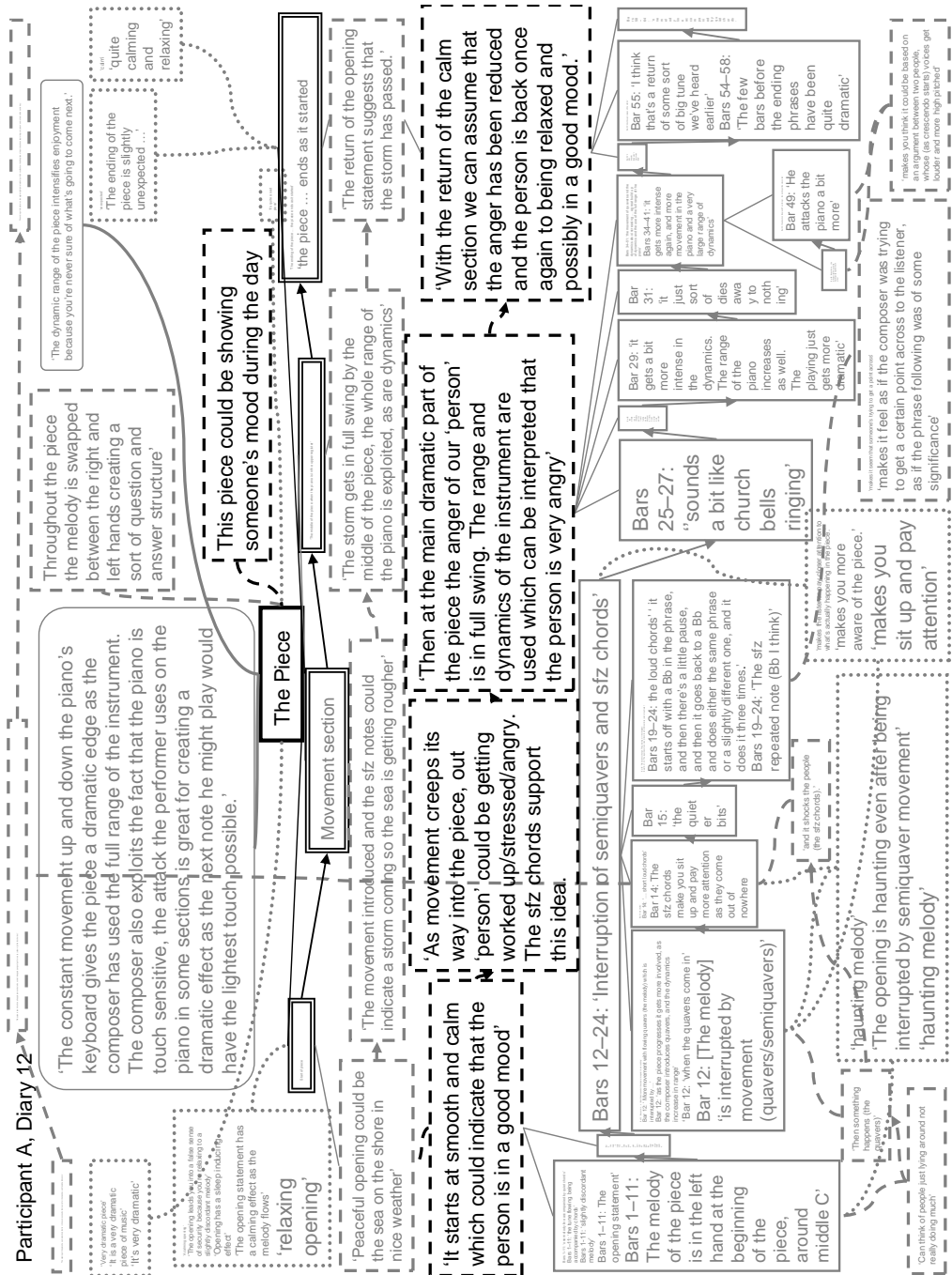
Schema 53 Schoenberg - Participant A: Diary 8



Schema 56 Schoenberg - Participant A: Diary 11

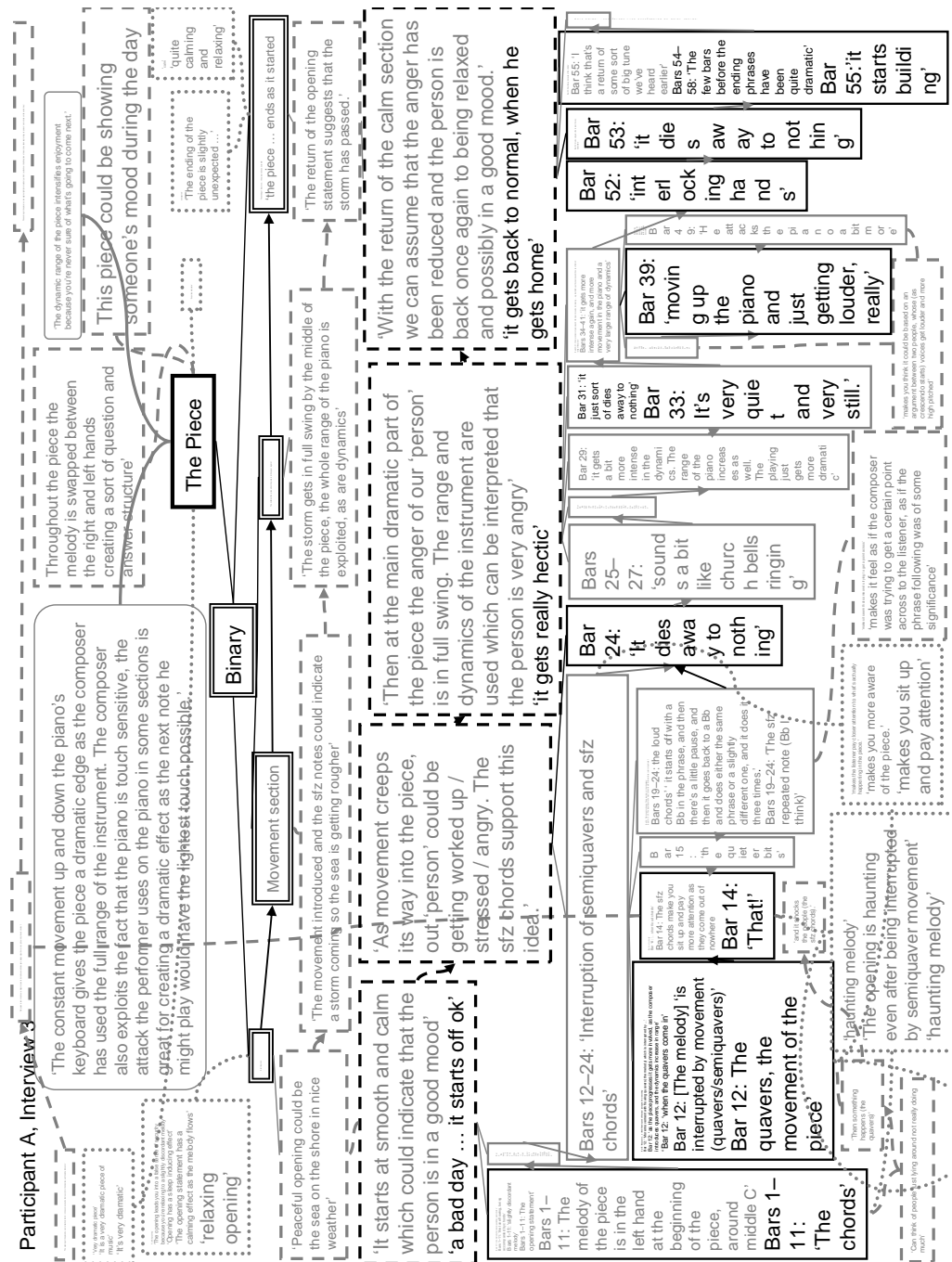


Schema 57 Schoenberg - Participant A: Diary 12

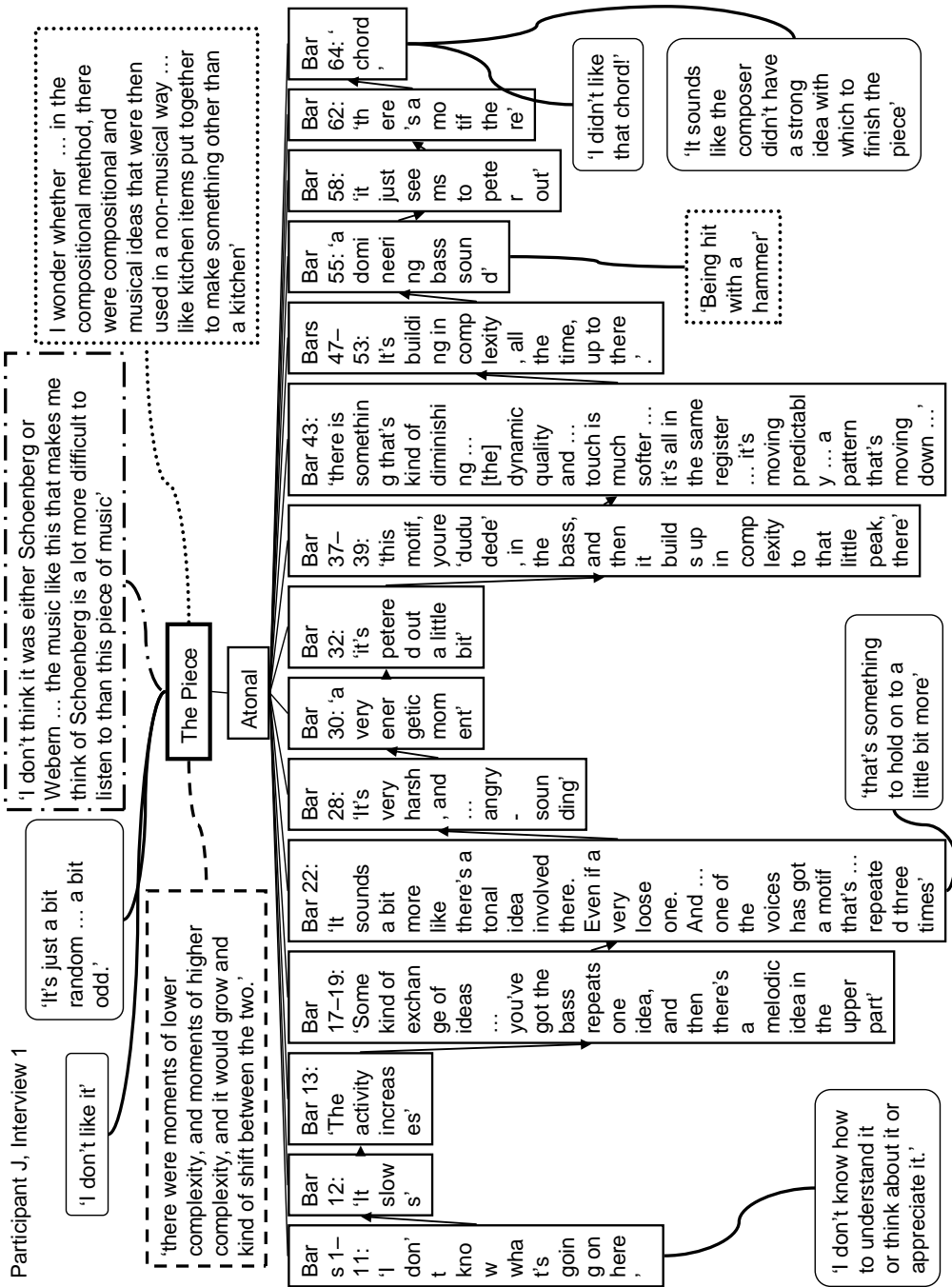


Schema 58 Schoenberg - Participant A: Interview

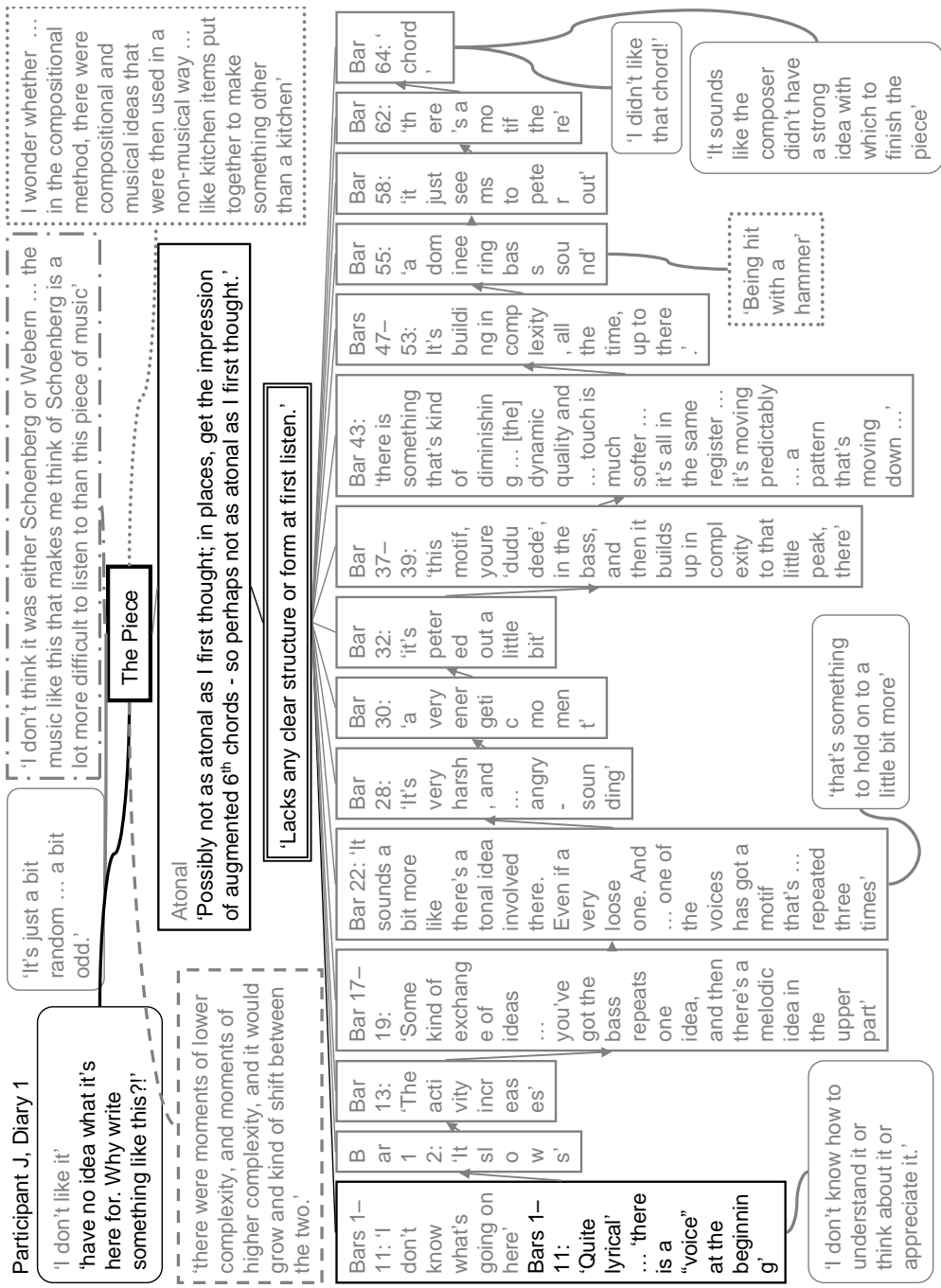
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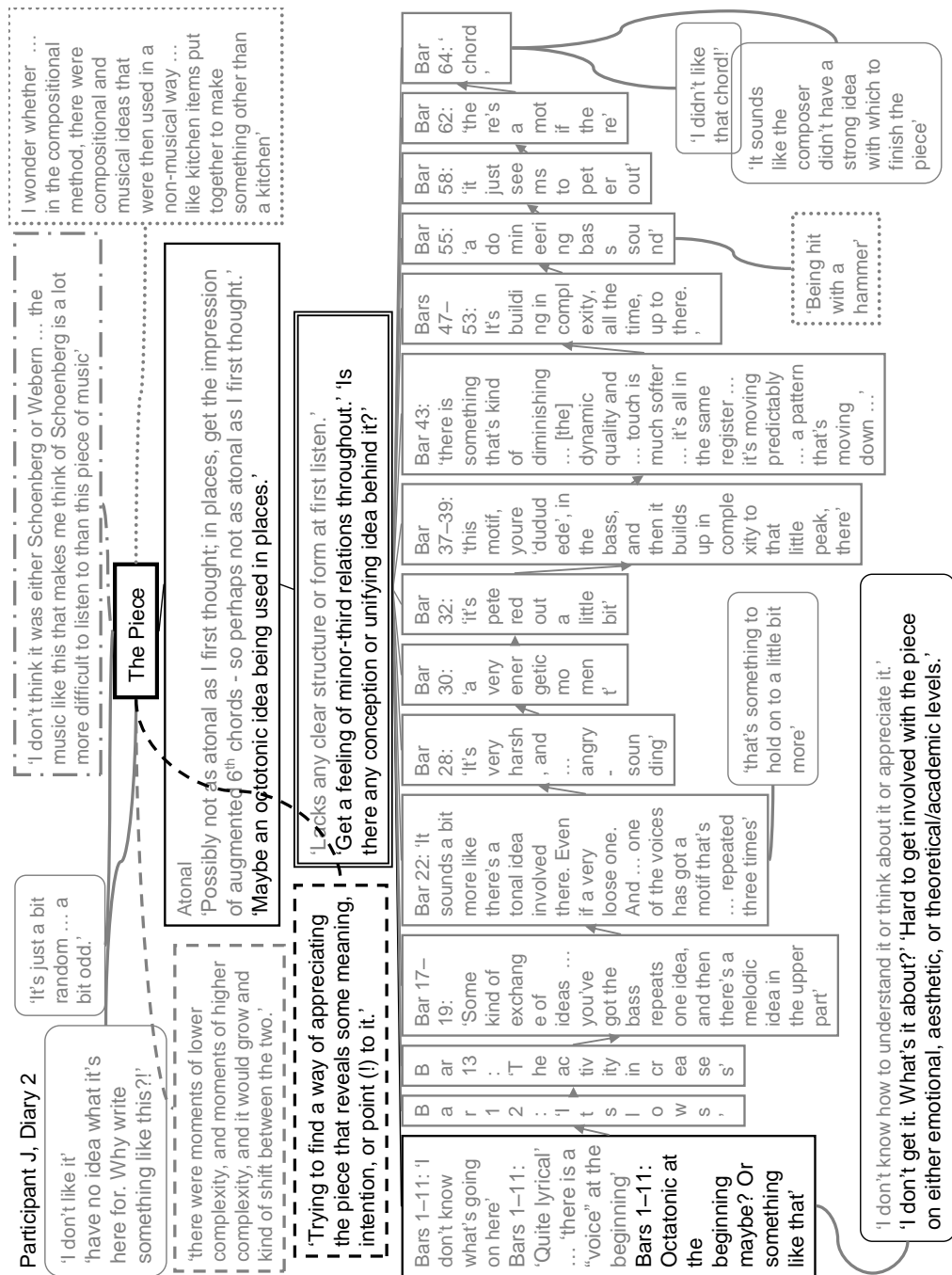
Schema 59 Schoenberg - Participant J: Interview 1



Schema 60 Schoenberg - Participant J: Diary 1



Schema 61 Schoenberg - Participant J: Diary 2



Schema 62 Schoenberg - Participant J: Diary 3

Participant J, Diary 3

'I don't like it' 'have no idea what it's here for. Why write something like this?!'

'It's just a bit random ... a bit odd.'

The Piece

'I don't think it was either Schoenberg or Webern ... the music like this that makes me think of Schoenberg is a lot more difficult to listen to than this piece of music'

'Too odd to be Ravel but seems like there are bits which could be. Similar chromaticism. But lacking in an overtly pianistic style and relatively strong themes. So no. And not Webern and Schoenberg - this is more modern I think. Post-2nd Viennese school. Post early C20th. Perhaps the interwar period - 1920-1940? I'm going for 1932!'

'I wonder whether ... in the compositional method, there were compositional and musical ideas that were then used in a non-musical way ... like kitchen items put together to make something other than a kitchen.'

'After a while, it just becomes boring'

'Lacks any clear structure or form at first listen.'

'Get a feeling of minor-third relations throughout.'

'Is there any conception or unifying idea behind it?'

'That's something to hold on to a little bit more'

'That sounds like the composer didn't have a strong idea with which to finish the piece'

'Being hit with a hammer'

'I don't know how to understand it or think about it or appreciate it.'

'I don't get it. What's it about?'

'Hard to get involved with the piece on either emotional, aesthetic, or theoretical/academic levels.'

Bars 1-11: 'I don't know what's going on here'

Bars 1-11: 'Quite lyrical' ... 'there is a "voice" at the beginning'

Bars 1-11: Octatonic at the beginning maybe? Or something like that'

Bar 13: 'The activity increases'

Bar 17-19: 'Some kind of exchange of ideas ... you've got the bass repeats one idea, and then there's a melodic idea in the upper part'

Bars 17-19: 'two ideas: 1 Loud and abrupt, 2 soft'

'Could be two people or two attitudes. But that would be stretching things a bit, because neither says anything!'

Bar 22: 'It sounds a bit more like there's a tonal idea involved there. Even if a very loose one. And ... one of the voices has got a motif that's ... repeated three times'

'that's something to hold on to a little bit more'

Bar 28: 'It's very harsh, and ... rhythmic motif'

Bar 30: 'a very energetic moment'

Bar 32: 'it's pepped up a little bit'

Bar 37-39: 'this motif, your "dudud" in the bass, and then it builds up in complexity to that little peak, there'

Bar 43: 'there is something of diminishing dynamic quality and much softer ... it's all in the same register ... it's moving predictably ... a pattern that's moving down ...'

Bars 47-53: 'building in complexity, all the time, there'

Bar 55: 'a dominant ending'

Bar 58: 'it just seems to peter out'

'I didn't like that chord!'

Bar 62: 'the rest of the motif'

Bar 64: 'chord'

Schema 63 Schoenberg - Participant J: Diary 4

Participant J, Diary 4

'I don't like it'
'have no idea what it's here for. Why write something like this?!'
'Seriously wondering why someone would write something like this. It's not pleasant to listen to. It doesn't excite the senses, except to make you want to recoil in discomfort. It doesn't readily portray anything immediately. It doesn't obviously represent any abstract idea ... Who listens to this?'

'Trying to find a way of appreciating the piece that reveals some meaning, intention, or point (!) to it.'
'Finding the lack of direction quite annoying'

The Piece
'there were moments of lower complexity, and moments of higher complexity, and it would grow and kind of shift between the two.'
'It's just a bit random... a bit odd.'

Atonal
'Possibly not as atonal as I first thought; in places, augmented 6th chords - so perhaps not as atonal as I first thought.'
'Maybe an octotonic idea being used in places.'

'I don't think it was either Schoenberg or Webern ... the music like this that makes me think of Schoenberg is a lot more difficult to listen to than this piece of music'
'Too odd to be Ravel but seems like there are bits which could be. Similar chromaticism. But lacking in an overtly pianistic style and relatively strong themes. So no. And not Webern and Schoenberg - this is more modern I think. Post-2nd Viennese school. Post early C20th. Perhaps the interwar period - 1920-1940? I'm going for 1932!'

'After a while, it just becomes boring'
'Not prepared to listen hard to this music and give it full attention. I'm quite tired and would like to relax. This music doesn't help.'

'I wonder whether ... in the compositional method, there were compositional and musical ideas that were then used in a non-musical way ... like kitchen items put together to make something other than a kitchen'

'Lacks any clear structure or form at first listen.'
'Get a feeling of minor-third relations throughout. 'Is there any conception or unifying idea behind it?'

Bar 1-11: 'I don't know what's going on here'
Bars 1-11: 'Quite lyrical' ... 'there is a "voice" at the beginning'
Bars 1-11: 'Octatonic at the beginning maybe? Or something like that'

Bar 13: 'The act of inviting someone to sit down'
'Beginning section, if isolated and recapitulated, could be Ravel'
'don't know how to understand it or think about it or appreciate it.'
'I don't get it. What's it about?' 'Hard to get involved with the piece on either emotional, aesthetic, or theoretical/academic levels.'

Bar 17-19: 'Some kind of exchange of ideas ... you've got the bass repeats one idea, and then there's a melodic idea in the upper part'
Bars 17-19: 'two ideas: 1 Loud and abrupt, 2 soft'
'Could be two people or two attitudes. But that would be stretching things a bit, because neither says anything!'
'that's something to hold on to a little bit more'

Bar 22: 'It sounds a bit more like there's a tonal idea involved there. Even if a very loose one. And ... one of the voices has got a motif that's ... repeated three times'

Bar 28: 'It's very harsh and ... angry ... the sound is ...'
Bar 30: 'it's very energetic ...'
Bar 32: 'it's ... out and then it builds up in complexity to that little peak, there'

Bar 37-39: 'this motif, you'd include the bass, and then it builds up in complexity to that little peak, there'

Bar 43: 'there is something of that kind of [the] dynamic quality and ... touch is much softer ... it's all in the same register ... it's moving predictably ... that's moving down ...'

Bars 47-53: 'It's building in complexity, all the time, up to there.'

Bar 55: 'a diminishing ... touch is much softer ... it's all in the same register ... it's moving predictably ... that's moving down ...'

Bar 58: 'it's just ...'
Bar 62: 'the ...'
Bar 64: 'the ...'

'I didn't like that chord!'
'It sounds like the composer didn't have a strong idea with which to finish the piece'

Schema 64 Schoenberg - Participant J: Interview 2

Participant J, Interview 2

'I don't like it'
'have no idea what it's here for. Why write something like this?'

'Seriously wondering why someone would write something like this. It's not pleasant to listen to. It doesn't excite the senses, except to make you want to recoil in discomfort. It doesn't readily portray anything immediately. It doesn't obviously represent any abstract idea ... Who listens to this?'

'Trying to find a way of appreciating the piece that reveals some meaning, intention, or point (!) to it.'
'Finding the lack of direction quite annoying'

The Piece

'there were moments of lower complexity, and moments of higher complexity, and it would grow and kind of shift between the two.'

'Possibly not as atonal as I first thought; in places, get the impression of augmented 6th chords - so perhaps not as atonal as I first thought.'
'Maybe an octatonic idea being used in places.'

'After a while, it just becomes boring'
'Not prepared to listen hard to this music and give it full attention. I'm quite tired and would like to relax. This music doesn't help.'

'I don't think it was either Schoenberg or Webern ... the music like this that makes me think of Schoenberg is a lot more difficult to listen to than this piece of music'
'Too odd to be Ravel but seems like there are bits which could be. Similar chromaticism. But lacking in an overtly pianistic style and relatively strong themes. So no. And not Webern and Schoenberg - this is more modern I think. Post-2nd Viennese school. Post early C20th. Perhaps the interval $\frac{11}{8}$... 1920-1930? I'm going for 1932!'

I wonder whether ... in the compositional method, there were musical ideas that were then used in a non-musical way ... like kitchen items put together to make something other than a kitchen'

'Lacks any clear structure or form at first listen.'
'Get a feeling of minor-third relations throughout. 'Is there any conception or unifying idea behind it?'

Bar 1-11: 'I don't know what's going on here'
Bars 1-11: 'Quite lyrical' ... 'there is a "voice" at the beginning'

Bar 12: 'This happens'

Bar 13: 'The activity increases'

Bar 17-19: 'Some kind of exchange of ideas ... you've got the bass repeats one idea, and then there's a melodic idea in the upper part'

Bars 17-19: 'two ideas: 1 Loud and abrupt, 2 soft'

Bar 19: 'rhythmic motifs that don't continue'

'Could be two people or two attitudes. But that would be stretching things a bit, because neither says anything!'

Bar 22: 'It sounds a bit more like there's a tonal idea involved there. Even if a very loose one. And ... one of the voices has got a motif that's ... repeated three times'

Bar 28: 'It's very harsh, angry-sounding'

Bar 30: 'a very energetic moment'

Bar 28-30: 'that phrase ... comes up three times ... it does it again, and then it, like, moves down, ... it's made into a motif'

Bar 32: 'it's petered out a little bit'

Bar 32: 'it's really hammering out the notes ... it's getting faster'

Bar 37-39: 'this motif, you're "duudee", in the bass, and then it builds up in complexity to that little peak, there'

Bar 39: 'it gets more complex ... he's really hammering out the notes ... it's getting faster'

Bar 43: 'there's something that's kind of diminishing ... (the) dynamic touch is much softer ... it's all in the same register ... it's moving predictably ... a pattern that's moving down ...'

Bar 43: 'It's gentle, and then you get this big loud crash'

Bar 55: 'a dominating bass sound'

Bar 55: 'it's got this motif there's a sequence of some sort'

Bar 55: 'I didn't like that chord!'

'It sounds like the composer didn't have a strong idea with which to finish the piece'

'Beginning section, if isolated and recapitulated, could be Ravel'
'it reminds me a bit of some Ravel'

'I don't know how to understand it or think about it or appreciate it.'
'I don't get it. What's it about?'

'Hard to get involved with the piece on either emotional, aesthetic, or theoretical/academic levels.'
'I don't get it'

Schema 65 Schoenberg - Participant J: Diary 5

Participant J, Diary 5

'I don't like it' have no idea what it's here for. Why write something like this? 'Seriously wondering why someone would write something like this. It's not pleasant to listen to. It doesn't excite the senses, except to make you want to recoil in discomfort. It doesn't readily portray anything immediately. It doesn't obviously represent any abstract idea ... Who listens to this?

'Trying to find a way of appreciating the piece that reveals some meaning, intention, or point (!) to it.' 'Finding the lack of direction quite annoying.'

Bar 12: 'This happens' Bar 13: 'The melody' Bar 14: 'The melody' Bar 15: 'The melody' Bar 16: 'The melody' Bar 17: 'The melody' Bar 18: 'The melody' Bar 19: 'The melody' Bar 20: 'The melody' Bar 21: 'The melody' Bar 22: 'The melody' Bar 23: 'The melody' Bar 24: 'The melody' Bar 25: 'The melody' Bar 26: 'The melody' Bar 27: 'The melody' Bar 28: 'The melody' Bar 29: 'The melody' Bar 30: 'The melody' Bar 31: 'The melody' Bar 32: 'The melody' Bar 33: 'The melody' Bar 34: 'The melody' Bar 35: 'The melody' Bar 36: 'The melody' Bar 37: 'The melody' Bar 38: 'The melody' Bar 39: 'The melody' Bar 40: 'The melody' Bar 41: 'The melody' Bar 42: 'The melody' Bar 43: 'The melody' Bar 44: 'The melody' Bar 45: 'The melody' Bar 46: 'The melody' Bar 47: 'The melody' Bar 48: 'The melody' Bar 49: 'The melody' Bar 50: 'The melody' Bar 51: 'The melody' Bar 52: 'The melody' Bar 53: 'The melody' Bar 54: 'The melody' Bar 55: 'The melody' Bar 56: 'The melody' Bar 57: 'The melody' Bar 58: 'The melody' Bar 59: 'The melody' Bar 60: 'The melody' Bar 61: 'The melody' Bar 62: 'The melody' Bar 63: 'The melody' Bar 64: 'The melody' Bar 65: 'The melody' Bar 66: 'The melody' Bar 67: 'The melody' Bar 68: 'The melody' Bar 69: 'The melody' Bar 70: 'The melody' Bar 71: 'The melody' Bar 72: 'The melody' Bar 73: 'The melody' Bar 74: 'The melody' Bar 75: 'The melody' Bar 76: 'The melody' Bar 77: 'The melody' Bar 78: 'The melody' Bar 79: 'The melody' Bar 80: 'The melody' Bar 81: 'The melody' Bar 82: 'The melody' Bar 83: 'The melody' Bar 84: 'The melody' Bar 85: 'The melody' Bar 86: 'The melody' Bar 87: 'The melody' Bar 88: 'The melody' Bar 89: 'The melody' Bar 90: 'The melody' Bar 91: 'The melody' Bar 92: 'The melody' Bar 93: 'The melody' Bar 94: 'The melody' Bar 95: 'The melody' Bar 96: 'The melody' Bar 97: 'The melody' Bar 98: 'The melody' Bar 99: 'The melody' Bar 100: 'The melody'

Bar 17-19: 'Some kind of exchange of ideas ... you've got the bass repeats one idea, and then there's a melodic idea in the upper part' Bars 17-19: 'two ideas: 1 Loud and abrupt, 2 soft' Bar 19: 'rhythmic motifs that don't continue'

'Could be two people or two attitudes. But that would be stretching things a bit, because neither says anything!'

'Beginning section, if isolated and recapitulated, could be Ravel' 'it reminds me a bit of some Ravel'

'I don't know how to understand it or think about it or appreciate it.' 'I don't get it. What's it about?' 'Hard to get involved with the piece on either emotional, aesthetic, or theoretical/academic levels.' 'I don't get it'

Bar 22: 'It sounds a bit more like there's a tonal idea involved there. Even if a very loose one. And ... one of the voices has got a motif that's ... repeated three times'

Bar 28: 'It's very harsh, and "agony, standing" that's something to hold on to a little bit more'

Bar 30: 'a very energetic moment' 'Being hit with a hammer'

Bar 32: 'It's a little bit complex ... it gets more complex ... he's really hammering out the notes ... it's getting faster'

Bar 37-39: 'this motif, your dududee ... in the bass, and then it builds up in complexity to that little peak, there Bar 39: 'it gets more complex ... he's really hammering out the notes ... it's getting faster'

Bar 43: 'there is something that's kind of diminishing ... the dynamic quality and ... touch is much softer ... register ... it's moving predictably ... a pattern that's moving down ... Bar 43: 'it's gentle, and then you get this big loud crash'

Bar 55: 'a diminished bass sound' Bar 55: 'it's got this motif ... there's a sequence of some sort'

'I didn't like that chord!'

'It sounds like the composer didn't have a strong idea with which to finish the piece'

'After a while, it just becomes boring' 'Not prepared to listen hard to this music and give it full attention. I'm quite tired and would like to relax. This music doesn't help.'

The Piece

'Perhaps it's not so abstract as I first thought. In places, get the impression of augmented 6th chords - so perhaps not as atonal as I first thought.' 'Perhaps it's not so abstract as I thought at first. There seems to be quite extensive use of rhythmic sequence and perhaps 'real' atonal sequences (if that means anything)' ... 'Although I recognize some of the motifs in sequence and evolving sometimes, I don't understand the intention behind the dynamic changes.'

'Lacks any clear structure or form at first listen.' 'Get a feeling of minor-third relations throughout.' 'Is there any conception or unifying idea behind it?'

'I don't think it was either Schoenberg or Webern ... the music like this that makes me think of Schoenberg is a lot more difficult to listen to than this piece of music'

'Too odd to be Ravel but seems like there are bits which could be. Similar chromaticism. But lacking in an overtly pianistic style and relatively strong themes. So ... no. And not Webern and Schoenberg - this is more modern I think. Post-2nd Viennese school. Post early C20th. Perhaps the interwar period. 1920-1940? I'm going for 1932!

I wonder whether ... in the compositional method, there were compositional and musical ideas that were then used in a non-musical way like kitchen items put together to make something other than a kitchen'

Schema 66 Schoenberg - Participant J: Diary 6

Participant J, Diary 6

'I don't like it'
 'have no idea what it's here for. Why write something like this?'
 'Seriously wondering why someone would write something like this. It's not pleasant to listen to. It doesn't excite the senses, except to make you want to recoil in discomfort. It doesn't obviously portray anything immediately. It doesn't obviously represent any abstract idea ... Who listens to this?'

'I seriously dislike this music. It is really uncomfortable and I think I enjoy it less and less each time I hear it.'

'Trying to find a way of appreciating the piece that reveals some meaning, intention, or point (I) to it.'
 'Finding the lack of direction quite annoying'

'there were moments of lower complexity and moments of higher complexity, and it would grow and kind of shift between the two.'

'Lacks any clear structure or form at first listen.'
 'Get a feeling of minor-third relations throughout.'
 'Is there any conception or unifying idea behind it?'

The Piece
 Atonal
 'Possibly not as atonal as I first thought; in places, get the impression of augmented 6th chords - so perhaps not as atonal as I first thought.'
 'Maybe an octotonic idea being used in places.'
 'Perhaps it's not so abstract as I thought at first. There seems to be quite extensive use of rhythmic sequence and perhaps 'real' atonal sequences (if that means anything!) ... Although I recognize some of the motifs in sequence and evolving sometimes, I don't understand the intention behind the dynamic changes.'

'I don't think it was either Schoenberg or Webern ... the music like this that makes me think of Schoenberg is a lot more difficult to listen to than this piece of music.'
 'Too odd to be Ravel but seems like there are bits which could be. Similar chromaticism. But lacking in an overtly pianistic style and relatively strong themes. So no. And not Webern and Schoenberg - this is more modern I think. Post-2nd Viennese school. Post early C20th. Perhaps the interwar period - 1920-1940? I'm going for 1932!'
 'I wonder whether ... in the compositional method, there were compositional and musical ideas that were then used in a non-musical way ... like kitchen items put together in a different way after than a kitchen?'

Bar 1-11: 'I don't know what's going on here'
 Bars 1-11: 'Quite lyrical ... there is a beginning'
 Bars 1-11: 'Octatonic at the beginning maybe? Or something like that'

Bar 12: 'This happens'
 Bar 12: 'It slows'
 Bar 13: 'The melody is very interesting'

Bar 17-19: 'Some kind of exchange of ideas ... you've got the bass repeats one idea, and then there's a pair of rhythmic ideas in the upper part'
 Bars 17-19: 'two ideas: 1 Loud and abrupt, 2 soft'
 Bar 19: 'rhythmic motifs that don't continue'

Bar 22: 'It sounds a bit more like there's a real idea involved there. Even if a very loose one. And the voices has got a motif that's repeated three times'

Bars 28-30: 'that phrase ... comes up three times ... it does it again, and then it, like, moves down, ... it's made into a motif'
 Bar 28: 'it's very harsh, and ... angry-sounding'
 Bar 30: 'a very energetic moment'

Bar 32: 'It's petered out a little bit'
 Bar 32: 'it gets more complex ... he's really hammering out the notes ... it's getting faster'

Bar 37-39: 'this motif, you're "duddude", in the bass, and then it builds up in the upper register ... it's a little bit more complex ... it's all in the same register ... it's moving predictably ... a pattern that's moving down ...'
 Bar 39: 'it gets more complex ... he's really hammering out the notes ... it's getting faster'

Bar 43: 'there is something that's kind of diminishing ... the dynamic touch is much softer ... it's all in the same register ... it's moving predictably ... a pattern that's moving down ...'
 Bar 43: 'it's gentle, and then you get this big loud crash'

Bar 47-53: 'It's kind of interesting in comparison with the earlier stuff ... it's all in the same register ... it's moving predictably ... a pattern that's moving down ...'
 Bar 47: 'It's kind of interesting in comparison with the earlier stuff ... it's all in the same register ... it's moving predictably ... a pattern that's moving down ...'

Bar 55: 'it's got this motif ... there's a sequence of some sort'

Bar 59-62: 'it's like the earlier stuff ... it's all in the same register ... it's moving predictably ... a pattern that's moving down ...'

Bar 65: 'a dominating bass sound'

'I don't like that chord!'
 'It sounds like the composer didn't have a strong idea with which to finish the piece'

'Being hit with a hammer'
 'Almost painful to have my ears abused by someone hitting a piano with a hammer (that's what it sounds like in places). Does sound like I'm being stabbed in the ear sometimes.'

'That's something to hold on to a little bit more'
'There's precious little for the ear to hold on to, nothing pleasing.'

'Could be two people or two attitudes. But that I would be stretching things a bit, because neither says anything!'

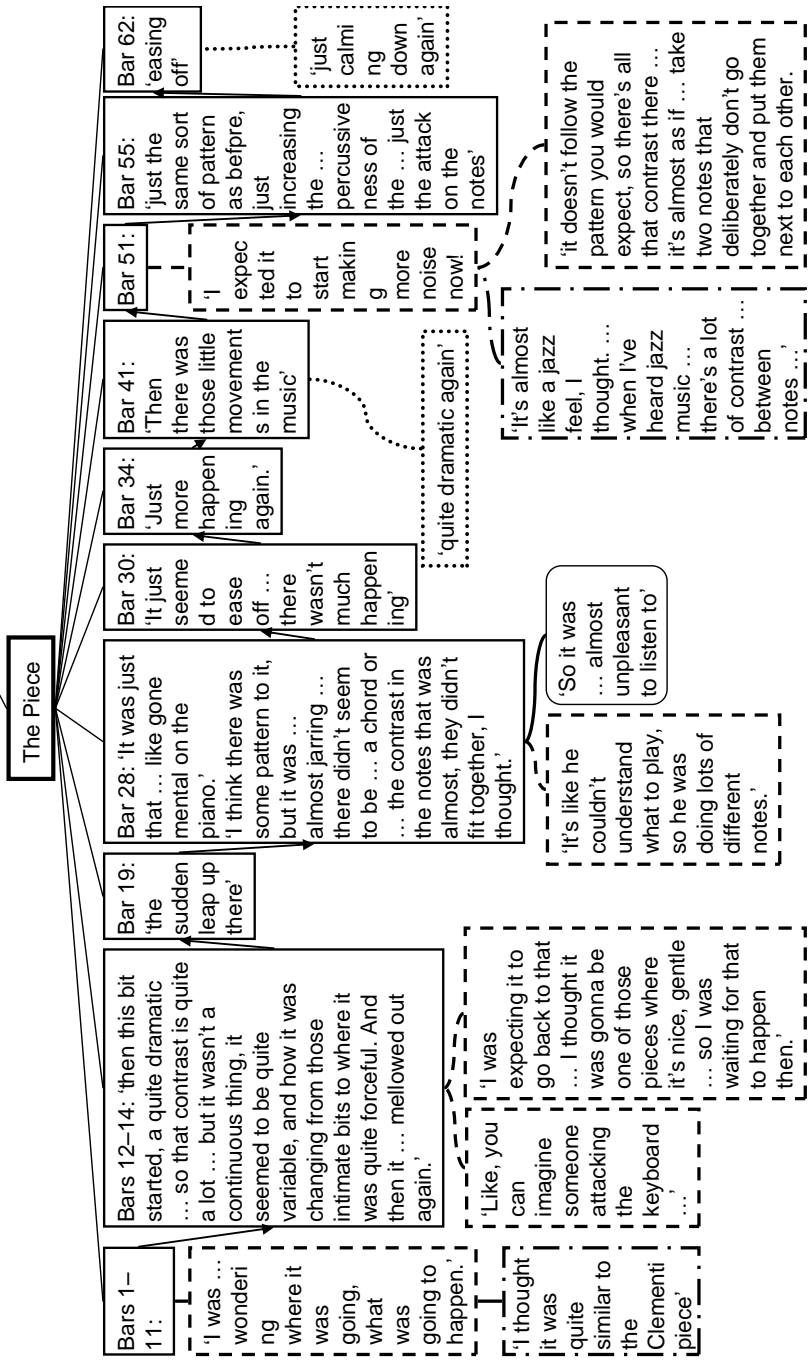
'Beginning section, if isolated and recapitulated, could be Ravel'
 'it reminds me a bit of some Ravel'

'I don't know how to understand it or think about it or appreciate it.'
 'I don't get it. What's it about?' 'Hard to get involved with the piece on either emotional, aesthetic, or theoretical/academic levels.'
 'I don't get it'

Schema 70 Schoenberg - Participant S: Interview 1

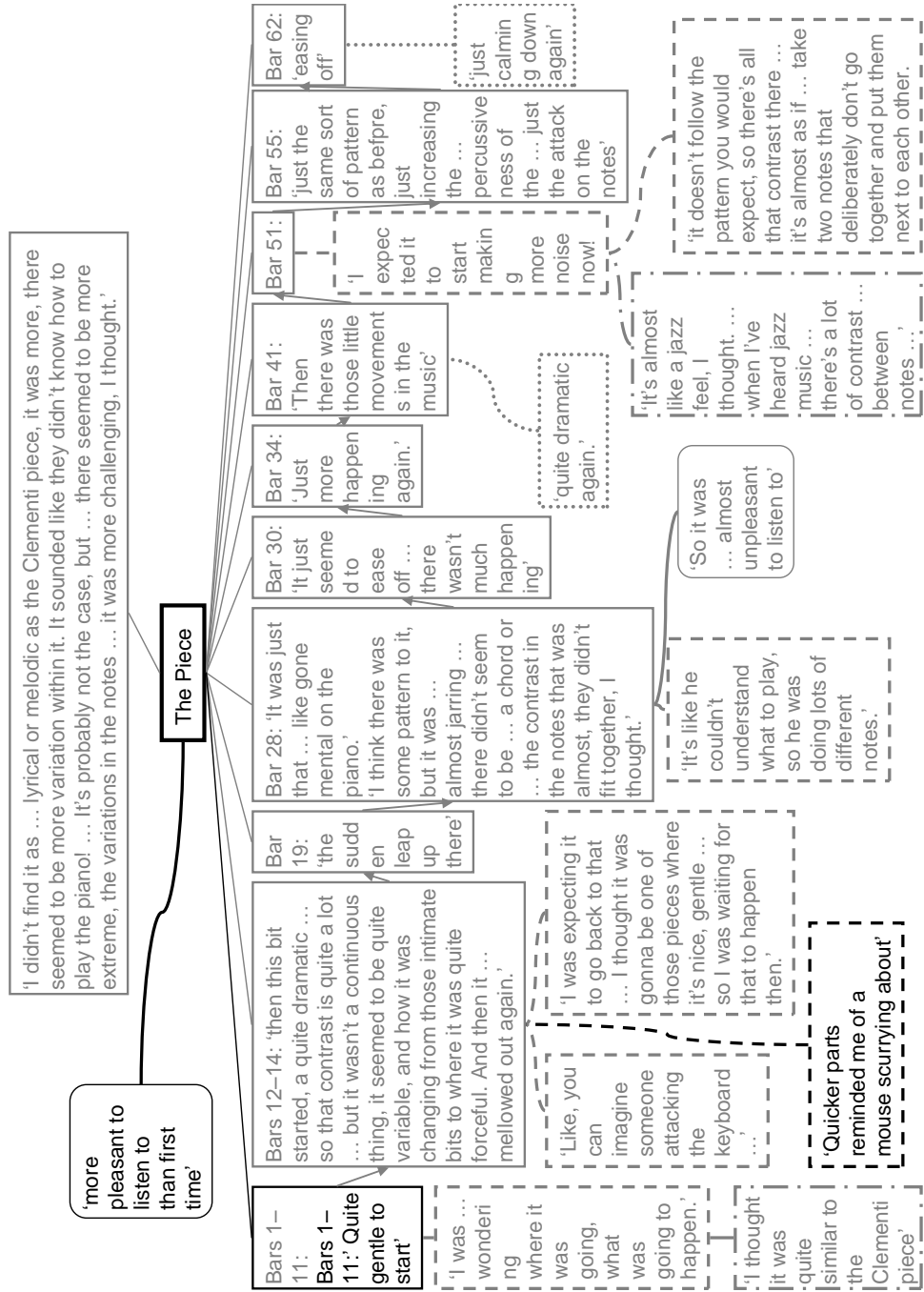
Participant S, Interview 1

'I didn't find it as ... lyrical or melodic as the Clementi piece, it was more, there seemed to be more variation within it. It sounded like they didn't know how to play the piano! ... It's probably not the case, but ... there seemed to be more extreme, the variations in the notes ... it was more challenging, I thought.'



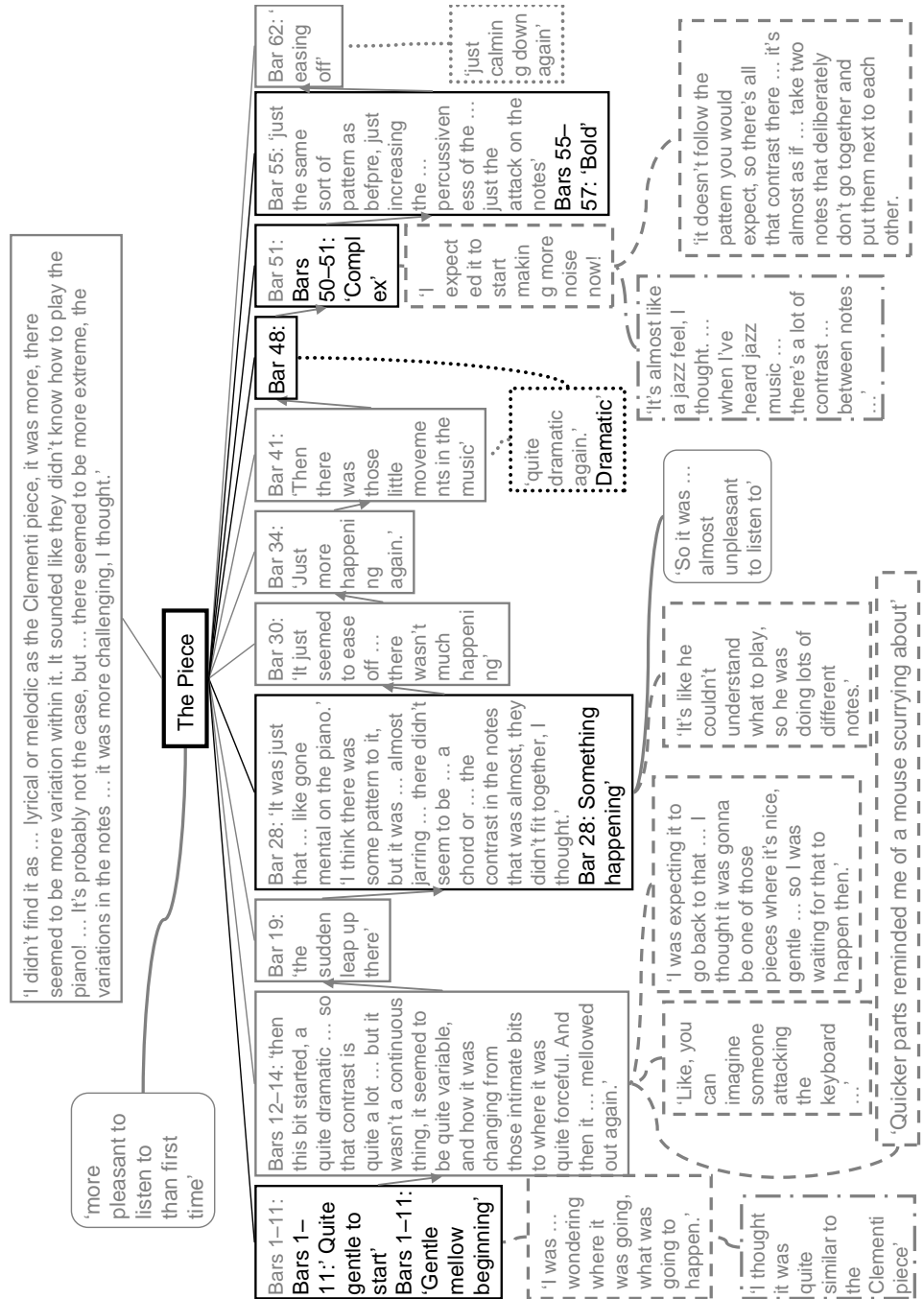
Schema 71 Schoenberg - Participant S: Diary 1

Participant S, Diary 1



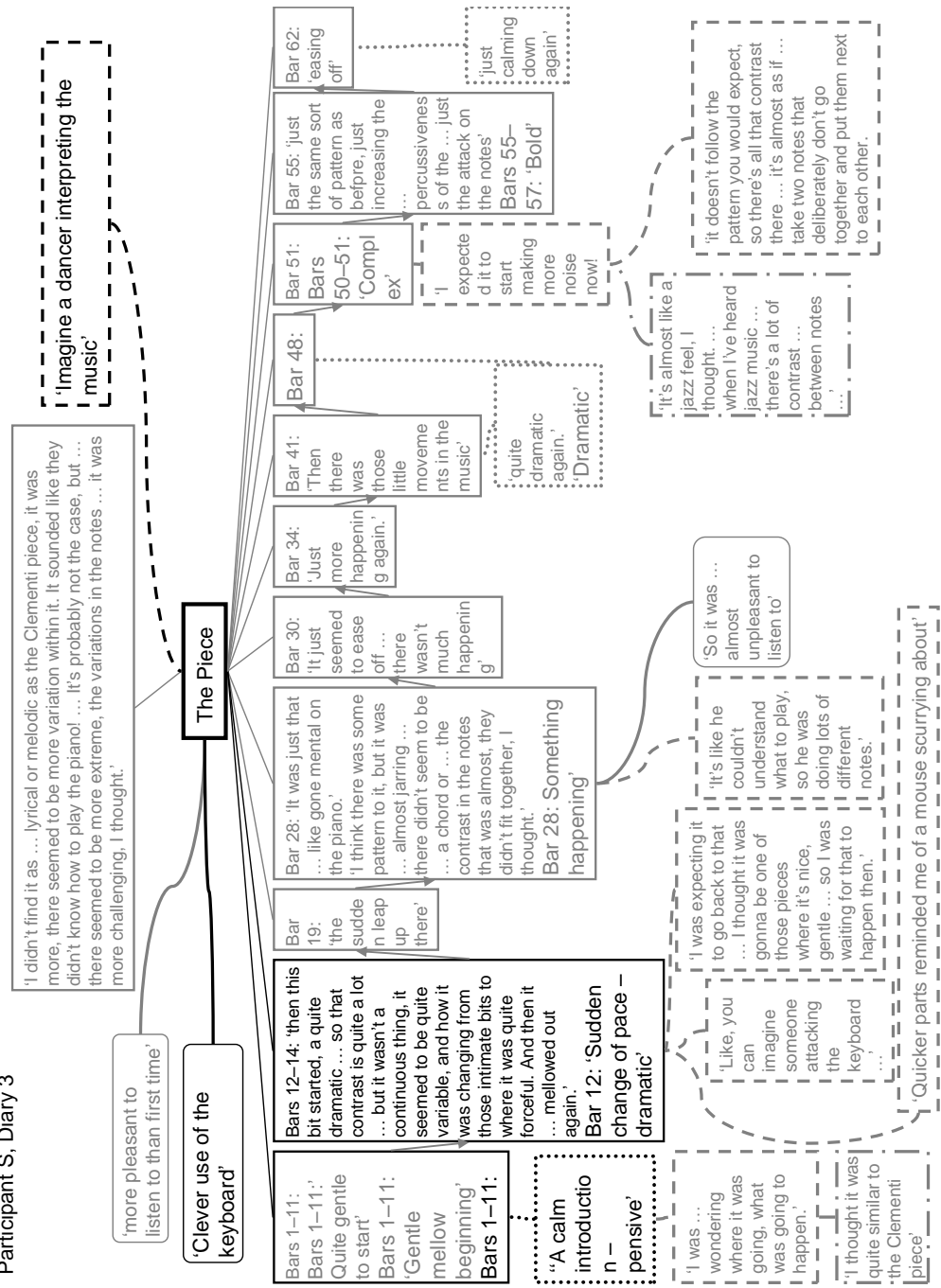
Schema 72 Schoenberg - Participant S: Diary 2

Participant S, Diary 2



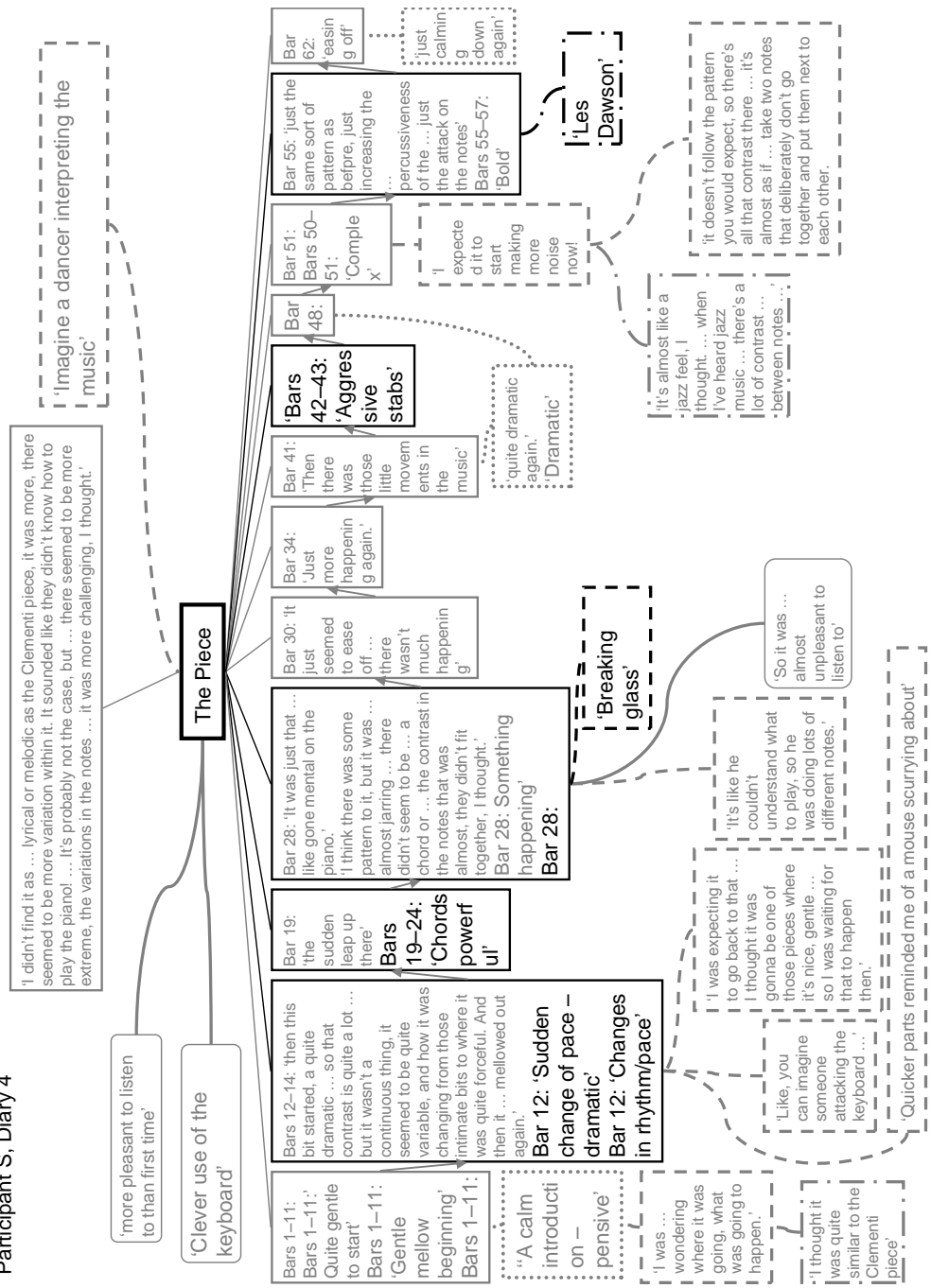
Schema 73 Schoenberg - Participant S: Diary 3

Participant S, Diary 3



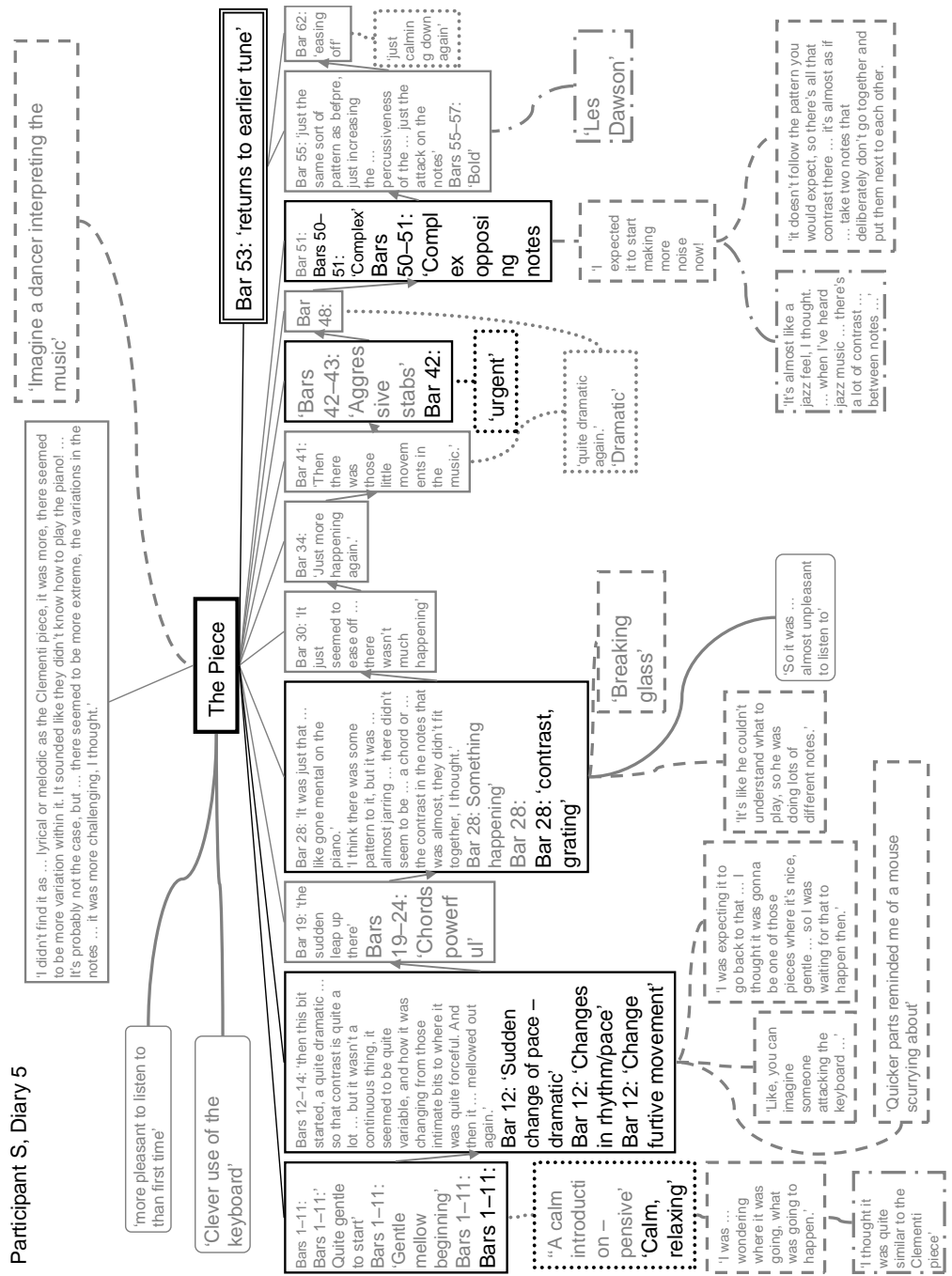
Schema 74 Schoenberg - Participant S: Diary 4

Participant S, Diary 4



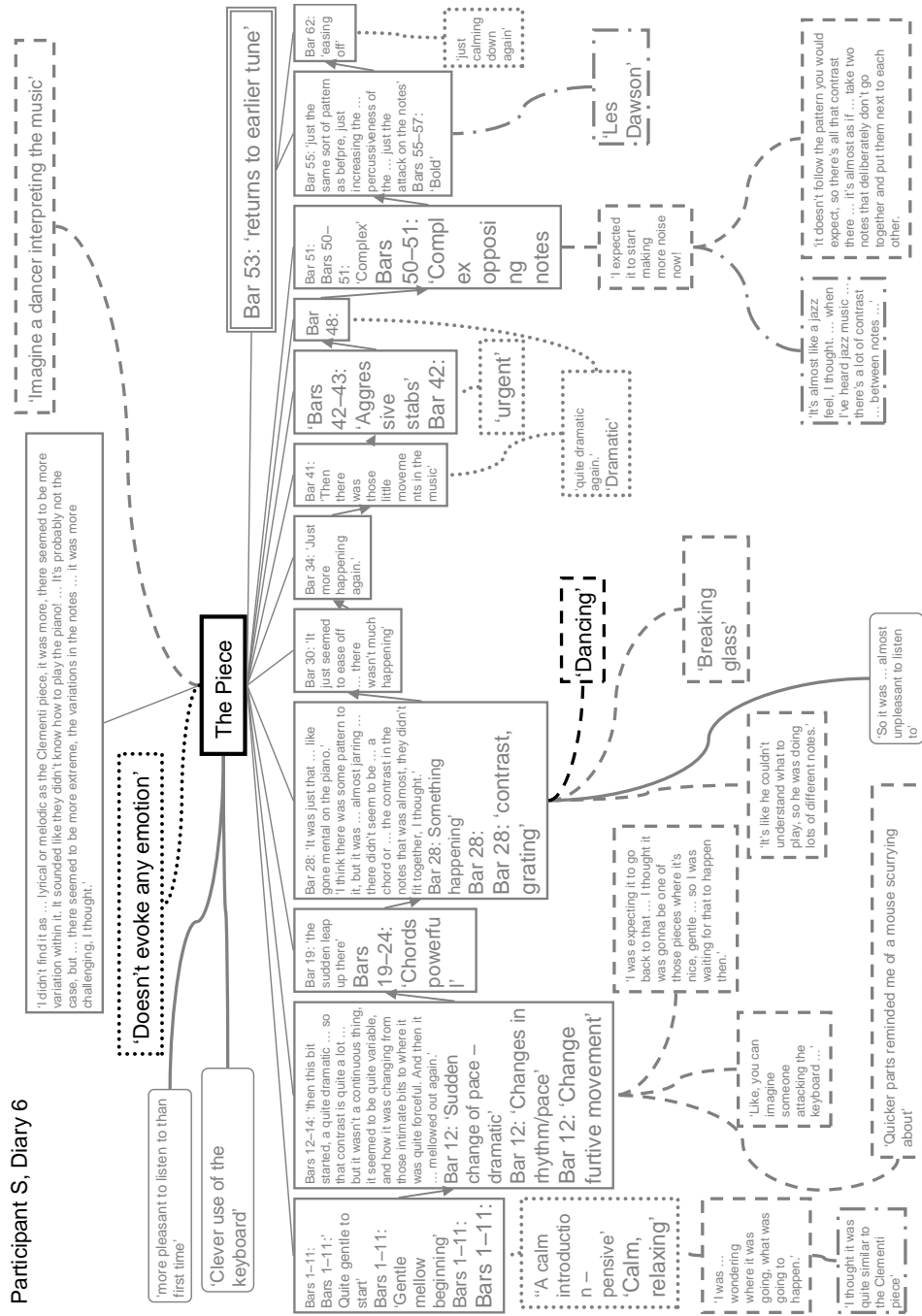
Schema 75 Schoenberg - Participant S Diary 5

Participant S, Diary 5

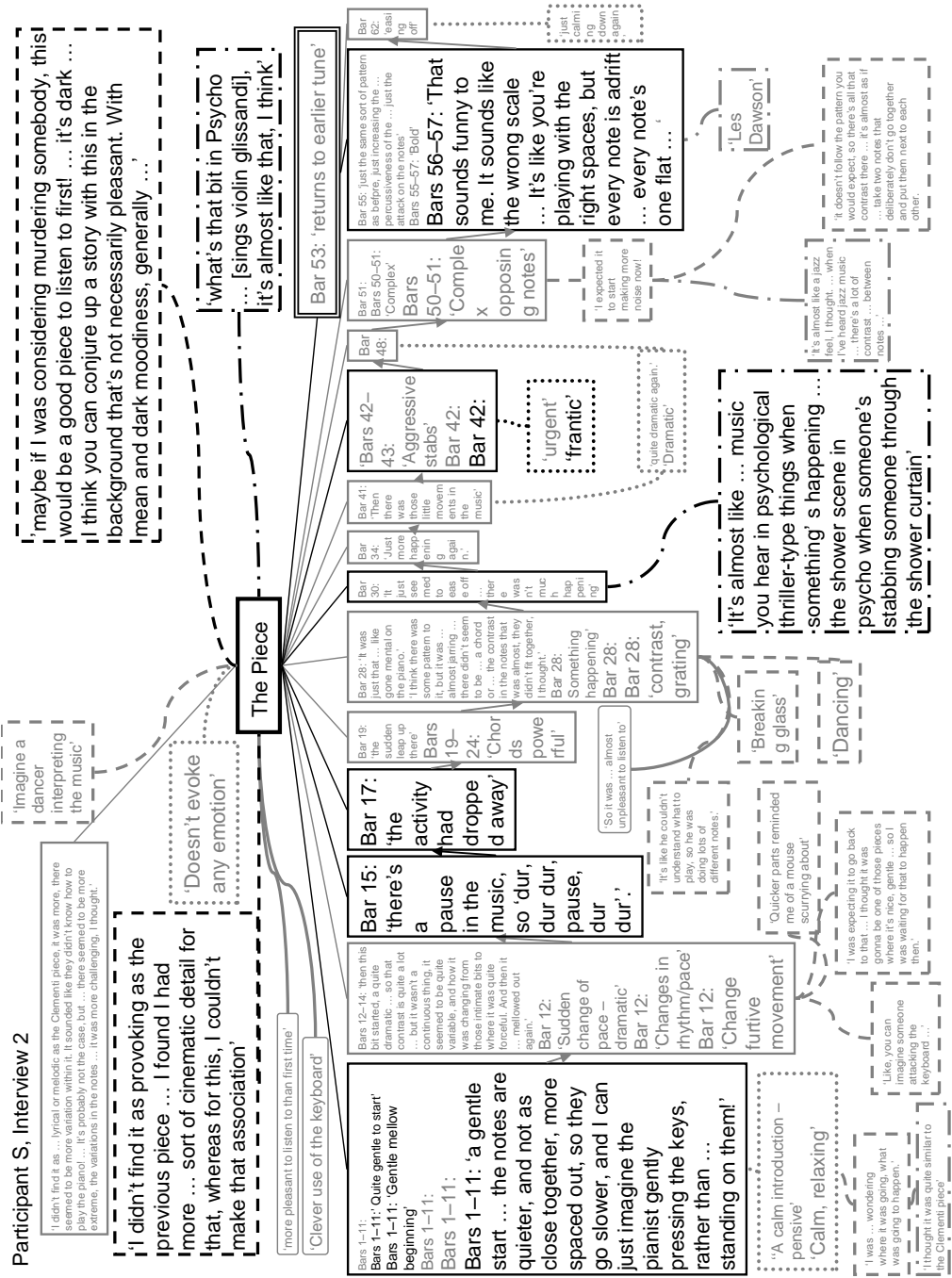


Schema 76 Schoenberg - Participant S: Diary 6

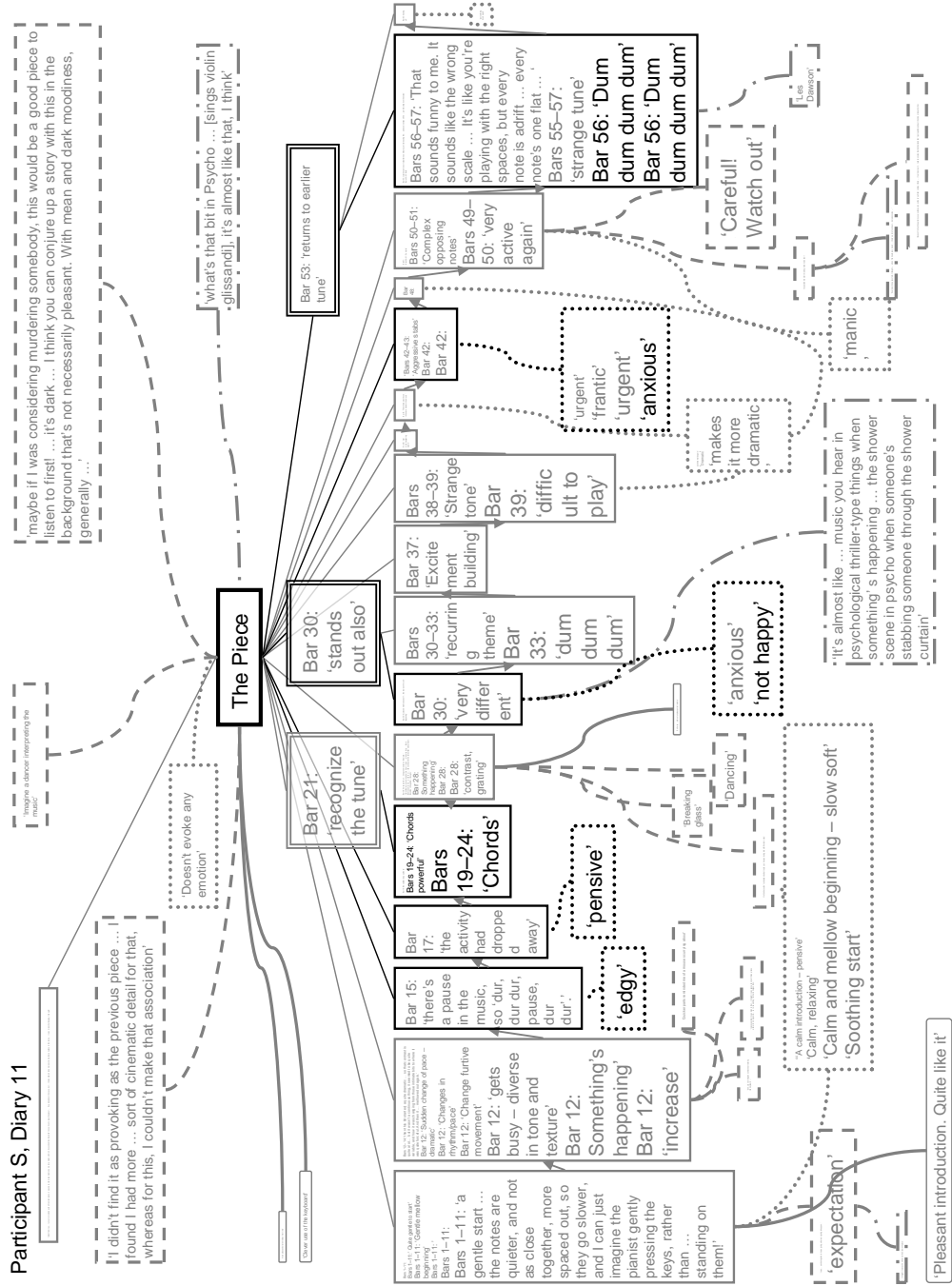
Participant S, Diary 6



Schema 77 Schoenberg - Participant S: Interview 2



Schema 82 Schoenberg - Participant S: Diary 11

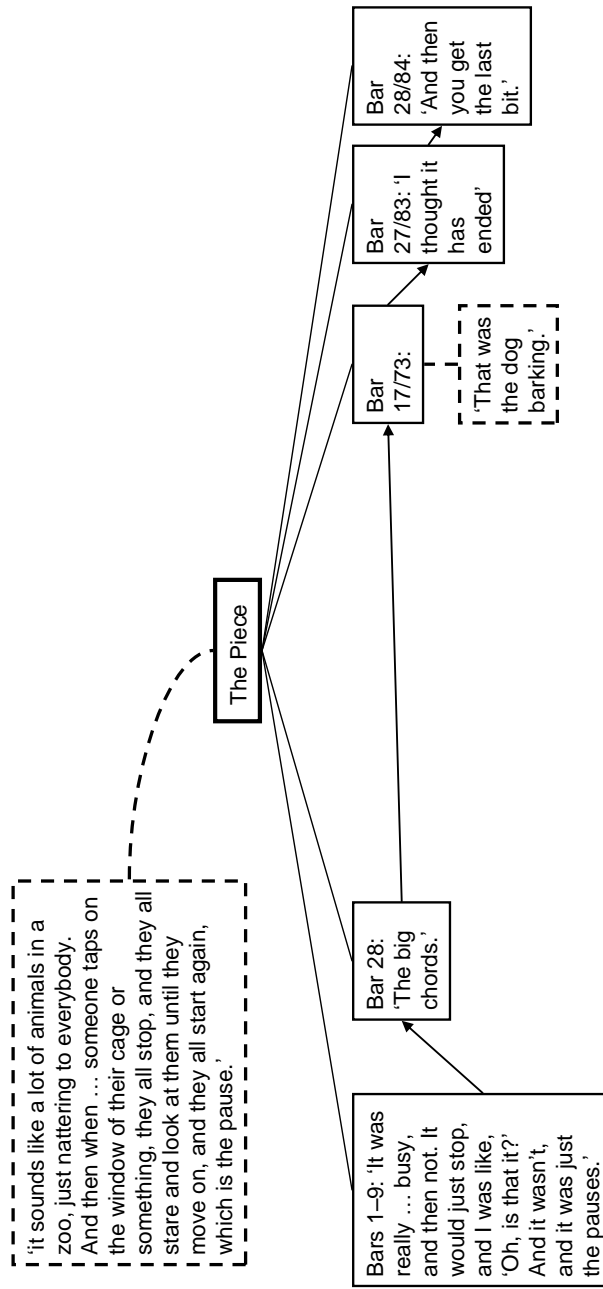


Appendix 6

Schemata: Responses to Berio

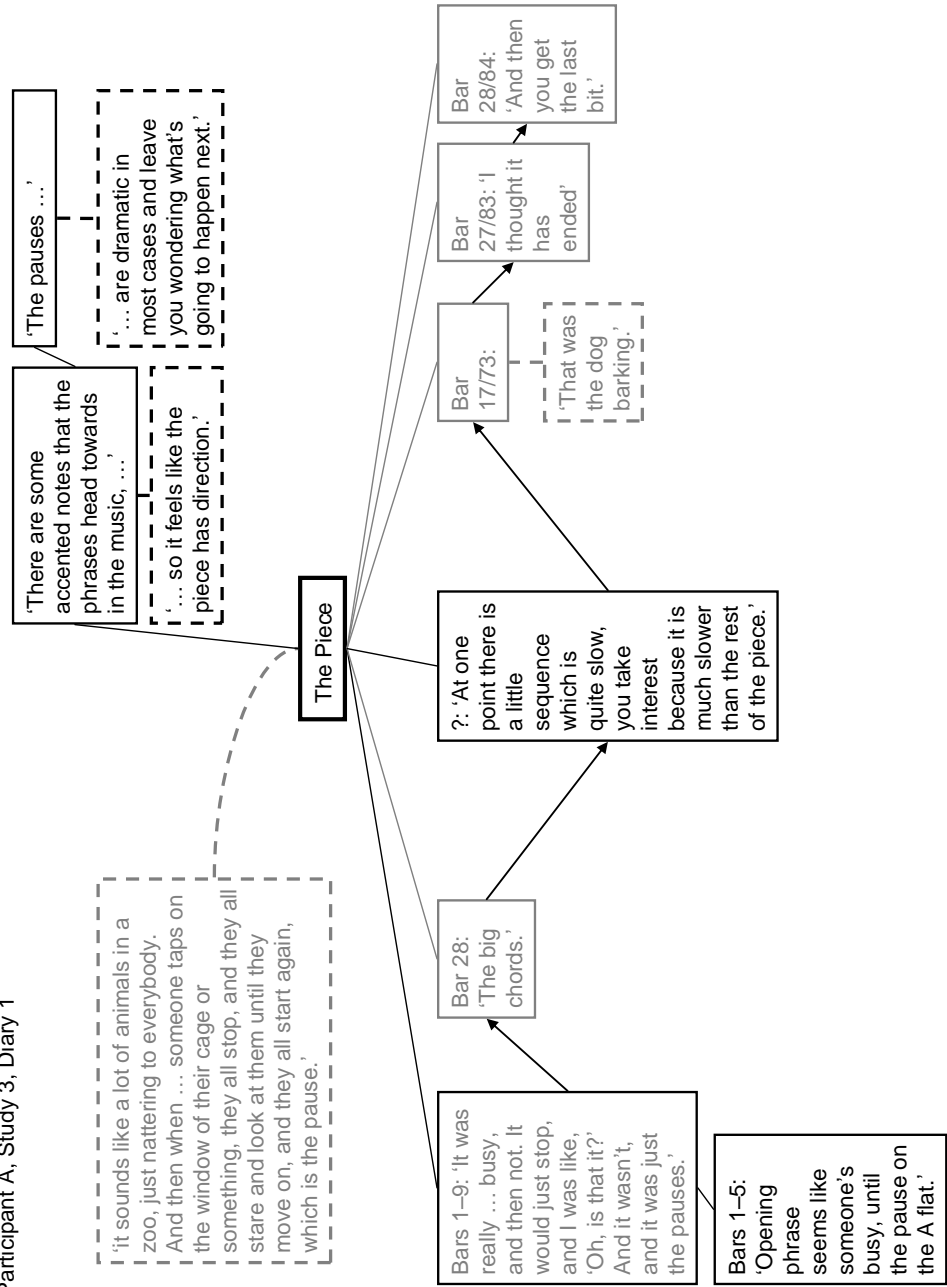
Schema 84 Berio - Participant A: Interview 1

Participant A, Study 3, Interview 1



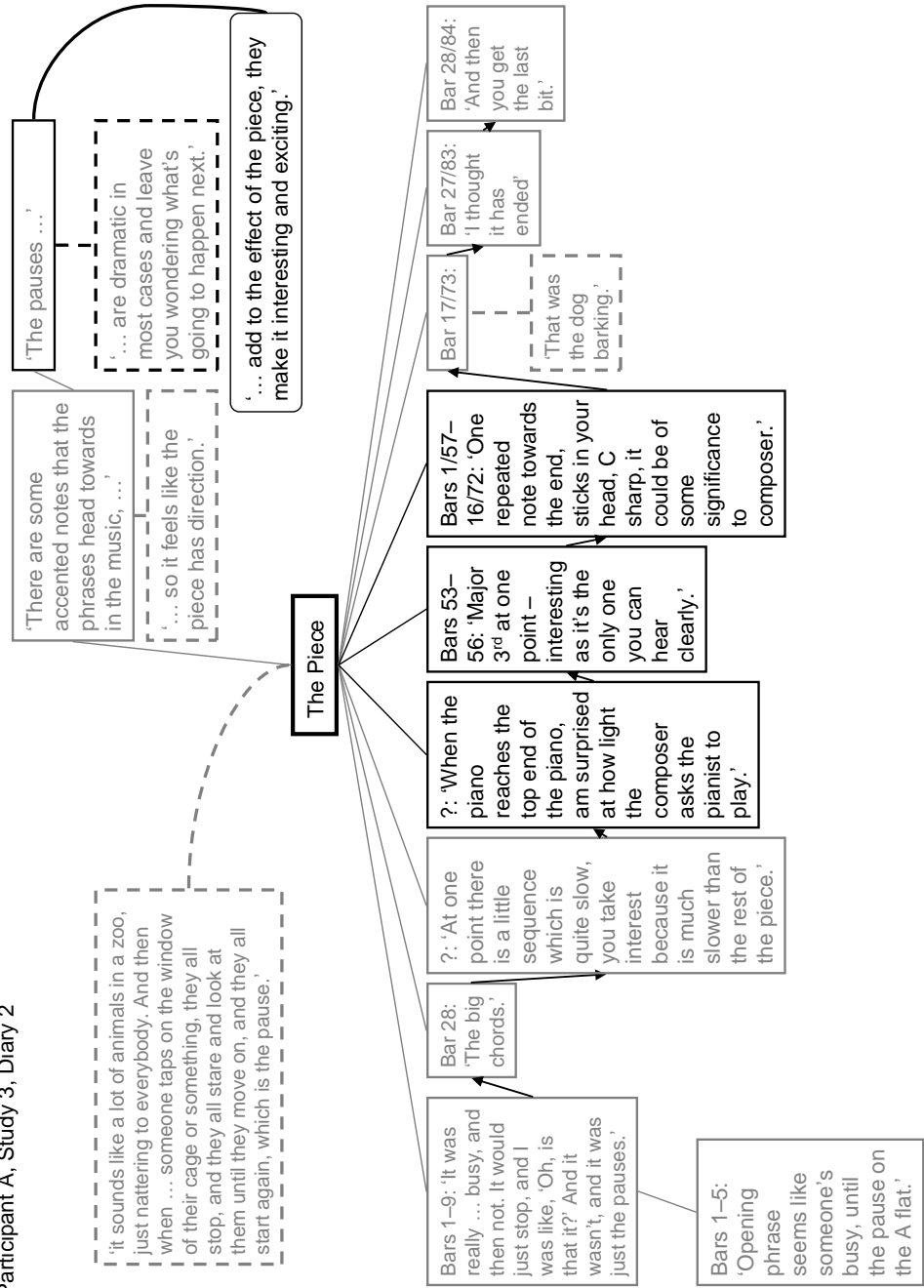
Schema 85 Berio - Participant A: Diary 1

Participant A, Study 3, Diary 1



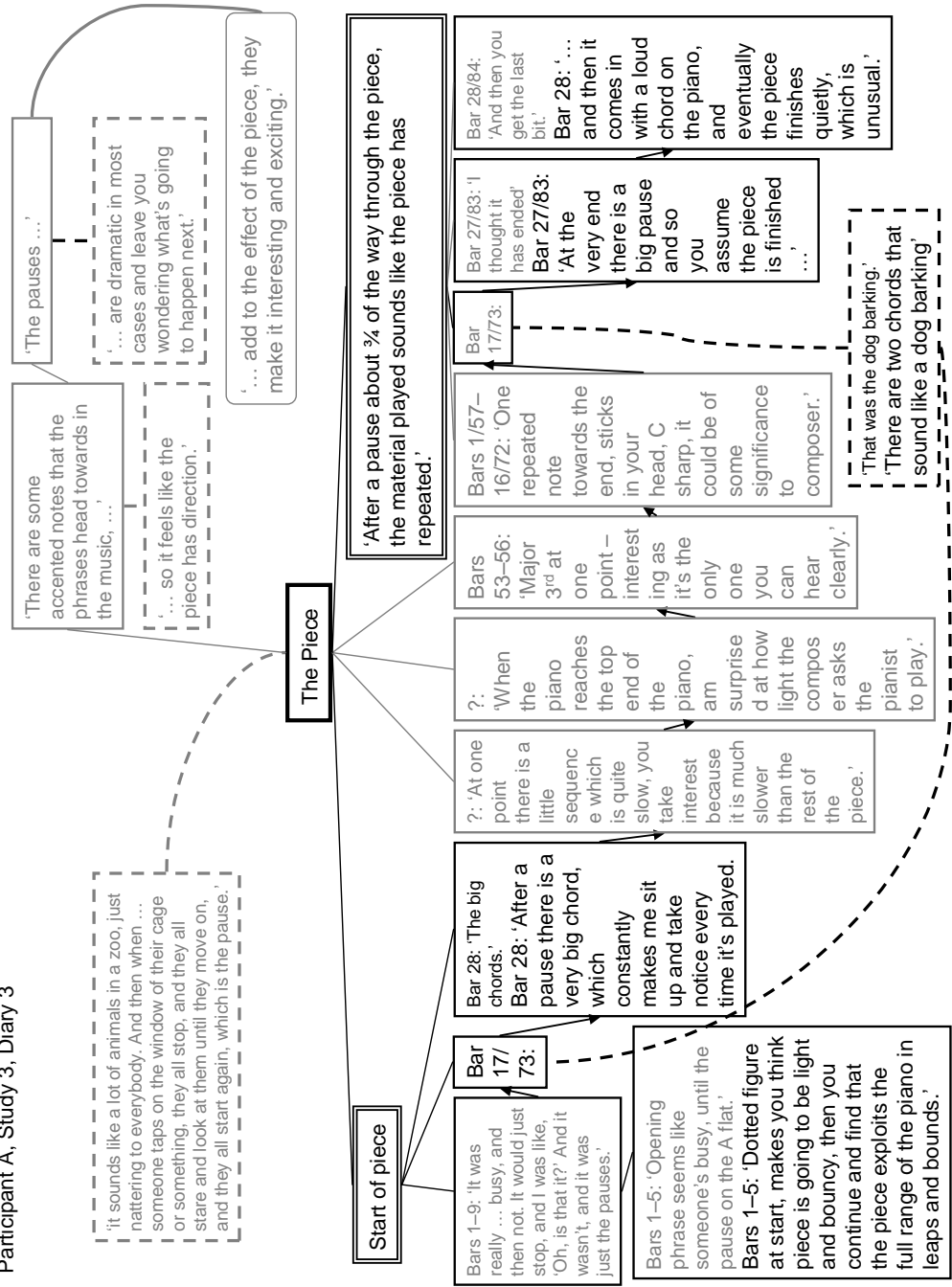
Schema 86 Berio - Participant A: Diary 2

Participant A, Study 3, Diary 2



Schema 87 Berio - Participant A: Diary 3

Participant A, Study 3, Diary 3



Schema 88 Berio - Participant A: Diary 4

Participant A, Study 3, Diary 4

'it sounds like a lot of animals in a zoo, just nattering to everybody. And then when ... someone taps on the window of their cage or something, they all stop, and they all stare and look at them until they move on, and they all start again, which is the pause.'

'The music could be representing some form of activity, that's so busy until something happens to make them stop and pause, but then they realise it's nothing much of importance, and so carry on bustling around.'

'There are some accented notes that the phrases head towards in the music, ...'

'... so it feels like the piece has direction.'

'The pauses ...'

'... are dramatic in most cases and leave you wondering what's going to happen next.'

'... add to the effect of the piece, they make it interesting and exciting.'

'This could be a major catastrophe which all the busy 'people' actually take notice of and perhaps try to improve it because we get similar material to what I was at the beginning after that crash'

'After a pause about 3/4 of the way through the piece, the material played sounds like the piece has repeated.'

The Piece

Start of piece

Bars 1-9: 'It was really ... busy, and then not. It would just stop, and I was like, 'Oh, is that it?' And it wasn't, and it was just the pauses.'

Bars 1-5: 'Dotted figure at start, makes you think piece is going to be light and bouncy, then you continue and find that the piece exploits the full range of the piano in leaps and bounds.'

Bar 28: 'The big chords.'
Bar 28: 'After a pause there is a very big chord, which constantly makes me sit up and take notice every time it's played.'

Bar 32: 'At one point there is a huge chord on the piano which is just left to echo for a bit ...'

? 'At one point there is a little sequence which is quite slow, you take interest because it is much slower than the rest of the piece.'

? 'When the piano reaches the top end of the piano, I am surprised at how light the composer asks the pianist to play.'

Bars 53-56: 'Major 3rd at one point - interesting as it's the only one you can hear clearly.'

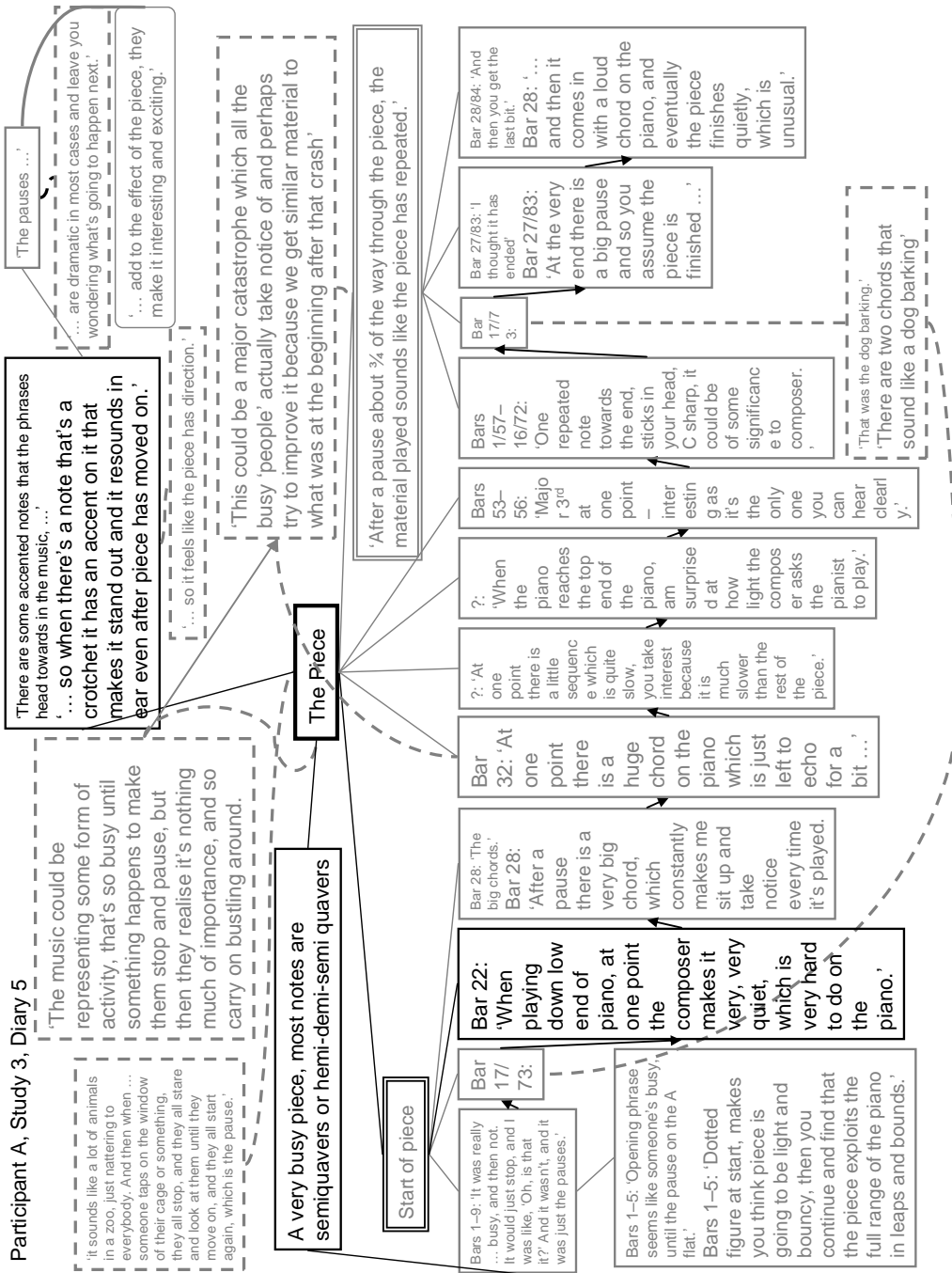
Bars 16/72: 'One repeated note towards the end, sticks in your head, C sharp, it could be of some significance to composer.'

Bar 17/73: '17/73: 3: ...'
Bar 27/83: 'At the very end there is a big pause and so you assume the piece is finished quietly, which is unusual.'

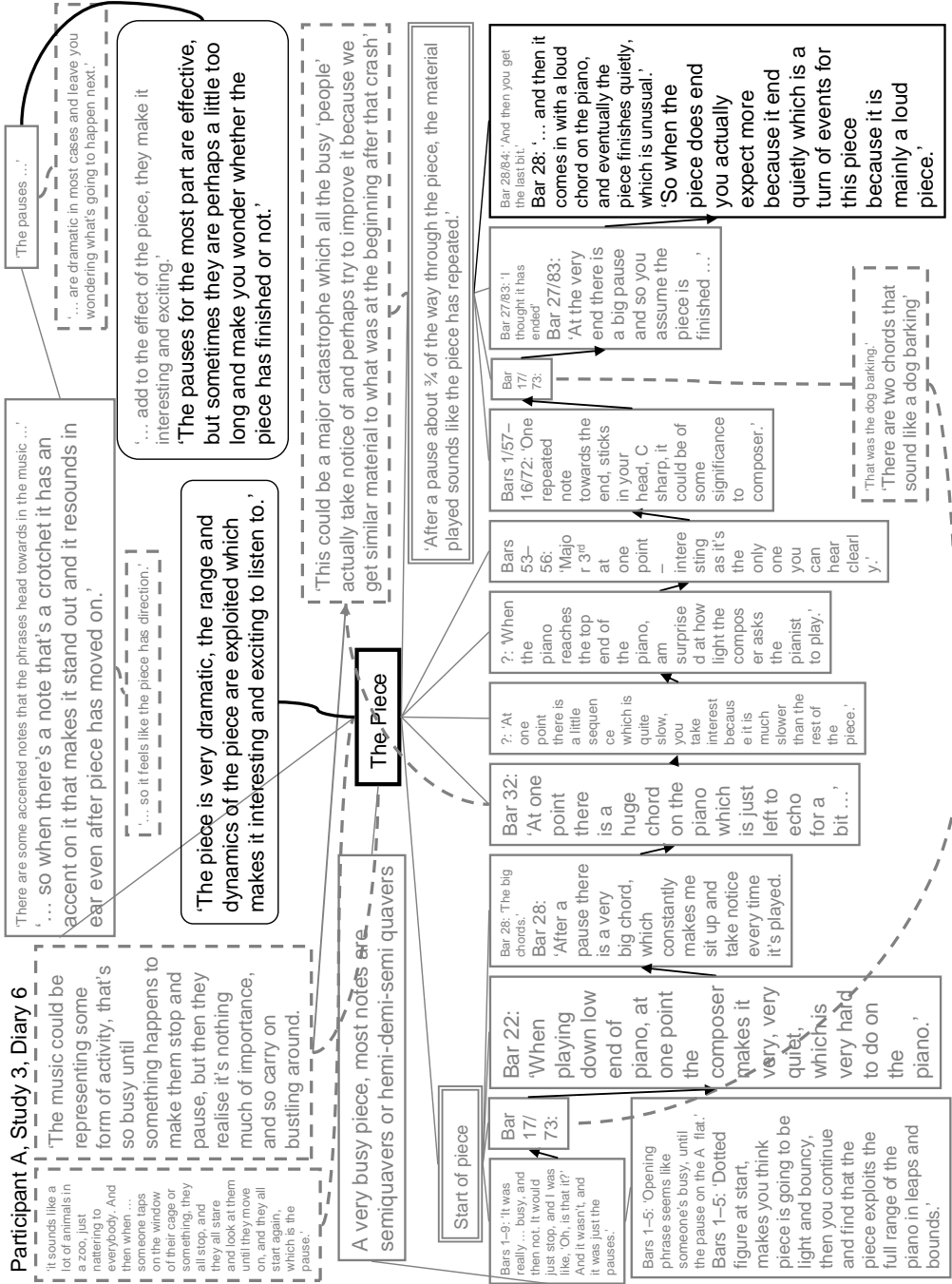
Bar 28/84: 'And then you get the last bit.'
Bar 28: '... and then it comes in with a loud chord on the piano, and eventually the piece finishes quietly, which is unusual.'

'That was the dog barking.'
'There are two chords that sound like a dog barking.'

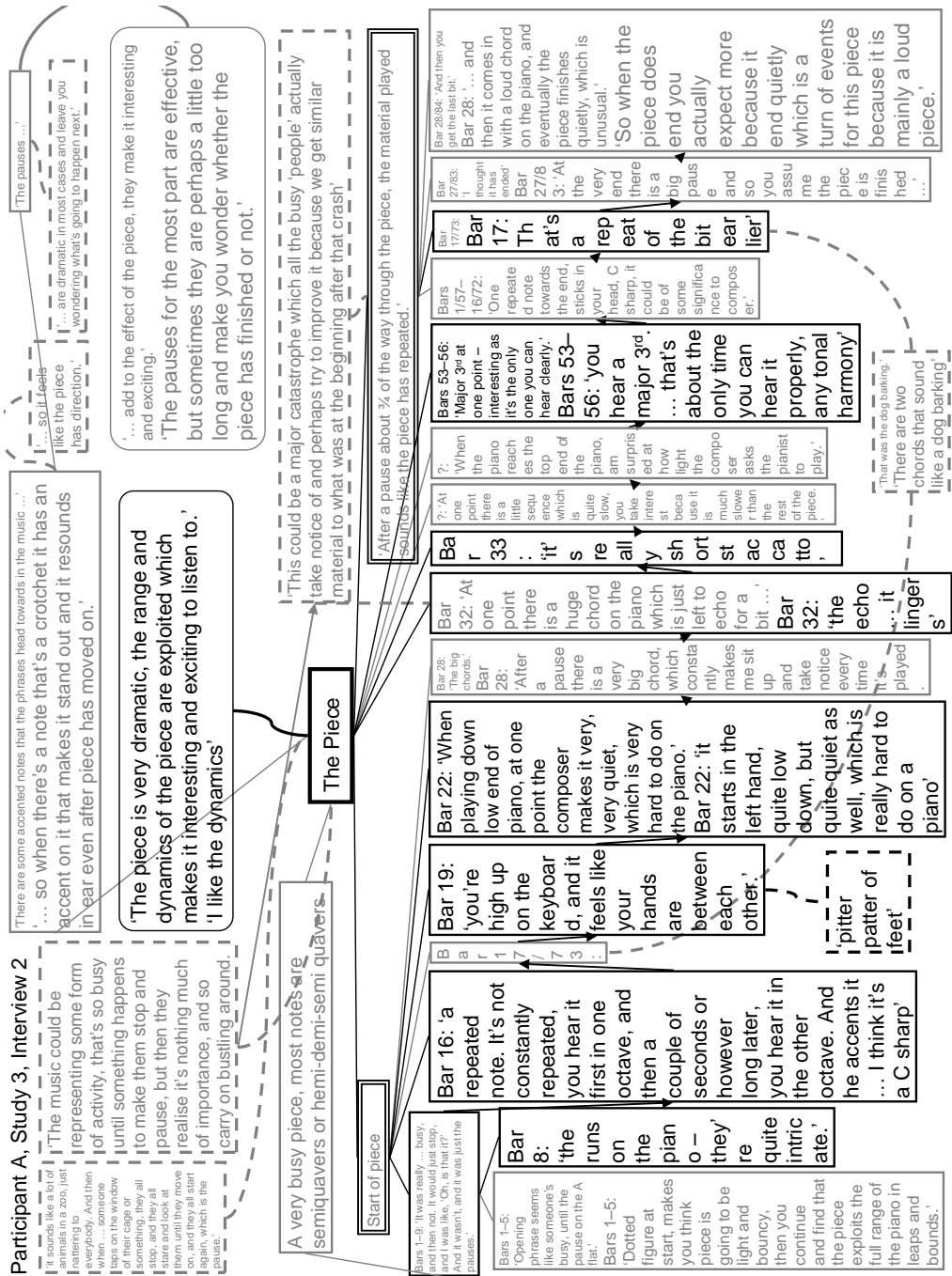
Schema 89 Berio - Participant A: Diary 5



Schema 90 Berio - Participant A: Diary 6



Schema 91 Berio - Participant A: Interview 2



Schema 92 Berio - Participant A: Diary 7

Participant A, Study 3, Diary 7
It sounds like a bit of animals in a cage to everybody. And when they are on the window of their cage or at the end of the all state and look at them until they all start again, which is the pause.

There are some accented notes that the phrases head towards in the music... so when there's a note that's a crotchet it has an accent on it that makes it stand out and it resonates in ear even after piece has moved on.
The accented notes really stay in your head after they have been played, like they're a sort of reference point.

The piece is very dramatic, the range and dynamics of the piece are exploited which makes it interesting and exciting to listen to. I like the dynamics.

A very busy piece, most notes are semiquavers or hemi-demi-semi quavers.

The Piece

Start of piece

Bars 1-8: It was really busy and I was just the pauses.

Bar 8: 'the run s on the pia no - the y're quit e intri cat e.'
Opening phrase seems like someone's busy, until the pause on the A flat.
Dotted figure at start, makes you think piece is going to be light and bouncy, then you continue and find that the piece exploits the full range of the piano in leaps and bounds.
Bars 1-5: 'stimulating'

Bar 16: 'a repeated note. It's not constantly repeated, you hear it first in one octave, and then a couple of seconds or however long later, you hear it in the other octave. And he accents it... I think it's a C sharp'

Bar 19: 'you're high up on the keyboard, and it feels like your hands are between each other.'

Bar 22: 'When playing down low end of piano, the composer makes it very quiet, which is very hard to do on the piano. Bar 22: 'it starts in the left hand, quite low but quite quiet as well, which is really hard to do on a piano'

Bar 28: 'The big pause there is a very big chord which constantly makes me sit up and take notice every time it's played.'

Bar 32: 'At one point there is a huge chord on the piano which is just left to echo for a bit... Bar 32: 'the echo... it lingers' Bar 32: 'the interest increases when the player has just played a huge chord and just let the piano echo'

Bar 33: 'it's all sh ort st ac ca tto'

Bar 53-56: 'Major 3rd at one point - it's the only one you can hear clearly. Bars 53-56: 'you hear a major 3rd... that's about the only time you can hear it properly, any tonal harmony'

Bar 17: 'The at's a rep eat of the bit ear ller'

Bar 27/83: 'The piece has ended. Bar 27/83: 'At the very end there is a big pause so you assume the piece is finished...'

Bar 28: '... and then it comes in with a loud chord on the piano, and eventually the piece finishes quietly, which is unusual. So when the piece does end you actually expect more because it ends quietly which is a turn of events for this piece because it is mainly a loud piece. Bar 28: After the pause at the end, you don't expect anything else, so a slight shock when the piano comes in again... it finishes quietly rather than loudly.'

The pauses... so it feels like the piece has disappeared... add to the effect of the piece, they make it interesting and exciting. The pauses for the most part are effective, but sometimes they are perhaps a little too long and make you wonder whether the piece has finished or not.

This could be a major catastrophe which all the busy 'people' actually take notice of and perhaps try to improve it because we get similar material to what I was at the beginning after that crash.

After a pause about 3/4 of the way through the piece, the material played sounds like the piece has repeated.

Bar 28: '... and then it comes in with a loud chord on the piano, and eventually the piece finishes quietly, which is unusual. So when the piece does end you actually expect more because it ends quietly which is a turn of events for this piece because it is mainly a loud piece. Bar 28: After the pause at the end, you don't expect anything else, so a slight shock when the piano comes in again... it finishes quietly rather than loudly.'

Bar 53-56: 'Major 3rd at one point - it's the only one you can hear clearly. Bars 53-56: 'you hear a major 3rd... that's about the only time you can hear it properly, any tonal harmony'

Bar 17: 'The at's a rep eat of the bit ear ller'

Bar 27/83: 'The piece has ended. Bar 27/83: 'At the very end there is a big pause so you assume the piece is finished...'

Bar 28: '... and then it comes in with a loud chord on the piano, and eventually the piece finishes quietly, which is unusual. So when the piece does end you actually expect more because it ends quietly which is a turn of events for this piece because it is mainly a loud piece. Bar 28: After the pause at the end, you don't expect anything else, so a slight shock when the piano comes in again... it finishes quietly rather than loudly.'

Schema 94 Berio - Participant A: Diary 9

Participant A, Study 3, Diary 9

There are some accented notes that emphasize how important the music is...
 ... so when there's a note that is a crotchet it has an accent on it that makes it stand out and it resounds in ear even after piece has moved on.
 'The accented notes really stay in your head after they have been played, like they're a sort of reference point'
 'the majority of the piece is loud, there are single accented notes dotted throughout the piece.'
 '... accentuate the mood of the composer, it feels like he/she was frustrated at the time they composed the piece.'
 'This piece is quite an aggressive piece of music'

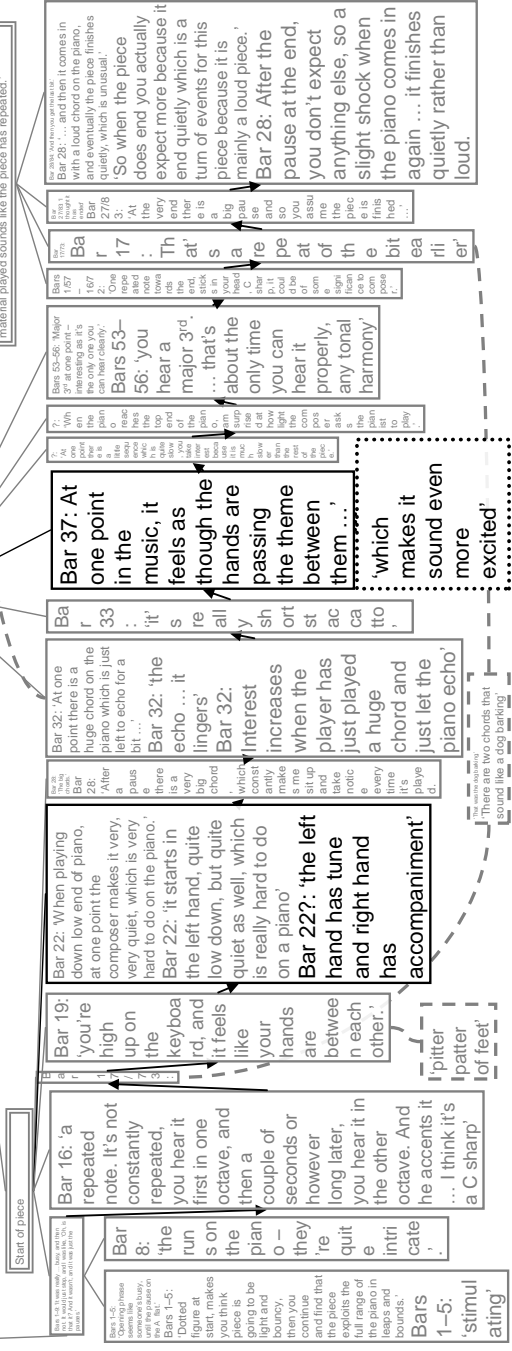
The piece is very dramatic, the range and dynamics of the piece are exploited which makes it interesting and exciting to listen to.
 'I like the dynamics'
 'The sudden changes in dynamic ...'
 'The composer uses the full range of the piano in actual range and the range of its dynamics'

A very busy piece, most notes are semiquavers or demi-semi quavers
 'the hemi-demi-semiquavers (or even faster), the constant movement ...'
 'A very busy piece, the hands of the artist have to fly over the keyboard and hit the right notes.'

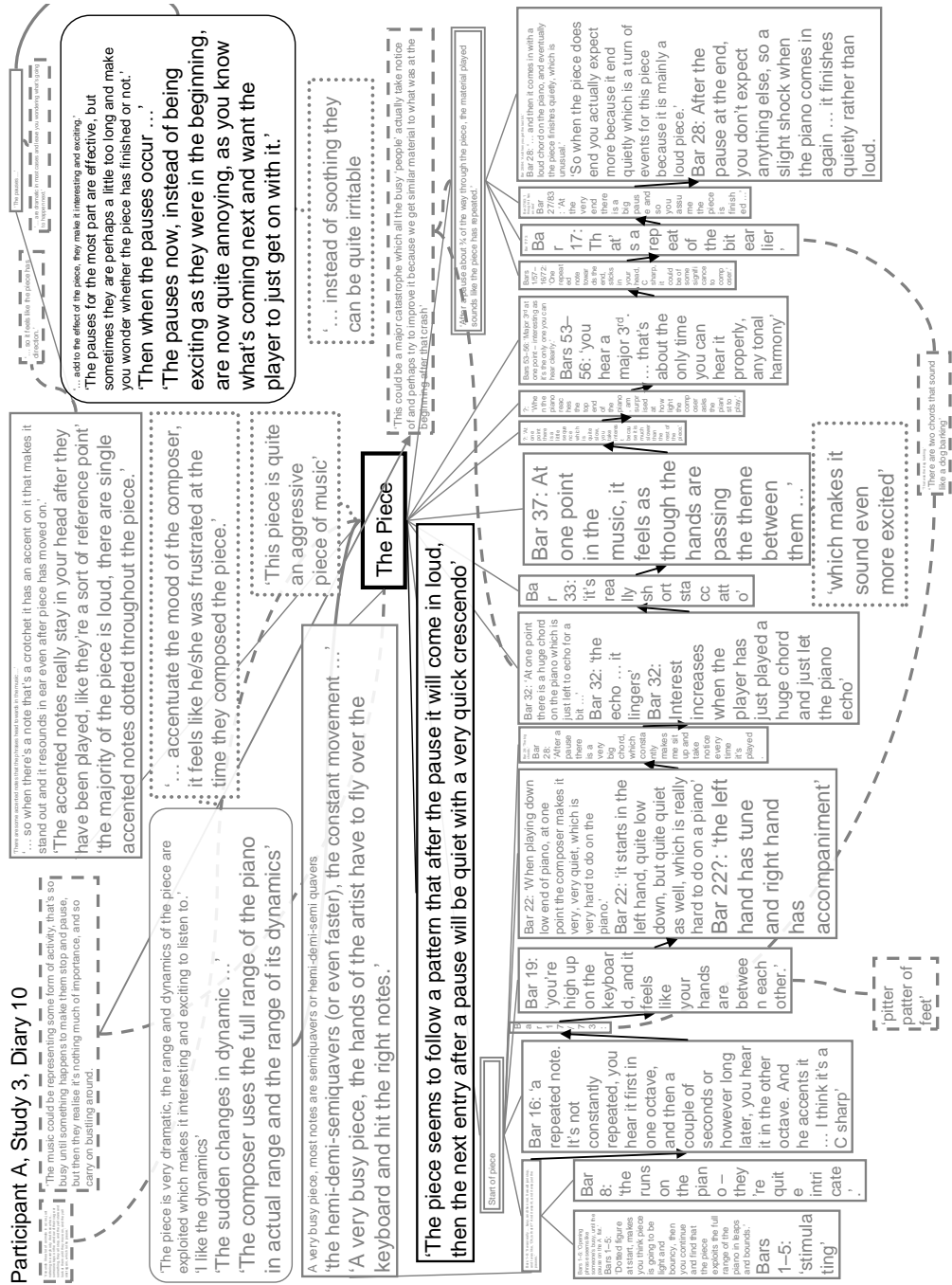
... add to the effect of the piece, they make it interesting and exciting.
 'The pauses for the most part are effective, but sometimes they are perhaps a little too long and make you wonder whether the piece has finished or not.'
 'Then when the pauses occur ...'
 '... instead of soothing they can be quite irritable'

This could be a major catastrophe which all the busy people actually take notice of and perhaps try to improve it because we get similar material to what was at the beginning after that crash'
 'After a pause about 3/4 of the way through the piece, the material played sounds like the piece has repeated.'

The Piece



Schema 95 Berio - Participant A: Diary 10



Schema 96 Berio - Participant A: Diary 11

Participant A, Study 3, Diary 11

The music could be representing some form of activity, that's so busy until something happens to make them stop and pass it, but then they realize it's not that simple, it's more complex.

The piece is very dramatic, the range and dynamics of the piece are exploited which makes it interesting and exciting to listen to.
I like the dynamics.
The sudden changes in dynamic ...
The composer uses the full range of the piano in actual range and the range of its dynamics.

A very busy piece, most notes are semiquavers or demi-semi quavers.
The hemi-demi-semiquavers (or even faster), the constant movement ...
A very busy piece, the hands of the artist have to fly over the keyboard and hit the right notes.
It is a very bouncy piece (lively might be a better word), listening to it is quite exhilarating because the piece is constantly on the move, even in the pauses.

... so when there's a note that's a crotchet it has an accent on it that makes it stand out and it resounds in ear even after piece has moved on.
The accented notes really stay in your head after they have been played, like they're a sort of reference point.
The majority of the piece is loud, there are single accented notes dotted throughout the piece.
... accentuate the mood of the composer, it feels like he/she was frustrated at the time they composed the piece.
This piece is quite an aggressive piece of music.

The pauses for the most part are effective, but sometimes they are perhaps a little too long and make you wonder whether the piece has finished or not.
Then when the pauses occur ...
The pauses now, instead of being exciting as they were in the beginning, are now quite annoying, as you know what's coming next and want the player to just get on with it.
... instead of soothing they can be quite irritable.
This could be a major catastrophe which all the busy people actually take notice of and perhaps try to remove it because we get similar reactions to what was at the beginning after the crash.

The piece seems to follow a pattern that after the pause it will come in loud, then the next entry after a pause will be quiet with a very quick crescendo.

Bar 16: 'a repeated note, it's not constantly repeated, you hear it first in one octave, and then a couple of seconds or however long later, you hear it in the other octave. And he accents it ... I think it's a C sharp.'

Bar 18: 'the run on the piano - the y're quite intricate.'
Bar 19: 'you're high up on the keyboard, and it feels like your hands are between each other.'

Bar 22: 'When playing down low end of piano, at one point it makes it very quiet which is very hard to do on the piano.'
Bar 22: 'It starts in the left hand, quite low down, but quite quiet as well, which is really hard to do on a piano.'
Bar 22: 'the left hand has tune and right hand has accompaniment.'

Bar 32: 'At one point echo ... it just left to echo for a moment.'
Bar 32: 'the lingers ... it increases when the player has just played a huge chord and just let the piano echo.'

Bar 33: 'it's really shor tly sta cca (to)'.
Bar 37: 'At one point in the music, it feels as though the hands are passing the theme between them ...'
'which makes it sound even more excited'

Bar 53-56: 'you hear a major 3rd ... that's about the only time you can hear it properly, any tonal harmony.'

Bar 17: 'The atmosphere is a bit ear tier'.
Bar 28: 'After the pause at the end, you don't expect anything else, so a slight shock when the piano comes in again ... it finishes quietly rather than loud.'
With this piece you need to expect the unexpected. Like at the end there is a long pause, you think the piece has finished and then crash, in comes another loud chord followed by quiet ones which end the piece.'

So when the piece does end you actually expect more because it ends quietly which is a turn of events for this piece because it is mainly a loud piece.
Bar 28: After the pause at the end, you don't expect anything else, so a slight shock when the piano comes in again ... it finishes quietly rather than loud.
With this piece you need to expect the unexpected. Like at the end there is a long pause, you think the piece has finished and then crash, in comes another loud chord followed by quiet ones which end the piece.'

Bar 28: 'The piece is very busy, most notes are semiquavers or demi-semi quavers. The hemi-demi-semiquavers (or even faster), the constant movement ... A very busy piece, the hands of the artist have to fly over the keyboard and hit the right notes. It is a very bouncy piece (lively might be a better word), listening to it is quite exhilarating because the piece is constantly on the move, even in the pauses.'

Bar 16: 'a repeated note, it's not constantly repeated, you hear it first in one octave, and then a couple of seconds or however long later, you hear it in the other octave. And he accents it ... I think it's a C sharp.'

Bar 18: 'the run on the piano - the y're quite intricate.'

Bar 19: 'you're high up on the keyboard, and it feels like your hands are between each other.'

Bar 22: 'When playing down low end of piano, at one point it makes it very quiet which is very hard to do on the piano.'

Bar 22: 'It starts in the left hand, quite low down, but quite quiet as well, which is really hard to do on a piano.'

Bar 22: 'the left hand has tune and right hand has accompaniment.'

Bar 32: 'At one point echo ... it just left to echo for a moment.'

Bar 32: 'the lingers ... it increases when the player has just played a huge chord and just let the piano echo.'

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Bar 37: 'At one point in the music, it feels as though the hands are passing the theme between them ...'
'which makes it sound even more excited'

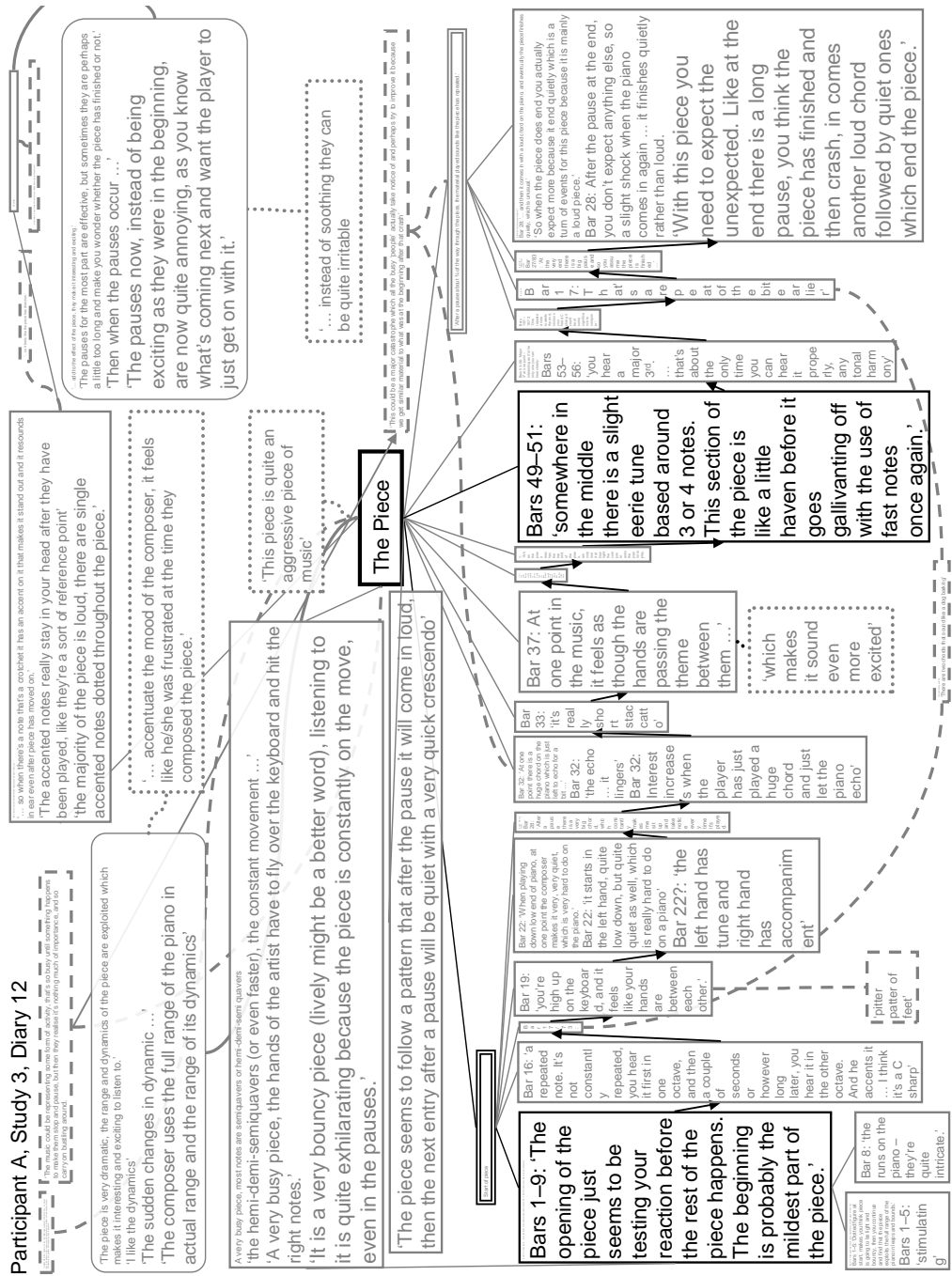
Bar 53-56: 'you hear a major 3rd ... that's about the only time you can hear it properly, any tonal harmony.'

Bar 17: 'The atmosphere is a bit ear tier'.

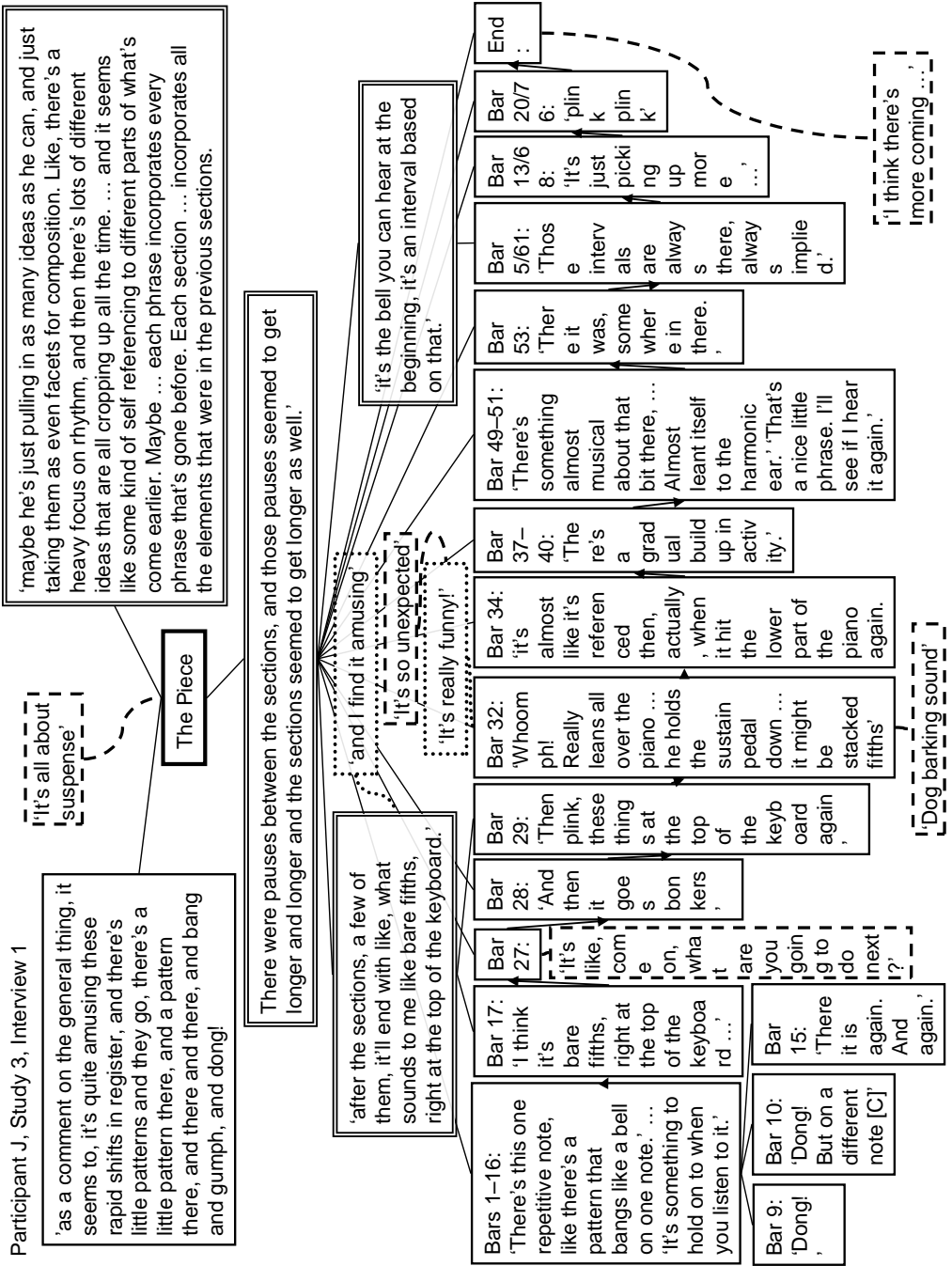
Bar 28: 'After the pause at the end, you don't expect anything else, so a slight shock when the piano comes in again ... it finishes quietly rather than loud.'

With this piece you need to expect the unexpected. Like at the end there is a long pause, you think the piece has finished and then crash, in comes another loud chord followed by quiet ones which end the piece.'

Schema 97 Berio - Participant A: Diary 12

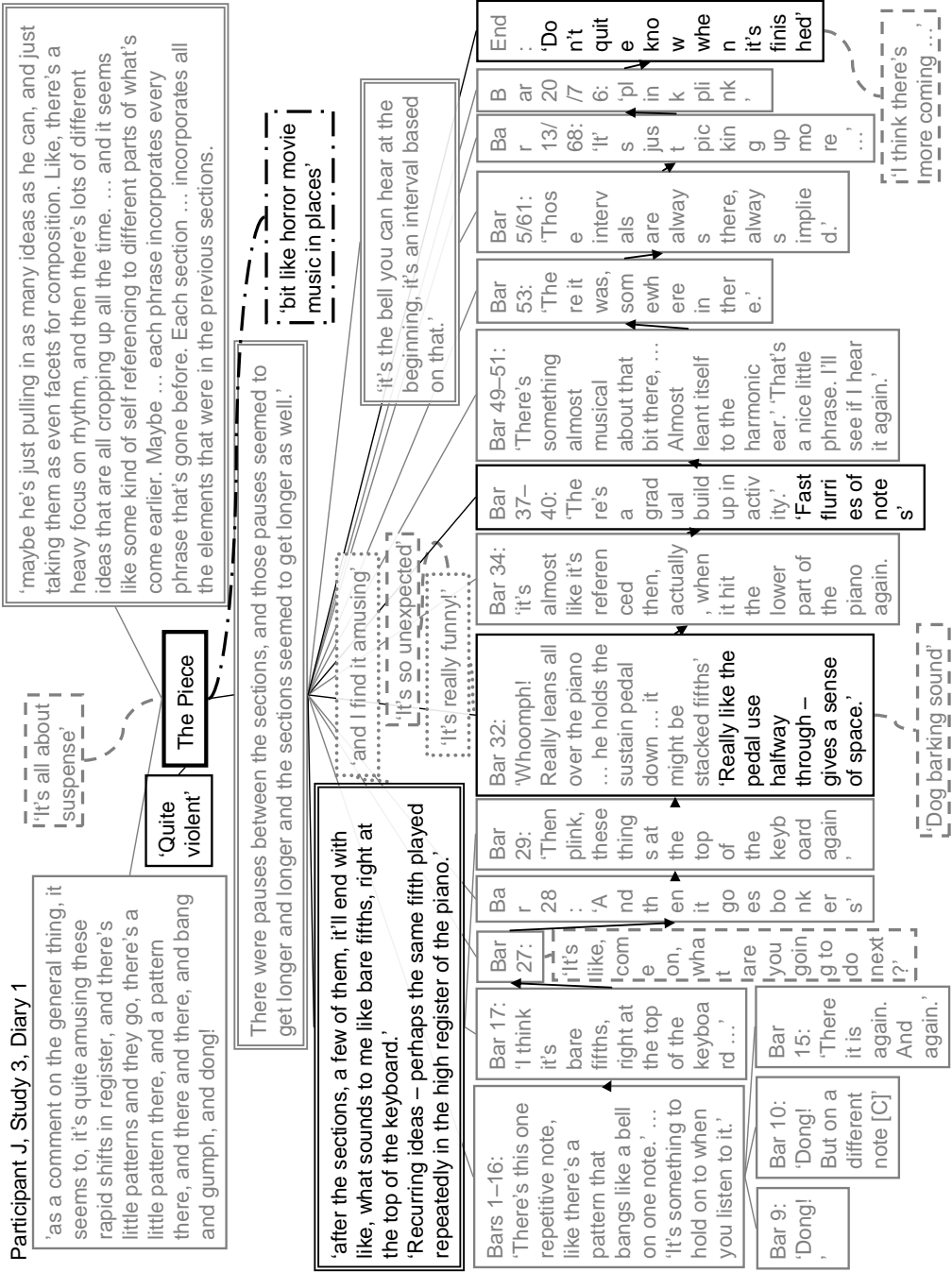


Schema 99 Berio - Participant J: Interview 1

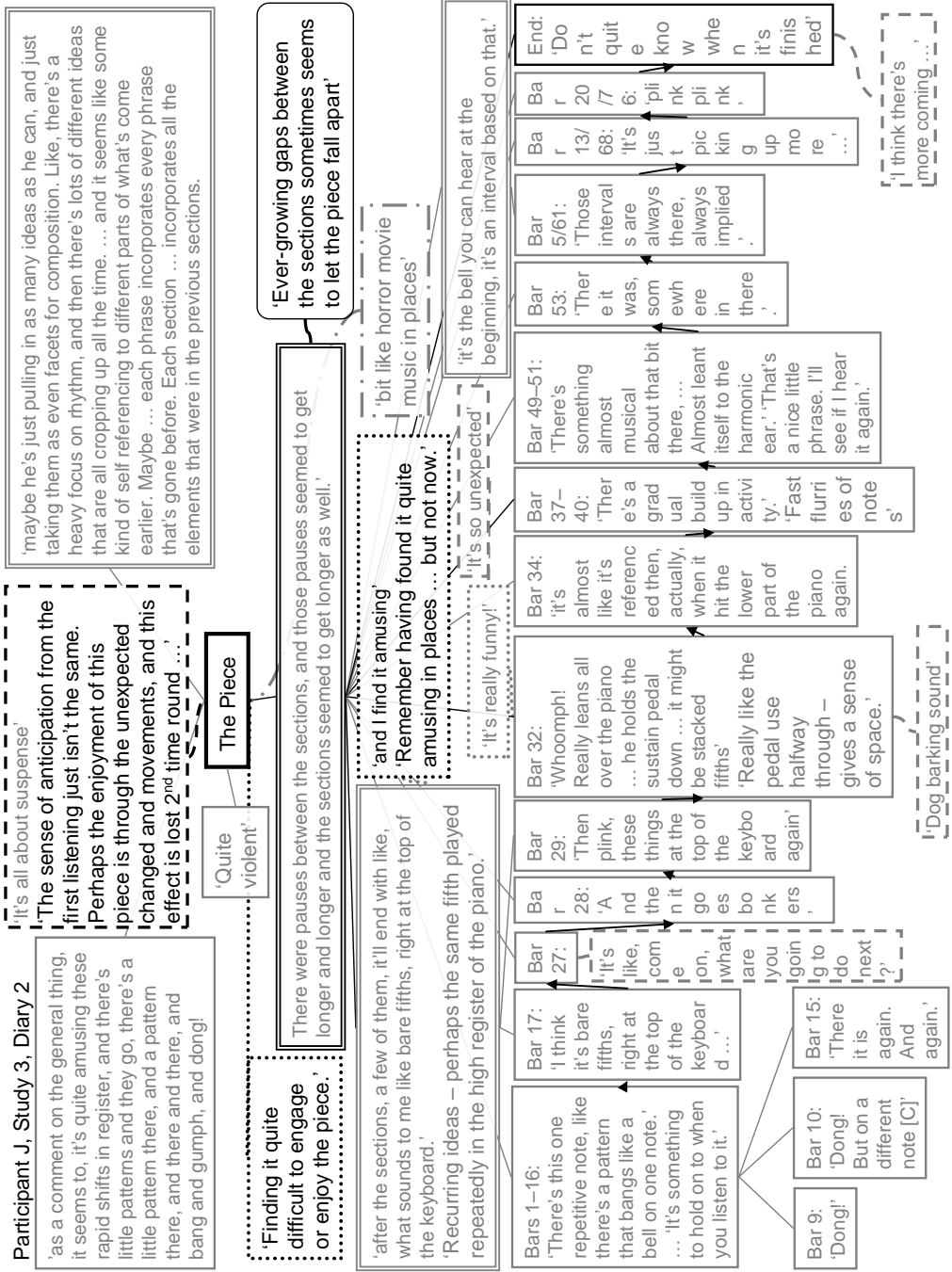


Schema 100 Berio - Participant J: Diary 1

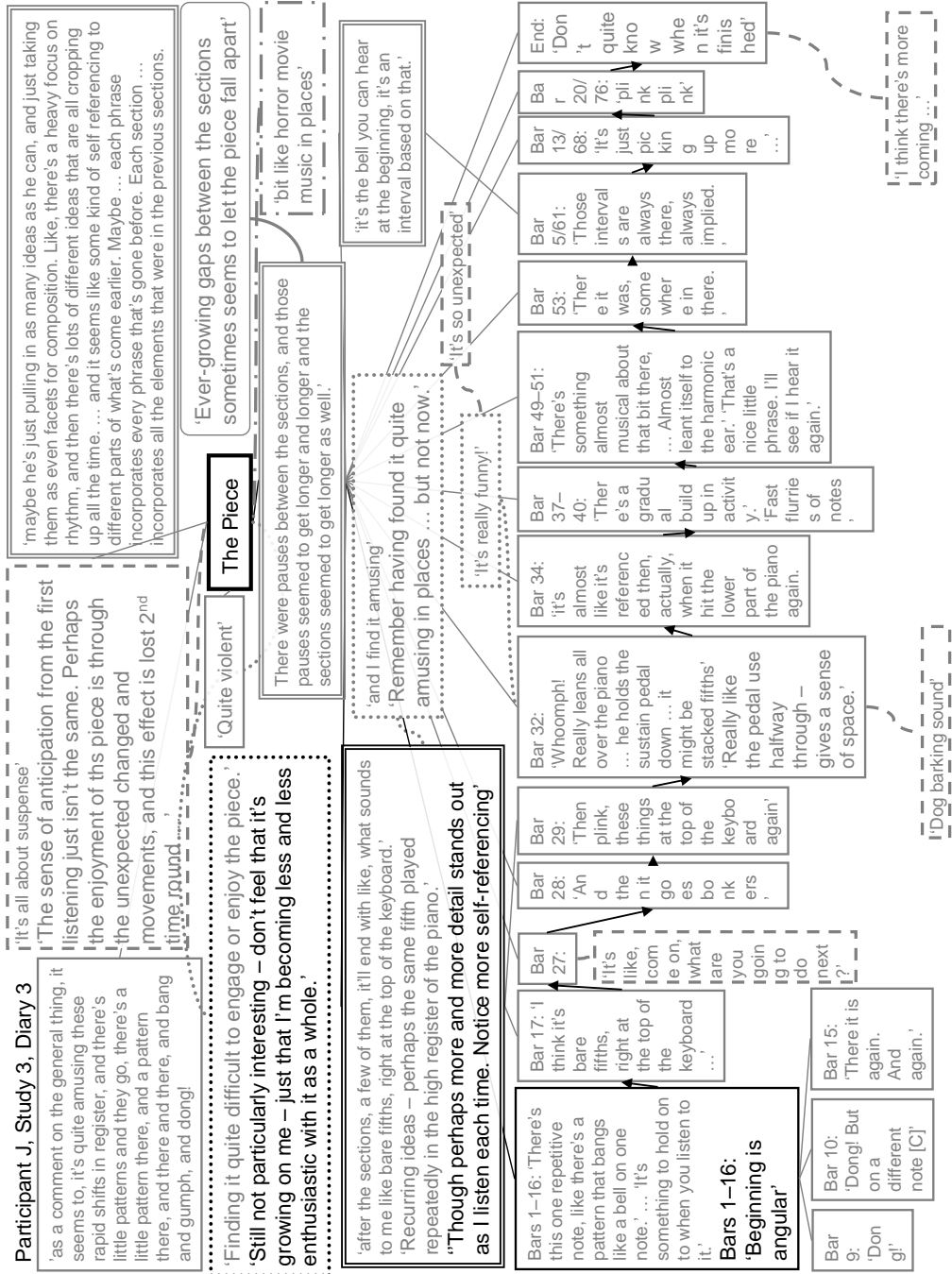
Participant J, Study 3, Diary 1



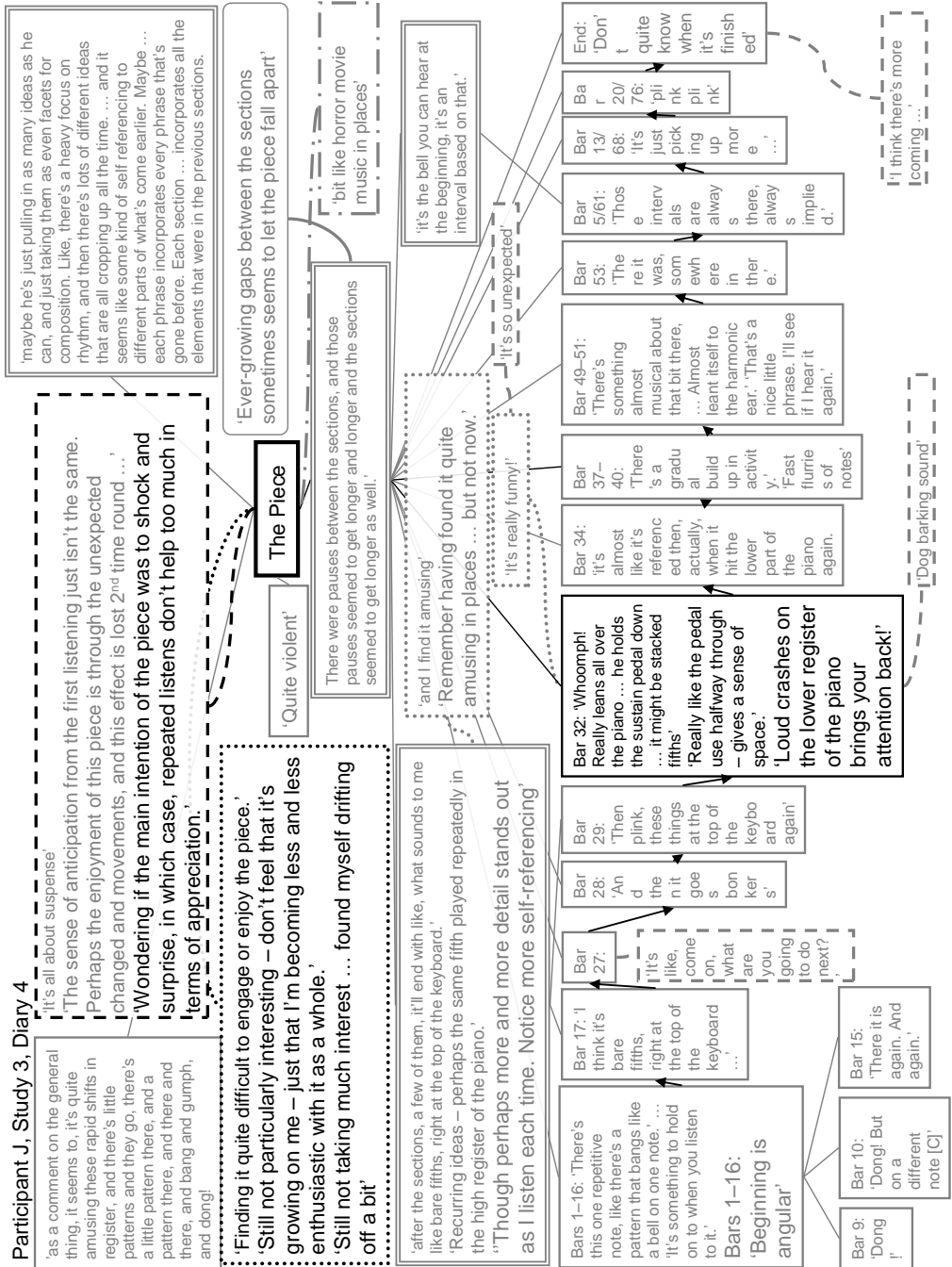
Schema 101 Berio - Participant J: Diary 2



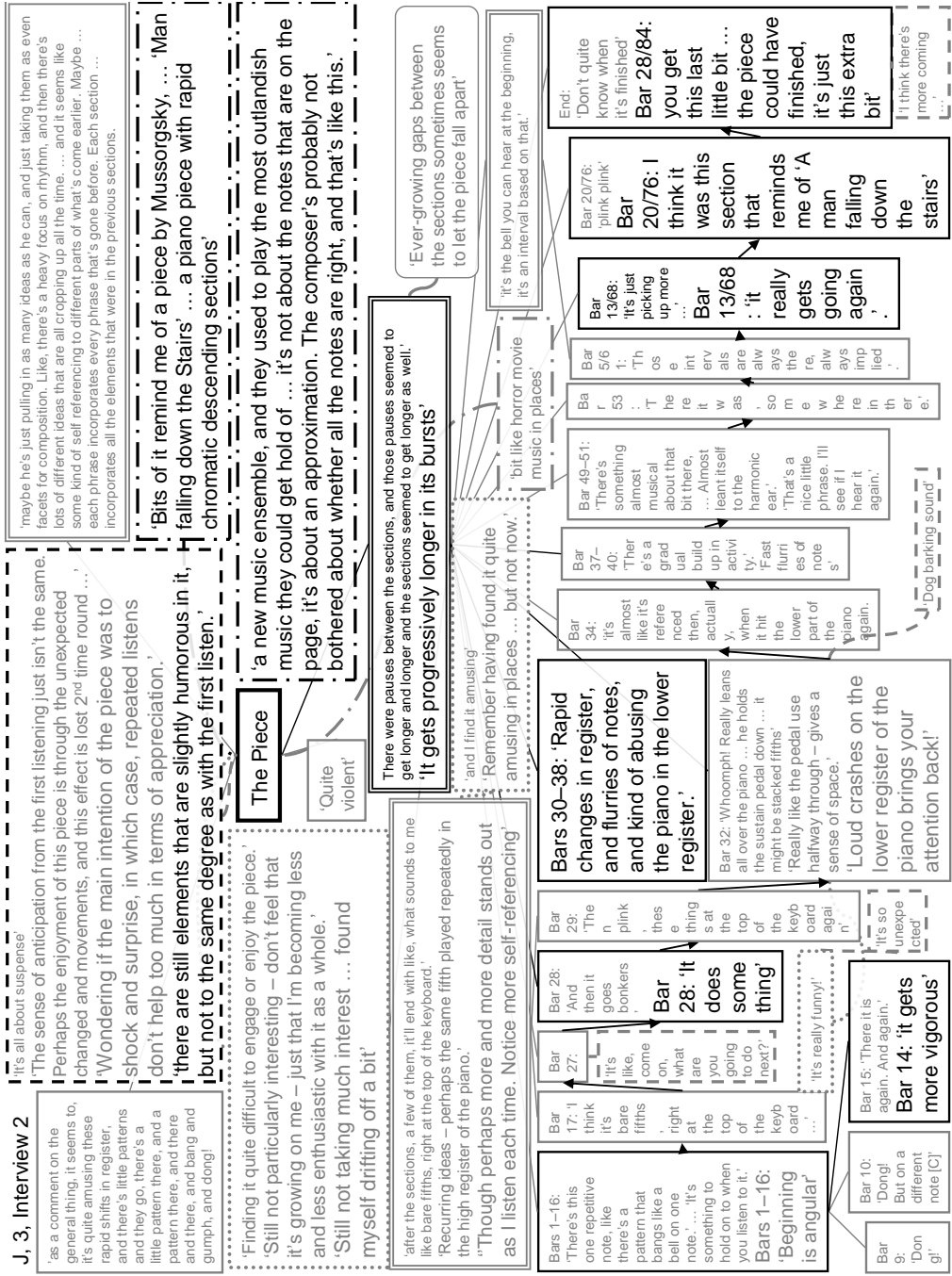
Schema 102 Berio - Participant J: Diary 3



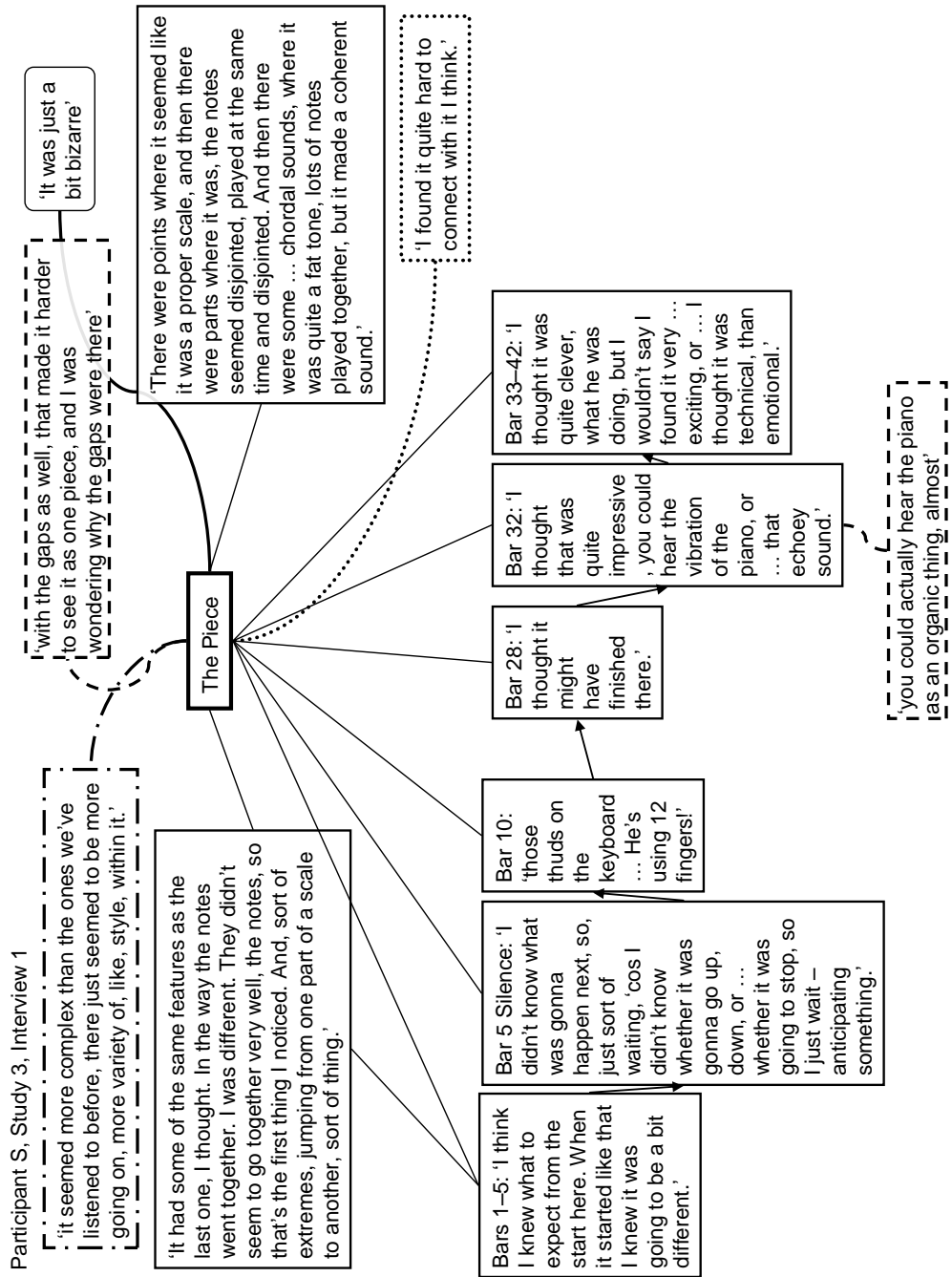
Schema 103 Berio - Participant J: Diary 4



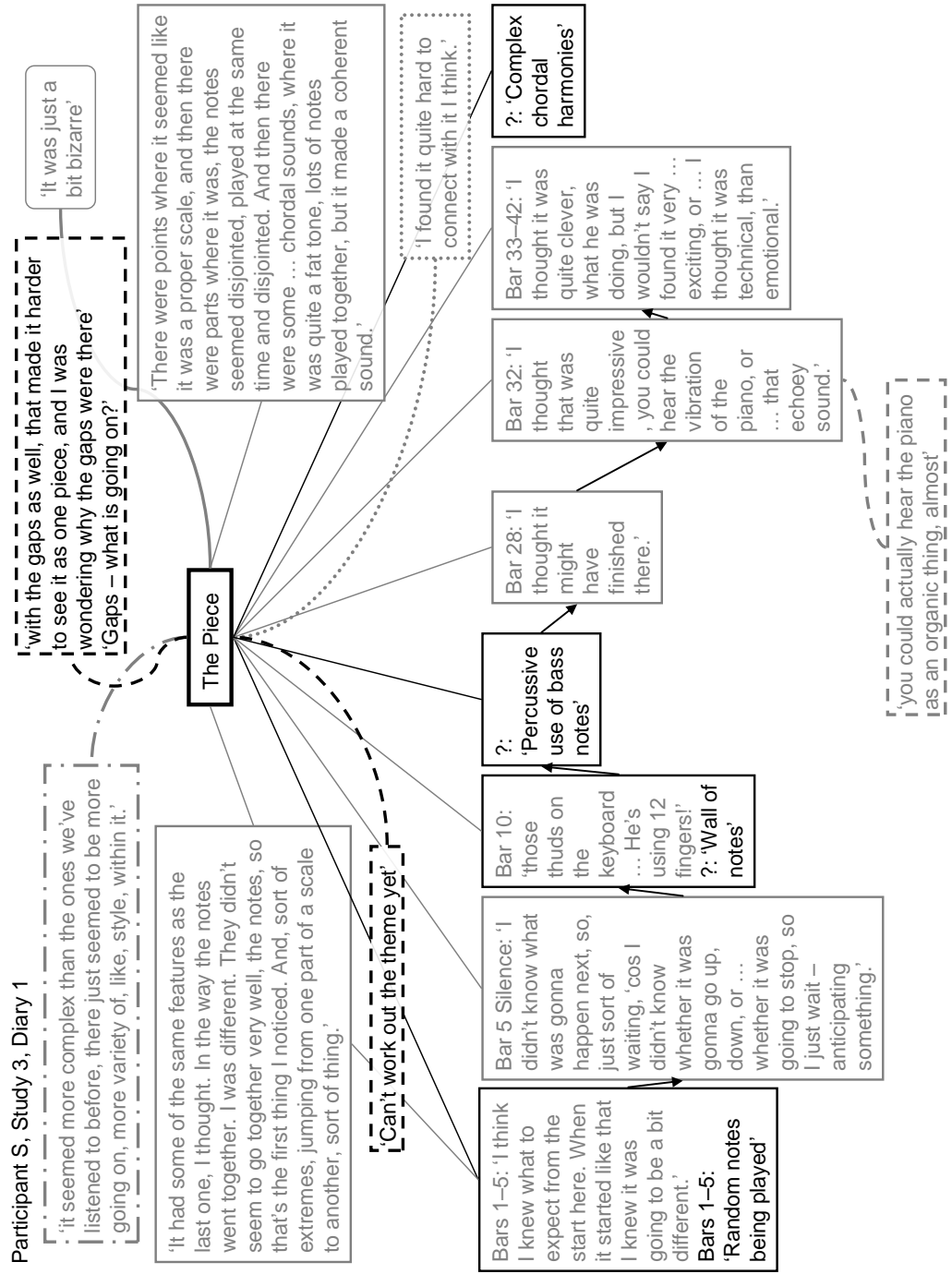
Schema 104 Berio - Participant J: Interview 2



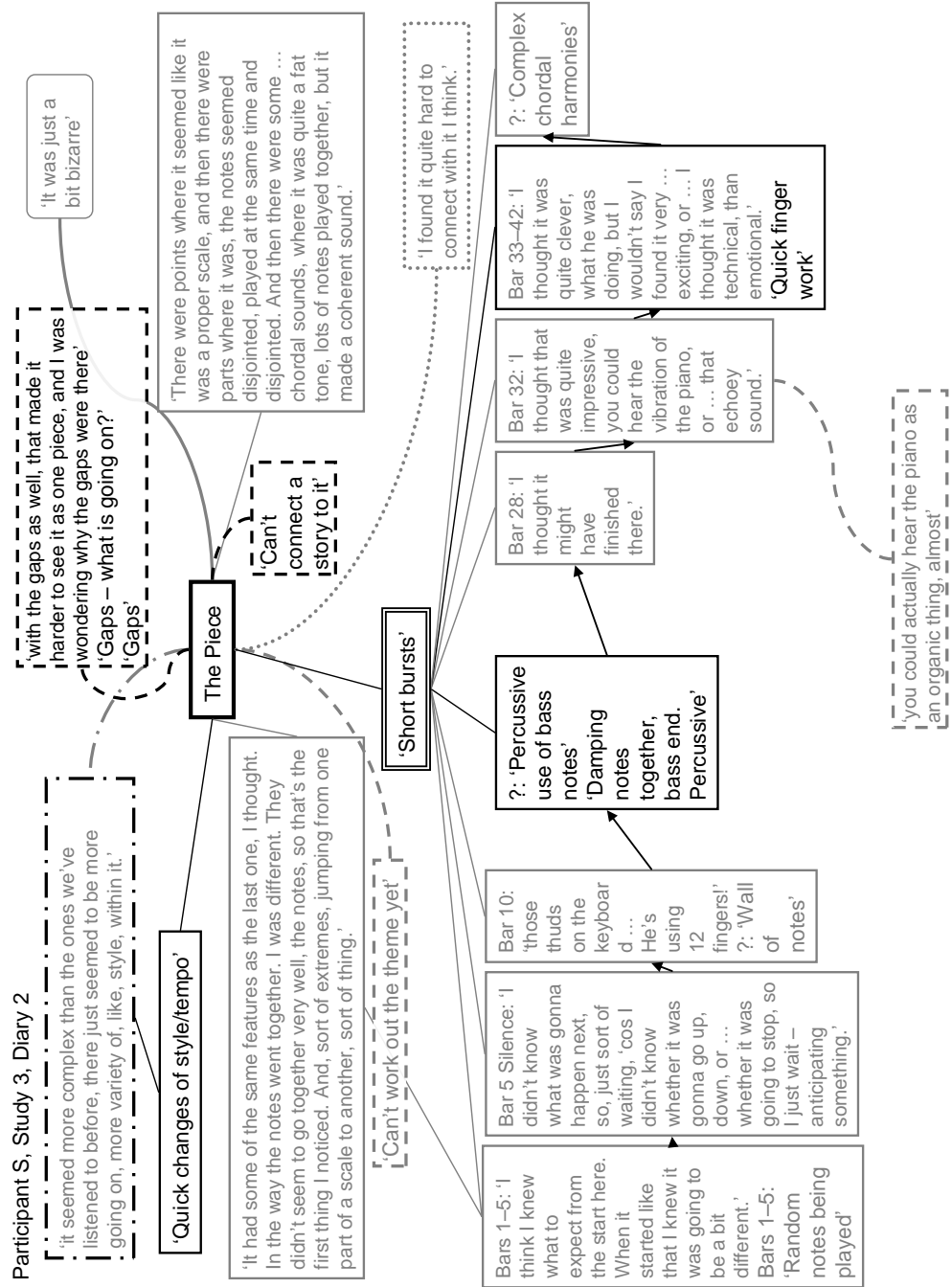
Schema 110 Berio - Participant S: Interview 1



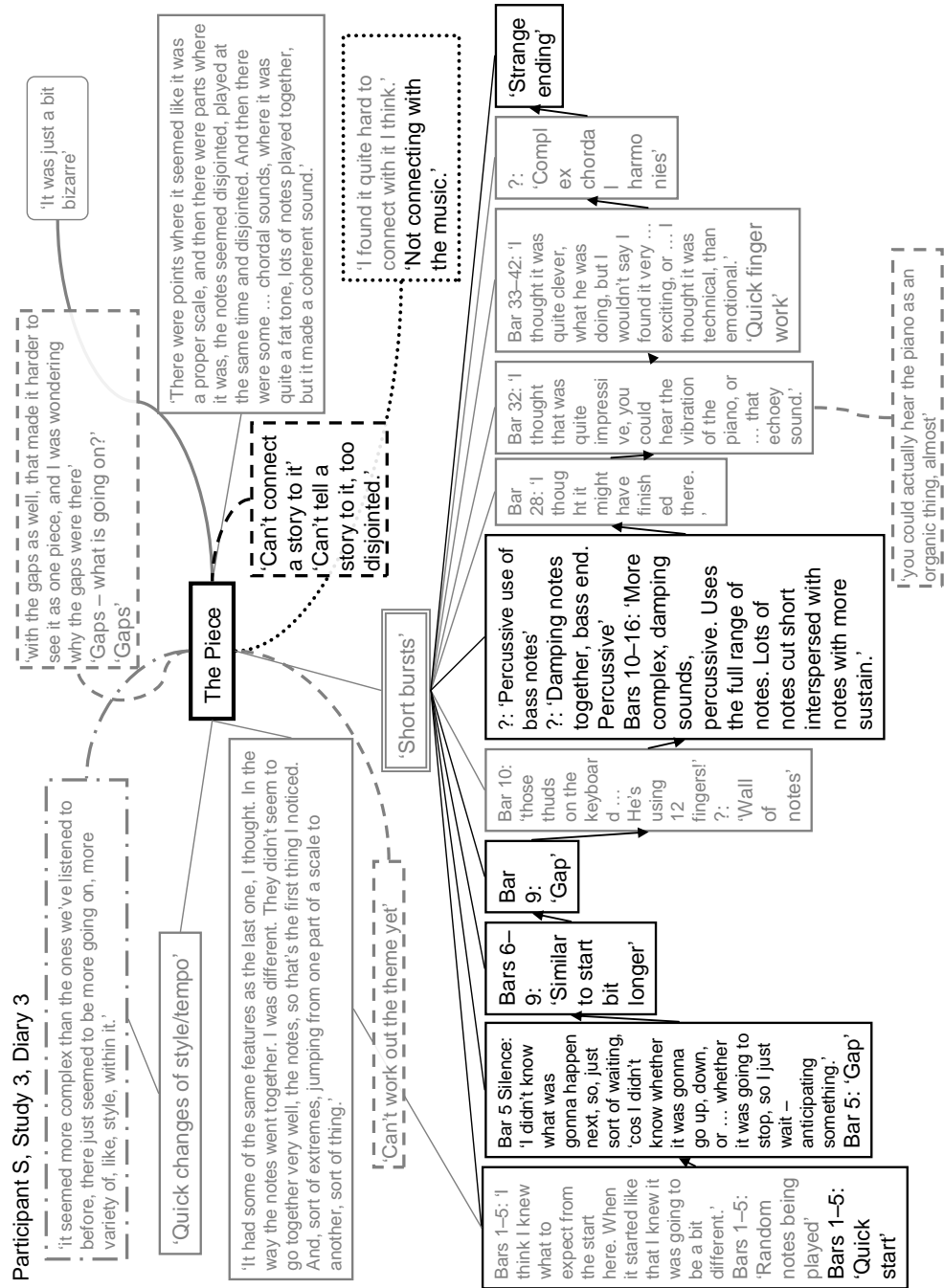
Schema 111 Berio - Participant S: Diary 1



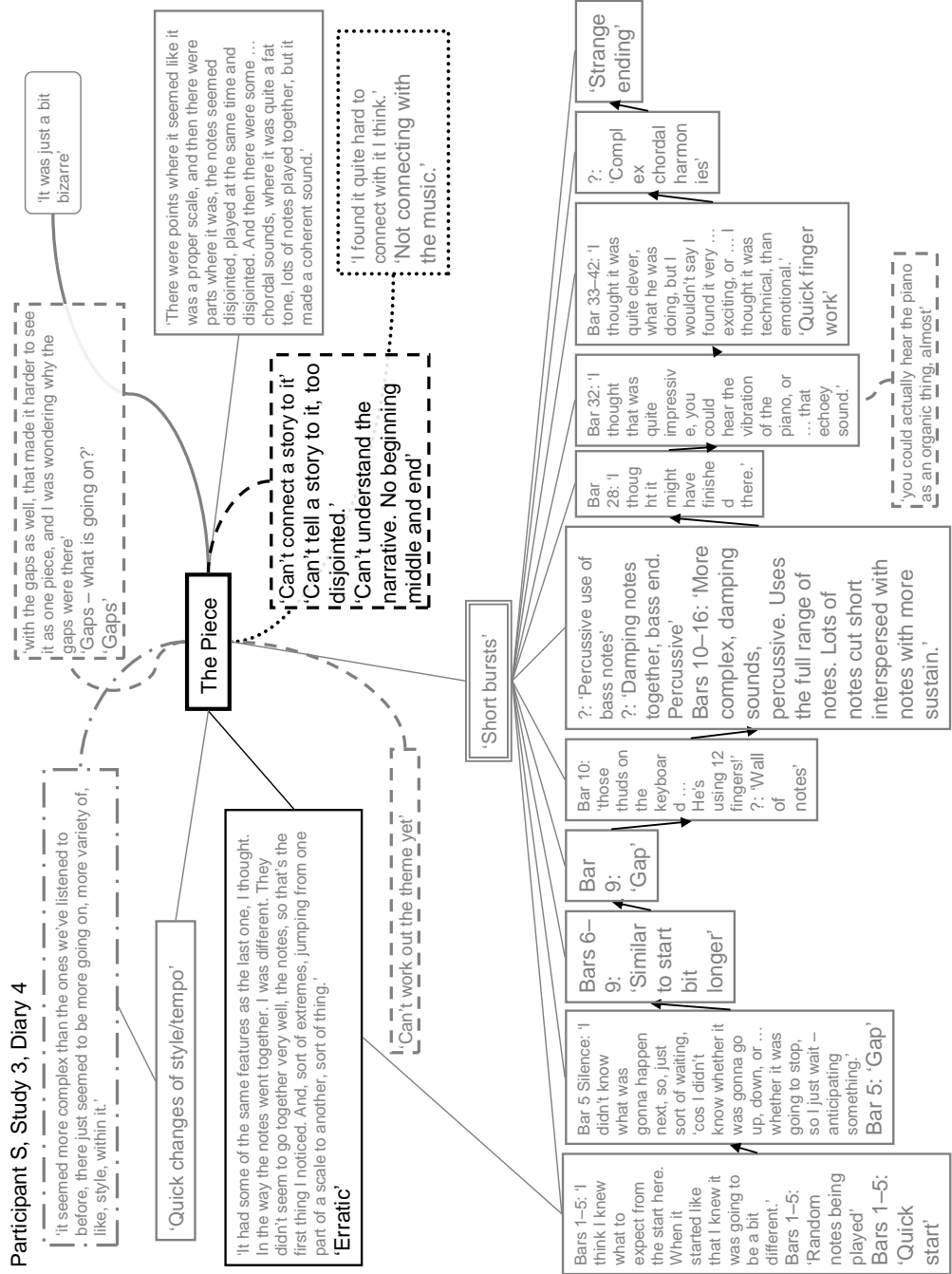
Schema 112 Berio - Participant S: Diary 2



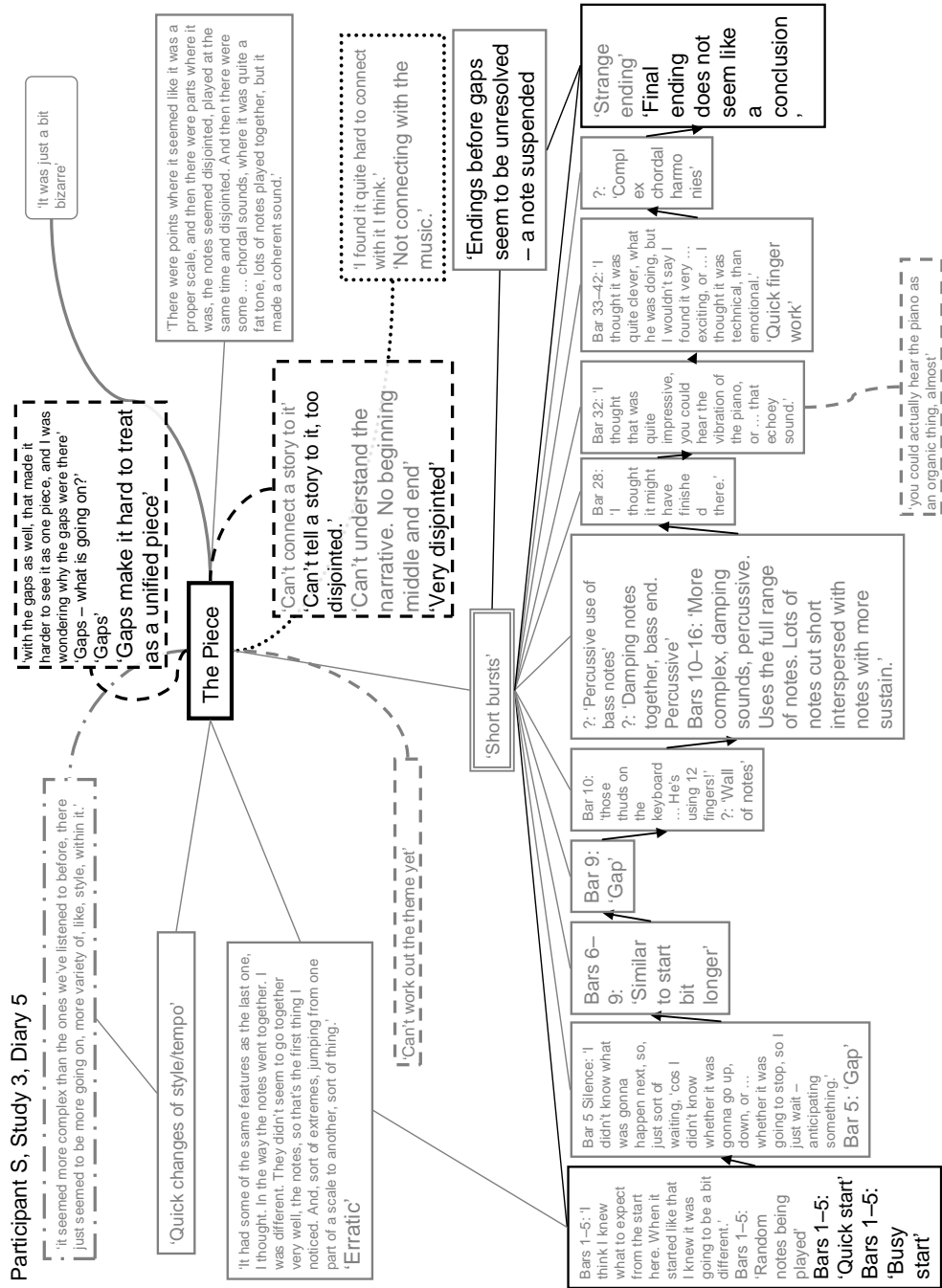
Schema 113 Berio - Participant S: Diary 3



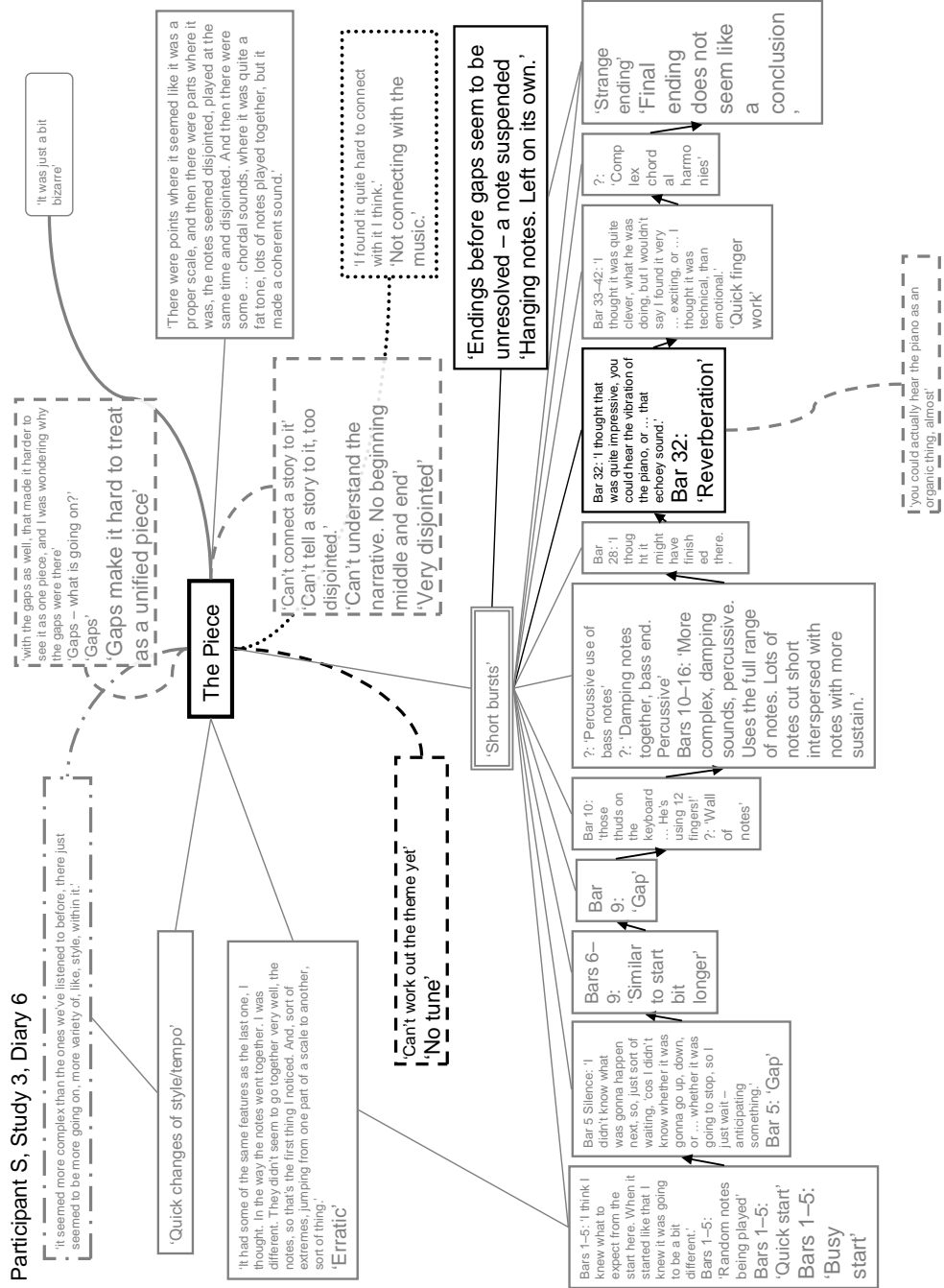
Schema 114 Berio - Participant S: Diary 4



Schema 115 Berio - Participant S: Diary 5



Schema 116 Berio - Participant S: Diary 6



Schema 118 Berio - Participant S: Diary 7

Participant S, Study 3, Diary 7

With the gaps as well, that made it hard to see it as one piece, and I was wondering why the gaps were there?

'Gaps - what is going on?'

'Gaps make it hard to treat as a unified piece' if you didn't have the silences, maybe it would be too much to comprehend ... it maybe fits in with what's happening!

There were points where it seemed like it was a proper scale, and then there were parts where it was, the notes seemed disjointed, played at the same time and disjointed. And then there were some ... chordal sounds, where it was quite a bit tone, bits of notes played together, but it made a coherent sound.

Can't connect a story to it
Can't tell a story to it, too disjointed.
Can't understand the narrative. No beginning middle and end
'Very disjointed'
'It didn't seem coherent, it didn't seem to be telling a story to me.'
'Doesn't make me think of descriptions. Too disjointed'

'It was just a bit bizarre'
'A lot of people won't like this.'

'I found it quite hard to connect with it, I think ...'
'Not connecting with the music.'

The Piece
'Can't work out the theme yet'
'No tune'
'No melody as such'

'Quick changes of style/tempo'
'the different styles that are involved ... lots of changes in tempo'
'Very varied'

'I tried some of the same features as the last one, I thought, it didn't seem to go together very well, the notes, so that's the first thing I noticed. And, sort of extremes, jumping from one or as soon to another, sort of thing.'
'Erratic'

Bar 1-5: 'I think I knew what to expect for what I heard in Berio. When I started like that I knew it was a bit different. I didn't know what was going on, it was gonna go up, or down, or whatever it was going to stop, so I was going to anticipate something. Bar 5: 'Gap' start'

Bar 6-9: 'Silly mill art bit lo ng er'

Bar 10: 'ho se on the box d... He's g 12 fing 2: 'W all of not es'

Bar 15: 'Percussive use of bass notes' end. Percussive damping sounds, percussive. Lots of notes cut short interspersed with notes more sustain. Bars 10-16: 'it got a bit more interesting with the use of the bass notes ... they gave quite a deep sound ... the percussive sound, but all seem to fit together.'

Bar 28: 'it was louder, and there was more going on.'
'It's a bit of a surprise, because you're waiting for something to happen, and then when it does, I suppose because you're anticipating it, you maybe react more. No matter what happened, you maybe would have reacted'

Bar 32: 'Thought that was quite a nice melodic pattern.'
'Reverberation'
'Bar 32'
'I thought it was quite a nice melodic pattern, but I was doing something, or thought it was a bit emotional. Quick finger work'

Bar 49: 'That note [C sharp]. It seemed to be in between ... on a scale somewhere between the beginning and the end, and it wasn't at the end. It seemed to stand out on its own.'
'That reminded me of cymbals, or a gong.'

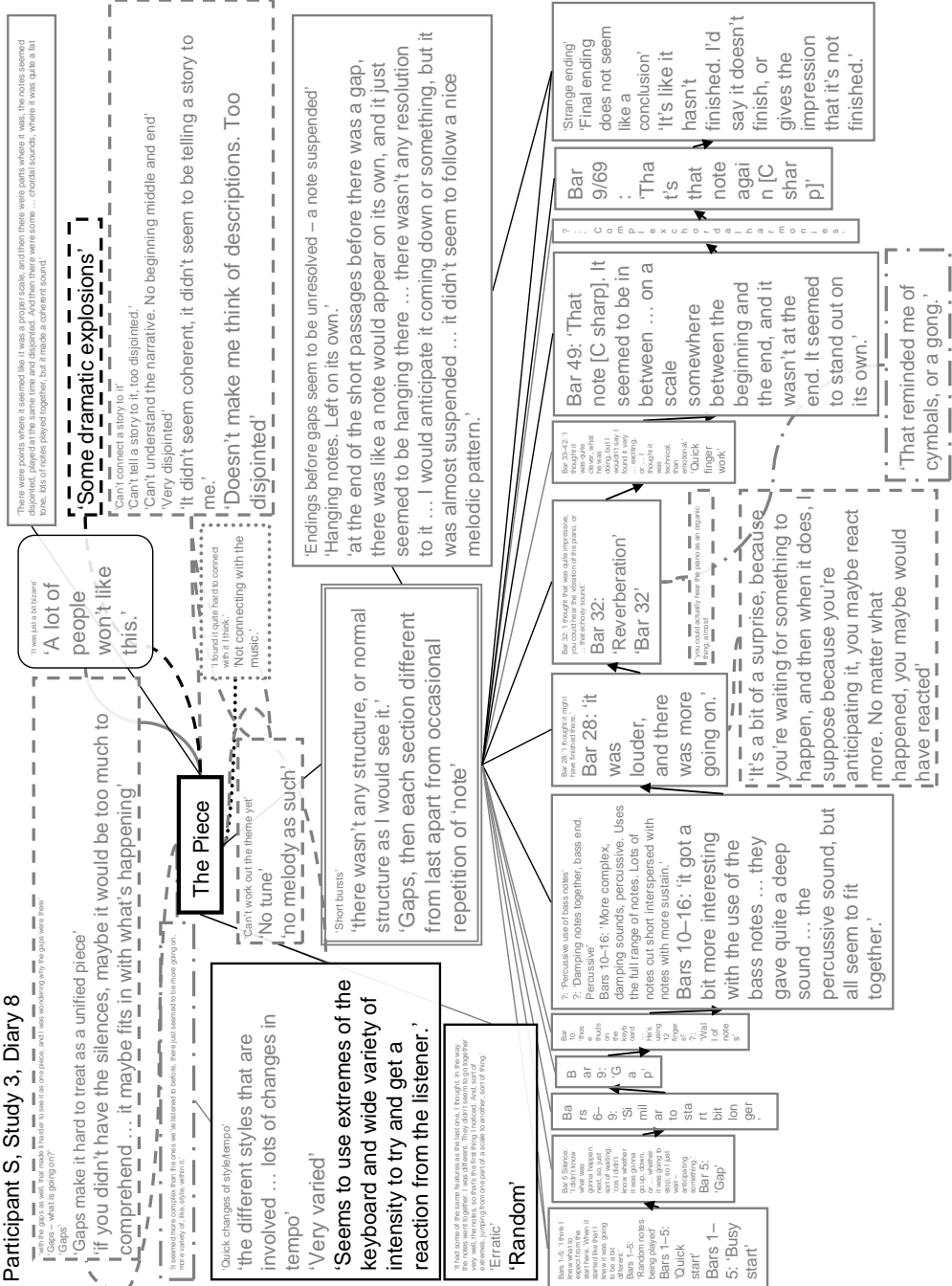
Bar 9/69: 'The conclusion' hasn't finished. I'd say it doesn't finish, or gives the impression that it's not finished.'

Bar 7: 'C o m p l e x c h o r d s'

'Endings before gaps seem to be unresolved - a note suspended'
'at the end of the short passages before there was a gap, there was like a note would appear on its own, and it just seemed to be hanging there ... there wasn't any resolution to it ... I would anticipate it coming down or something, but it was almost suspended ... it didn't seem to follow a nice melodic pattern.'

Schema 119 Berio - Participant S: Diary 8

Participant S, Study 3, Diary 8



Schema 121 Berio - Participant S: Diary 10

Participant S, Study 3, Diary 10

‘Gaps make it hard to treat as a unified piece’
‘if you didn’t have the silences, maybe it would be too much to comprehend ... it
maybe fits in with what’s happening’
‘Like the pianist is thinking what to do next. Pauses.’

The Piece
‘Can’t connect with the music.’
‘No melody as such’
‘Not much of a “tune”’

‘Some dramatic explosions’
‘Can’t tell a story to it, too disjointed.’
‘Very disjointed’
‘It didn’t seem coherent, it didn’t seem to be telling a story to me.’
‘Doesn’t make me think of descriptions. Too disjointed’

‘A lot of people won’t like this.’

‘The gaps stop engagement.’
‘Endings before gaps seem to be unresolved — a note suspended’
‘Hanging notes. Left on its own.’
‘at the end of the short passages before there was a gap, there was like a note would appear on its own, and it just seemed to be hanging there ... there wasn’t any resolution to it ... I would anticipate it coming down or something, but it was almost suspended ... it didn’t seem to follow a nice melodic pattern.’

‘Quite changes of style/ tempo’
‘the different styles that are involved ... lots of changes in tempo’
‘Very varied’
‘Seems to use extremes of the keyboard and wide variety of intensity to try and get a reaction from the listener.’

‘Random’
‘Erratic’

‘There wasn’t any structure, or normal structure as I would see it.’
‘Gaps, then each section different from last apart from occasional repetition of ‘note’
‘The only common theme is the recurring note 2.34/35 [Bar 50], 3.35 [Bar 16/72]. The other common factor is the randomness of the ‘chunks’ of music.’

‘Stripped down’
‘No tune’
‘Can’t connect with the music.’

‘Bar 20: thought it was going to be a melody starting here but it didn’t last long.’
‘Bars 10-16: it got a bit more interesting with the use of the bass notes ... they gave quite a deep sound ... the percussive sound, but all seem to fit together.’

‘Bar 28: it was louder, and there was more going on.’
‘It’s a bit of a surprise, because you’re waiting for something to happen, and then when it does, I suppose because you’re anticipating it, you maybe react more. No matter what happened, I you maybe would have reacted’

‘Bar 32: ‘Reverberation’ Bar 32: ‘Some dramatic changes’
‘That reminded me of cymbals, or a gong.’

‘Bar 49: That note [C sharp]. It seemed to be in between ... on a scale somewhere between the beginning and the end, and it wasn’t at the end. It seemed to stand out on its own.’

‘Bar 50: ‘note’
‘aim ost bein g play ed back war ds’

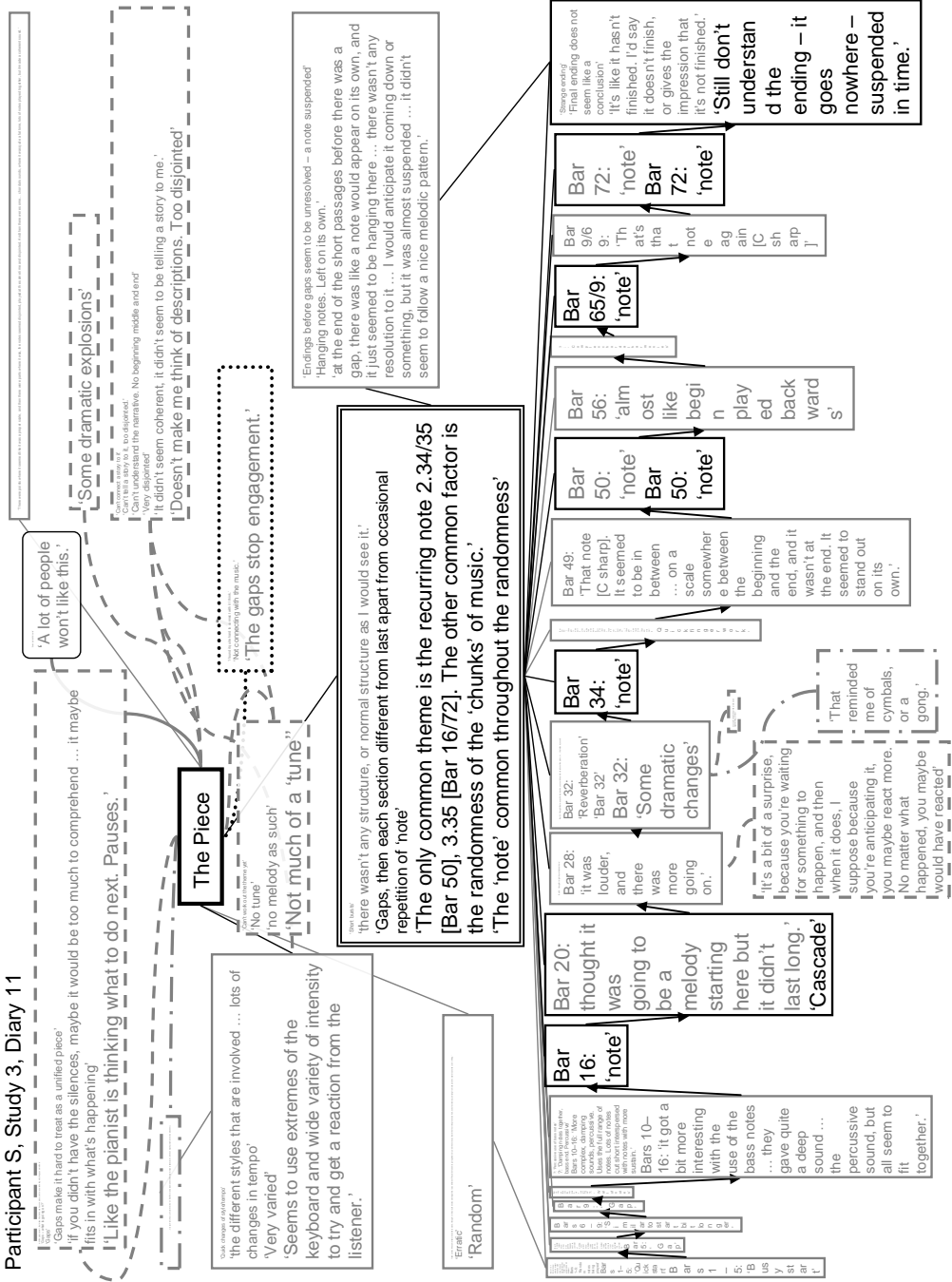
‘Bar 56: ‘aim ost bein g play ed back war ds’

‘Bar 72: ‘note’
‘r 9/6 9: ‘Th at’ s tha not e ag ain [C sh ar p]’

‘Strange ending’
‘Final ending does not seem like a conclusion’
‘It’s like it hasn’t finished’
‘I’d say it doesn’t finish, or gives the impressio n that it’s not finished.’

Schema 122 Berio - Participant S: Diary 11

Participant S, Study 3, Diary 11



Appendix 7

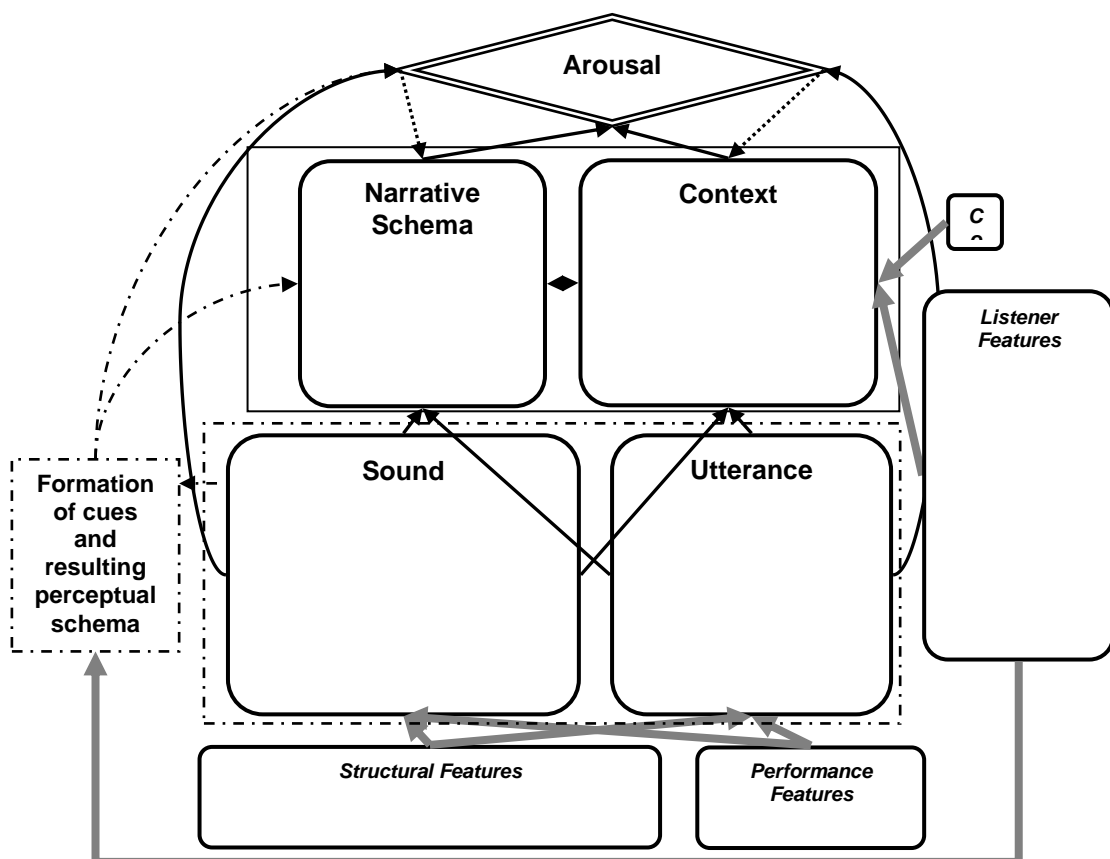
Proportionate Models

Introduction

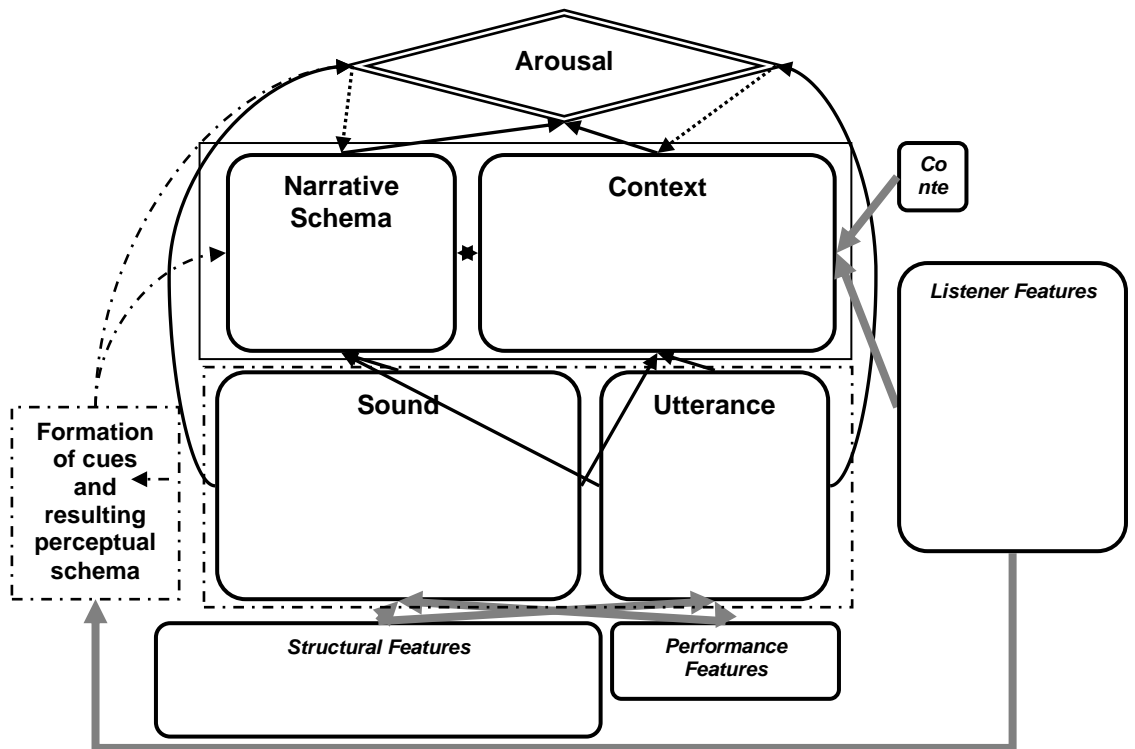
The proportionate models shown here illustrate the way in which the combined model of emotional responses to music outlined in Chapter 1 may be used to understand a sample of participants' responses to a specific piece and as their familiarity with the piece develops. The changing emphasis on each aspect of the model is represented by the area of the box containing each contributory factor to the emotional responses. The larger the box, the more comments pertained to that category.

Responses to Clementi

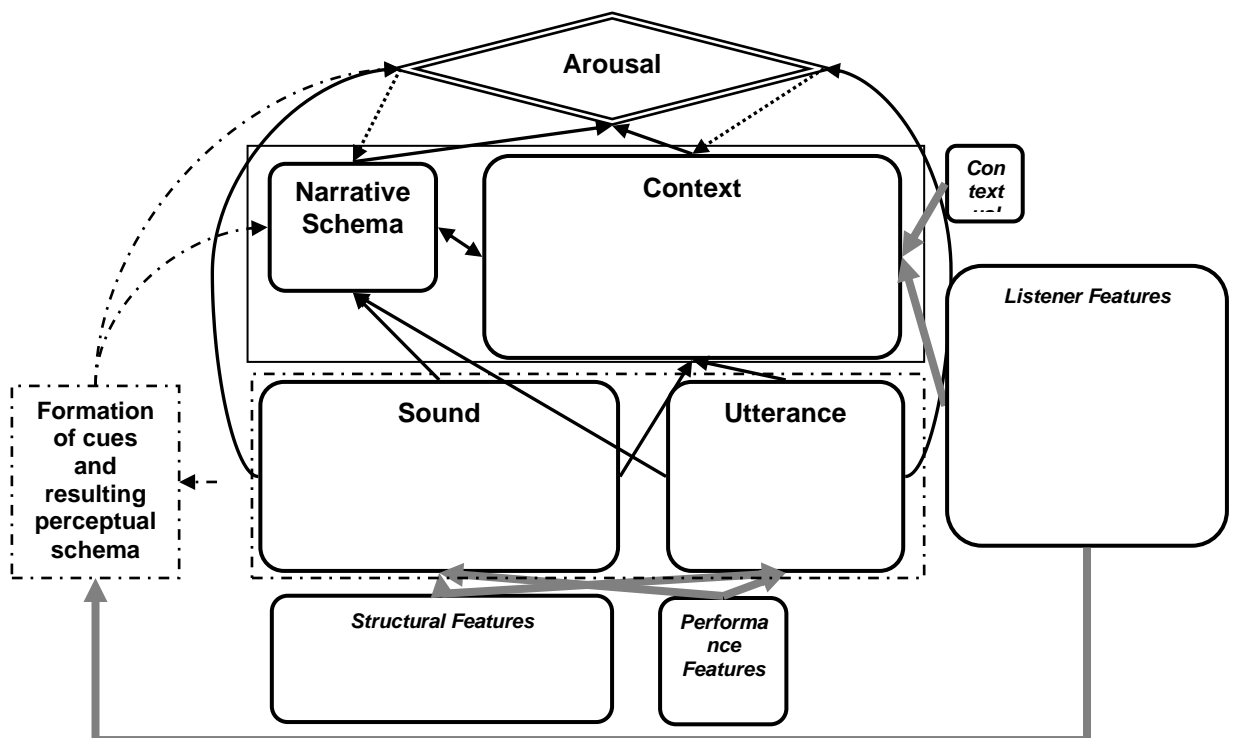
Model 1: Responses to Clementi: Session 1



Model 2: Responses to Clementi: Session 2

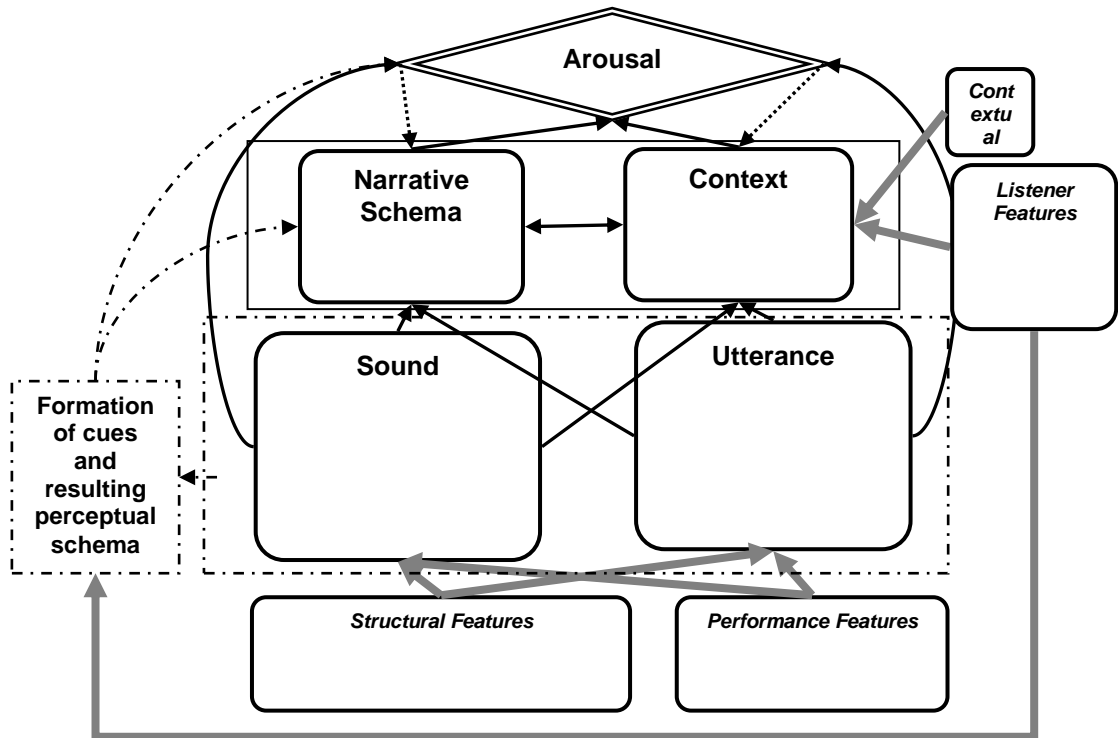


Model 3: Responses to Clementi: Session 3

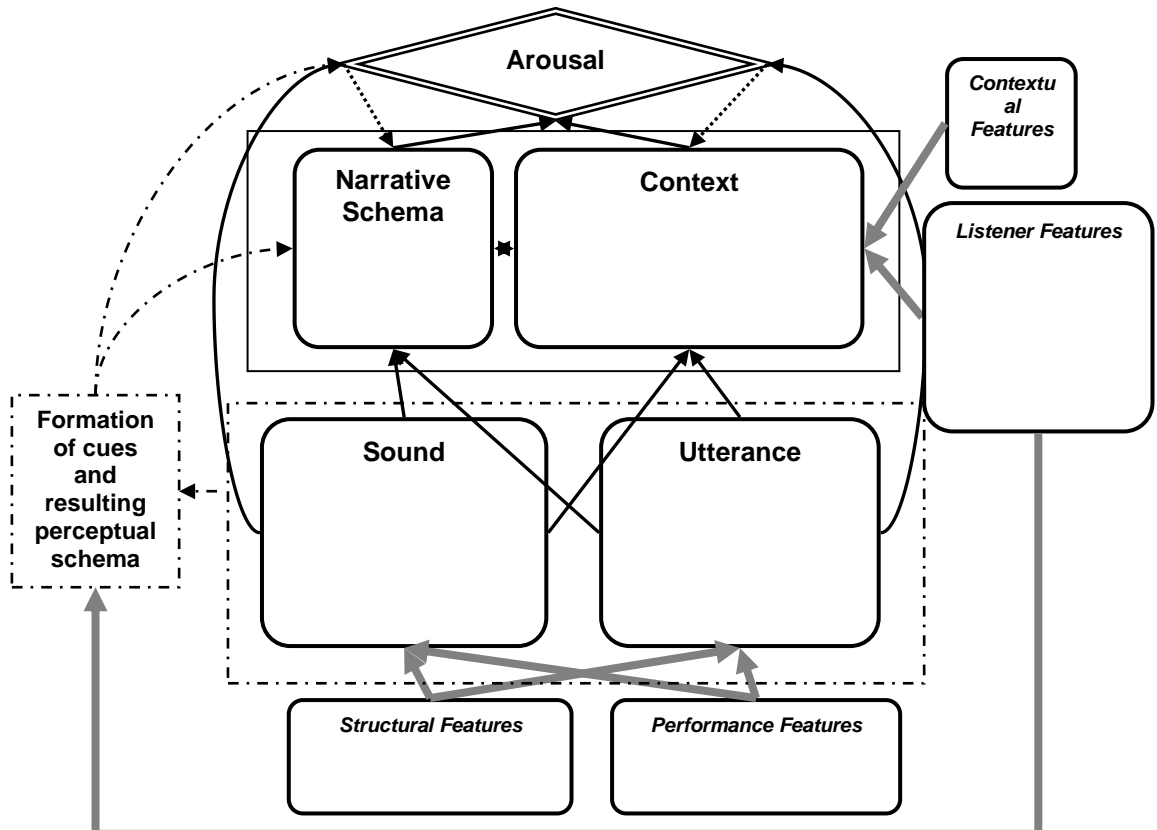


Responses to Schoenberg

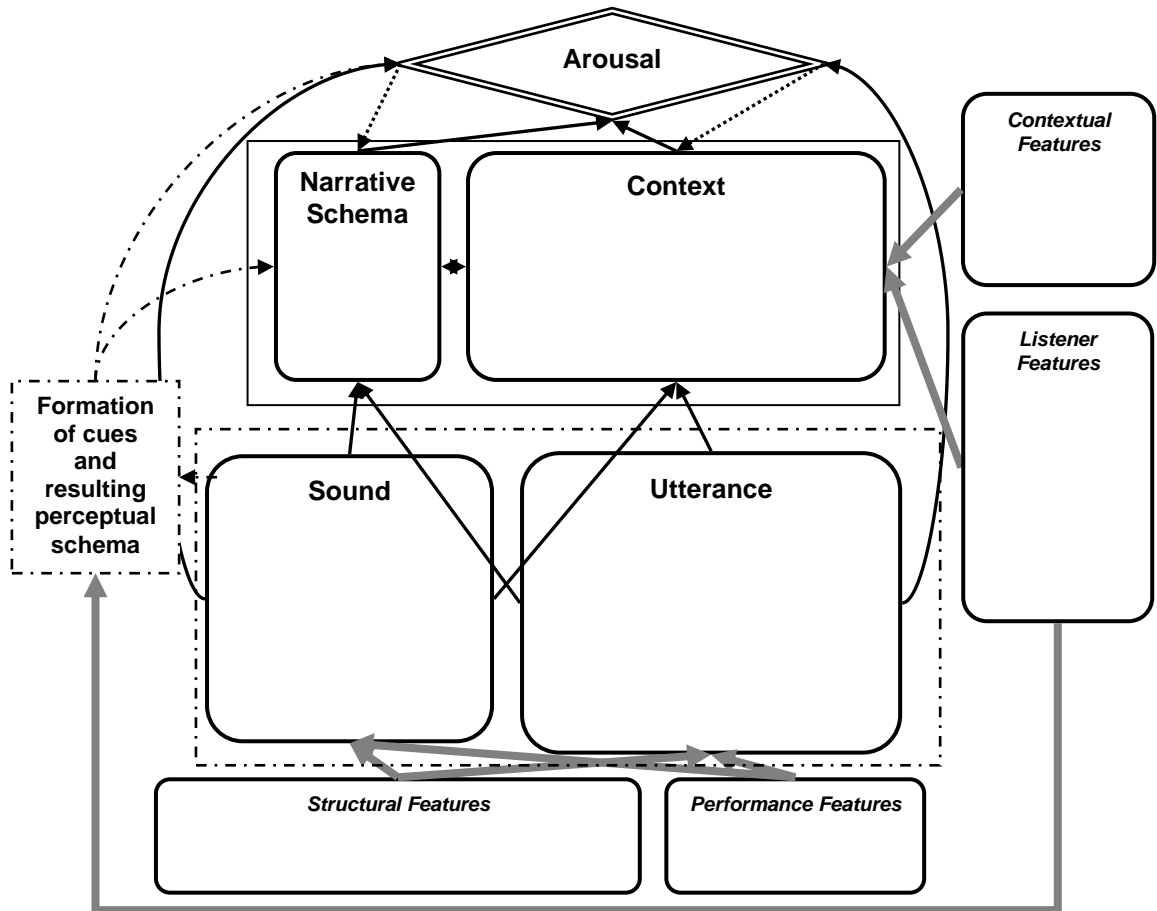
Model 4: Responses to Schoenberg: Session 1



Model 5: Responses to Schoenberg: Session 2

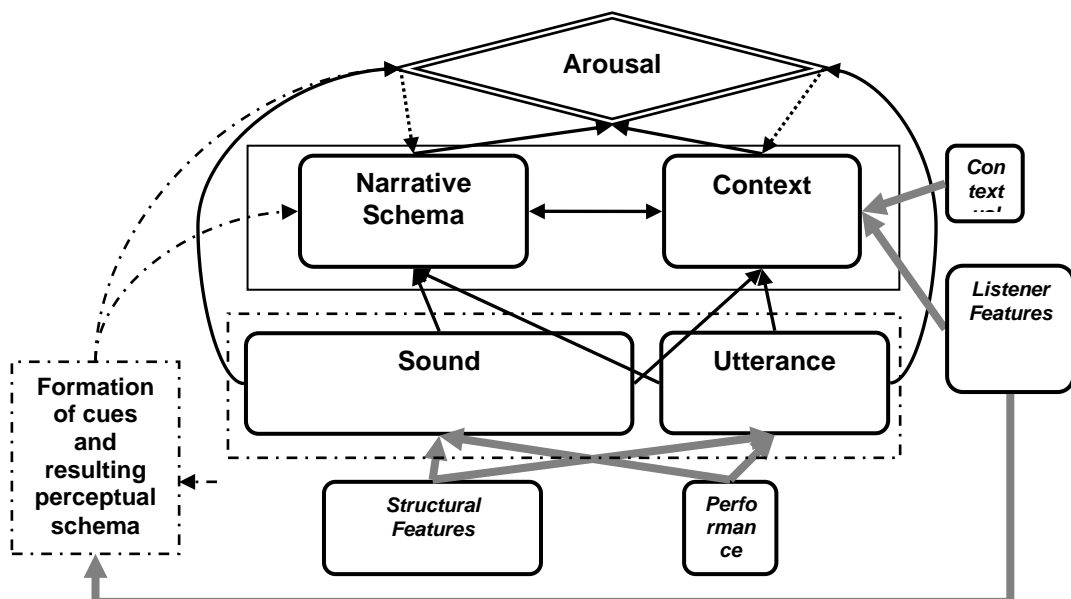


Model 6: Responses to Schoenberg: Session 3

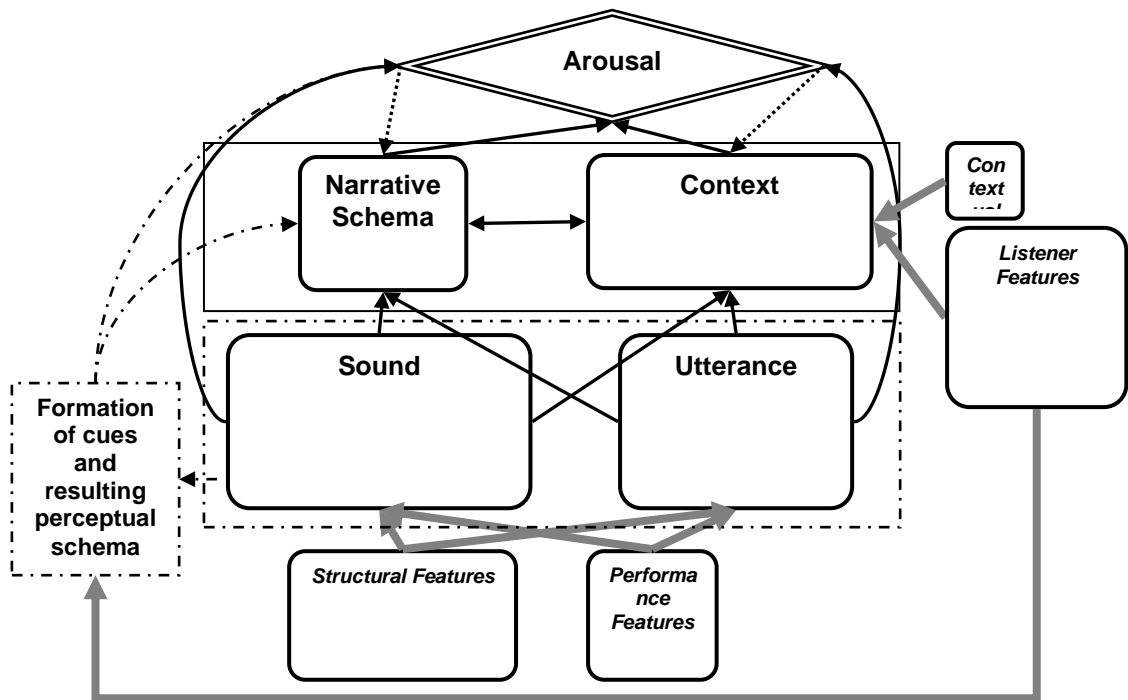


Responses to Berio

Model 7: Responses to Berio: Session 1



Model 8: Responses to Berio: Session 2



Model 9: Responses to Berio: Session 3

