ATTENTIONAL FACTORS IN MUSICAL COMPOSITION: THEIR
IDENTIFICATION AND REPRESENTATION

by

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ABSTRACT

The thesis was concerned with differences in what individuals attend to as a function of domain knowledge. “Attention” in this thesis is premised on the construction of “meaning”: an active process driven by the quality of prior knowledge and underlying intention. It was argued, that observation of compositional behaviours (what the composer ‘does’), would be reflective of different qualities of internal decisions made as compositional goals are selected, implemented and evaluated. To access composer’s internal concerns, a unique multi-method design was developed. Concurrent verbal protocols made available current cognitive concerns in working memory while retrospective protocols were seen as accessing metacognitive dispositions and affective thoughts held in long-term memory. By triangulating videos and transcribed verbal protocols, seven categories of Attentional Foci were observed.

The verbal categories were converted to step-graphs to visually represent the attentional processes of real-time composing. The resulting graphs provide two data sources – firstly, a measure of time devoted to each category before shifting to another category of activity, and secondly, the number of instances devoted to each category. Variations in Attentional Focus were argued to reflect different layers and qualities of intention. This in turn implied different qualities of knowledge use and strategic behaviours.
Study 1 explored between group differences in the composing behaviours of five novice and two professional composers. Behaviours were coded and converted to step-graphs to give a profile of Attentional Focus for each composer. The graphs were grouped into three clusters. The graphs of Attentional Foci reflected differences along the novice-expert continuum. The professional composers shifted attention over all the categories, whereas the novice composer’s attention was limited to the central categories. Further analysis revealed differences in the underlying cognitive complexity driving the processing concerns of each group. Professional composers were able to draw on extensive prior knowledge and mindfully regulate the composing process. Novices with less developed schemas and regulated the composing task with less efficiency. Also noted were individual differences in patterns of Attentional Foci and individual differences in motivations of task engagement.

Study 2 investigated individual differences within a common cohort of fourteen tertiary music students. Measures of individual differences of beliefs in control over task (Strategic Flexibility Questionnaire Cantwell & Moore, 1996); approach to task (Study Process Questionnaire Biggs, 1987) and beliefs in self-efficacy (developed by the author for this study) were linked to different patterns of Attentional Foci and in turn linked to quality of compositional outcome. Maladaptive dispositions were linked to central categories of Attentional Foci and low SOLO scores for their musical compositions. Adaptive dispositions were linked to a wider spread of Attentional Foci and high SOLO scores for their musical compositions.
The implication of this thesis is that musical composition is conceptualised as much an intellectual process as a musical process. A metacognitive account of musical composition provides a necessary but not sufficient condition for an account of process in musical composition. The thesis implies that the process of musical composition is multi-dimensional. For example, even if there are special musical abilities that underpin the process of musical composition then how that ability is enacted can be explicated through metacognitive theory.
CHAPTER 1

Introduction

In one of the interviews reported in this thesis, an experienced university lecturer, teacher and professional composer responded to the question “If you are teaching first year university students in composition, how would you go about using this composition as part of that teaching process?” He responded with “I would say that you wouldn’t is the real answer!” He then expanded his answer by describing music composition as a ‘process’. Further, he described undergraduate students as having too many ‘ideas’; and not knowing what to do with the ideas.

The temptation of a student is to have idea on every page in every bar, and so to take just some tiny idea and maybe proliferate. Show them how to do that and show them how to go back and forth on it, change your mind and realise that that note needs to be twice as long because it was … all that sort of thing.

This anecdote describes composition as a ‘process’ and highlights differences in what experts attend to during the composition process. For the student in this anecdote, the process of what to attend to is problematic. The student struggles with translating compositional intent into satisfactory compositional activity. Something appears to get lost in the translation of intention into action. Why is this so?

For this composer the process is clear. As a professional composer, he is able to draw on extensive prior knowledge of the process of composing and is able to use this experience to notice what is possible in a ‘tiny idea’ and how to take that idea and to attend to it in the development of the composition. It may have been the
case that the professional composer may have at some earlier time been like the student and been unable to have seen possibilities in a ‘tiny idea’. How do composers develop the capacity to notice potential in a musical idea? Could it be that learning to compose, like learning to teach mathematics, is about “shifts in the form as well as the focus of attention” (Mason, 2010, p. 24)? How does attention play out in the in-situ process of composing?

Sloboda (1985) asserts that the composing process is the ‘central and fundamental process’ of a psychology of music because it is concerned with the generation of new pieces of music. Despite music composition being of central importance to a psychology of music, there has been little research into how composers compose music in real-time (Collins, 2011; Sloboda, 1985).

Collins (2011) argues that the reason for the paucity of research into the composing process may be due to a belief that the process itself is ‘mysterious’ and ‘spiritual’. This belief is espoused in the writings of some composers who attempt to describe their idiosyncratic processes of composition (e.g. Discussion between Harvey & Deliege, 2006). However, there is a need to integrate scientific investigations into the underlying knowledge of how composers learn to shift the focus and form of their attention during the composing process.

**Purpose of thesis**

The question of ‘how composers compose’ is of key importance to the music profession, and music educators. Theoretical understandings and modelling of the
psychology of composing will allow for the development of scientific research that may have implications for the development of music education curriculum and pedagogy.

*Structure of Thesis*

The overall structure of the thesis is illustrated in Figure 1.1 below.

*Chapter 1:* By way of introduction, Chapter 1 raises the possibility that there is a relationship between intention and the allocation and distribution of attention during the composing process. Thus to answer the question “How do composers compose?” may be to examine patterns of attention during the composing process. Unlike the “mystery models”, analysis of the form and focus of attention is contended to be empirically possible.

*Chapter 2:* Existing explanations of the composing process are inadequate in explaining individual differences in intention and therefore attention. We look in the next chapter at alternative analytic frameworks through educational psychology.
Figure 1.1 Structure of the Thesis
Chapter 3: Intention and the allocation of attention in real-time composing is addressed from current accounts of educational psychology. The framework addresses the question – what does the composer do whilst composing?’ The account begins with an account of intellectual development situated within Biggs and Collis’ (1982) SOLO Taxonomy – thus minimally setting the stage for accounts of individual differences as both a developmental phenomenon as well as individual differences surrounding differential levels of expertise. Whilst this approach acknowledges that certain developmentally constrained mental models will influence the quality of compositional construction, on its own, this paradigm does not explain intention – it remains process and product centred. The chapter therefore argues that by overlaying the approach of Cantwell, (2000; 2004) and Vermunt (1996, 1998) integrating domains of affect, metacognition and cognition that existing research into the compositional process can be extended to include intentionality and the distribution of attention.

Chapter 4: The purpose of this chapter is to describe a methodology that allows the underlying cognitive, metacognitive and affective domains to be accessed and to make explicit the procedural processes that are required for the actual regulation of, and control over the compositional process. Further, as the composition process occurs over time, it is intended, in developing this methodology, to provide a mechanism for capturing this real-time activity and to develop a metric for its measurement and representation. Such a mechanism - in this case graphic representations of attentional focus in real-time – will then be able to assist in the subsequent inferencing about the underlying attentional foci
and thus the quality of processing associated with different qualities of compositional outcomes.

Chapter 5: In chapter 5 a study describing differences in the Attentional Foci of novices and experts is reported. The graphs of Attentional Foci allowed inferences to be drawn about the underlying metacognitive control which in turn direct the form and focus of attention.

Chapter 6: This chapter extends the inferences drawn in Chapter 5 by making explicit the differences in the substantive knowledge and strategic processes underlying the novice-expert differences. At the same time, individual differences are discussed in the underlying epistemologies driving the decision making. Individual differences are explained by reference to potential underlying dispositions.

Chapter 7: The second study reported in this thesis further addressed potential individual differences within a cohort of broadly common expertise. Observed differences in attentional behaviour within this group would provide evidence of a mediating effect of dispositions on attentional patterns that are independent of prior musical expertise.

Chapter 8: In the final chapter the results of the empirical studies of attentional focus are discussed in terms of the underlying theoretical constructs. Implications of these studies for the theoretical conception of music composition and strategic processes as well as diagnostic and instructional processes are suggested.
I now return to Sloboda’s 1985 attempt to match composer’s writings about their composing processes and place their writing within a psychological framework. Such a model provides a starting point for finding a theoretical model of the composing process. He suggests that a psychological model needs to account for composer’s intention and individual differences.

Sloboda’s tentative working model of the composing process

Examining the personal reflections of composer’s writings about their own compositional process, Sloboda proposed a tentative working model of the composing process. This model is presented in Figure 1.2 below. The model is a binary scheme of ‘inspiration’ and then execution. Inspiration is used by Sloboda to refer to motivation (see also Thrash, 2003). Execution relies on drawing on prior composing experiences and strategies. Execution allows for the process of transforming and altering the composition during the process of composition. Sloboda specifically refers to knowledge available in long term memory and thus implicates links to the retrieval of prior knowledge in memory as important to the composing process. Thus the underlying mechanism in this account is prior musical knowledge and knowledge of the composing process available to the composer.
On this basis Sloboda provides an autobiographical account of his own thoughts while composing a choral composition for performance by his local choir. The account is a very rich description of his experience of the process linked with musical examples and scores of the work as it unfolds. Sloboda emphasises the importance of goals (intentions) to the composing process. Composition is a matter of having an overarching or ‘superordinate’ goal and then reducing the problem spaces into sub goals. Thus there is the implication that there is a hierarchy of goal concerns or task hierarchies. Sloboda emphasises the prior knowledge that the composer brings to the compositional task as well as of strategies for solving the compositional problem space. Further, using verbal protocols provides access to the in-situ processing concerns of the composer.
The verbal protocol reported by Sloboda is a mixture of both concurrent protocols and retrospective reflections of the decisions and processing impasses that he encountered in the process. The report published is a very rich description of the composing process and has been described as ‘the best contribution in the whole surveyed literature’ (Garcia, 2001).

As the model is only a tentative outline, it does not provide the researcher with a fully worked out psychological model of the compositional process. I therefore review the research into the composing process in the Chapter 2.
CHAPTER 2

Review of Literature - Musical Composition

In chapter 1 the possibility of a relationship between intention and the allocation and distribution of attention during the in-situ composing behaviours may provide empirical insight into how composers compose. The purpose of this chapter is to review the empirical literature to examine extant theoretical models that may provide psychological explanations of the hypothesized relationship between intention and attention of the composing process.

A number of composers and music theoreticians have proposed theoretical models to describe the compositional process. These theorists have utilised both general theories of creative behaviour and autobiographical descriptions of the composing process (Baroni, 1999; Emmerson, 1989; Laske, 1989; Roozendaal, 1993). To date, only Roozendaal (1993) has featured in one study by Collins (2011).

Reviews by Webster of the musical literature (1992; 2003) separates’ the process of creativity from the creative products or compositions. The general distinction between process and product is a feature of the research literature examining creativity. The process is defined by Sloboda (1985) as the ‘internal psychological processes’ of the composer. Kratus (1994) suggests that the composition process refers ‘to the fluid thoughts and actions of the composer in generating the product’. However, this separation of the process from the product does not allow for discussion of the possible interactions between the composer’s intention, with the process and the development of the composition (see also Collins, 2005).

General theories of the creative process

*Gestalt theory*

Gestalt theory emphasise how elements fit together to form a structure. From this perceptive, the process of composition is to restructure how the parts of the composition combine to form the whole. Restructuring occurs when the composer sees an unexpected solution (“flash of insight”) to an impasse encountered in a problem (Collins, 2005). The theory places an emphasis on perception or patterns in the solution process (Anderson, 2009; Mayer, 1992).

*Stage theory*

The most commonly cited stage theory in the music composition research literature (for example Bennett, 1976; Kratus, 1989; Burnard & Younker, 2002) is that proposed by Wallis (1926). Wallis 1926) suggests that the thinking or
compositional process can be broken down into four stages: *preparation* – *incubation* – *illumination* - *verification*. This model implies that the process is about problem solving and it is linear (Jeanneret & Forrest, 2008). ‘Preparation’ describes the period when the initial problem is assessed and the composer becomes familiar with the musical materials they are working with. ‘Incubation’ represents time spent in unconscious processing of the problem. ‘Illumination’ is the so-called ‘flash of insight’ or ‘aha’ moment when the solution of the problem is realised. ‘Verification’ is when the final product is realised.

Unfortunately, these four stages are based on introspections by Wallis and others about what they think they are doing when they solve problems, rather than on psychological experimentation (Mayer, 1992). Further, the stages are very general and do not allow for specific cognitive mechanisms to be identified that would account for qualitative differences in how these stages may be acquired or differences in how these mechanisms can be best used by composers with different backgrounds and experiences of composing (Lubart, 2001). For example, stages do not adequately account for differences in quality of intention or attention evidenced between novice and expert composers? How would you teach composers to ‘incubate’ or to have ‘illumination’?

*Information processing theory*

Information processing theories aim to capture a composers thought processes by using verbal protocol analysis (for example Ericsson & Simon 1993) and to develop computer models to test the hypothesised nature of thinking that underpins the composing process (Newell & Simon, 1972; Pearce & Wiggins,
2002). Composing is regarded as a form of problem solving characterised as ‘ill-structured’ (Reitman, 1965; Newell & Simon, 1972). To resolve the ‘ill-structured’ nature of the problem requires trial and error search through a ‘problem-space’. The problem solver moves from the initial state of the problem to its ‘goal state’ controlled by the structure of a rule system.

Empirical studies of compositional process

*Professional Composers*

Research involving professional composers includes three single case studies (Reitman, 1965; Collins, 2005; McAdams, 2004) and an investigation of two professional composers (Whitaker, 1996). Reitman (1965) and Whitaker (1996) used a concurrent verbal protocol methodology to gain insight into the problem solving statements of composers during the development of their compositions. Collins (2005) and McAdams (2004) found that concurrent verbal protocol methodology not satisfactory as they followed composers over a three year period. They resorted to retrospective reporting, interviews, use of MIDI save-as files and written or computer generated musical scores, drawings and artefacts.

Reitman (1965) noted three findings:

- That as an ‘ill-structured problem’, the composing process involved ‘constraint proliferation’ as the number of sub-problems is solved, the sub-problems become more critical as the composition nears completion.
- As the problem – solving process unfolds, the composer may ignore particular aspects of the music (such as rhythm) to deal with other aspects of the composition – ‘attribute discontinuity’.

- The composer may defer plans or actions until suitable ‘conditions’ arise for their implementation – ‘connected alternates’.

Reitman (1965) emphasised the thought processes of the composer and not the music produced. In contrast Collins (2005) and McAdams (2004) analysed the music produced by the composers and linked the musical analysis with the problem solving of the composers. On this basis, Collins (2005) developed a hypothetical model of the compositional process as a general solution space at the macro level and a series of restructuring problems at a micro level. He viewed the composition process as a ‘synthesis of stage process models of general creativity and Gestalt theory’, and ‘information processing’.

McAdams (2004) documents the development of a composition and shares the composer’s view of the process of composition. This composer proceeds from ‘large-scale planning, to the specific resources to be used, to the creation of thematic materials and then to the use of those materials to create the designed form’.

Whitaker (1996) used Dewey’s ‘reflective thinking’ as a means of inferring the quality of thinking processes used in the composing process. Verbal protocols were collected over a period of two months. There were no observations of the composers by the researcher, so it is impossible to verify whether the collected
protocols were of all the composing sessions or only some of the sessions. Results indicated six phases of reflective thinking:

- Prereflection (recognition of a problem)
- Suggestion (suspension of decision)
- Intellectualization of the problem through funded experience
- Creation of a hypothesis
- Elaboration of the hypothesis through reasoning
- Hypothesis testing

The research discussed in this section relies on descriptive analysis of the composition process by reference to either thought processes of composers or the perception of musical patterns by the researcher. The research questions do not extend to the issue of composers intention and the allocation of attention during the composing process.

Comparing Novice – Expert composers

Sloboda (1985) suggested that a way forward to understanding the composing process would be to compare differences in ways that novice and expert composers solved the same musical problem. Following this suggestion, a series of studies investigated differences in how novices and experts solved different types of musical problems. Problems were designed as closed tasks such as designing a melody with specific restraints (Davidson & Welsh, 1988) or designing harmonies to a given tune (Colley et al, 1992). The studies used subjects drawn from tertiary, high school and professional composers. Some
subjects were intending to be performers (Davidson and Welch 1988) and not composers, while other studies relied on high school students.

Davidson and Welsh (1988) investigated the way that piano majors’ in first and third year differed in their understanding of the concept of tonality. Data for the study were based on the responses of ten tertiary music students to a modulation task. The ten students (all piano majors) were at two levels of expertise (5 first year conservatory students, and 5 students who had completed at least two years of conservatory study). The researchers were particularly interested in investigating whether the tonal knowledge implicitly acquired with advanced performance ability would transfer to the composition of a tonal melody.

The task involved composing a melody that modulated from C major to F sharp major and then returning to C major. Modulations a tri-tone from the starting key are not usual in music. Therefore, the researchers assumed that such an unusual problem would engage non-routine problem solving behaviours from the participants as they attempted to solve the problem. The rhythm of the tune was given, thus providing a number of opportunities for planning the placement of the modulation and for structuring the melody. Subjects had available a piano at which they worked and were stopped at the completion of 30 minutes. They were instructed to work on a sheet of manuscript provided in which the given rhythm was provided on the top stave. The manuscript paper consisted of six blank staves and that if they made a mistake to continue their working by moving to the next stave. Thus mistakes as well as solutions were available to the researchers. The
participants were also instructed to talk aloud as they worked and to explain what they were considering at each step of the process.

The analysis consisted of size of the working unit as evidenced by the shifts to the next stave when a mistake was made. Analysis of the musical manuscript for evidence of generating new material, integration of rhythm into the working process, use of motivic relationships, orientations to the first key, transition to the next key, return to the home key, efficiency of the modulation process, how the key is defined, strategies used, and success of the melody.

Major findings of the study reported differences in the way the two groups represented the problem and the strategies they employed in solving the task. Both groups were able to verbally define the keys to be used as C major and F sharp major without difficulty. However, the first year students’ defined key with single notes, usually the tonic or notes of the tonic triad. In contrast, the older students defined key by using a more dynamic and structured tonal schema that supported the hierarchical relationship implicit in scales and scalar fragments. Strategically, the first year students were unable to design or construct a melody except at the most local level. Consequently, they usually added notes to their melody without a long-range goal or design in mind. In contrast, the more advanced students were able to use means-ends analysis, and even use a generate-test model. The length of the working unit was a bar in the novice composers and up to three bars in length in the more expert participants.
Younker and Smith (1996) modified the task designed by Davidson and Welch (1988). Instead of requiring subjects to modulate to the distant key of F sharp, Younker & Smith required their subjects to begin in C major and modulate to A major and then to return to C major. The rhythmic structure of the task was the same as that used in the Davidson and Welsh experiment. Data was collected from four subjects; one adult expert and one adult novice composer, and one high school expert and one high school novice composer. The researchers focussed on the thought processes of the four subjects by collecting verbal protocols, retrospective interviews and musical productions. The protocol of subject 1 was then parsed into categories illustrating goal structures. A model was developed and then checked against each subject’s protocol to verify the model. The major findings demonstrated a gradual progression from the high school novice’s approach emphasising ‘note-to-note’ detail through to the adult expert who worked from a whole-part-whole manner. Differences were noted in the expert adult and high school composer relying on improvisation and also in working faster at the task than the novice composers.

Colley, Banton, Down and Pither (1992) investigated the strategies employed by three first year undergraduate students and one professional composer as they completed a harmonisation of a J.S. Bach Chorale. The task was similar to the final examination that the undergraduates would take at the end of the year. The subjects were given the melody line for the entire nine bars and the alto, tenor and bass lines of the first half of the first phrase. The task involved completing the alto, tenor and bass lines in the style of Bach. They were asked to think aloud as they worked. The task was timed for one hour and they could use the keyboard to
check their work in the last fifteen minutes. At the end of the session, a short structured interview was conducted which attempted to elicit the subjects overall strategies and their own evaluations of the different components of the task. All tapes of the verbal reports and interviews were transcribed and independently verified by an independent researcher.

Major findings highlighted differences between the strategies employed by the first year students and the professional composer. The professional composer had a larger knowledge base, a larger strategic repertoire, reflected on the task as a whole, was able to integrate part-movement in conjunction with chord structures and was able to devote processing capacity to stylistic constraints. In contrast, the first year students began work on cadence points, concentrated on note-by-note details, experienced difficulty in applying knowledge in a flexible manner and did not reflect on an overall plan before commencing the task. The researchers suggest that the professional composer reflected a deeper understanding of the nature of the task whereas the first year students reflected on the surface features of the task.

Kennedy (1999) compared the compositional processes of two composers (a high school and a postgraduate composer) as they set the same poem to music. Data collection included interviews, two progress/observation sessions, the collection of compositional sketches, audiotapes of sessions where the researcher was not present and a final interview where participants listened to and reflected on performances of their compositions. Findings included observations that both composers employed exploratory or ‘doodling’ periods to generate musical
material. Differences were noted in prior learning experiences of both composers. This difference was highlighted in the way that the postgraduate composer demonstrated a higher degree of ‘craftsmanship’ in her composition, utilised time more efficiently and her composition was judged by other expert composers as being more complex than the novice high school composer.

These studies have attempted to limit the variables under investigation by imposing restrictions on the task, time or genre allowed. For example, Davidson and Welsh (1988) imposed a time limit of thirty minutes and imposed a pre-set rhythmical framework for the task. Colley, et al (1992) gave a set melody which was to be harmonised in the style of Bach. This style may not have been familiar to the student/novice composers.

In summary, these studies demonstrate group differences in the knowledge of the tasks and in the strategies employed. Generally, the novices worked note by note while the experts were able to link goals and sub goals. In addition the experts were able to draw on a rich representation of the task and have strategic procedures which were flexible and adaptable to the requirements of the different problems encountered in the tasks. However, the data analysis relied on analysing patterns of musical notes. The analysis did not extend to individual differences in the reasons the composers chose particular strategies over others.
Three studies investigated ways that university students compose music. Bamberger (1977; 2003) used qualitative data to investigate how novice composers with no prior experience with music could arrange given ‘tune blocks’ within a special computer program into larger scale compositions. The novice composers used reflective journals to record their feelings and decisions about the direction and form of the emerging composition. Bamberger describes the ‘intuitive’ ways that prior experiences of listening to music provides as students build a musical composition from the given ‘tune blocks’. Descriptive analysis is given as students shift between ‘tune blocks’ to build larger scale ‘phrases’ and ‘sections’.

Collins and Dunn (2011) investigated how three tertiary students composed on computers. The methodology was adapted from Collins 2005 study into the composing processes of a professional composer. Mixed method included video collections; verbal protocols and MIDI save-as files. Data was triangulated for each data set. Results indicated that subjects used four stages:

- Stage 1: statement of intention of broad musical aims
- Stage 2: the development of thematic, germinal ideas
- Stage 3: smaller-scale editing/refining processes
- Stage 4: creating solutions (general, specific or deferred)

Both Bamberger (1977, 2002) and Collins and Dunn (2011) show how composers illustrate a ‘building blocks’ approach (Collins & Dunn 2011) to the way a
composer builds the musical composition. In many ways this is similar to the ways that novices were shown to work in the novice-expert studies by Davidson and Welsh, (1988); Colley et al (1992) and Younker and Smith (1996). Not addressed were the meanings that the composers presumably apply to the composition process.

Children Composing
A number of researcher’s have investigated ways that children compose. This body of research reflects a growing interest by music teachers as researchers and their interest in understanding how children compose. The studies reflect both quantitative and qualitative designs.

Of interest is Kratus (1989) argument that composing music is a dynamic process in time, thus the process of composing should reflect different categories of activities over time. Further, the sounds composers make are an audible analogue of their internal thought processes. Kratus (1989) asked 60 children, aged seven, nine and eleven to make up a song on a keyboard within a ten minute timed session. Although this study analysed the final compositions (products) of interest is the use of time as a factor in the analysis. The compositions were analysed and coded into four categories of activities: exploration, development, repetition and silence. Exploration is linked to divergent thinking as it is generating many different and unique solutions to a problem. Development and repetition are linked to convergent thinking as it is about converging on the ‘best possible answer’ (Webster, 1987). Results indicated developmental differences in that older children used less ‘exploration’ and more development and repetition.
processes. Whilst this methodology can reveal ‘what’ a composer does it cannot reveal ‘why’ a composer makes certain decisions (Kratus, 1989; Sloboda, 1985).

An alternative way of measuring process is addressed by capturing computer MIDI files as traces of compositional process (Seddon & O’Neill 2003; see also Folkestad, Lindstrom & Hargreaves, 1997, Folkestad, Hargreaves & Lindstrom, 1998). This gives access to the written notes as well as the sequence and grouping of the notes in time.

Folkestad et al (1997, 1998) report a three year study into the composing processes of 14 participants aged 15-16 with no previous experience of composing. The units of analysis were the 129 created pieces of music and not the individual participants. Results were descriptive categories of possible ways to compose: ‘horizontal’ versus ‘vertical’ compositional styles. In horizontal composing, each line of music is played from beginning to end and recorded. Another line is added to the original line and so on until the composition is completed. In Vertical composition each section is completed before moving to the next section. However, it is not clear to what extent the various styles are learnt or if they are a feature of innate capacity. Another possibility is that the computer program may lend itself to a particular way of composing. Certainly the methodology does not extend to assessing whether the use of a particular style is the intention of the composer.

Seddon and O’Neill (2003) used Forty-eight students aged 13-14 years to find out what influence prior experiences of formal instrumental music tuition (FIMT) had
on compositional processes. Analysis revealed 12 composition strategies and three meta-approaches: ‘Crafting’; ‘Expressing’ and ‘Immersing’. Expressing and Immersing were associated with exploring (a feature of ‘divergent’ thinking Webster, 2002). Correlations supported the finding that participants with FIMT used low exploratory behaviours and participants without FIMT used high exploratory behaviours. Seddon and O’Neill acknowledge that their study was not to solicit the participant’s viewpoint (p.133). Therefore this methodology still has the same limitations as noted above by Kratus (1989), that it cannot reveal the decision making process of the composer.

Mellor (2007) addressed this issue by using a within - methods design. Data included on-screen ‘mouse’ manipulations, retrospective verbal protocols and interview data. Participants were instructed to use a computer program to compose. A video of their composing was played back while the participants retrospectively remembered what they were doing at the time. This methodology attempts to overcome the issue raised above, but still has limitations as the verbal protocol of the participants is retrospective of the actual task and relies on heeded information in short term memory and subsequently stored in long – term memory (Ericsson & Simon, 1993; Pressley & Afflerbach, 1995; Taylor & Dionne, 2000). Delayed reports increase the tendency to reconstruct, rather than to report accounts of the cognitive processing.

protocols to analyse the pathways, Chen used MIDI files, reflective journals and semi-structured interviews. The methodologies do not extend to either the composer’s intention or the distribution of attention.


Bunting (1987, 1988) describes the interactions of a teacher with two 15 and 16 year old students as they developed their compositions over a period of time. The study is interesting in highlighting issues of the relationship between a committed teacher and the need to expand the thinking of the students about their compositions.

Conclusion

The literature is limited to descriptions of perceptual differences in the substantive and strategic knowledge base of composers. Perceptual aspects of cognition may be seen as lower –order cognitive processes (Pegg, 2010) and are distinguished from higher – order accounts which deal with ‘meaning’. The empirical research literature of musical composition did not extend to an account of the role of attention in the composing process. It is therefore intended in the next chapter to
explore these issues from the perspective of learning theory and educational psychology.
CHAPTER 3

Theoretical account of musical cognition

The previous chapter reviewed literature relating to the process of musical composition. Composing was conceptualised as creative problem–solving of either defined or ill-defined musical problems. The literature was shown to be limited to descriptions of perceptual differences in the substantive and strategic knowledge base of composers. Perceptual aspects of cognition may be seen as lower–order cognitive processes (Pegg, 2010) and are distinguished from higher–order accounts which deal with ‘meaning’. The empirical research literature of musical composition did not extend to an account of the role of attention in the composing process.

This chapter aims to develop a theory of the underlying processes in compositional activity. It will draw on recent accounts of theories of learning from educational psychology that may help to explain the progression of compositional competence as novice composers develop expertise and to examine the role of individual differences within these groups. It will be demonstrated that learning necessarily involves shifts in the form as well as the focus of intention (Mason, 2010).

More recently, there has been a small but growing interest amongst music education researchers in applying theoretical constructs from educational psychology to the investigation of musical cognition. McPherson and Zimmerman
(2002) and McPherson and Renwick (2011) have proposed investigating musical learning and development through the lens of self-regulated learning (SRL). In contrast, Cantwell and Millard (1994) and Sullivan and Cantwell (1999) have applied theoretical constructs from the student approach to learning (SAL) literature to investigate what music students do whilst learning to sight – read new music. The intention of this chapter is to address the issue of musical cognition from the perspective of the SAL approach to educational psychology and learning theory.

The Developmental Domain

Biggs and Collis (1989) identified systematic changes in the way in which individuals in western cultures engage with learning because of both development and education (see Table 3.1). These developmental changes represent fundamental changes in the way that learning is conceptualised and enacted. In addition to acquiring more knowledge (knowing more) modes of learning involve qualitative transformations in how the world is represented (knowing differently) (Cantwell 2004). Therefore, development change is about the acquisition of different modalities of thinking.

For example, Biggs and Collis (1989) suggest that children begin to logically operate on the real world from about the age of 6. The concrete-symbolic mode permits the use of symbol systems, e.g. the development and use of skills in text processing, writing itself, as well as musical and mathematical notation. The main
feature of this mode of thought is the ability to process symbols in a disembodied context.

Formal-1 (from around 16 years on) allows for systematic thinking that is theoretical in nature. This becomes identifiable with the body of knowledge that currently prevails in a discipline. Professional, as opposed to technical, competence requires an understanding of first principles so that the practitioner can generate viable alternatives when rule-of-thumb prescriptions prove inadequate to the particular situation (Biggs 1992). The exit point for this modality of thinking allows for entrance to professional practice.

Formal-2 (from around 20 years on) thought essentially reduces theory to its basic propositional level as the basis for future development (Cantwell 2004). Thus the opportunity to question the conventional bounds of theory and practice and establishing new paradigms (Kuhn, 1962) helps reshape and extend the boundaries of the profession. In music composition, an example of this mode of thinking is evident in Wagner extending theoretical limits for tonality in ‘Tristan and Isolde’.

In summary, Biggs and Collis provide a developmental model that explains developmental change in terms of acquiring different modes of thinking. The acquisition of later modes of thought is additive, allowing for earlier modes to coexist with later modes of thought, thus greatly expanding the cognitive repertoire of the mature adult compared to the young child. What is not explained so far is the way that knowledge progresses within a mode.
Table 3.1: Developmental change underlying modes we learn within (Adapted from Cantwell, 2004)

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Age onset</th>
<th>Modality of reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensori-motor</td>
<td>From birth</td>
<td>Based on refinement of motor skills in direct response to sensory input. Knowledge acquired tacitly – reflected in ‘knowing how’ in skilled motor performance</td>
</tr>
<tr>
<td>Ikonic</td>
<td>Around 18 months on</td>
<td>Relates to that which is perceived or felt directly. Basis of intuitive knowledge. Modality of reasoning in pre-school and infants settings</td>
</tr>
<tr>
<td>Concrete symbolic</td>
<td>Around 6 years on</td>
<td>Use of secondary symbol systems, which have referents in the material world, facilitating the communication and concrete logical manipulation of declarative knowledge. Basic modality of reasoning for primary and junior secondary schooling</td>
</tr>
<tr>
<td>Formal - 1</td>
<td>Around 16 years on</td>
<td>Beginning of questioning how things are and hypothesizing about how they might be. Allows for systematic thinking that is theoretical in nature. By the end of this mode, understanding of an entire discipline allows for entrance to professional practice</td>
</tr>
<tr>
<td>Formal – 2</td>
<td>Around 20 years on</td>
<td>Reshaping and extending the boundaries of professional practice. Essentially reduces theory to its basic propositional level as the basis for future theory development. Underlies most postgraduate study.</td>
</tr>
</tbody>
</table>

Learning cycles and SOLO

The development of knowledge within a mode is based on a five level taxonomy of increasing structural complexity (Biggs & Collis, 1982). In this regard, it is similar to the development of expertise in any field or domain of study (see Figure 3.1 below). Presumably, a composer would begin his journey as one who is naïve and perhaps possessing only rudimentary knowledge (e.g. Chi, 2006). Early learning involves the development of a knowledge base. Cantwell (2004)
describes this as ‘knowing “what” in a relatively undifferentiated form’ (p. 362). For composer’s this would equate to the rote learning of scales, chords, melodic invention and harmonisation as found in any theory book on composing or in Australian Music Examination Board style exams. In SOLO terms this is a unistructural representation. As more knowledge is acquired, identifiable relationships between various elements of information emerge. These common elements allow for knowledge to be categorised; in composing, all things to do with harmonisation in ‘Bach’ style is put into that category, all things to do with ‘12-bar blues’ is put in this basket and so on. However, the knowledge about composing is based upon ‘sequences of categories which remain closed and constrained to the concrete, but which are increasingly complex internally’ (Cantwell, 2004). This is typically multi-structural on SOLO criteria. Finally, the discrete boundaries between categories become perceptually flawed and interrelationships between categories become increasingly evident. Thus, there becomes a point at which what is understood represents a generalization from the knowledge rather than the knowledge itself (Cantwell, 2004). Hence knowledge becomes more general and less tied to the particular. In SOLO terms, this represents a relational level.

The modes and the levels within modes are descriptive of broad outcomes of learning in terms of intellectual development. Thus SOLO is a useful measure for assessing discrepancies between intention and action as a result of developmentally constrained mental models. However, SOLO is an outcome measure and does not address individual differences in how attention is allocated
during the composing process. Hence the need to embed developmental models of learning within models of individual differences.

**Individual differences – The Internal Domain**

An account of individual differences in composing music is derived from models of learning developed by Cantwell and colleagues (Cantwell, 2000; 2004, 2010; Cantwell et al, 2000; Cantwell & Jeanneret, 2004); and Vermunt and colleagues (Vermunt, 1996; 1998; ten Cate, Snell, Mann & Vermunt, 2004). These theoretical accounts of learning emphasise a highly interactive model between the
internal domains (see figure 3.2 below) of cognition, metacognition and affect.

Cantwell (2004) suggests that:

...what happens in real time learning (the cognitive domain) is driven by the intentions and planning undertaken by the learner as tasks are engaged (the sub-domain of metacognitive regulation). At the same time, intention formation and planning does not occur in a vacuum: not only are there a plethora of external factors at play (context, environment, task, and so forth) but there are also a crucial array of internal factors at work providing an interpretation of how these external demands are met. These internal factors include both theories and judgements of self as learner (affective domain) and constructed theories and judgements about learning (sub-domain of metacognitive disposition). In interaction, these provide the internal parameters for establishing the planning and processing activity. p. 373-374.

Each of these domains is now discussed in relation to musical composition.

Figure 3.2 Figure of internal domains of learning (From Cantwell 2004)
The Cognitive Domain

Composing music has been conceptualised as ‘ill-structured’ problem solving (Reitman, 1965; Bamberger, 1977; Davidson & Welch, 1988; Colley et al 1992; Younker & Smith, 1996; Kratus, 1989, 1994; Collins, 2005, 2007; Collins & Dunn, 2011). To solve ill-structured problems requires the composer to acquire both content and strategic knowledge of composition through the processing and understanding of complex and generally highly abstract information (Cantwell & Millard, 2004). The acquisition of highly abstract information involves ‘a progression across a range of simpler to more complex mental models of a domain, as well as a progression in conceptual understanding’ (Snow, 1989, p.9). This progression is reflected in the shift from naive misunderstandings and misconceptions to conceptually rich deep understandings (also SOLO taxonomy Biggs & Collis, 1982).

The development of highly abstract information is reflected in Kirby’s (1991) eight level model of text processing. Kirby suggests that learning to read involves the construction of multi-layered meanings across eight potential levels of attention in text processing (see Figure 3.3 below). At each level, separate and additive processing operations are utilised to automatically decode feature analysis, letters, syllable identification, word and word group identification. Less automatic and more effortful processes requiring comprehension operations are required for generating understandings of textual ideas, main ideas and themes.

Implied in Kirby’s model is the idea that individuals selectively and interactively focus on information across a range of different levels to develop understanding.
Therefore as learning progresses, more complex and abstract representations of text meanings are generated (Alexander, 1992; Prawat, 1989).

Learning not involves increasing abstraction of structural content but also the increasing development of an underlying strategic repertoire. Weinstein and Mayer (1986) have proposed a taxonomy of learning strategies that has considerable equivalence with Kirby’s (1991) eight-level taxonomy of reading processes (see figure 3.3 below). Weinstein and Mayer’s model identify four distinct types of encoding processes (selection, acquisition, construction and integration) which represent qualitatively different ways of addressing material to be learnt. Associated with each of these encoding processes are specific types of strategic behaviours. Selection and acquisition processes are linked to rehearsal type strategies, whilst construction and integration encoding processes are more closely linked to organisation and elaboration strategies. They also suggest that specific strategies may re-occur across the various encoding processes. For example, rehearsal may be appropriate for simple tasks (e.g. learning the names of musical notes) as well as more complex tasks (e.g. rehearsing chord sequences across large sections). Therefore what is important in Weinstein and Mayer’s conception is the appropriateness of the strategy to the encoding process currently being utilised.
Figure 3.3 Equivalence between content and strategic concerns in text processing adapted from Cantwell 1994.
Strategic knowledge is therefore reflective of a hierarchical structure as that evident in content knowledge. Automaticity of processing skills into a goal consistent format may reflect a complex structure which may be applied to task specific, domain specific or general ‘mindful abstraction of a principle’ (Kirby, 1989; Perkins & Salomon, 1989). Such abstractions imply the linking of content and strategic knowledge into unified schematic frameworks (Prawat, 1991; Schuell, 1990; Schraw, 2006). or ‘metaschemes’ that act as ‘roadmaps’ for subsequent processing (Cantwell, 2004).

Cantwell & Millard (1994) have proposed a conceptual equivalence between the quality of thinking in music (reflected in the planning processes of musicians learning to sight read a new musical score) and the way that text processing is conceptualised. Based on the notion of differential levels of meaning construction in text and musical analysis, Cantwell (2004) proposed a more generic model of a multi-layered model of meaning generation. Adapting this multi-layered model to music

Detail level analysis leaves information largely untransformed, with the consequence that learning outcomes may rarely reflect more than a reproductive focus. Main Idea level analysis represents a first order transformation of information. It is however, a categorical focus in which information is largely summarised under context dependent and conventional headings. The thematic level of analysis involves a more fundamental transformation of information through the construction of meanings beyond the literal meanings exemplified in
Figure 3.4 A generic framework for use in analysing musical composition adapted from Cantwell (2004).

the main idea and detail levels of analysis. That is analysis involves an integrative focus, potentially extending meanings to potentially quite high levels of abstraction, comprehension and composing is illustrated in Figure 3.4 above.

This theoretical model, specifies potential interactions between prior experiences, how attention is deployed, and in what ways, and with what intention and disposition (Mason, 2010, p.35) the composition task may be addressed. The qualities of understanding in music processing/construction model and the links
with intention and process with the quality of musical outcome (SOLO) is illustrated in Figure 3.5 below.

*The Metacognitive Domain*

*Regulative level:* understanding the quality of planning in composing (the regulative level) is therefore premised on a taxonomic framework acknowledging that meaning may be constructed at multiple levels. Underlying the taxonomic model of attentional focus is the assumption that intention in learning and composing will typically constrain processing activity to particular levels of meaning. The level addressed by the composer is perhaps related to knowledge of musical possibilities and intention. Given the theoretical and empirical link between intention and process described in the student approach to learning literature (e.g. Biggs, 1996), shifts in attentional focus represent a transformational process driven by qualitatively different understandings and conceptions of the possibilities and purposes of the process itself. Shifting attentional focus from a reproductive to a categorical focus requires expanding working memory capacity and understandings driven by qualitatively different conceptions of the possibilities and purposes of the musical process itself. The shift to a higher level of attentional focus is necessarily accompanied by an increased proportion of attention devoted to constructed as opposed to given information. Therefore each level may be described in terms of qualitative different processes in how intention and attention plays out in the composing process:
Figure 3.5 Linking quality of musical understanding and processing with implied quality of focal level (both intention and process) and quality of composition outcome as measured by SOLO. (Adapted from Cantwell 2004).
- Attending to an integrative focus
- Attending to a categorical focus
- Attending to a reproductive focus

Attentional factors may relate to cognitive, dispositional or affective factors.

Where automaticity of decoding at lower levels is not acquired, then comprehension outcomes are likely to be constrained to isolated units of meaning (feature analysis, letters, syllables, words and word groups). However, where automaticity of decoding at the lower levels is attained then the composer is able to attend to higher levels of meaning (comprehending textural ideas, main ideas and themes).

**Dispositional level:** for technically competent composers, individual differences in attentional allocation relates to more distal measures such as the composers ‘approach to learning’ rather than to more proximal features of musical text. Research investigating learner’s dispositions to adopt a ‘deep’ approach to learning demonstrate learners will adopt appropriate motivational and strategic approaches to find personal meaning and to attend to higher levels of meaning such as main ideas and themes. In contrast, those composers reporting a disposition to adopt a ‘surface approach’ are more likely to reduce processing demands by focussing attention on lower levels of meaning.
Affect

Deciding to engage in an ill-structured activity such as composing requires significant emotional investment to engage and persist (Cantwell, 2004). Positive affect will lift the quality of intention and raise attention to a personal sense of agency in pursuit of personal goals. Anxiety and or negative judgements of self-efficacy will likely lower the quality of intention and lower attention to less demanding and easier cognitive load to preserve a personal sense of failure.

Empirical evidence from music literature

Empirical support for this model is found in Cantwell and Millard’s (1994) study of planning processes in learning to sight read an unseen musical score. Six students from a pool of 30 were selected based on their extreme scores on Biggs’ (1987) Learning Process Questionnaire. Three students reported extreme scores on the Deep scale and three students reported extreme scores on the surface scale. The students had attained a minimum standard of second grade or higher in AMEB exams, thus assuming a minimum competence in the skills of reading musical notation over a range of two octaves. The six students were tested individually and given three scores (graded from simple to difficult) to prepare. Each student was asked to study the score, play it through and then give a description of how they would practice it for performance. Each interview was recorded and later transcribed. The transcribed responses were analysed for attentional focus and strategy use. Two examples follow: the first example is from a ‘deep oriented’ student and the second from a ‘surface oriented’ student.

The responses of these two students illustrate the differences in the planning focus adopted. For the deep oriented student, learning the score involved not only
decoding the musical notation, but also adding to the notation the musical meaning intended – ‘... trying to make the piece musical’. Thus the level of understanding of the nature of the task and the variety and depth of strategies needed to implement that understanding, the deep oriented student indicated much more complex musical epistemology than is evident in the reproductive focus of the surface oriented student – ‘I’d keep going over the same spot if I kept getting it wrong’.

In summary, this research suggests that the quality of understanding about the requirements of the task of musical sight-reading and therefore the quality of the strategies they plan to use in meeting the task is a function of the different epistemologies that drive the decision making. What is interesting in this research is that both groups of students were defining the task, setting goals and selecting ways of achieving their goals. In other words, both groups of students were regulating the task. That is, they were all ‘being metacognitive’. Where they differed was in the quality of the planning and in the mental operations (strategies) they were choosing to carry out those plans.

This then raises the question of what kinds of strategies do lower and higher achieving learners choose? To seek answers to this question, Sullivan and Cantwell (1999) tested a causal model to find the differences in the planning behaviours and strategic choices of music students in learning how to perform a familiar and an unfamiliar music score. It was argued that the level at which students formed intentions in learning new music would reflect a ‘deep’ orientation or ‘surface’ orientation to learning (Biggs, 1987), prior knowledge (as
measured by AMEB levels and familiarity with graphic notation), depth of
cognitive engagement (as indicated by reading times and reaction times), and
quality of strategy use contribute significantly to the quality with which
musicians plan to learn conventional and unconventional musical scores. Fifty
three undergraduate music and music education students were required to read
on-line (via a computer screen) a traditionally notated and a graphically notated
music score and to comment on how they go about learning that score to a level
of performance competence. Protocols were scored for the presence of high-
level, mid-level and low-level strategies and for the level of focus of the
planning. Strategies were scored from low, medium to high level for knowledge
transformation, size of units being encoded, understanding how the task may best
be tackled and less conscious control to conscious control of
resources/questioning and exploration. These strategies are outlined in Table 3.2
below.

Table 3.2 Strategies utilised in learning to read a music score Adapted from
Sullivan and Cantwell (1999)

<table>
<thead>
<tr>
<th>Knowledge transformation</th>
<th>Size of units being encoded</th>
<th>Understanding how the task may best be tackled</th>
<th>Less Conscious control to conscious control of resources/questioning, and exploration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td>Interpretation</td>
<td>Patterning</td>
<td>Prioritising</td>
</tr>
<tr>
<td>Linking</td>
<td>Linking</td>
<td>Chunking</td>
<td>Speed alteration; scanning</td>
</tr>
<tr>
<td><strong>Mid</strong></td>
<td>Association</td>
<td>Rote learning</td>
<td>No response/avoidance</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td></td>
<td></td>
<td>External recourse</td>
</tr>
</tbody>
</table>
Planning focus was based broadly on Biggs and Collis’ (1982) SOLO taxonomy (see Figure 3.1 above) and Cantwell and Millard’s (1994) application of this to musical planning. A seven level taxonomy of planning foci in learning new music was developed for this study. The taxonomy ranged from irrelevancy at the lowest level, through to concern with musical elements only, to concern with the whole score, interpretation of the score and ultimately the contextualisation of the score within the broader musical domain.

A three-step model was proposed in attempting to explain the quality of musicians planning processes. In this model, ‘presage’ factors of approaches to learning (Biggs and Moore, 1993) and prior musical knowledge (AMEB level attained) would influence the quality of strategy use (mediated by depth of cognitive engagement) which in turn would influence the quality of planning.

Results of the path analysis for the traditionally notated score confirmed the model being tested. This linked a ‘deep’ approach with high-level strategies and high planning focus and accounted for 78% of the variance in planning focus. Prior musical achievement, as measured by AMEB level, had no significant influence on strategy use or planning focus.

Given this theoretical background the following research questions were proposed for this study:

1. What do composers do when composing?
2. Is there a relationship between compositional behaviours and compositional outcomes and the prior knowledge the composer brings to the task?

3. If we control for prior knowledge, are there other internal processes that mediate compositional behaviours and which may predict compositional outcomes?

To address these questions, methodological issues to be addressed include firstly the development of a mechanism for capturing the real time processing activities of composers and to develop a metric for its measurement and representation. Secondly methods for accessing cognitive, affective and metacognitive information need to be addressed. These issues are discussed in chapter 4 below.
CHAPTER 4

Methodology

The purpose of this chapter is to describe a methodology that allows the underlying cognitive, metacognitive and affective domains to be accessed and to make explicit the procedural processes that are required for the actual regulation of, and control over the compositional process. Further, as the composition process occurs over time, it is intended, in developing this methodology, to provide a mechanism for capturing this real-time activity and to develop a metric for its measurement and representation. Such a mechanism - in this case graphic representation of Attentional Foci in real-time – will then be able to assist in the subsequent inferencing about the underlying quality of processing associated with different qualities of compositional outcomes.

In the remainder of this chapter, methodological issues related to accessing cognitive, metacognitive and affective information are discussed. This is followed by a description of the methodology employed in obtaining the verbal protocol data for this research. A section follows which describes the design of studies one and two and implications of this for the selection of participants in both studies. The next section outlines the problem-solving task developed for the study. Finally, the procedures employed in the data analysis and the graphic representations are reported.
Methodological Issues

Given that learning theory argues that the quality of the outcome is driven by the quality of thinking underlying the process (as noted in chapter 3), then the methodological issue is how to access and capture these thought processes. It is argued in this section that accessing and capturing thought processes requires a multi-method design and that triangulation of data is needed.

Veenman (2005) classifies instruments according to whether they are administered either prospectively (before the task) concurrently (during the task) or retrospectively (after the task). Both prospective and retrospective measures concern off-line reports\(^1\), whereas concurrent measures concern on-line reports. As this methodology is aimed at the on-line processing of composers whilst actually composing, concurrent measures will be examined. Concurrent measures include think-aloud protocols (Eriksson and Simon, 1993; Pressley and Afflerbach, 1995), systematic observation (Alexander at al 1995), computer log-files of eye-movements (Kinnunen and Vauras, 1995), traces of mental events (Winne, 2011) and processes and diaries (Boekaerts and Corno, 2005). A limitation of systematic observation is that they can only account for qualitative behavioural assessments and do not assess the metacognitive intentions for pursuing goals and objectives (Veenman, 2003). Log-files are computerised recordings of eye-movements and/or computer saved files of evidence of problem solving behaviours. As such, log files do not reveal metacognitive deliberations. Traces of process that students leave behind as they work can be recorded on computer or in compositional sketches. However such traces do not

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\(^1\) On-line reports reflect current processing concerns i.e. what I am actually doing. Off-line reports reflect what I think I would do or what I think I did (Eriksson and Simon, 1993).
reveal intentions or other activities undertaken (Boekaerts and Corno, 2005; Sloboda, 1985)

The predominant on-line method for the assessment of regulative processes is the analysis of think-aloud protocols (Veenman, 2003). Protocol analysis has been used to assess regulative behaviours in a number of fields including mathematical problem solving (Schoenfeld, 1987), reading (Pressley and Afflerbach, 1995), science (Chi and Bassock, 1989), problem-solving (Ericsson and Smith, 1991), music sight reading (Sullivan and Cantwell, 1999) as well as composition (Davidson and Welch, 1988; Colley et al, 1992; Richardson, 1996 and Younker and Smith, 1996). The advantage of thinking-aloud while completing a task is the potential to capture current processing concerns and affective judgements, as well as actions undertaken (Eriksson and Simon, 1993; Pressley and Afflerbach, 1995; Veenman, 2003).

Nisbett and Wilson, (1977) suggested that verbal reports may be suspect to reactivity. Their concern is that it changes the cognitive processes mediating the performance of tasks in comparison to the traditional silent conditions under which psychological phenomena are typically studied in the laboratory. In reply to these concerns, Ericsson and Simon (1993, p. 16) draw attention to three different types of verbal protocols and their relationship to information processing models. Level 1 verbalisation refers to information reproduced in the form in which it is headed. Level 2 and Level 3 verbalisation refers to one or more mediating processes between attention to the information and its delivery. For example if subjects are asked to explain or give reasons for decisions then
this would necessarily involve attention to additional information and therefore changes the sequence of heeded information. Thus Ericsson and Simon (1993) draw attention for the need to design instructions that ask the subject to either ‘talk aloud’ or ‘think aloud’ so that only heeded information is attended to by the subject. Thus the protocol should reflect ‘a stream of consciousness’ as the information relevant to the task is heeded in working memory (Ericsson and Simon, 1993). Where the stream of consciousness reverts to an internal silent mode, then Ericsson and Simon (1993) recommend that participants be instructed to ‘keep talking’ (see section Procedures on p. 62 below).

A further disadvantage is the time consuming aspect of transcription and analysis by one or more judges. Despite these disadvantages, many researchers highlight the richness of the data (Pressley and Afflerbach, 1995; Richardson and Whittaker, 1996) and the capacity of the method to provide insights into the concurrent processing concerns of the participants and to provide construct validity to the theoretical psychological processes that drive problem solving (Bachman, 2002; Lund, 2005; Norris et al, 2004).

Whilst verbal protocols give access to how one is solving a problem, they do not necessarily tap the potential of what participants may know. It is argued that what one does is not necessarily related to what one knows. Therefore, retrospective reports need to be conducted immediately after task performance to tap into the relationship between what was done versus what one intended to do, as well as the conscious self-awareness of the processing concerns engaged (Eriksson and Simon, 1993; Taylor and Dionne, 2000). Such retrospective
reports can also be used to triangulate and enhance the reliability of the task behaviours by referencing video recordings and self-reports of knowledge used in the task. Given the concerns highlighted above, it is essential that to enhance reliability of assessing metacognitive regulation and metacognitive beliefs a multi-method design is needed.

**Design**

**Study 1**

The design for study 1 is a between subject design. The dependant variable is the differential patterns of attentional focus between seven potential categories (problem representation, deliberative planning, improvised planning, trialling, transcribing, monitoring and evaluating). The graphic representations of shifts in attentional focus are argued to reflect different qualities of cognitive complexity (see section Taxonomy of attentional focus), and therefore should reflect SOLO categories. However, SOLO categories remain an outcome measure and do not allow for the underlying processes that yield that category and of the constituent knowledge reflecting that category to be specified. It is, therefore, the intention of this design to determine – via post hoc analysis of the protocols - if the attentional pattern for SOLO categories allows us to distinguish differences in substantive knowledge and the processes utilised in the construction of meanings at each of the potential levels of outcome.
Study 2

The design for study 2 utilised a within subject design at Time 1 (T1) and Time 2 (T2). Two potential measures in study 1 were number of instances and time spent in each of seven potential categories of attentional focus. In study 2, measures of instances and time spent on each category were anticipated to distinguish individual differences within subject’s patterns of attentional focus. Measures used to predict differential patterns of attentional focus included Study Process Questionnaire (Biggs, 1987); Strategic Flexibility Questionnaire (Cantwell and Moore, 1996); Self-efficacy (Bandura, 1993) plus prior experiences in music (instrumental and theory grade attainment).

Participants

Study 1

Participants chosen to take part in the study 1 were selected on the basis of the following codicils. First, they would reflect a range of competencies in composition. Second, they would be at a stage in their development where it may be inferred that they understand or have a workable grasp of the discipline of composition (Biggs and Collis, 1989; Cantwell, 2004). Thirdly, they would be developmentally able to be fluent in both verbal and musical language.

Given the above codicils, five university students enrolled in music composition as a major in Australian universities and two professional composers were invited to participate in the study. Table 4.1 below summarises their prior
### Table 4.1: Participants in Study 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Pseudonym</th>
<th>Gender</th>
<th>Age</th>
<th>Academic Year</th>
<th>Instrument (Years Learnt)</th>
<th>Compositional Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>Male</td>
<td>Male</td>
<td>23</td>
<td>4th year B.Mus.</td>
<td>Guitar (10) Piano (8)</td>
<td>Limited to guitar and small ensemble pieces up to four minutes in length</td>
</tr>
<tr>
<td>Frank</td>
<td>Male</td>
<td>Male</td>
<td>20</td>
<td>1st year B.Mus.</td>
<td>Voice/Piano (10)</td>
<td>Limited to a few choral and instrumental compositions up to four minutes in length</td>
</tr>
<tr>
<td>Amanda</td>
<td>Female</td>
<td>Female</td>
<td>20</td>
<td>2nd year B.Mus.</td>
<td>Voice/Piano/Zither (10)</td>
<td>A number of large choral and instrumental works lasting up to twelve minutes in length</td>
</tr>
<tr>
<td>Bob</td>
<td>Male</td>
<td>Male</td>
<td>22</td>
<td>3rd year B.Mus.</td>
<td>Piano (14)</td>
<td>Extensive number of large choral and instrumental works including some commissions for film that lasted up to twenty minutes in length</td>
</tr>
<tr>
<td>Gavin</td>
<td>Male</td>
<td>Male</td>
<td>19</td>
<td>1st year B.Mus.</td>
<td>Piano (10)</td>
<td>Some limited instrumental pieces and works for solo up to four minutes in length</td>
</tr>
<tr>
<td>Colin</td>
<td>Male</td>
<td>Male</td>
<td>31</td>
<td>Professional</td>
<td>Not known</td>
<td>Extended works for orchestra, solo, instrumental ensembles and commissions. Composer in residence for major symphony orchestra in Australia. Extensive recordings. Compositions range in length from four to thirty five minutes</td>
</tr>
<tr>
<td>Adrian</td>
<td>Male</td>
<td>Male</td>
<td>42</td>
<td>Professional</td>
<td>Not known</td>
<td>Works for a large variety and combination of performers. Includes works for stage, orchestra, instrumental, vocal and radio. Extensive recordings and commissions. Compositions range from four to ninety minutes in length</td>
</tr>
</tbody>
</table>

Pseudonyms are used to protect the identity of the participants.

**Study 2**

Study 2 was premised on the assumption that students learning to compose would show some progression in their regulation of the composing process over the course of a semester as a result of either specific instruction and or the gaining of compositional experience. Therefore it was anticipated that there...
would be differences in the graphing of Attentional Foci between the beginnings of a semester and the end of a semesters instruction.

The design of study 2 utilised a with-in subject design, where participants were chosen with the following codicils. First, participants should reflect a similar stage of competence. Second, they would be at a stage in their development where it may be inferred that they understand or have a workable grasp of the discipline of composition (Biggs and Collis, 1989; Cantwell, 2004). Thirdly, they would be developmentally able to be fluent in both verbal and musical language.

In regard to the first codicil listed above, Biggs and Collis’s (1989) identify five potential modes within which individuals engage and make meaning of the world. Each mode provides a way of characterising the optimal way different forms of knowledge provide a lens or filter through which the individual engages and makes meaning of the world. The modes or levels are named as sensori-motor, ikonic, concrete-symbolic, formal - 1 and formal - 2. Formal – 1 type thought involves the capacity to integrate declarative, procedural and conditional knowledge to solve problems within a domain and to be able to theorise within a domain. Such types of thinking are typically associated with undergraduate courses.

Given this theoretical background, and further that undergraduates (including music composition students) are selected on the basis of their performance at entry exams, interviews and portfolios of compositions, then it is assumed that university undergraduates in music are capable of formal – 1 type thinking.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Pseudonym</th>
<th>Gender</th>
<th>Age</th>
<th>Academic Year</th>
<th>Instrument</th>
<th>Compositional Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbara</td>
<td>Female</td>
<td>Female</td>
<td>18</td>
<td>1st year</td>
<td>Alto Sax (6th grade) Theory (6th grade)</td>
<td>Some four compositions prior to entering university. Longest composition about five minutes in length</td>
</tr>
<tr>
<td>Colleen</td>
<td>Female</td>
<td>Female</td>
<td>21</td>
<td>4th year</td>
<td>Piano (7th grade) Theory (5th grade)</td>
<td>Began composing about 9 years of age. Extensive compositions for a variety of instruments and song cycles. Longest composition about 15 minutes in length</td>
</tr>
<tr>
<td>Delvene</td>
<td>Female</td>
<td>Female</td>
<td>21</td>
<td>3rd year</td>
<td>Piano (7th grade) Theory (7th grade)</td>
<td>Began composing at sixteen. Longest composition a piano sonata that lasts about seven minutes</td>
</tr>
<tr>
<td>Hank</td>
<td>Male</td>
<td>Male</td>
<td>18</td>
<td>1st year</td>
<td>Piano (8th grade) Theory (4th grade)</td>
<td>Composed about thirty-seven compositions in a variety of styles. Length of composition about seven minutes</td>
</tr>
<tr>
<td>Helen</td>
<td>Female</td>
<td>Female</td>
<td>20</td>
<td>3rd year</td>
<td>Piano (8th grade) Theory (6th grade)</td>
<td>Began composing about the age of ten. Many compositions about a hundred. Including film and commercial music</td>
</tr>
<tr>
<td>Ignatius</td>
<td>Male</td>
<td>Male</td>
<td>33</td>
<td>2nd year</td>
<td>Piano (8th grade) Theory (6th grade)</td>
<td>Prior experience writing for synthesizer. Began writing at age ten. Mainly interested in ‘new age’ style of music</td>
</tr>
<tr>
<td>John</td>
<td>Male</td>
<td>Male</td>
<td>19</td>
<td>1st year</td>
<td>Piano (8th grade) Theory (6th grade)</td>
<td>Completed twenty compositions including songs and a composition to accompany an art exhibit and film music</td>
</tr>
<tr>
<td>Kevin</td>
<td>Male</td>
<td>Male</td>
<td>19</td>
<td>1st year</td>
<td>Piano (8th grade)</td>
<td>Began composing about the age of twelve in first year high school. Wrote instrumental and songs including songs for school production and a film score</td>
</tr>
<tr>
<td>Liam</td>
<td>Male</td>
<td>Male</td>
<td>26</td>
<td>3rd year</td>
<td>Guitar (A.Mus.A.) Theory (A.Mus.A.)</td>
<td>Earlier experience of writing for piano and clarinet. Mainly short pieces not longer than 8 minutes</td>
</tr>
<tr>
<td>Martin</td>
<td>Male</td>
<td>Male</td>
<td>18</td>
<td>1st year</td>
<td>Piano (A. Mus. A.) Theory (8th grade)</td>
<td>Began composing around the age of five. Composed about thirty-five compositions mainly for piano. Longest composition about six minutes</td>
</tr>
<tr>
<td>Nigel</td>
<td>Male</td>
<td>Male</td>
<td>18</td>
<td>1st year</td>
<td>Piano (6th grade)</td>
<td>Began composing about age fourteen. Written around twenty compositions. Particular interest in film music. Longest composition around seven minutes</td>
</tr>
<tr>
<td>Peter</td>
<td>Male</td>
<td>Male</td>
<td>21</td>
<td>3rd year</td>
<td>Saxophone (6th grade) Theory (6th grade)</td>
<td>Started composing at age seven. Written over seventy compositions including songs film music for a variety of media. Longest composition about 17 minutes</td>
</tr>
<tr>
<td>Name</td>
<td>Gender</td>
<td>Year</td>
<td>Instrument (AMEB Grade)</td>
<td>Theory (AMEB Grade)</td>
<td>Composition Details</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>------</td>
<td>-------------------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>Sergio</td>
<td>Male</td>
<td>2nd</td>
<td>Trumpet (A. Mus. A.)</td>
<td>Theory (8th grade)</td>
<td>A variety of compositions for brass and for piano. Longest piece written was Symphonic Variations of 18 minutes</td>
<td></td>
</tr>
<tr>
<td>Vern</td>
<td>Male</td>
<td>1st</td>
<td>Piano (A. Mus. A.)</td>
<td>Theory (7th grade)</td>
<td>Began writing music at about the age of five. Has written about 60 compositions in a diverse range of styles. Produced a CD of original compositions</td>
<td></td>
</tr>
</tbody>
</table>

Participants of Formal – 1 thought. The participant’s profiles are given in Table 4.2 below.

**Materials and Tasks**

**Study 1**

Participants completed a demographic information sheet that sought information on age, gender, instrument learnt and AMEB grade or equivalent standard attained and AMEB theory/musicianship grade achieved. In addition participants completed a brief survey about the number and types of compositional experiences to date.

Participants completed two tasks. Firstly, a composition task was designed to reflect the variation of regulative activities or in Veenman’s (2004) terms the metacognitive skillfulness of the composers to plan, monitor and regulate the composing task. The openness of the compositional task, in conjunction with the think-aloud methodology, would allow for the observation of potential differences in the nature of self-regulating behaviours employed by the composers. Secondly, a semi-structured retrospective interview was incorporated to encourage explicit metacognitive reflections about the compositional processes deployed.
Composition task

The subjects were required to compose for thirty minutes, in any style and for any combination of instruments that they chose. Thirty minutes was considered an adequate length of time in which to capture representative regulative processing behaviours of the composers (Davidson and Welsh, 1988; Younker and Smith 1996). The nature of the composition task was designed to be as open ended and ill-structured as possible so as to engage experienced as well as more novice-like composers in the task of compositional problem solving.

It was expected that the nature of the task (ill-structured musical problem-solving) combined with the measurement decisions (think-aloud) would make evident the full range of self-regulatory behaviours. Participants were allowed to address the task in any way that they liked. It was assumed that participants would address the task in either of two ways; either as an exercise to complete a new composition within the thirty-minute time frame, or as an opportunity to continue composing on some project already in existence. Either way, the participants would still need to engage metacognitive strategic behaviours to mindfully address the task (Solomon and Globerson, 1987). To tap the cognitive and regulative processes composers used while composing, the subjects were instructed to verbalise their thoughts (Ericcson and Simon, 1993). To access their metacognitive awareness, a retrospective interview was designed. The process was videotaped and tape-recorded.
Retrospective interview

At the end of the timed thirty minutes, participants were asked to play their composition. Retrospective questions (given in brackets below) were designed to tap the following data:

- Reflection on whether the composition met their intentions
  (What was going through your head as you played?)
- Situational awareness of where strategies and tactics did not work
  (What would you like to revise in your composition?)
- Meta awareness of cognitive control and beliefs
  (If you are teaching first year university students in composition, how would you go about using this composition as part of that teaching process?)
- Judgement of performance on task in relation to usual task performance
  (Specify a rating from 1 through to 5 as to how you thought you went in your composition, where 1 is poor through to 5 is excellent. Why did you give this mark?)

Study 2

The same procedures used in study 1 were followed in study 2. In addition participants completed three questionnaires at the beginning of each session. The questionnaires were The Study Process Questionnaire (Biggs, 1987), Strategic Flexibility Questionnaire (Cantwell and Moore, 1996), and a Self-efficacy questionnaire designed by the researcher.

Strategic Flexibility Questionnaire (SFQ)

This instrument is a 21-item self-report questionnaire requiring students to indicate on a 1 to 5 Likert--type scale, their strength of agreement with
statements relating to the way they approach the management of musical composition information-processing strategies. The questionnaire was based on a previously validated instrument (the Strategic Flexibility Questionnaire) in which adaptive, inflexible and irresolute beliefs about self-regulatory control can be identified (Cantwell & Moore, 1996). Cantwell and Moore (1996) report reliability coefficients (Cronbach’s alpha) for each of the subscales (Inflexibility 0.79; Irresolute 0.81 and Adaptive 0.78).

For purposes of the present study, the wording of items within the existing SFQ was modified to reflect the task specific content of musical composition. This required only slight modifications of wording. The reworded items were trialled on a cohort of 60 tertiary music education students from three different universities within Australia. Reliability coefficients (Cronbach’s alpha) were within an acceptable range for each of the subscales (Inflexible 0.83; Irresolute 0.77 and Adaptive 0.63).

Adaptive Self-regulatory Control: This scale had been previously identified as representing a predisposition towards planning of strategic options prior to engagement with learning, and towards a preparedness to monitor and alter strategic behaviours whilst engaged in the learning process. In the modified version, such flexibility in planning and monitoring is presumed to be present in the way individuals engage in musical composition. E.g., “Before starting work on a particular composing problem I like to play with a number of possible ways of attacking the problem”.
Inflexible Self-regulatory Control: This scale had previously been identified with an unwillingness to modify or monitor the efficacy of strategic decisions either during learning or prior to engagement in learning. In the present version, such inflexibility in control strategies is presumed to be reflected in conceptions of musical self-regulatory control. E.g., “I find that I have one good way of going about composing new music and this is effective nearly all the time”.

Irresolute Self-regulatory Control: This scale had been previously identified with the reporting of high levels of confusion and uncertainty in the selection and management of learning strategies. It is expected that some individuals may also report similar confusion and loss of control in selecting and implementing musical cognitions. E.g. “When preparing for a composition task I often find the ideas and methods I come across when studying new compositions are more confusing than helpful”.

Study Process Questionnaire

In a previous study, Sullivan & Cantwell (1999) reported using a modified and shortened version of Biggs’ (1987) Study Process Questionnaire. The questionnaire was based on a previously validated instrument (the Study Process Questionnaire) in which Students Approach to Learning are reflected in distinct interactions between intentions, motives and strategies, known as surface, achieving and deep approach. Biggs, Kember and Leung (2001) report reliability coefficients (Cronbach Alpha’s) for each of the sub-scales (Deep Approach 0.73; Surface Approach 0.64 and Achieving Approach 0.78). For the purposes of the present study, six items from each of the surface, deep and achieving scales
(three motive and three strategy items for each) were modified to be specific to musical composition. This required only slight changes of wording. The reworded items were trialled on a cohort of 60 tertiary music education students from three different universities within Australia. Reliability coefficients (Cronbach’s alpha) for each of the subscales were Surface 0.39; Deep 0.55 and Achieving 0.49. These low reliability scores may be due to the structural weakness of reducing the scales to six items; three motive and three strategies for each scale.

Surface: This scale had previously been identified with those students who rely on extrinsic motivations and to adopt superficial strategies to learning academic tasks. It is expected that some individuals may also report reliance on extrinsic motivation and to simplify structural complexity to a point of minimally acceptable competence. E.g. Surface: “I generally restrict my composing to what is specifically set as I think it is unnecessary to do anything extra”.

Deep: This scale had previously been identified with those students who were intrinsically interested in the subject matter and were motivated to understand by interrelating ideas with prior knowledge. It is expected that for musical composition this approach would be marked by a desire to understand in a structurally complex way. E.g., “I find that composing in any style of music can be highly interesting once I get into it”.

Achieving: This scale has been identified with those students who seek ego enhancement through high academic grades. It is expected that in musical
composition that this approach would be marked by a desire to achieve high academic grades. E.g., “I would basically see myself as an ambitious person and want to get to the top of the class in composition, whatever I do”.

_Self-efficacy Questionnaire_

This questionnaire sought to gauge the degree of confidence participants report in the following areas of musical composition:

- To plan musical compositions;
- To overcome composing problems when composing;
- To develop effective composition skills when the need arises;
- To compose ‘good’ music and
- To use new musical knowledge.

For purposes of the present study the questionnaire was trialled on a cohort of 60 tertiary music education students from three different universities within Australia. The questionnaire demonstrated acceptable levels of reliability (Cronbach’s alpha) of 0.88.

_Procedures_

After obtaining informed consent, composers were individually interviewed in either a rehearsal studio in a university or their own residence. The researcher conducted all sessions. Composers were seated at a table or at a keyboard and the researcher attached a lapel microphone to the clothing of the composer.

Following guidelines outlined by Ericsson and Simon (1993) the following instructions were given:
I would like to give you practice at thinking out aloud as you do a task. By this I mean for you to talk out aloud whatever you are thinking about as you go about doing this task. This practice session will not be recorded. Do you have any questions?

The practice task was then given and subjects continued doing the task until their verbalisation was fluent and the researcher was satisfied that the composer was able to verbalise his/her thoughts with ease. Fluency with verbalising was achieved within three to five minutes.

After completing the practice task, and when the composer indicated that he/she understood the think aloud procedure, the following instructions were given:

For the next thirty minutes I would like you to compose a short composition in any style and for any combination of instruments that you would like. As you compose, I would like you to think out aloud as you work. I will video-record you as you work and I will also record your talking. If there are periods of silence I will ask you what you are thinking about. I will give you a five-minute warning before the thirty minutes is finished. You may start now.

The researcher positioned himself behind and out of sight of the composer while they were working and remained silent throughout the experimental task except when the composer’s speech was soft or unclear, or there were more than 15 seconds of silence (Ericsson and Simon, 1993 p. 83). On these occasions the researcher reminded the composer to speak clearly or used the standard prompts below:

Keep talking
Talk louder
At the conclusion of the thirty-minute composing session, the composers were instructed to finish what they would like to finish. When they finished and looked up, the researcher then asked them the following questions:

1. Could you play your completed composition for me?
2. (After playing) What was going through your head as you played?
3. What would you like to revise in your composition?
4. If you were teaching someone else to compose, how would you go about using this composition as part of that teaching process?
5. Specify a rating from 1 to 5 as to how you thought you went in your composition, where 1 is poor through to 5 is excellent?
6. Why did you give this mark?

Each session lasted approximately 45 minutes. All interviews were collected over a six-week period. The transcribed data were then given back to the composer’s for verification and returned to the researcher who then updated any corrections. The transcribed data were then analysed.

Data analysis techniques

The videos were scrutinised to categorise shifts in compositional activities. The shifts were categorised as talking, writing, and playing/singing. As the verbal protocols already contained the talking component, the other activities were inserted into the protocols. A sample protocol is given in table 3 below.
Coding scheme

The coding scheme was developed in a ‘bottom-up’ process by analysing the verbal protocols and actions of the participants. Activities of the composers revolved around three types of actions:

1. talking,
2. playing and or singing, and
3. writing or notating musical symbols.

Further analysis of the videos were conducted to identify shifts in composer’s actions. Shifts in actions are theoretically linked to changes of intention. The protocols were then referenced against the activities of the video to check whether the composer’s verbal protocols were indicative of an intention to plan, write or monitor the resulting segment of the composition being constructed.

Talking component of the transcripts: The analysis of the video tapes and protocols suggested that talking fulfilled one of four functions.

- Talk about the global intentions of the composition. This is marked by a claim such as “I intend to compose a twelve bar blues”. This was coded as problem representation.
- Talk about sub goals to be fulfilled. This was marked by comments such as “I will now compose the next phrase” or “I need to add another phrase to this”. These types of expression were coded as deliberative planning.
- Talk that reflected either positive or negative evaluations of notes, motives or chords. “I’m just seeing if these sound nice” or “That chord sounds odd”. These expressions were coded as monitoring.
Talk that reflected either positive or negative evaluations of phrases, sections or the whole composition were coded as evaluating.

Music component of the transcripts: the analysis of the tapes and protocols suggested that the playing of music fulfilled one of four functions.

- Music as a coherent improvisation. The improvisation was followed by the activity of transcribing sections of the improvisation. This type of sound was called improvised planning.

- Music played immediately after the transcribing process as a check on the accuracy of the transcription. This type of activity was included as a function of monitoring.

- Playing of an entire phrase or section or music. This was more extensive in terms of time and amount of music played. This was categorised as evaluation.

- Short and repeated playing’s of the same few notes or chords. These didn’t seem to be coherent in the sense of the improvised music, but seemed to be a search for the first note or a search for what is the next note to add. This seemed to be full of trials to find the right notes to transcribe. This was categorised as trialling.

Writing musical symbols was categorised as transcribing

This coding scheme was not imposed on the data from previous research.

The coding scheme was then triangulated against the literature on problem solving and the regulation of tasks (for example Biggs, 1998; Biggs, Lai, Tang and Lavelle, 1999; Flavel, 1979; Gollwitzer and Schaal, 1998; Kellogg, 1994;
Kirby, 1991; Lawson, 1991; Veenman, 2004). Gollwitzer and Schaal (1998) argue that goal intentions are located at the meta-level of strategic processing and implementation intentions operate on the subordinate meta-level of planning. At the meta-level the goal intention is that “I want to achieve z!” whereas at the operative level the intention is that “When I encounter x, I will perform behaviour y!” Thus goal intention is equivalent to the thematic level in Kirby’s (1991) taxonomy of reading and goal implementation occurs at the lower levels. In Biggs’s (1988) terms the goal intention is considered more distal than the more proximal intentions of implementation at the operative level.

A number of implications follow from this. First is that intention precedes action. Secondly it suggests that the composer may proceed by either establishing goal intentions first, before implementing them, (a top down process) or alternatively, begin by implementing goals (a bottom up process). These two fundamentally different processes are also supported in the literature on expertise (for example, Ericsson and Smith, 1991; Chi 1988). This literature highlights the fundamental differences in prior knowledge (the driving schemes for composition), both quantitatively and qualitatively, between novices and experts. Hence it is likely that experts can conceptualise a thematic sense to future composition and buttress this with well-established strategic and musical knowledge. Thus, the exercise may well become one of confirmatory compositional thinking. Novices, on the other hand may be less able, due to less developed knowledge and strategic options, to conceptualise, as a predominantly top-down process, coherent musical content. The likelihood is, that for these less expert composers, that there will be an interaction between partially formed ideas and partially
accessible requisite musical and strategic knowledge. Therefore, what should be evident is the manifest process in which the composition is created – top down versus fundamentally bottom up.

Based on this theoretical literature,

**Reliability of coding**

Veenman (1999, 2005) argues that high inter-judge reliability only indicates the stability and consistency of measures obtained by two or more subjective judges applying the same coding scheme. Content validity is determined by the coding scheme itself, while construct validity can be obtained by predictive validity of convergent measures. In accepting this argument, two different experts in composition and protocol analysis independently recoded six of the protocols. The percentage of agreement between the experts was 88%. Disagreements were resolved by discussion between the experts until a mutual agreement was reached on the coding category to be applied.

**Taxonomy of attentional focus**

Cantwell and Jeanneret (2004) argue that the generic qualities of process (i.e. the reproductive, categorical and integrative foci) imply different qualities of knowledge use and strategic behaviour. In addition, these levels may also be seen as interactive and additive through the construction of coherent relationships within and between knowledge elements constructed at each level of analysis. It is therefore the intention of the taxonomy of attentional focus to reflect the different qualities of process and to reflect the qualities of compositional activity
devoted to the construction of meaning as distinct from the categorical and reproductive levels. The taxonomy is designed to read as decreasing levels of cognitive complexity as one moves towards the centre followed by increasing levels of cognitive complexity as one moves through monitoring and then to evaluative judgements. This is illustrated in figure 1 below. The taxonomy of Attentional Focus is described in Table 4.3 below.

Figure 4.1 Taxonomy of Attentional Focus as a function of cognitive complexity
Table 4.3: Coding scheme and definitions for taxonomy of attentional focus

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Representation</td>
<td>A global description of the composer’s intention to compose in a particular form, style or genre</td>
</tr>
<tr>
<td>Deliberative planning</td>
<td>Verbal statements describing sub-goals to be attained</td>
</tr>
<tr>
<td>Improvisational planning</td>
<td>Coherent musical playing that is made up in the moment</td>
</tr>
<tr>
<td>Trialling</td>
<td>Repeated playing or singing of the same short musical notes, chords, rhythms or melodies</td>
</tr>
<tr>
<td>Transcribing</td>
<td>Writing musical notation</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Verbal statements that are positive or negative assessments of notes, motifs, chords. Or playing of music just written</td>
</tr>
<tr>
<td>Evaluating</td>
<td>Verbal statements that are positive or negative assessments of phrases, sections or the entire work. Or playing of music just written of phrases, sections or the entire work</td>
</tr>
</tbody>
</table>

Table 4.4: Sample coding-scheme for Frank

<table>
<thead>
<tr>
<th>Activity</th>
<th>Verbal Protocol</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking</td>
<td>I am going to write a psalm tune. Used to singing psalms and it’s broken up into four quarters. So each quarter, the first quarter has, basically four different chords in it. The second one has six and the third has four and the fourth has six as well. So um, I have to figure out some chord progressions for it and I am going to write for SATB so stave, so I have to choose a key and, major or minor and from past experiences I think that the minor one’s are better, so I'll do a minor key, so I just have to figure out a minor key. I have to think about the ranges of the voices so if we, Bottom note can be an F for the bases, top note can be a G for the sopranos, that's not too bad, maybe D maximum for the alto's and E for the tenor's so they won't complain, or an E flat or something. I am just figuring out how I can get a G into something. Yeah, OK, maybe C minor because that's got a fifth up there, fourth there and a minor third. Do it in C minor. (Writes key signature). Might make it have, put my key signature in, OK, now the way I would go about this would be to do a fair bit of trial and error to get it sounding nice. It will finish in C minor but probably a different in version of the chord. Plays C minor chord. That sounds like a nice way to start.</td>
<td>Problem representation</td>
</tr>
<tr>
<td>Playing</td>
<td></td>
<td>Trialling</td>
</tr>
<tr>
<td>Talking</td>
<td></td>
<td>Deliberative planning</td>
</tr>
<tr>
<td>Playing</td>
<td></td>
<td>Monitoring</td>
</tr>
<tr>
<td>Writing</td>
<td></td>
<td>Transcribing</td>
</tr>
<tr>
<td>Talking</td>
<td></td>
<td>Deliberative planning</td>
</tr>
<tr>
<td>Playing</td>
<td></td>
<td>Trialling</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Talking</th>
<th>Plays a series of three chords</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Playing</td>
<td>I’m just trying it out to see what sounds nice, that sounded OK before so.</td>
<td>Tripalling</td>
</tr>
<tr>
<td>Talking</td>
<td></td>
<td>Monitoring</td>
</tr>
<tr>
<td>Playing</td>
<td>Music</td>
<td>Tripalling</td>
</tr>
<tr>
<td>Writing</td>
<td>Writes</td>
<td>Transcribing</td>
</tr>
<tr>
<td>Talking</td>
<td>I was trying to make it more interesting but I might do that later.</td>
<td>Monitoring</td>
</tr>
<tr>
<td>Writing</td>
<td>Writes</td>
<td>Transcribing</td>
</tr>
<tr>
<td>Playing</td>
<td>Music</td>
<td>Monitoring</td>
</tr>
<tr>
<td>Talking</td>
<td>OK there’s my first quarter done.</td>
<td>Monitoring</td>
</tr>
<tr>
<td>Playing</td>
<td>Music</td>
<td>Tripalling</td>
</tr>
<tr>
<td>Talking</td>
<td>I’m just trial and erroring here as well.</td>
<td>Monitoring</td>
</tr>
</tbody>
</table>

**Sample coding scheme**

This coding scheme was then applied to all subjects’ protocols. A sample-coding scheme for Frank is given in Table 4.4 above. The left hand column indicates the type of activity observed in the video. The central column reports the verbal protocol and the right hand column reports the coding applied to the protocol.

**Graphing of Attentional Focus**

The resulting coded transcripts were then tabulated to provide a description of the amount of time spent on each of the seven categories of attentional focus. These sequences were then timed against the video data to allow for the construction of “real-time” representation of attentional focus. A table was created for each participant. The first column listed the time in seconds from 1 through to 1800 seconds. The second column recorded the category of attentional focus at that time. The categories were represented on a scale of 7 (for Problem
representation) through to 1 (Evaluation). The tables were then converted to step graphs, with the attentional category represent on the Y-axis and time on the X-axis. Samples of two of the graphs are presented in Figures 1 and 2 below.

*How to read the graphs*

The graphs represent shifts in attention across seven facets of attentional focus as they occur in real time. The central categories of the graphs (Improvised planning, Trialling and Transcribing) are representative of the natural observations of composers while composing, while attention at the extreme

![Graph of Attentional Focus for David](image_url)
categories (Problem representation, Deliberate planning, Monitoring and Evaluation) may be associated with more explicit metacognitive activity.

David’s graph indicates considerable time spent in trialling and transcribing activities and a little time in deliberate planning, improvised planning and monitoring. Therefore the task is addressed with what may be termed less complex cognitive activity. In contrast Colin’s graph indicates much greater time spent at the extremes of the attentional taxonomy, i.e. in deliberate planning, monitoring and evaluating.

Figure 4.3: Graph of Attentional Focus for Colin
Therefore it may be implied that greater complexity of cognitive processing is taking place. It remains for the detailed analysis of these and other participants graphing of attentional foci graphs to make explicit the links between the theoretical constructs highlighted in Chapter 3 and the regulative processing of the composers to be made explicit. These analyses are the subject of Chapter 5.
CHAPTER 5

Study 1

In chapter 4 a methodology was described that provides a way of accessing and making explicit the interactions of the cognitive, metacognitive and affective domains. Further, as the composition process occurs over time, it was proposed that graphing the regulative processes of planning, transcribing, monitoring and evaluation would provide both a representation of the different qualities of the regulative processes of composers as well as providing a metric for its measurement.

It is hypothesised that if composers are selected on the basis of their prior knowledge (novice – expert continuum) and are given a common, open – ended composition task then the differences in prior knowledge ought to be reflected in differences in the distribution and direction of attentional behaviours, *independent of the music composed*. This then leads to the following research questions:

1. What do composers do when composing?
2. Is there a relationship between compositional behaviours and compositional outcomes and the prior knowledge the composer brings to the task?
Method

Participants

The participants were selected on the basis that they would reflect a range of competencies in composition, and it may be inferred that they had a workable grasp of the discipline. Given these codicils, five university students majoring in music composition at Australian Universities and two professional composers were invited to join the study. It is assumed that this purposive sample (Wiersma & Jurs, 2009) would provide enough variation in the data to develop a comprehensive description of differences in the substantive knowledge and processes utilised in-situ by the composers. Their profiles are given in chapter 4, Table 1.

Procedures

After obtaining informed consent, participants completed a demographic information sheet and completed two tasks. The first task was designed to tap the responses of the composers to an open ended compositional task, and in conjunction with the think-aloud methodology would allow the underlying self-regulating behaviours of the composers to be captured in-situ. Secondly, a semi-structured retrospective interview was included to capture explicit metacognitive reflections about the compositional processes deployed.

Participants were individually interviewed in a location of their choice, either a rehearsal studio in a university or their own residence. The researcher conducted all interview sessions and followed a standard protocol. Details of task design,
Data analysis

The videos were scrutinised to categorise shifts in compositional activities. The shifts were categorised as talking, writing, and playing/singing. The inductive method of analysis and the coding schemes used are described in detail in chapter 4.

Results – Section 1

Clustering of the graphs

Two independent judges, the researcher and one other trained colleague, visually grouped the Graphs of Attentional Foci, independently of a priori groupings, into like – patterns. Initial clustering supported two clusters. Expert composers were in one cluster and novice composers in the other. Further analysis of the novice composers enabled these composers to be divided into two further clusters. Thus the final groupings resulted in three clusters – discriminated by the proportion of time devoted to higher and lower – level attentional foci.

Following the analysis contained in this chapter and Chapter 6, it was noted that there were similarities in the development of expertise in nursing as described by Benner (2009). Following Benner’s developmental classification, we named each cluster as Less Proficient Novices (LPN), More Proficient Novices (MPN) and Expert Composers (EC).
Figure 5.1: Representation of attentional focus for David

Figure 5.2: Representation of attentional focus for Frank
Less Proficient Composers

The features of the graphs at this level are the constraining of attentional focus to the more central categories. Little or no attention is given to the global aspects of problem representation or to evaluation. The graphs of the attentional focus for David and Frank (pseudonyms) are presented in Figures 5.1 and 5.2 above.

The graphic representation of attentional focus allows for a quantitative measure of the amount of time spent at each category as a percentage of the total time spent in compositional activity. Table 5.1 below shows time in seconds and as a percentage in each category of attentional focus. David did not use his full time in composition and finished his composition after 1484 seconds. Each of the

Table 5.1 Time as percentage for David and Frank at each of seven categories of attentional focus

<table>
<thead>
<tr>
<th>Category</th>
<th>David</th>
<th>Percentage</th>
<th>Frank</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Defined</td>
<td>0</td>
<td>0</td>
<td>36</td>
<td>2.00</td>
</tr>
<tr>
<td>Deliberative Planning</td>
<td>112</td>
<td>7.55</td>
<td>142</td>
<td>7.88</td>
</tr>
<tr>
<td>Improvised Planning</td>
<td>352</td>
<td>23.72</td>
<td>42</td>
<td>2.33</td>
</tr>
<tr>
<td>Trialling</td>
<td>344</td>
<td>23.18</td>
<td>998</td>
<td>55.38</td>
</tr>
<tr>
<td>Transcribing</td>
<td>626</td>
<td>42.18</td>
<td>422</td>
<td>23.42</td>
</tr>
<tr>
<td>Monitoring</td>
<td>50</td>
<td>3.37</td>
<td>140</td>
<td>7.77</td>
</tr>
<tr>
<td>Evaluating</td>
<td>0</td>
<td>0</td>
<td>22</td>
<td>1.22</td>
</tr>
<tr>
<td>Total</td>
<td>1484</td>
<td>100%</td>
<td>1800</td>
<td>100%</td>
</tr>
</tbody>
</table>
Figure 5.3 Percentage of time at seven potential levels of attention by David and Frank in composing task

other composers did use their full time in composition and some even extended their time by a few minutes to finish what they were doing. For purposes of this research, the graphs included the first 1800 seconds of time.

David devoted no time to problem representation, 7.55% to deliberative planning, 23.72% to improvised planning; 23.18% to trialling, 42.18% to transcribing, 3.37% to monitoring and no time to evaluating. Frank devoted 2.00% of time to problem definition, 7.88% to deliberative planning, 2.33% to improvised planning, 55.38% to trialling, 23.42% transcribing, 7.77% to monitoring and 1.22% to evaluating. The graph shows that both David and Frank spent most time in the central categories of either improvised planning or trialling, and in transcribing.
This then poses the question: What did the composers attend to at different points in the compositional period? To provide insights into this question, an analysis of attention at each quartile of time was conducted. The table of attention as a percentage of time for each quartile is given in Table 5.2 and bar graphs in each category in each quartile of time is given in Figure 5.4 (see below).

**Quartile analysis for LPN**

*First quartile:* David devoted no time to problem definition, 16.5% to deliberative planning, 23% to improvising, no time to trialling, 61% of time to transcribing, no time in monitoring or evaluating. Frank devoted 8% of time to problem definition, 30.5% to deliberative planning, 9.5% to improvised planning, 27% to trialling, 23% to transcribing, 7% to monitoring and no time to evaluating.

*Second quartile:* David devoted no time to problem definition, 10.5% of time to deliberative planning, and 47.5% to improvised planning, no time to trialling, 32.5% of time to transcribing, 10.5% to monitoring and no time to evaluation. Frank devoted no time to problem definition, 1% of time to deliberative planning, no time to improvised planning, 70% of time to trialling, 22% of time to transcribing, 7% of time to monitoring and no time to evaluation.

*Third quartile:* David devoted no time to problem definition or deliberative planning, 10% to improvised planning, 67% to trialling, 22% to transcribing, 1%
Table 5.2 Time as percentages for each category of attention in each quartile of time for David and Frank

<table>
<thead>
<tr>
<th>Category</th>
<th>Quartile 1</th>
<th>Quartile 2</th>
<th>Quartile 3</th>
<th>Quartile 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time</td>
<td>Percent</td>
<td>Time</td>
<td>Percent</td>
</tr>
<tr>
<td>Prob. Def.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Delib. Plan</td>
<td>61</td>
<td>16.50</td>
<td>40</td>
<td>10.50</td>
</tr>
<tr>
<td>Impro. Plan</td>
<td>84</td>
<td>23</td>
<td>178</td>
<td>47.50</td>
</tr>
<tr>
<td>Trialling</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Transcribing</td>
<td>226</td>
<td>61</td>
<td>121</td>
<td>32.50</td>
</tr>
<tr>
<td>Monitoring</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Evaluating</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>371</td>
<td>100</td>
<td>371</td>
<td>100</td>
</tr>
</tbody>
</table>

David

<table>
<thead>
<tr>
<th>Category</th>
<th>Quartile 1</th>
<th>Quartile 2</th>
<th>Quartile 3</th>
<th>Quartile 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time</td>
<td>Percent</td>
<td>Time</td>
<td>Percent</td>
</tr>
<tr>
<td>Prob. Def.</td>
<td>36</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Delib. Plan</td>
<td>138</td>
<td>30.50</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Impro. Plan</td>
<td>42</td>
<td>9.50</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trialling</td>
<td>122</td>
<td>27</td>
<td>318</td>
<td>70</td>
</tr>
<tr>
<td>Transcribing</td>
<td>102</td>
<td>23</td>
<td>98</td>
<td>22</td>
</tr>
<tr>
<td>Monitoring</td>
<td>10</td>
<td>2</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>Evaluating</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>100</td>
<td>450</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure 5.4 Graph of percentage of time David and Frank spent in each category during each quartile of composition task.
to monitoring and no time to evaluation. Frank devoted no time to problem
definition, deliberative planning or improvised planning, 68% of time to trialling,
16% of time to transcribing, 16% of time to monitoring and no time in
evaluation.

_Fourth quartile:_ David devoted no time to problem definition or deliberative
planning, 15.5% to improvised planning, 16% to trialling, 54.5% to transcribing,
4% to monitoring and no time to evaluation. David devoted no time to problem
definition, deliberative planning or improvised planning, 55% of time in trialling,
34% to transcribing, 6% to monitoring and 5% to evaluation.

In summary, the composers in Cluster 1 used either improvisation to generate the
music to be transcribed or employed a trialling strategy to find notes and then to
transcribe the music generated. Whichever strategy was employed, the same
process was employed for the next three quartiles of time.

_More Proficient Composers_

Whilst this cluster reflected many of the focal and strategic attributes of Cluster
1, the processes differed in the nature of initial planning and to a lesser extent in
the use of monitoring and evaluation. The graphic representation of the
compositional activities of Amanda, Bob and Gavin are presented in Figures 5.4,
5.5 and 5.6 below.
Figure 5.5: Graph of representation of attentional focus for Amanda

Figure 5.6: Graph of representation of attentional focus for Bob
Figure 5.7: Attentional focus for Gavin

The difference between LPN and MPN is the greater attention given to deliberative planning, monitoring and evaluation. Whilst some time is given to attending to problem representation, most time is devoted to the inner categories of improvised planning, trialling, transcribing and monitoring. An exception is the graphing of attentional focus for Gavin. Gavin devoted more time to deliberative planning and evaluation than either Bob or Amanda. Differences in time spent on each category as a percentage of time is given in Table 5.3 and graphically presented in Figure 5.8.

As evident in Figure 5.8 Amanda and Bob have similar profiles and Gavin is different. Amanda devoted 1% of time to problem definition, 14% to deliberative planning, 18% to improvised planning, 43% to trialling, 19% to transcribing, 4% to monitoring and 1% to evaluating. Bob devoted 2% of time to problem identification, 5% to deliberative planning, 15% to improvised planning, 36% to
Table 5.3: Time as percentage for Amanda, Bob and Gavin at each of seven categories of attentional focus

<table>
<thead>
<tr>
<th></th>
<th>Amanda</th>
<th></th>
<th>Bob</th>
<th></th>
<th>Gavin</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time (seconds)</td>
<td>Percent</td>
<td>Time (seconds)</td>
<td>Percent</td>
<td>Time (seconds)</td>
<td>Percent</td>
</tr>
<tr>
<td>Problem Defined</td>
<td>19</td>
<td>1</td>
<td>36</td>
<td>2</td>
<td>62</td>
<td>3</td>
</tr>
<tr>
<td>Deliberative Planning</td>
<td>256</td>
<td>14</td>
<td>90</td>
<td>5</td>
<td>418</td>
<td>23</td>
</tr>
<tr>
<td>Improvised Planning</td>
<td>328</td>
<td>18</td>
<td>270</td>
<td>15</td>
<td>142</td>
<td>8</td>
</tr>
<tr>
<td>Trialling</td>
<td>774</td>
<td>43</td>
<td>648</td>
<td>36</td>
<td>190</td>
<td>11</td>
</tr>
<tr>
<td>Transcribing</td>
<td>334</td>
<td>19</td>
<td>702</td>
<td>39</td>
<td>546</td>
<td>30</td>
</tr>
<tr>
<td>Monitoring</td>
<td>76</td>
<td>4</td>
<td>36</td>
<td>2</td>
<td>334</td>
<td>19</td>
</tr>
<tr>
<td>Evaluating</td>
<td>13</td>
<td>1</td>
<td>18</td>
<td>1</td>
<td>108</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>1800</td>
<td>100</td>
<td>1800</td>
<td>100</td>
<td>1800</td>
<td>100</td>
</tr>
</tbody>
</table>

trialling, 39% to transcribing, 2% to monitoring and 1% to evaluating. The difference between Amanda and Bob and those included in cluster 1 is subtle, but significant in the tendency to use a wider spread of attention to the outside categories of problem definition, deliberative planning, monitoring and evaluating. Gavin devoted 3% of time to problem definition, 23% to deliberative planning, 8% to improvised planning, 11% to trialling, 30% to transcribing, 19% to monitoring and 6% to evaluating. It is argued that the cluster for Gavin may be
Figure 5.8: Graph of percentage of time Amanda, Bob and Gavin spent on seven categories of attention considered to be transitional between cluster 2 and cluster 3. However, Gavin is still constrained to the inner categories and only marginally devotes more time to the extreme categories of problem definition and evaluation than Amanda and Bob.

**Quartile analysis for MPN**

*First quartile:* Amanda devoted 4.5% of time to problem definition, 25% to deliberative planning, 10% to improvised planning, 25.5% to trialling, 33.5% to transcribing, no time to monitoring, and 1.5% to evaluating. Bob devoted 10% of time to problem definition, 10% to deliberative planning, 14.5% to improvised planning, 33% to trialling, 26.5% to transcribing, 5% to monitoring and 1% to evaluating. Gavin devoted 14% to problem definition, 34% to deliberative
Table 5.4: Time as percentage for Amanda, Bob and Gavin at each of seven categories in each quartile of time

<table>
<thead>
<tr>
<th></th>
<th>Amanda</th>
<th></th>
<th>Bob</th>
<th></th>
<th>Gavin</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Quartile</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Prob. Def.</td>
<td>20</td>
<td>4.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Del. Plan</td>
<td>112</td>
<td>25</td>
<td>32</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Impro. Plan</td>
<td>46</td>
<td>10</td>
<td>10</td>
<td>2</td>
<td>158</td>
</tr>
<tr>
<td>Trialling</td>
<td>114</td>
<td>25.5</td>
<td>268</td>
<td>60</td>
<td>216</td>
</tr>
<tr>
<td>Transcribe</td>
<td>150</td>
<td>33.5</td>
<td>114</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Monitor</td>
<td>0</td>
<td>0</td>
<td>26</td>
<td>6</td>
<td>40</td>
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<tr>
<td>Evaluate</td>
<td>8</td>
<td>1.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>100</td>
<td>450</td>
<td>100</td>
<td>450</td>
</tr>
</tbody>
</table>
Figure 5.9: Graph of percentage of time in each quartile of time for Amanda, Bob and Gavin
planning, 7% to improvised planning, 9% to trialling, 17% to transcribing, 12% to monitoring and 7% to evaluating.

Second quartile: Amanda devoted no time to problem definition, 7% to deliberative planning, 2% to improvised planning, 60% to trialling, 25% to transcribing, 6% to monitoring and no time to evaluating. Bob devoted no time to problem definition, 5.5% to deliberative planning, and 10.5% to improvised planning, 41% to trialling, 40% to transcribing, 2% to monitoring and 1% to evaluating. Gavin devoted no time to problem definition, 24.5% to deliberative planning, 6% to improvised planning, 9.5% to trialling, 31% to transcribing, 16% to monitoring, and 13% to evaluating.

Third quartile: Amanda devoted no time in problem definition, 1.5% to deliberative planning, 35% to improvised planning, 48% to trialling, 6.5% to transcribing, 9% to monitoring, and no time to evaluating. Bob devoted no time to problem definition, 2% to deliberative planning, 12% to improvised planning, 43.5% to trialling, 42% to transcribing, 0.5% to monitoring and no time to evaluating. Gavin devoted no time to problem definition, 14% to deliberative planning, 14% to improvised planning, 29.5% to trialling, 29.5% to transcribing, 20.5% to monitoring, and 2.5% to evaluating

Fourth quartile: Amanda devoted no time to problem definition, 23.5% to deliberative planning, and 25% to improvised planning 39% to trialling, 9% to transcribing, 2% to monitoring, and 1.5% to evaluating. Bob devoted no time to problem definition, 2% to deliberative planning, 23.5% to improvised planning,
24.5% to trialling, 49% to transcribing, 1% to monitoring, and no time to evaluating. Gavin devoted no time in problem definition, 20.5% to deliberative planning, 4% to improvised planning, 4.5% to trialling, 44% to transcribing, 26% to monitoring and 1% to evaluating.

In summary, while composers included in Cluster 2 spent a greater proportion of time than those in Cluster 1 on the extreme of the categories, the emphasis remained in the central categories of improvised planning, trialling and transcribing. However, there is evidence of an increasingly cyclic motion to the graphs as these composers cycle through deliberative planning, improvising, transcribing and then monitoring.

**Expert Composers**

The graphs of attentional focus in Cluster 3 indicated more attention at the extremes of the graphs in problem definition, deliberate planning, monitoring and evaluation. The graphs of Colin and Adrian are grouped together to indicate this more extensive range in attentional focus. The graphs are presented in Figures 5.10 and 5.11 below.

The percentage of time Colin and Adrian spent in each level is given in table 5.5 below. The graphic representation of the percentage of time Gavin and Adrian spent in each category of time is given in Figure 5.12 below.
Figure 5.10: Representation of attentional focus for Colin

Figure 5.11: Representation of attentional focus for Adrian
Table 5.5: Table of percentage of time Colin and Adrian spent on each of seven categories of attentional focus.

<table>
<thead>
<tr>
<th></th>
<th>Colin</th>
<th>Adrian</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time</td>
<td>Percent</td>
</tr>
<tr>
<td>Problem Defined</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Deliberative Planning</td>
<td>290</td>
<td>16</td>
</tr>
<tr>
<td>Improvised Planning</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>Trialling</td>
<td>160</td>
<td>9</td>
</tr>
<tr>
<td>Transcribing</td>
<td>904</td>
<td>50</td>
</tr>
<tr>
<td>Monitoring</td>
<td>134</td>
<td>7</td>
</tr>
<tr>
<td>Evaluating</td>
<td>270</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>1800</td>
<td>100</td>
</tr>
</tbody>
</table>

As is evident in figure 5.11, Adrian and Gavin strategically approached the task of composition very differently. From the transcribed protocols, Adrian worked on an existing musical problem: composing a minute waltz. The waltz was one of sixty waltzes he had been commissioned to compose. The musical problem was not how to compose a single one-minute waltz, but rather how to conceptualise the quality of sound that would be needed to take the listener on a journey of one hour. From this perspective, Adrian was already attempting to “integrate a higher-order scheme for a decontextualized representation of the musical problem” (Cantwell and Millard, 1994). On the other hand, Gavin did not know what to write. He began by just “mucking around”. It was not until the first section of the composition was complete that he was able to conceptualise and integrate musical content within a three-part ternary structure.
Figure 5.11: Graph of percentage of time Colin and Adrian spent in seven categories of attentional focus.

Colin devoted 1% of time to problem definition, 16% to deliberative planning, 2% to improvised planning, 9% to trialling, 50% to transcribing, 7% to monitoring and 15% to evaluating. Adrian devoted 19% of time to problem representation, 23% to deliberative planning, no time to improvising, 9% to trialling, 25% to transcribing, 22% to monitoring and 2% to evaluating. It is noted these composers spent little time in improvised planning and trialling in comparison with the composers in Clusters 1 and 2.
Quartile analysis for EC

The percentage of time Colin and Adrian spent in each category of attentional foci in each quartile of time is given in table 5.6 and represented as a bar graph in figure 5.12 below.

First Quartile: Colin devoted no time to Problem Definition, 20% to Deliberative Planning, 6% to Improvised Planning, 18% to Trialling, 52% to transcribing, 4% to monitoring and no time to evaluating. Adrian devoted 70% of time to problem representation, 4% to deliberative planning, no time to improvised planning or trialling, 18% to transcribing, 8% to monitoring and no time to evaluating.

Second quartile: Colin devoted no time to problem definition, 13.5% to deliberative planning, 1.5% to improvised planning, 12% to trialling, 54% to transcribing, 9.5% to monitoring, and 9.5% to evaluating. Adrian devoted no time to problem definition, 70.5% to deliberative planning, no time to improvised planning or trialling, 29% to transcribing, 0.5% to monitoring, and no time to evaluation.

Third Quartile: Colin devoted 1.5% to deliberative planning, 23.5% to deliberative planning, no time to improvised planning, 3.5% to trialling, 53% to transcribing, 12.5% to monitoring, and 6% to evaluating. Adrian devoted 5.5% to problem definition, no time to deliberative planning or improvised planning, 16.5% to trialling, 33% to transcribing, 45% to monitoring and no time to evaluating.
Table 5.6 Table of percentage of time Colin and Adrian spent in each category of foci in each quartile of time

<table>
<thead>
<tr>
<th></th>
<th>Quartile</th>
<th>Quartile</th>
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<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>Percent</td>
<td>Time</td>
<td>Percent</td>
</tr>
<tr>
<td>Prob. Def</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Delib. Plan</td>
<td>88</td>
<td>20</td>
<td>60</td>
<td>13.50</td>
</tr>
<tr>
<td>Impro. Plan</td>
<td>28</td>
<td>6</td>
<td>8</td>
<td>1.50</td>
</tr>
<tr>
<td>Trialling</td>
<td>82</td>
<td>18</td>
<td>54</td>
<td>12</td>
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<tr>
<td>Transcribing</td>
<td>232</td>
<td>52</td>
<td>244</td>
<td>54</td>
</tr>
<tr>
<td>Monitoring</td>
<td>20</td>
<td>4</td>
<td>42</td>
<td>9.50</td>
</tr>
<tr>
<td>Evaluating</td>
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<td>42</td>
<td>9.50</td>
</tr>
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<td>100</td>
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<table>
<thead>
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<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>Percent</td>
<td>Time</td>
<td>Percent</td>
</tr>
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<td>Prob. Def</td>
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<td>70</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Delib. Plan</td>
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<td>4</td>
<td>318</td>
<td>70.50</td>
</tr>
<tr>
<td>Impro. Plan</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trialling</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Transcribing</td>
<td>80</td>
<td>18</td>
<td>130</td>
<td>29</td>
</tr>
<tr>
<td>Monitoring</td>
<td>36</td>
<td>8</td>
<td>2</td>
<td>0.50</td>
</tr>
<tr>
<td>Evaluating</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>450</td>
<td>100</td>
<td>450</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure 5.12 Graph of percentage of time Gavin and Adrian spent in each quartile of time
Fourth Quartile: Colin devoted no time to problem definition, 7.5% to deliberative planning, no time to improvised planning, 2% to trialling, 42% to transcribing, 3.5% to monitoring, and 45% to evaluating. Adrian devoted no time to problem definition, 17% to deliberative planning, no time to improvised planning, 20.5% in trialling, 21% to transcribing, 34% to monitoring, and 7.5% to evaluating.

In summary, the composers of this cluster were the professional composers. They devoted more time than either Cluster 1 or 2 composers to the extreme categories of Problem Definition, Deliberative Planning, Monitoring and Evaluating. This is especially noted in the Graph of Attentional Focus for Adrian. The last third of Colin’s graph reflects the cyclic nature of regulative behaviours as intention and goals are integrated.

Discussion

The graphs reflect different patterns of attentional focus and were sorted into three clusters. The three clusters reflect shifts in Attentional Foci. For Cluster 1 there is an emphasis on processes using the central categories of Improvised Planning, Trialling, Transcribing and Monitoring through to Cluster 3 where there is an emphasis on the extreme categories of Problem Definition, Deliberative Planning, Monitoring and Evaluation. This is summarised in Table 5.6 where the average percentage of time spent at each category of attention for each cluster is summarised and presented in graph form in Figure 5.13 below.
Table 5.6 Summary of percentage of time on each category at each cluster

<table>
<thead>
<tr>
<th></th>
<th>Problem Defined</th>
<th>Deliberative Planning</th>
<th>Improvised Planning</th>
<th>Trialling</th>
<th>Transcribing</th>
<th>Monitoring</th>
<th>Evaluating</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPN</td>
<td>1.00</td>
<td>7.72</td>
<td>13.03</td>
<td>39.28</td>
<td>32.80</td>
<td>5.57</td>
<td>0.60</td>
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<tr>
<td>MPN</td>
<td>2.33</td>
<td>14.06</td>
<td>13.80</td>
<td>29.68</td>
<td>29.38</td>
<td>8.90</td>
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</tr>
<tr>
<td>EC</td>
<td>9.60</td>
<td>19.53</td>
<td>1.00</td>
<td>9.05</td>
<td>37.68</td>
<td>14.65</td>
<td>8.45</td>
</tr>
</tbody>
</table>

Figure 5.13 Summary of attentional focus for cluster groups
Comparing the average time for each cluster, it is noted that EC devote more time to reflecting on the nature of the problem to be addressed than LPN or MPN. EC devotes more time to deliberative planning than either LPN or MPN. EC devotes relatively little time to improvised planning, but novices devote equal quantities of time to this activity. EC devotes little time to trialling but novices devote considerably more time to this activity. EC, on average, devote more time to transcribing than does novices. EC devotes more time on average to monitoring than novices. Finally, EC on average devotes more time to evaluating than novices.

Graphs for LPN indicate that the composition task is addressed by activities that may be described as ‘doing’ activities such as improvising, trialling transcribing and some monitoring. That is, the composition activity is closely tied to the act of composition as a regulated activity, but one, which, in all likelihood, involves little reference to higher order elements of meaning and understanding. The limited amount of monitoring is more indicative of reflection on the surface features of the composition than on the overall meaning and direction of the composition. MPN graphs reflected many of the focal and strategic attributes of the LPN graphs. However, the processes differed in the nature of initial planning and, to a lesser extent, in the use of monitoring and evaluating. EC graphs, on the other hand, gave time to represent the musical problem, spent a far greater proportion of time in deliberative planning and in monitoring and evaluating, and very little time to improvised planning and trialling.

As the members of EC were Professional Composers, it may be said that the graphing of Attentional Focus provides a robust representation of the differences in the regulative processes of composers in the novice – expert continuum. Secondly, the graphs provide
a robust measurement of both time and instances devoted to each potential category. It is assumed that each Cluster is descriptive of the different qualities of cognitive complexity brought to the task. As such, LPN graphs are assumed to be less cognitively complex than MPN or EC; and MPN graphs are more cognitively complex than LPN and less cognitively complex than those at EC. However, as the graphs may be indicative of the underlying cognitive, affective and metacognitive processes involved in generating the composition, it is also intended to be able to isolate the level of activity most characteristic of the response at each cluster. In the next chapter, the verbal protocols will be analysed for constituent knowledge used, strategic processes employed, understanding of the task and metacognitive awareness at each cluster.
CHAPTER 6

Study 1: Qualitative analysis of processing concerns

The previous chapter demonstrated that the graphing of Attentional Foci discriminated between novice and expert composers. The graphs provided a visual representation of real-time differences in the compositional process. The graphs also allowed for inferences to be made regarding the quality of the prior knowledge employed in the construction and orchestration of the cognitive and metacognitive activities underlying attentional shifts between categories. Attention devoted by the composers to the extremes of the categories theoretically implies increasing cognitive complexity with which the expert composers strategically addressed the compositional process. However the graphs remain an outcome of the process. It is intended in this chapter to make explicit substantive differences in the underlying cognitive complexity driving the shifts in Attentional Foci.

Chapter 3 outlined ways of assessing cognitive complexity - a synthesis of SOLO criteria as a measure of global quality within a framework derived from text processing theory. Global quality was identified at three generic levels of task structure at the level of detail, main ideas and themes; leading to outcomes reflecting a reproductive focus, a categorical focus and an integrative focus. Defining outcomes in terms of these three levels suggests limits to the epistemology driving the processing behaviour. Thus this chapter seeks to make explicit the differences in substantive content, strategic biases and implied epistemologies, underlying the graphs of Attentional Foci in Chapter 5.
Method

Firstly, the concurrent verbal protocols were analysed for evidence of structural complexity of the task (see table 6.1 below). Secondly, the concurrent verbal protocols were analysed for evidence of Sullivan and Cantwell’s, (1999), three level model (see Chapter 3) for the quality of strategies employed (see table 6.2 below). Finally, the retrospective verbal protocols were analysed for evidence of self-awareness of both strategic processes employed as well as understandings of the task of composing and the implied musical epistemology evident in the composer’s responses.

Tables 6.1 and 6.2 were combined in Table 6.3 and triangulated against a number of taxonomies. Weinstein’s and Meyer’s (1986) taxonomy of encoding processes to infer links between participants responses and memory processes, Chan’s et al (1992) taxonomy of processes while constructing and solving an essay, Cantwell and Jeanneret’s (2004) outcomes of generic processing concerns, and the SOLO taxonomy (Biggs & Collis, 1982).
Table 6.1: Definitions and Sample Protocols of Taxonomy of Compositional Skills

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Sample Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Features</strong></td>
<td>Awareness of the lines and curves that constitute the basis of all notations. This implies awareness of the letters and musical symbols and notes as being systematic and meaningful.</td>
<td>What would I rework was first of all I would have to make it neater so that I could actually read it properly to play. (Bob)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>… the actual business of writing the music down is somehow related to the creative act. (Adrian)</td>
</tr>
<tr>
<td><strong>Notes/signs</strong></td>
<td>Consistent interpretation of features allows an individual to attend to basic symbol units of music. This allows for recognition of individual notes, clefs signs, time signature, dynamic markings, sharps, flats and so forth.</td>
<td>I think its sounding quite bassey, I don't mean Count Bassie, I mean quite bottom heavy, which I’m going to rub out that treble stave immediately and put in another bass stave. I think I can write 3/4 with impunity. That's the tempo (Gestures and sings). That's about 100, I would get up and get my metronome but it's on the other side of the room, so, maybe that's a bit slower than 100, maybe that's 90. I reckon its about 92 (Adrian)</td>
</tr>
<tr>
<td><strong>Intervals</strong></td>
<td>Structural analysis involving recognition of the systematic relationship between adjoining notes.</td>
<td>The D is there not in the bass and the C sharp is in the bass not there that gives us a nice, ninth. (Adrian)</td>
</tr>
<tr>
<td><strong>Clusters</strong></td>
<td>A cluster is a short musical idea such as a chord or scale run and thus represents the first level of musical meaning. The processing of clusters may be by visual cues of structural analysis or aural strategies of structural analysis such as singing or playing. The meanings attached to individual clusters are decontextualized and isolated</td>
<td>A first inversion, and an inversion of the … I'll change the sopranos to an E flat and the thirds and for the tenor and bass on the same note there as well, so we finish A flat in that chord, and put alto's on C. (Frank)</td>
</tr>
<tr>
<td><strong>Motifs/Note grouplets</strong></td>
<td>Processing music at this level involves the chunking of clusters into patterns. The processing strategies involve the use of semantic content (assigning meanings) as well as syntactic information (knowing how to form stylistic conventions).</td>
<td>There's no sort of motif thing in there, and if I had more time I would possibly go back and revise this and make it sort of, link it more into piano partners sort of motifs and also the bass part and have a look at them and see what they were going to do. (Colin)</td>
</tr>
<tr>
<td><strong>Ideas/Musical Phrase or Figure</strong></td>
<td>Processing music at this level involves the inferring of additional information from the notes, such as perceiving unusual sound combinations, or inferring relationships implied by combining motifs into a musical phrase such as question and answer type phrases.</td>
<td>OK that’s fine. I need another pattern in there cause it’s not phrasing quite right. (Colin)</td>
</tr>
<tr>
<td><strong>Main Idea/Musical Idea/Sections</strong></td>
<td>Processing of music at this level involves the ability to segment music into integrated sections corresponding to a sequence of major points. Structural features such as major cadence points and the integration of motifs and chord schemes into a coherent section often signal main ideas.</td>
<td>So, done, done, let’s get the same theme, same rhythm as the beginning piece. Intro. Section, section. (Bob)</td>
</tr>
<tr>
<td><strong>Musical Themes</strong></td>
<td>Highly abstract conceptualisations of the underlying message or argument of the composition. Thematic processing provides the means of integrating all lower levels of information into a coherent representation of the composers intentions.</td>
<td>I'll try and write a waltz, because I'm doing a series of waltz's at the moment a series of 60, minute waltz's for the pianist 'X' and the idea behind them is that you end up with 60 chunks of time which are equal but in the course of the 60 waltz's the style of the waltzes’ varies enormously so some of them will be very slow and some of them will be very fast. Some of them may have twelve bars and some may have 112 bars, some of them will have a lot of notes and some will have hardly any. Some will be great be big barn storming numbers, some of them will be spare and Satiesque and so you actually get to play with time in real time everything, but each piece will last a minute, but in terms of perception of time there is a distinct difference and some of them will seem to go on much longer than others. I'm also going to join some of them up so that they will, actually one will flow into another and there will be other places where obviously one will just stop and something completely different will start. (Adrian)</td>
</tr>
</tbody>
</table>
Table 6.2: Coding categories for strategy use and sample protocols

<table>
<thead>
<tr>
<th>Level</th>
<th>Strategy</th>
<th>Sample protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low –level strategies</strong></td>
<td><strong>Association</strong>: Linking of two or more musical elements without transforming the musical meanings</td>
<td>I’ve got to have a D in the altos otherwise you don’t have a chord, the major chord. O.K. now I just have to fill in the middle parts. (Frank).</td>
</tr>
<tr>
<td></td>
<td><strong>Trial and Error</strong>: Reasonably unsystematic strategy selection, which persevered with</td>
<td>O.K. now the way I would go about this would be to do a fair bit of trial and error to get it sounding nice. (Frank).</td>
</tr>
<tr>
<td></td>
<td><strong>External recourse</strong>: Using an external resource to solve the musical problem rather than developing alternative strategies.</td>
<td>I’m just writing anything that comes to mind, whether or not it makes sense with the one before that, it’s the sort of minor that comes to mind and join them up later on. (Amanda).</td>
</tr>
<tr>
<td><strong>Mid-level strategies</strong></td>
<td><strong>Speed alteration</strong>: Slowing the speed so that details may be more easily attended to.</td>
<td>Wish I could play the piano sometimes. O.K. I’ll just turn the tempo down a bit. Eighty that would be good. (Colin).</td>
</tr>
<tr>
<td></td>
<td><strong>Chunking</strong>: Strategy of sorting smaller, relatively less important units of musical information into larger, more meaningful units.</td>
<td>I’ll have it doing that and I’ll put it in there except I’ll have it reversed and I’ll have it longer and I’ll have it faded, …nice pattern. (Colin).</td>
</tr>
<tr>
<td></td>
<td><strong>Linking</strong>: when new musical information is referenced to prior knowledge.</td>
<td>I think I have actually got a sort of model at the back of my mind to be perfectly honest which is, which is Ravel in this particular one, actually I mean the Valse Nobile Sentimental are a sort of model for the whole piece… (Adrian).</td>
</tr>
</tbody>
</table>
|                            | **Scanning**: A deliberative overview of the score to identify elements in the music that may create interest or enhance fluency. | Now this is getting a bit too predictable, so let’s change a bit of timing. Let’s do that,…, 5/4 then back to 4/4 which means I’ll have to add an extra beat to this. (Bob). \[I think that’s nice, I think that will work and you actually, it really the perception of tonality really alters in the course of those four bars and by the time you come back to the original \textit{G} … it doesn’t sound like\]
<table>
<thead>
<tr>
<th>High-level Strategies</th>
<th>Patterning: Sorting of relevant and important musical information into a hierarchy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring: Process of testing oneself, checking whether strategies are working, asking questions about strategic behaviour.</td>
<td>… its very odd, I mean I think this works nicely but we do seem to be all in, effectively D major in the bass. Well is it D major? We’ve got G’s and D’s and F sharps and C sharps in the bass and umm … we have an E flat and A flats in the melody. That’s right, somehow the chords in between are going to have to make sense of this, or at any rate not be in a third key. (Adrian).</td>
</tr>
<tr>
<td>Interpretation: Strategy of imposing meaning on small parts, sections, or the whole of a piece thereby transforming the music into something original and meaningful.</td>
<td>I’m getting used to that now, in fact I’ll swap it around now so I’ll have the pad coming in first, cause it’s more of a, repeat it, it’s more of a warm sound. Repeat that, yeah, yeah, yeah do it! (Colin).</td>
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</tbody>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Selection (Pays attention to selected information and transfers to working memory)</td>
<td>Prefactual confabulation: Repeats fragmentary parts of text, specious associations, non-analytical and isolated responses</td>
<td>Features to clusters: Focus on isolated elements of information, which may remain decontextualized or inappropriately generalised to form an incomplete or inaccurate representation of the musical problem</td>
<td>Clusters to phrases: Individual units of information such as musical terms chords or motifs considered in isolation from the surrounding context allowing for construction of a partially accurate but incomplete representation of the musical problem</td>
<td>Transform Knowledge</td>
<td>Size of units</td>
</tr>
<tr>
<td></td>
<td>Acquisition (Actively transfers the information from working memory to long-term memory)</td>
<td>Knowledge/detail retelling: Near verbatim repetition of details: elaborations of specious and often over generalised, non-critical acceptance of information</td>
<td>Association</td>
<td>Rote learning</td>
<td>No response/avoidance</td>
<td>External recourse</td>
</tr>
</tbody>
</table>

Unistructural: Focus on single relevant dimension to the cue: coherence based on linearity rather than integration. All knowledge items treated temporally and discretely. Closure based on isolated detail.
<table>
<thead>
<tr>
<th></th>
<th>Construction (Actively builds connections between ideas in information and develops coherent outlines or schemes)</th>
<th>Assimilation: Paraphrases text to clarify meaning, uses relevant personal knowledge to elaborate, evaluate text on basis of personal knowledge</th>
<th>Phrases to musical ideas: Focus on clustering of individual ideas into meaningful, but discrete, musical categories as a basis for accurately summarising the major components of the musical problem</th>
<th>Linking</th>
<th>Chunking</th>
<th>Speed alteration</th>
<th>Research</th>
<th>Categorical focus: First - order transformation of information to context dependent and conventional headings</th>
<th>Multistructural: Focus on multiple dimensions of cue allowing for restructuring segments of music into more integrative categories. Categories treated as discrete. Closure based on selected categories of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td><strong>Construction</strong>/ <strong>Integration</strong> (Builds connections between old and new information)</td>
<td><strong>Problem solving:</strong> Identifies sources of confusion, and hypothesizes ways to resolve problems. Evaluates new text by reference to personal knowledge</td>
<td><strong>Musical ideas to musical themes</strong> (closed): Focus on the integration of clusters of musical information to form a coherent, but situationally-specific representation of the musical problem</td>
<td>Interpretation</td>
<td>Patterning</td>
<td>Prioritising</td>
<td>Monitoring</td>
<td><strong>Integrative focus:</strong> Second - order transformation of information, extending meaning to high levels of abstraction</td>
<td><strong>Relational:</strong> Identifies relationships between categories of information that is integrated into a coherent music-centred meaning. Closure based on music-derived theme.</td>
</tr>
<tr>
<td>Extrapolation: Constructs inferences and hypothesis to extrapolate knowledge not already known or shown in the text. Conflicting information resolved by synthesis rather than selection</td>
<td><strong>Themes (Open):</strong> Integrative focus centred on higher-order schemes allowing for a decontextualised representation of the musical problem</td>
<td><strong>Extended Abstract:</strong> Point of integration of meaning goes beyond immediate musical text. Relationship to more general knowledge elaborated. Avoids complete closure, retaining element of higher-level tentativeness</td>
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Results

Less Proficient Novices

David

David’s intention was not clearly formed at the beginning of the session. He began by declaring, “I don’t know what to write”. Twenty seconds later he was

“But thinking of a, of a sound, cause usually when I write it, I’ve been inspired by something to write, but at the moment nothing is getting me, so I’m just trying to build up some inspiration maybe using some influence”.

Later the intention was to compose in ‘Montuno’ jazz style. In the second part of the protocol the intention was to compose a twelve bar blues.

Implementation

Initial planning began with trialling sounds on the keyboard. “Well I just thought I’d use the ii-v progression in C”. The first concern was to find a bass line to fit the chords “Left hand and I just thought add a bass to it.”

The sound was monitored against whether it sounded ‘funky’ and in ‘Montuno style’. Then later “I might just pen it down, start writing a vamp.” This first phase was abandoned when an extension to the two bar vamp could not be designed. In Garners (1989) terms cognitive failure occurred when he attempted to “follow on from that vamp”. The linking of chords into a coherent phrase eluded him. Further he was concerned about the sound as being “too generic and boring”, and later with “copying someone else’s tune”.
A second phase was to implement a ‘twelve bar blues’. This second phase used only chord symbols to indicate the chord progression of the twelve bar blues. David finished the composing session after twenty minutes of work.

*Structure of task engagement*

Analyses of the structural features engaged by the composer was determined by examining the details of the protocols, videos and composition and examining the structural features used to plan, monitor and evaluate the composition. The results are tabulated and displayed in figure 6.1 below.

<table>
<thead>
<tr>
<th>Themes</th>
<th>Deliberative Planning</th>
<th>Improvised Planning</th>
<th>Trialling</th>
<th>Transcribing</th>
<th>Monitoring</th>
<th>Evaluating</th>
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<tr>
<td>Ideas</td>
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<tr>
<td>Phrases</td>
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<td>Motifs</td>
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<td>Clusters</td>
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<td>Intervals</td>
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<tr>
<td>Notes/signs</td>
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<tr>
<td>Features</td>
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</table>

Figure 6.1: Structural features used to regulate the composing task for David
The planning involved finding chords and linking melodies to chords where possible. Activities included verbal recognition of what was being attended to while talking, playing and writing. See table 6.1 for sample statements and playing.

**Strategies used**

**Rote learning** was evident where David would play over the same bass line many times with the apparent aim of memorising the music before transcribing it. **Avoidance** was evident at the end of the first intention where the attempt to extend the bass line was abandoned. This was apparent when the style was eluding David and he attributed this to the absence of inspiration:

“…cause usually when I write it, I’ve been inspired by something to write, but at the moment nothing is getting me, so I’m just trying to build up some inspiration maybe using some influence.”

**Epistemological inferences**

When asked how he would teach someone to compose like he does he responded with:

Learn your chords and learn your scales and then chuck it all out the window and jam, it’s as simple as that in brief.

In this response there is evidence of a reliance on technical knowledge -“chords and scales”, but apparent confusion as to how to use this information in the construction of coherent goal directed planning at higher levels of construction –“and then chuck it all out the window and jam”. This would seem to suggest a confusion in being able to conceptualise coherent meaning and planning over a range of processing concerns and integrate lower order musical details such as chords and melodic motifs (‘vamps’ in David’s terms) into higher order structural concerns such as phrases and sections.
Frank

Frank’s explicit intention was to compose a “psalm tune”.

Implementation

Initial planning included a diagrammatic sketch of four phrases with each phrase consisting of 6 minums, then 4 minums, 6 minums, and finally 4 minums. Chords were trialled on the keyboard and were monitored against - “What sounds good”. Vocal notes were allocated on the basis of fitting the notes to the rules of the formation of four-part harmony such as:

“I’ve got to have a D in the altos otherwise you don’t have the chord, the major chord. OK now I just to have to fill in the middle parts.”

The procedure for finding the chord to use next was identified by Frank as “trial and error”.

Structure of task engagement

Analyses of the structural features utilised was determined by examining the details of the protocols, videos and composition and examining the structural features used in planning, monitoring and evaluation. The results are tabulated and displayed in Figure 6.2 below.

Strategies used

Low-level strategies of trial and error and rote learning along with a mid-level strategy of linking were evident in the protocols. **Trial and error**: a reasonably unsystematic
strategy selection was persevered with for most of the composing session. This consisted of finding a chord and then identifying which notes would be allocated to which vocal line. **Rote learning**: was evidenced in the trialling of chords until memorised and then transcribing the sounds into musical notation. **Linking** was evidenced when Frank identified the style to a ‘psalm tune’.

**Epistemological inferences**

When asked how he would teach someone else to compose as he did Frank replied:

‘I don't know if it's free choice or whatever to lay it all out and to think what needs to be done in it, like I did at the top with setting it out and choosing a key. It's a bit hard really because what I did was mostly trial and error and I don't know but that's the way I compose in this sort of way.’
In initial planning, Frank set out the rhythmic structure of the psalm. In doing this he failed to conceptualise the task as essentially a series of chords that move to a cadence at the end of each section. He used a trial and error strategy throughout to find the notes of the triad that would complete the vocal parts. There was no attempt to think beyond the immediate concern of the completion of the chord, such as how the vocal part might link to the next chord.

**Summary of generic processing concerns for Less Proficient Novices**

In terms of the focal level of processing concerns responses of David and Frank were constrained to musical information up to clusters. Individual units of musical information were considered in isolation from the surrounding context producing a partially accurate but incomplete representation of the musical problem. For Frank, the issue was to provide the correct spelling of the notes of the triad in four part harmony without recourse to the implications of voice leading and chord progressions at the higher level of phrases and sections. In other words, closure was attained with the solving of what notes fitted the chord. For David, attention was devoted to finding ways of creating links between bass line and chords of the twelve bar blues. Explicit attention to this level of detail limits the capacity to attend to higher order features of the task such as structure and providing coherent links between the levels of information. Where a solution to extending the riff to other chords could not be found the musical construction was abandoned and David resorted to less complex tasks such as writing out chord symbols for the 12-bar blues.

In Biggs and Collis’ (1982) terms these responses were typically focused at the unistructural level, displaying what Biggs (1992) notes as “a heavy reliance on retelling
source material with minimal transformations” (p.4). Closure of the problem for Frank was obtained when the relevant note was identified that belonged to the triad. There was no attempt to integrate this isolated note into a coherent melody that linked with preceding and succeeding notes. Chords were treated in isolation and not directed to tonal cadence points. Closure was based on the ‘pleasing’ quality of the chord. For David, closure was based on not succeeding in meeting his criterion of constructing music that was not ‘too generic and boring’. A bass line could not be constructed that met this criterion thus it was not possible for David to integrate the constructed vamp with the constituent phrase and sectional units.

In terms of Chan et al (1992) levels of constructive activity, the participants appeared to see the content in terms of data to be controlled and not as “a problem to be solved”. The establishment of coherent links between levels of information - a necessary precursor to ill-structured problem solving, was not attained. Thus, for both composers, the strategic behaviours in Sullivan and Cantwell’s terms (1999) rely on mainly low-level strategic behaviours of association, rote learning, avoidance, and external recourse.

Neither participant gave evidence in their protocols of awareness of information at the level of musical themes, main ideas or idea level of information. The responses characteristically address relevant but isolated information relating to the problem. Thus this demonstrates in Biggs and Collis’ (1982) terms clear evidence of a unistructural response.

Strategically, the composers actively paid attention to some of the information. However, the emphasis is on the selective attention to linearity of information and the
over use of trial and error, association and reliance on the use of external recourse (Sullivan & Cantwell, 1999). As information was encountered, these composers dealt with it in isolation from preceding and succeeding information, thus relying on reproducing largely untransformed (Cantwell & Jeanneret, 2004) information.

The use of near verbatim repetition of the same details and often over generalised and non-critical acceptance of musical information is a feature of the protocols. Hence, reliance on ‘rules’ in a non-critical way leads to a largely ‘reproductive’ focus (Cantwell & Jeanneret, 2004) terms.

More Proficient Novices

Amanda

Intention

Amanda began by suggesting that she would:

“…write something, definitely in a penta-tonic scale and maybe something depressing. There was a poem that I was reading the other day.

Implementation

Initial planning included writing a scale and then improvising some melodic patterns. The scale was identified as a South Vietnamese scale that ‘usually depicts sadness’. This was followed by more melodic patterns being played on the keyboard. After a few minutes an impasse was identified. “I’m not exactly sure what it is I want to say about it. Ok um, I’m going to have to write a poem first”. The poem was written and then Amanda reconciled content and structure by associating the emotional content of the poem with melodic motifs that represented the emotional content of the poem. “Ok, so now it’s going to be more based on emotion. Ok, so tears. The motif represents tears”.
**Structure of task engagement**

Analyses of the structural features engaged by the composer was determined by examining the details of the protocols, videos and composition and examining the structural features used to plan, monitor and evaluate the composition. The results are displayed in Figure 6.3 below.

![Figure 6.3: Structural features used to regulate the composing task by Amanda](image)

**Strategies used:**

Low-level strategies included
- **External recourse** where the musical problem of structure was solved by reference to the emotive content of the poem.

- **Rote learning** where Amanda reproduced large units of music after trialling on the keyboard.

Mid-level strategies included:

- **Linking** when Amanda referenced prior knowledge of Vietnamese scales and motifs.

- **Chunking** of melodies and motifs into coherent phrases.

*Epistemological inferences*

Amanda would teach students to structure the music. She didn’t think that you could teach students to ‘feel’ music. The important issue is to feel the music and then to write it down.

> Um, well for me I have to be able to hear it first before I can actually write anything and before I actually hear it I have to have something to base it on, because I write poetry and I like poetry, I have to have a guideline there, my guideline is a poem. I think in that way it gives your piece form a sense of structure so that you know, OK, this is what I want to achieve so you get this felling, otherwise if it comes through becomes real wishy washy, that’s why I have trouble with this, because a lot of it was just like you’re just going around and around.

*Bob*

Bob’s intention was to compose a percussion composition. Prior experiences of a jazz piece and work with his composition teacher at a music camp acted as influences on his intention.
**Implementation**

Initial planning included recalling apparent random prior experiences of percussion and ways of working. A key of ‘A flat’ was decided on the basis that ‘it is a nice key’. He then began improvising and selecting instruments. A riff emerges and a key signature of 4/4 was settled on. Later the plan is extended to include references to ‘call and response’

**Structure of task engagement**

Analyses of the structural features engaged by the composer was determined by examining the details of the protocols, videos and composition and examining the structural features used to plan, monitor and evaluate the composition. The results are displayed in Figure 6.4 below.

![Figure 6.4: Structural features used to regulate the composing task by Bob](image-url)
Strategies used

Low-level strategies included:

- **Rote learning** where music was trialled on the piano and memorised before transcribing.

Mid-level strategies included:

- **Linking** where reference is made to prior knowledge of a previous jazz composition, prior knowledge of instruments played and references to known composers such as Steve Reich.

- **Speed alteration** where changes in tempo are deliberately implanted in that getting the music to move gradually from slow to faster ‘acts as a psychological thing’.

- **Chunking** was used where smaller riffs became integrated into phrases and sections.

Epistemological inferences

Bob displayed evidence of re-thinking what composition is about. He spoke about the need to economically use musical material and to explore the quality of sound colour in his compositions.

Um… I know personally what I would do and still do and I’ve been taught this year, is that less information, you know less is more. And so this is like using five notes or something and I think it would make quite an interesting composition. So I would use that cause it’s all that tone colour and stuff too. I never really appreciated the fact that instruments have different sounds and you can make a piece based on different sounds and not on you know thirteenth chords and all this garbage. Um … so just from say look you don’t have to do much. And don’t be afraid to be tonal.

Gavin

Gavin’s intention was to write for piano.
“I will write for piano and what I will do is um, a specific amount of bars in order to know what my goal is from the beginning. And I think I’ll make it 19 bars, in which case I’ll write 3 in each line”.

Implementation

Initial planning involved drawing bar lines and choosing D minor mode. He then began to improvise on the keyboard for twenty seconds. He continued to improvise and eventually a bass riff was created and a theme emerged. Gavin had problems transcribing the syncopation of the left hand.

Structure of task engagement

Analyses of the structural features engaged by the composer was determined by examining the details of the protocols, videos and composition and examining the structural features used to plan, monitor and evaluate the composition. The results are displayed in Figure 6.5 below.

Strategies used

Low-level strategies included:

- **Rote learning**, where Gavin spent large amounts of time improvising and trialling music before committing to transcribing.

- **Trial and error** was utilised to commit to memory the complex rhythmic figures of the bass riffs.

Mid-level strategies included:

- **Speed alteration** to deliberately slow the tempo of the music so that the rhythm could be transcribed.
Figure 6.5: Structural features used to regulate the composing task by Gavin

- **Chunking** was used to combine riffs into phrases.
- **Scanning** was used when Gavin thought that the music was getting too predictable and introduced a bar of 5/4 (see appendix x).

High-level strategies included:

- **Patterning** was used so that a clearer sense of the structure was achieved.

*Epistemological inferences*

In reply to how he would teach somebody else to compose as he had, Gavin began by describing how to think of a style then retold the structure in terms of sections. At the end of the description of the structure of the composition he elaborated his idea that music was like the cycle of life.
...actually apply to me teaching it is, think of a style and within that style a rhythmic pattern that serves as some sort of drone. OK in terms of sections OK, OK we’ve had a couple a subsections within our first melody, OK, first section and second section, ... and then that marks the end of that section and this sort of like brings it, marks the end as well as it brings it to a next section which is basically a textural thing and a bit of commentary on the first one. OK having said that I have to tell the student well there is a new section coming in different well have to find something that stage, that makes reference to the theme but the same time isn’t that similar so it’s considered to be the same section, it’s got to be something that’s contrast at the same time still compatible, not compatible um, consistent that’s the word I’m looking, consistent with the first section that I put forward and then itself has to end, and then OK, it also say then, OK then that basically ends like this, sorry this is the actual second section, there is a principal here that I guess that I’ve applied, and the principal is that OK ... is beautiful but also grow of things is just as beautiful if not more, I being very subjective but I looking from my personal point of view so ... I mean something like this, something that repeats itself, the growth is something that repeats itself but that something comes from that in this case, right hand adding to that same texture and now that growth brings us back right to the beginning. It sort of like repeats back to that second core response, not in the same way but in a different kind of way, and finishing it you know I’d also tell the student to try, that music goes in cycles, a lot of things in life goes in cycles, seasons of the year go in cycles, the earth itself goes in cycles, and a lot of people in the world and different religions say that life goes in cycles as in you know 1 life and the next life goes in cycles, I don’t believe that personally but it something that certainly that cycles things happen a lot in life and therefore why not represent that in the music by you know beginning in a similar to what we start, but this time with a lot more growth that has occurred through the process of the composition, and therefore instead of ending like we started, we finish like, using the same material as the beginning but using both hands in order to achieve that. I’ll add that on and I’ll just add another bar just giving that last long note. OK and that does write down, to a nothing, we go from a nothing and finish at a nothing. That’s probably a rough idea of how I would.

**Summary of generic processing concerns for More Proficient Novices**

In terms of the focal level of processing in Irvine’s terms, the responses of the composers focussed attention on musical information up to and including musical ideas.

In Biggs and Collis’ (1989) terms the composers were typically focused at the multi
structural level where multiple dimensions of cues allowed for restructuring of content into more integrative categories. In Chan’s et al (1994) terms, the composers were able to elaborate and evaluate the music on the basis of personal knowledge and actively build connections between levels of musical information and to develop coherent outlines or schemes. In Cantwell and Millard’s (1994) terms the construction of individual ideas into meaningful, but discrete, musical knowledge was a basis for accurately summarising the major components of the musical problem. However, closure was based on selected categories of information at the phrase and section level and thus reflected in Cantwell and Jeanneret’s (2004) terms as a first order transformation of information to context dependent and conventional headings. However the musical problem was still treated as a bottom up process where melodies were generated and then assimilated into structures where phrases and structure became the organising feature.

**Expert Composers**

**Colin**

Colin began with uncertainty as to what to write. After approximately 15 minutes of working, the intention to write a ternary structure was formed.

**Implementation**

Initial planning included recognising thirty minutes as a time constraint so therefore in order to complete the composition ‘do something short’. He began by checking sounds on a computer and then improvising something. Ideas were recognised and identified as ‘ideas in my head, some rhythmic patterns and stuff’. After a first section had been constructed, there was a realisation ‘where is this going?’ Chordal patterns were worked
out for a second section and then a ternary structure was established. As soon as this structure was established, the protocol is then filled with self-efficacy comments such as ‘yeah go for it’ and ‘sounding good’.

Structure of task engagement

Analyses of the structural features engaged by the composer was determined by examining the details of the protocols, videos and composition and examining the structural features used to plan, monitor and evaluate the composition. The results are displayed in Figure 6.6 below.

Figure 6.6: Structural features used to regulate the composing task by Colin
**Strategies used**

Mid-level strategies included:

- **Chunking** where smaller motifs are integrated with phrasing and sections.
- **Scanning** where there is evaluation of sections and providing evidence of linking sections to create interest and enhance the fluency of the music.

High-level strategies included.

- **Interpretation**, where meaning is imposed on small motifs, phrases and sections. **Patterning** where underlying motifs were integrated into structures and phrases. **Prioritising** where the sorting of relevant and important musical information from less relevant and important information into a hierarchy of concerns.
- **Monitoring** where the process of checking oneself, and checking whether strategies are working.

**Epistemological inferences**

In response as to how he would teach somebody else to compose, Colin responded in terms of structuring the composition by using a harmonic scheme in the planning process. Thus implying flexibility in the epistemology driving the decision to refocus the quality of intention as an impasse in processing musical knowledge is acknowledged.

Part of the whole thing is writing things quickly. About half of the way through, like when I've done the first section and I thought right where is this going? and I realised that I needed to have some sort of harmonic structure to the whole thing and that's when I worked out the pad chords. So in fact maybe that's something that I should have done in the first place, 'cause I just basically started and didn't know what I was doing. Of course I was just mucking around and then it came to me later, so possibly I would say to students that it’s very important they map out their harmonic areas at the beginning.
Adrian

Adrian’s intention was to write a series of sixty by one minute waltzes. The whole composition was a commission and he was just starting the initial composing process.

The statement of the problem was as follows:

I'll try and write a waltz, because I'm doing a series of waltz's at the moment a series of 60, minute waltz's for the pianist (x) and the idea behind them is that you end up with 60 chunks of time which are equal but in the course of the 60 waltz's the style of the waltzes' varies enormously so some of them will be very slow and some of them will be very fast. Some of them may have twelve bars and some may have 112 bars, some of them will have a lot of notes and some will have hardly any. Some will be great be big barn storming numbers, some of them will be spare and Satiesque and so you actually get to play with time in real time everything, but each piece will last a minute, but in terms of perception of time there is a distinct difference and some of them will seem to go on much longer than others. I'm also going to join some of them up so that they will, actually one will flow into another and there will be other places where obviously one will just stop and something completely different will start. I've written, I've actually completed two of them, two down 58 to go and sketched out ideas for perhaps another five

Implementation

Initial planning is done in terms of establishing a tempo of 92 and then hearing sounds internally and then transcribing them. Later a keyboard is used to check what is written.

Structure of task engagement

Analyses of the structural features engaged by the composer was determined by examining the details of the protocols, videos and composition and examining the structural features used to plan, monitor and evaluate the composition. The results are displayed in Figure 6.7 below
Figure 6.7: Structural features used to regulate the composing task by Adrian

**Strategies used**

Mid-level strategies included:

- **Chunking** where smaller motifs are integrated with phrasing and sections.
- **Scanning** where there is evaluation of sections and providing evidence of linking sections to create interest and enhance the fluency of the music.

High-level strategies included:

- **Interpretation**, where meaning is imposed on small motifs, phrases and sections. **Patterning** where underlying motifs were integrated into structures and phrases. **Prioritising** where the sorting of relevant and important musical information from less relevant and important information into a hierarchy of concerns.
• **Monitoring** where the process of checking oneself, and checking whether strategies are working.

*Epistemological inferences*

For Adrian the task of composition as he did it was not suitable for teaching composition students. This was because “composition is not having ideas; it is what you do with the ideas.” To compose a waltz was to ‘limit myself enormously before I’ve thought of the single thing’. To demonstrate the process was to start with a single note and to ask questions (in other words to be metacognitive) such as:

…should it be a long note or a short note, a loud note or a quite note or whether it should be a flute or whether it should be a soprano saxophone or whatever, and then to take it from there so that they can see something evolving from a single note

*Summary of generic processing concerns for Expert Composers*

The crucial shift in activity at this level involves the awareness to orchestrate meaning over a wide range of processing concerns up to and including the thematic level. Two different approaches were observed. On the one hand Colin began in a bottom up process and began to engage with the construction of melodies phrases and sections. In Chan et al (1992) terms, Colin was able to identify sources of confusion in his approach and to resolve the problem by hypothesizing about the nature of the structure and then implementing a chordal scheme to provide a means of organising the construction and integration into a coherent but situationally-specific representation of the musical problem. In Cantwell and Millard’s (1994) terms, Colin’s response may be described as closed.
Strategically, Colin used mid-level and high-level strategic behaviours such as chunking, speed-alteration, patterning, prioritising and monitoring. It was obvious that in Weinstein and Meyer’s (1986) terms, the breadth of strategic knowledge brought to bear on the compositional process allowed for the construction and integration of well-known schemes to coherently build in a bottom-up approach to the task of musical composition.

In Biggs and Collis (1982) terms, this represents a relational outcome. Relationships between categories of information (at the integration of motifs, phrases and structure) are integrated into a coherent music-centred meaning. Closure was based on music-derived themes. In Cantwell and Jeanneret’s terms (2004), this represented a second order transformation of information where musical meaning was extended to high levels of abstraction.

In contrast, whilst Adrian also ranged across the full range of focal processing concerns his approach can be best described as using a top-down processing approach. At the beginning of the process, Adrian reflected for some considerable period of time on the nature of the problem he had set himself. In Cantwell and Sullivan’s terms (1994), Adrian focussed on a higher-order scheme that allowed for a decontextualised representation of the musical problem. Specifically the higher-order scheme was to compose a series of sixty-one minute waltzes. The musical problem for Adrian was how to best organise the first few waltzes so that the listener could get a sense of the projection of the sounds in time. The issue of writing a waltz was not a problem. Rather the problem was to locate this particular waltz in the sequence of waltzes. In Biggs and Collis’ terms, (1982) the response would be at an extended abstract level, where the
point of integration of meaning goes beyond immediate musical text. A relationship to more general knowledge is elaborated, and Adrian avoids complete closure, rather retaining elements of higher-order tentativeness.

In Sullivan and Cantwell’s terms (1999), Adrian used both mid-level and high-level strategies of linking, chunking, scanning, interpretation, patterning, prioritising and monitoring. Patterns of musical entities are integrated into the fabric of the design and are able to be monitored against the internal representation of the musical problem (Sullivan and Cantwell, 1999). This level of integration is provided by the constructive activity of building interconnections between elements of incoming information (Weinstein and Meyer, 1986). Such a level of integration represents a second-order transformation of knowledge, where meaning is extended to high levels of abstraction (Cantwell and Jeanneret, 2004).

Discussion

Analysis of the verbal protocols provided the basis for constructing an eight level Taxonomy of Compositional Skills, thus providing a basis for describing the structural complexity evident in the composer’s in-situ musical concerns evident from the concurrent verbal protocols. The elements of the Taxonomy ranged from structurally less complex elements of Features of Notation, Notes/signs, Intervals, Clusters, Motifs/Note groups, to more structurally complex elements of Ideas/Musical Phrases, Main Ideas and Musical Themes.

The focus of attention links to the structural complexity of the composer’s processing. Expert Composers with their attention on thematic elements, global planning and
evaluation, represent relational/extended abstract outcomes in SOLO terms. More Proficient Composers with their attention on musical phrases, motifs, deliberate planning, improvisation, trialling and monitoring; represent multi-structural outcomes in SOLO terms. Less Proficient Composers with their attention on clusters, improvisation or trial and error, represent uni-structural outcomes in SOLO terms. Frequencies of utterances of Structural complexities by the composers is shown in Table 6.4 below. Frequencies of utterances of strategies used by the composers are shown in Table 6.5 below. This relationship is shown in Figure 6.8 below.

Epistemological differences were implied from the verbal protocols. Expert Composers beliefs in the uncertainty of knowledge enabled them to flexibly shift attention to resolve processing impasses and to keep an open mind to potential solutions to problems. In contrast, Less Proficient Composers reflected beliefs in certainty of knowledge as reflected in their reliance on the authority of ‘rules’ to process musical information. The outcome of these beliefs led to inappropriate ‘absolute’ conclusions.

What emerged from this study were differences in how the compositions were created, - top down versus bottom up. Expert Composers conceptualised a thematic sense to future composition and buttressed this with well-established strategic and musical knowledge. Thus, the exercise may well have been one of confirmatory compositional thinking. Novices, on the other hand were less able, due to less developed knowledge and strategic options, to conceptualise, as a predominantly top-down process, coherent musical content. Therefore, for these less expert composers, there was an interaction between partially formed ideas and partially accessible requisite musical and strategic knowledge.
Table 6.4 Frequencies of utterances of Structural Complexity

<table>
<thead>
<tr>
<th>Structural Complexity</th>
<th>Less Proficient Novices</th>
<th>More Proficient Novices</th>
<th>Expert Composers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musical Themes</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Main Ideas</td>
<td>0</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Ideas/Musical Phrases</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Motifs/Notes</td>
<td>0</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Clusters</td>
<td>1</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Intervals</td>
<td>12</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Notes/Signs</td>
<td>14</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Features of Notation</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 6.5 Frequencies of utterances of Strategies

<table>
<thead>
<tr>
<th>Strategy Level</th>
<th>Less Proficient Novices</th>
<th>More Proficient Novices</th>
<th>Expert Composers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Patterning</td>
<td>0</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Prioritising</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Monitoring</td>
<td>1</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td><strong>Mid-Level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linking</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Chunking</td>
<td>0</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Speed Alteration</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Scanning</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td><strong>Low Level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rote Learning</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Trial and Error</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>External Recourse</td>
<td>3</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>
Figure 6.8: From Task complexity to Quality of Cognitive complexity, as Measured by SOLO. (Adapted from McMullin, 2006)
This study did not examine why these composers employed the strategies that they did. Theoretical constructs outlined in Chapter 3 would predict that higher order; dispositional factors might explain individual differences in compositional process. There was evidence in this study of individual differences. These included individual differences in the patterns of Attentional Foci. Further, Less Proficient Composers involved little reference to high order elements of meaning and understanding and tended to demonstrate confusion in reconciling task conception with appropriate regulatory behaviours. This in turn led to a lack of self-confidence in their ability to effectively plan and monitor the composition process.

Theory would predict that given a cohort of composers with a common knowledge base then the quality of the metacognitive dispositions would be the basis of individual differences in the direction and allocation of attention. To investigate this proposition a second study was designed to test this prediction. This study is reported in Chapter 7.
CHAPTER 7

Study 2: Individual differences in composition

In Study 1 profiles of composers processing was represented graphically as attentional shifts between seven potential categories, Problem Definition, Deliberative Planning, Improvised Planning, Trialling, Transcribing, Monitoring and Evaluation. In Chapter 5, the graphs were grouped into three clusters, EC; MPN; and LPN. Composers classified as LPN were characterised by shifts in attention between Improvised Planning, Trialling, Transcribing and Monitoring. Little time was devoted to the extreme categories of Problem Definition, Deliberative Planning or Evaluation. Composers classified as MPN many of the characteristics of LPN, but differed in the increasing shifts of attention to Problem Definition, Deliberative Planning and Evaluating. Composers classified as EC increasingly shifted between Problem Definition, Deliberative Planning, Transcribing, Monitoring and Evaluating. Little attention was devoted to Improvised Planning or Trialling. The groupings reflected levels of expertise as suggested by the composer’s prior experience of composition.

In Chapter 6 qualitative evidence was provided for these groupings. LPN composers tended to engage the composition task at a relatively shallow level, use low-level strategies and conceive of composing as relying on the surface features of learning/reproducing scales and chords. MPN composers tended to engage the composition task at a slightly deeper level and use both shallow and mid-level strategies and conceive of composing as relying on well-known conceptual structures. EC composers engaged the composition task across all levels of
activity, and used both mid-level and high-level strategies and were able to conceive of the task as problem solving or in thematic ideas and were able to integrate content with structure.

Whilst this analysis was able to distinguish both quantitatively and qualitatively between subjects, there was also evidence that the graphing of attentional focus also indicated individual differences between subjects. For example, in Cluster 3 the professional composers engaged with the task in very different ways.

If we control for prior knowledge are their other internal processes that mediate compositional behaviours and which may predict compositional outcomes?

Method

Participants

In study 1 reported in chapters 5 and 6, it was noted that the cases varied both between and within subjects. In this study the design of the study is to investigate individual differences within subjects. Therefore, participants were chosen with the following codicils. First, participants should reflect a similar stage of competence. Second, they would be at a stage in their development where it may be inferred that they understand or have a workable knowledge of the discipline of composition (Biggs and Collis, 1989; Biggs, 1992; Cantwell, 2004). Thirdly they would be able to be fluent in both verbal and musical language.

Given the above codicils, participants were chosen on the basis of their enrolment in an undergraduate degree program and were majoring in composition. The
degree program was conducted in a university setting in rural N.S.W. Australia. Table 4.2 summarises the participants’ demographic background, academic level attained, instruments learned, A.M.E.B. level attained on an instrument, theory and/or musicianship and prior compositional experience.

**Materials and Tasks**

**Materials**

Materials for the study consisted of a demographic information sheet, and three questionnaires. Demographic information included age, gender, instrument learned, AMEB grade or equivalent standard achieved, and AMEB grade in theory/musicianship achieved. Three questionnaires relating to aspects of musical composition were provided. An adaptation of Cantwell & Moore’s (1996) Strategic Flexibility Questionnaire provided a measure of the manner in which students metacognitively deal with complexities in musical composition. Biggs’ (1987) Study Process Questionnaire was included as a measure of the underlying conception of learning driving musical composition engagement, and a Self-efficacy Questionnaire as a measure of personal belief to confidently engage specific aspects of composition tasks. Details of these questionnaires, along with sample items were detailed in Chapter 4.

**Procedures**

After obtaining informed consent, all participants were individually tested at two times in Semester 2 of 2001. The testing of participants at two times was premised on the assumption that students learning to compose would show some progression in their regulation of the composing process over the course of a
semester as a result of either specific instruction and or the gaining of compositional experience. Therefore it was anticipated that there would be differences in the graphing of Attentional Foci between the beginnings of a semester and the end of a semester's instruction.

Time 1 was in the first week of the semester and Time 2 was in the fourteenth and final week of Semester 2. Participants chose the location where the testing would be carried out. Three participants chose to do the testing in their own homes, while eleven participants chose to be tested in studios in the Conservatorium of Music. Participants completed the demographic information sheet at the first testing time. At both Time 1 and Time 2, participants also completed the SPQ, SFQ and Self-efficacy questionnaires. Participants were given as much time as they needed to complete the questionnaires.

The composition component of the session followed the same procedure as reported in Study 1 (see Chapter 5). The researcher conducted all interview sessions and followed a standard protocol. Details of task design, standard protocol administered and procedures were reported in Chapter 4. All composition sessions and interviews were audio-recorded and videotaped.

Data analysis

Scoring of graphs

In study 1 (see Chapter 5), the graphs were grouped into three clusters. Graphs in Cluster 1 were characterised by attention to the inner categories of Improvising, Trialling, Transcribing and Monitoring and giving little or no attention to the
extreme categories of Problem Definition or Evaluating. Graphs in Cluster 2 exhibited many of the characteristics of the graphs in Cluster 1, but differed in the increasing attention given to Problem Definition, Deliberative Planning and Evaluation. Graphs in Cluster 3 devoted most attention to Problem Definition, Deliberative Planning and Evaluating, giving little attention to Improvisation or Trialling.

The graphs in this study were similar to those patterns represented in Cluster 2 in the previous study. The graphs were graded for their cognitive complexity on a three-point scale reflective of SOLO categories by the researcher and a trained assistant. Differences between the grades were discussed until agreement was reached. Descriptive statistics of SOLO scores and number of graphs in each category are shown in Table 7.1 below.

*Scoring of compositions*

The compositions were scored on a three-point scale indicative of a SOLO type rating. A score of three was indicative of a relational type outcome, a score of two was indicative of a multi-structural outcome and a score of one was indicative of a unistructural outcome. The researcher and a trained composer, with extensive experience in marking compositions at the HSC music composition exam, scored the compositions. Any disagreements were discussed until mutual agreement was reached. Descriptive statistics of SOLO scores for composition is given above in Table 7.2.
Statistical procedures

The power of 14 cases is not sufficient to make meaningful statistical comparison. However, we are interested in the patterns that emerge from the data. Therefore a series of ANOVA’s were conducted to test if there were any differences in attentional focus between Time 1 and Time 2. Secondly correlations between Attentional Focus and measures of prior learning were conducted to assess emerging patterns between prior learning of instrumental music and theory/musicianship. Thirdly, a series of correlations between Attentional Focus and measures of individual differences (SPQ, SFQ and Self-Efficacy) were conducted to assess emerging patterns in the data. Finally, a series of correlations between Attentional Focus and compositional ratings were conducted to assess the patterns emerging between Attentional Focus and better compositional outcomes.

Results

It is intended to look for significant changes across time. Are any of the individual focal levels different across time? The descriptive statistics of instances and time at each of the seven potential levels of attentional focus are given in Table 7.1 below.
Table 7.3 Descriptive statistics of Instances and Time devoted to levels of attentional focus at Time 1 & Time 2

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th></th>
<th>Time 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Instances 1</td>
<td>Duration 1</td>
<td>Instances 2</td>
<td>Duration 2</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Problem Define</td>
<td>1.00</td>
<td>1.04</td>
<td>2.39</td>
<td>3.4</td>
</tr>
<tr>
<td>Deliberative Plan</td>
<td>31.29</td>
<td>15.03</td>
<td>19.15</td>
<td>11.41</td>
</tr>
<tr>
<td>Improvised Plan</td>
<td>9.21</td>
<td>13.92</td>
<td>7.32</td>
<td>11.09</td>
</tr>
<tr>
<td>Transcribing</td>
<td>45.36</td>
<td>19.09</td>
<td>27.07</td>
<td>11.39</td>
</tr>
<tr>
<td>Monitoring</td>
<td>49.64</td>
<td>22.76</td>
<td>21.98</td>
<td>9.65</td>
</tr>
<tr>
<td>Evaluation</td>
<td>2.43</td>
<td>2.28</td>
<td>3.3</td>
<td>3.26</td>
</tr>
</tbody>
</table>

Changes over time within the group

Potential interactive changes in attentional levels between Time 1 and Time 2 were assessed through a series of 2 (Time 1 and Time 2) x 7 (Problem Identification, Deliberative planning, Improvised planning, Trialling, Transcribing, Monitoring and Evaluation) analyses of variance.

Differences of instances of Attentional Focus at Time 1 and Time 2

In relation to the instances of Attentional Focus at Time 1 and Time2, no general effect was evident for time of testing (F 6, 78 = 1.0672, p=0.38943). This is graphically shown in Figure 7.1 below.

Two features of interest in the graph is the overall ascendancy of instances at Time 2, and the vertical grouping of attentional focus into three groups. The most
instances were Transcribing and Monitoring, an intermediate group of Deliberative Planning and Trialling and the least instances were Improvised Planning, Evaluating and Problem Identification.

The most instances were Transcribing and Monitoring at both Time 1 and Time 2. At Time 2 there were fewer instances of monitoring and more instances of Transcribing. At Time 2 there was an increase of instances of Trialling. The least instance was in Problem Identification. At time 2 instances of Improvised Planning were less and instances of Evaluating slightly increased.

Figure 7.1: Instances of Focal attention at Time 1 & 2
Figure 7.2: Duration of processing at Time 1 and Time 2 for each attentional level.

In relation to the differences in time devoted to processing at each level at Time 1 and Time 2, there was again no significant overall effect ($F(6, 78) = 1.1916$, $p=0.31959$). Time spent at each level of attention is presented in Figure 7.2 below.

The first feature of this graph is the increase at Time 2 on Transcribing, Trialling and Evaluating and the decrease at Time 2 on Monitoring, Deliberative Planning and Improvised planning. The second feature of the graph is the vertical grouping of Attentional focus into three groups. The least time spent was in Problem Identification. Little time was devoted to Improvised Planning. An intermediate group is time spent in Deliberative Planning and Trialling. The most time was spent in Monitoring and Transcribing.
Relationship between Attentional Focus and measures of Prior Learning

Correlations of Attentional Focus with Instrumental Level

Participants completed a questionnaire that sought information about the AMEB levels reached by the participant in the areas of instrumental achievement. Correlations between the seven categories of attentional focus and the level of instrumental level attained are presented in Table 7.2 below.

Time 1 Instances and Duration: Higher attainment in instrumental lessons was significantly negatively correlated with both instances and duration of Trialling. There were substantive but non-significant positive associations between instrumental level and instances and duration of both Problem Definition and Deliberative Planning as well as duration of Improvised Planning and Monitoring.

Table 7.4 Correlations of Attentional Focus with Instrument Level at Time 1 and 2

<table>
<thead>
<tr>
<th>Category</th>
<th>Instrumental Level Attained at Time 1</th>
<th>Instrumental Level Attained at Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Instances 1</td>
<td>Duration</td>
</tr>
<tr>
<td>Problem Defin</td>
<td>0.26</td>
<td>0.22</td>
</tr>
<tr>
<td>Delib. Planning</td>
<td>0.29</td>
<td>0.43</td>
</tr>
<tr>
<td>Improv. Planning</td>
<td>0.16</td>
<td>0.31</td>
</tr>
<tr>
<td>Trialling</td>
<td>-0.55*</td>
<td>-0.65*</td>
</tr>
<tr>
<td>Transcribing</td>
<td>-0.18</td>
<td>0.10</td>
</tr>
<tr>
<td>Monitoring</td>
<td>-0.06</td>
<td>0.22</td>
</tr>
<tr>
<td>Evaluating</td>
<td>0.14</td>
<td>0.07</td>
</tr>
</tbody>
</table>

*p < .05
Time 2 Instances and Duration: Higher attainment in instrumental lessons was significantly negatively correlated with duration of Trialling. There were substantive but non-significant positive associations between instrumental level attained and instances and duration of Deliberative Planning and Improvised Planning.

Correlations of Attentional Focus with Theory/Musicianship Level
Participants completed a questionnaire that sought information about the AMEB levels reached by the participant in the areas of theory/musicianship achievement. Correlations between the seven categories of attentional focus and the level of instrumental level attained are presented in Table 7.3 below.

<table>
<thead>
<tr>
<th></th>
<th>Theory Level Attained at Time 1</th>
<th>Theory Level Attained at Time 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Instances 1</td>
<td>Duration</td>
</tr>
<tr>
<td>Problem Define</td>
<td>-0.32</td>
<td>-0.34</td>
</tr>
<tr>
<td>Delib. Planning</td>
<td>0.26</td>
<td>0.31</td>
</tr>
<tr>
<td>Impro. Planning</td>
<td>-0.10</td>
<td>-0.03</td>
</tr>
<tr>
<td>Trialling</td>
<td>-0.27</td>
<td>-0.32</td>
</tr>
<tr>
<td>Transcribing</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>Monitoring</td>
<td>0.16</td>
<td>0.34</td>
</tr>
<tr>
<td>Evaluating</td>
<td>-0.16</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

*p < .05
**Time 1 Instances and Duration:** At time 1 higher attainment in theory was associated with substantive but non-significant negative associations between instances and duration of Problem Definition and Trialling and positive associations between instances and duration of Deliberative Planning.

**Time 2 Instances and Duration:** At time 2 higher attainments in Theory were associated with substantive but non-significant associations with positive instances of Deliberative Planning and Evaluating, and negative durations of Trialling.

**Relationships between Attentional Focus and measures of individual differences**

Participants completed a series of self-report measures that sought information about their Approach to Learning, Strategic Flexibility and Self-efficacy (see Chapter 4 for full descriptions of scales for each instrument). Correlations between the seven categories of Attentional Focus and:

1. Approach to Learning are presented in Table 7.4 below
2. Strategic Flexibility are presented in Table 7.5 below
3. Self-Efficacy are presented in Table 7.6 below

**Attentional Focus and Approach to Learning**

**Time 1**

Participants completed a modified and shortened version of Strategic Process Questionnaire (Biggs, 1987). Table 7.4 and Table 7.5 present correlations of Attentional Focus with SPQ at Times 1 and 2.
Deep 1, Instances and Duration: Higher scores on the Deep scale of the SPQ were associated with substantive but non-significant negative associations between instances and duration of Monitoring and instances of Deliberative Planning.

Achieving 1, Instances and Duration: Higher scores on the Achieving scale of the SPQ were associated with substantive but non-significant positive associations with both instances and duration of Deliberative Planning and Monitoring; substantive but non-significant negative associations with Improvised Planning and negative associations with durations of Transcribing.

Surface 1, Instances and Duration: Higher scores on the Surface scale of the SPQ were significantly negatively associated with both instances and duration of Improvised Planning and positive associations with instances of Transcribing.

Table 7.6 Correlations of Attentional Focus with SPQ at Time 1

<table>
<thead>
<tr>
<th></th>
<th>Deep 1</th>
<th></th>
<th>Achieving 1</th>
<th></th>
<th>Surface 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Instances</td>
<td>Duration</td>
<td>Instances</td>
<td>Duration</td>
<td>Instances</td>
<td>Durations</td>
</tr>
<tr>
<td>Problem Defin</td>
<td>-0.07</td>
<td>-0.13</td>
<td>-0.10</td>
<td>-0.14</td>
<td>-0.22</td>
<td>-0.25</td>
</tr>
<tr>
<td>Delib. Planning</td>
<td>0.27</td>
<td>0.10</td>
<td>0.50</td>
<td>0.39</td>
<td>0.40</td>
<td>0.14</td>
</tr>
<tr>
<td>Impro. Planning</td>
<td>-0.08</td>
<td>0.03</td>
<td>-0.37</td>
<td>-0.22</td>
<td>-0.55*</td>
<td>-0.57*</td>
</tr>
<tr>
<td>Trialling</td>
<td>-0.01</td>
<td>-0.11</td>
<td>-0.13</td>
<td>-0.08</td>
<td>0.45</td>
<td>0.26</td>
</tr>
<tr>
<td>Transcribing</td>
<td>0.03</td>
<td>-0.13</td>
<td>0.04</td>
<td>-0.29</td>
<td>0.63*</td>
<td>0.11</td>
</tr>
<tr>
<td>Monitoring</td>
<td>0.27</td>
<td>0.26</td>
<td>0.21</td>
<td>0.29</td>
<td>0.42</td>
<td>0.00</td>
</tr>
<tr>
<td>Evaluating</td>
<td>-0.13</td>
<td>0.01</td>
<td>0.15</td>
<td>0.17</td>
<td>-0.05</td>
<td>-0.20</td>
</tr>
</tbody>
</table>

*p < .05
Higher Surface scores were associated with substantive but non-significant negative associations between instances and durations of Problem Definitions; positive but non-significant instances and durations of Trialling and instances of Monitoring.

Deep 2, Instances and Duration: Higher scores on the Deep scale of the SPQ at time 2 were significantly correlated with both instances and duration of Improvised Planning. Substantive but non-significant associations with both instances and durations of Deliberative Planning, associations with duration of Problem Definition and Monitoring and negative associations with instances of Trialling and positive but non-significant associations with duration of Monitoring.

Table 7.7 Correlations of Attentional Focus with SPQ at Time 2

<table>
<thead>
<tr>
<th></th>
<th>Deep 2 Instances</th>
<th>Deep 2 Duration</th>
<th>Achieving 2 Instances</th>
<th>Achieving 2 Duration</th>
<th>Surface 2 Instances</th>
<th>Surface 2 Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Define</td>
<td>0.09</td>
<td>0.41</td>
<td>-0.16</td>
<td>0.12</td>
<td>-0.21</td>
<td>-0.52</td>
</tr>
<tr>
<td>Delib. Planning</td>
<td>0.40</td>
<td>0.44</td>
<td>0.42</td>
<td>0.33</td>
<td>-0.26</td>
<td>-0.25</td>
</tr>
<tr>
<td>Impro. Planning</td>
<td>-0.64*</td>
<td>-0.66*</td>
<td>-0.14</td>
<td>-0.29</td>
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<td>-0.26</td>
</tr>
<tr>
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<td>0.11</td>
<td>0.10</td>
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<tr>
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<td>-0.62*</td>
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</tr>
<tr>
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<td>0.21</td>
<td>0.51</td>
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</tr>
<tr>
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<td>0.01</td>
<td>-0.11</td>
<td>0.06</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*p < 0.05
Achieving 2, Instances and Duration: Higher scores on the Achieving scale of the SPQ were significantly negatively associated with duration of Transcribing. Substantive and non-significant scores were associated with positive instances and duration of Deliberative Planning and Monitoring and negative duration of Improvised Planning.

Surface 2, Instances and Durations: Higher scores on the Surface scale were associated with substantive but non-significant negative associations of instances and durations with Problem Definition, Deliberative Planning and Improvised Planning. Substantive but non-significant associations were positively associated with instances and durations of Transcribing but negatively associated with duration of Monitoring.

Table 7.8 Correlations of Attentional Focus with SFQ at Time 1

<table>
<thead>
<tr>
<th></th>
<th>Adaptive 1</th>
<th></th>
<th>Inflexible 1</th>
<th></th>
<th>Irresolute 1</th>
<th></th>
</tr>
</thead>
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<td>Instances</td>
<td>Duration</td>
<td>Instances</td>
<td>Duration</td>
</tr>
<tr>
<td>Problem Defin</td>
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</tr>
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</tr>
<tr>
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<td>0.44</td>
<td>0.64*</td>
</tr>
<tr>
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<td>0.14</td>
<td>0.26</td>
<td>-0.54*</td>
<td>-0.40</td>
</tr>
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*p < 0.05
Table 7.9 Correlations of Attentional Focus with SFQ at Time 2

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<th>Irresolute 2</th>
<th></th>
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<td>Instances</td>
<td>Duration</td>
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<td>Duration</td>
</tr>
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<td>Monitoring</td>
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<td>-0.11</td>
<td>-0.08</td>
<td>-0.08</td>
<td>0.16</td>
</tr>
</tbody>
</table>

*p < 0.05

Attentional Focus and Control over Learning

Participants completed a modified version of Strategic Flexibility Questionnaire (Cantwell and Moore, 1996). Table 7.6 and Table 7.7 present correlations of Attentional Focus with SFQ at Times 1 and 2.

Adaptive 1, Instances and Duration: Higher scores on the Adaptive scale of the SFQ were associated with substantive but non-significant positive associations with both instances and duration of Problem Definition and negative associations with both instances and duration of Evaluating.
Inflexible 1, Instances and Duration: Higher scores on the Inflexible scale of the SFQ were associated with significant relationships between negative durations of Deliberative Planning and significant positive instances of Improvised Planning. Substantive but non-significant negative associations were associated between both instances and durations of Monitoring and positive associations between both instances and durations of Evaluating; negative associations of instances with Deliberative Planning; positive associations of durations with Improvised Planning and Trialling.

Irresolute 1, Instances and Durations: Higher scores on the Irresolute scale of the SFQ were associated with significant positive relationships between duration and Improvised Planning, significant negative relationships between instances and Trialling and instances and Transcribing. Substantive but non-significant negative relationships were associated between instances and Deliberative Planning; durations and Trialling; durations and Transcribing. Substantive but non-significant positive relationships were associated between instances and Improvised Planning; durations and monitoring and both instances and durations of Evaluating.

Adaptive 2, Instances and Duration: Higher scores on the Adaptive scale of the SFQ were associated with substantive but non-significant positive relationship between duration and Deliberative Planning; negative relationship between instances and duration of Improvised Planning; negative relationship between instances and Trialling; positive relationship between duration and Monitoring and negative relationship between duration and Evaluating.
**Inflexible 2, Instances and Duration:** Higher scores on the Inflexible scale were associated with substantive but non-significant negative relationship between duration and Problem Definition; negative relationship between instances and duration of Deliberative Planning; positive relationship between duration and Trialling; negative relationship between instances and Transcribing and negative relationship between instances and duration of Monitoring.

**Irresolute 2, Instances and Duration:** High scores on the Irresolute scale of the SFQ were associated with significant relationships associated with both instances and duration of Improvised Planning. Substantive but non-significant negative relationship were associated between duration and Trialling.

Table 7.10 Correlations of Attentional Focus with Self Efficacy at Time 1 & Time 2

<table>
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<tr>
<th></th>
<th>Self-Efficacy at Time 1</th>
<th>Self-Efficacy at Time 2</th>
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<tbody>
<tr>
<td></td>
<td>Instances 1</td>
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<td>0.23</td>
</tr>
<tr>
<td>Evaluating</td>
<td>0.03</td>
<td>0.20</td>
</tr>
</tbody>
</table>
Attentional focus and self-efficacy

Participants completed a researcher-developed version of Self-Efficacy for music composition. Table 7.8 present correlations of Attentional Focus with Self-Efficacy at Times 1 and 2.

Self-Efficacy 1 Instances and Duration: Higher scores on the Self-Efficacy scale at time 1 were associated with substantive but non-significant negative associations with both instances and duration of Problem Definition; positively associated with both instances and duration of Deliberative Planning and Monitoring and positively associated with duration of Evaluating.

Self-Efficacy 2 Instances and Duration: Higher scores on the Self-efficacy scale at time 2 were associated with significant negative relationship with Improvised Planning. Substantive but non-significant associations were associated with positive instances with Deliberative Planning; negative associations of instances with Improvised Planning; negative associations of duration with Transcribing; positive associations with instances and durations with Monitoring and negative associations of duration with Evaluating.

Links with SOLO scoring of music compositions

The music compositions were rated on a three-point scale indicative of a Relational outcome, Multi-structural outcome and Unistructural outcome (Biggs and Collis, 1982). These scores were correlated with measures of Attentional Focus at Times 1 and 2. The correlations are presented in Table 7.9 below.
SOLO score at Time 1, Instances and Duration: Compositions that scored high SOLO scores at time 1 were significantly associated with negative relationships of instances with Trialling, and positive relationships of duration with Improvised Planning and negative relationship with Trialling. Substantive but non-significant relationships were associated with positive instances and duration of Problem Definition; positive associations of instances and duration with Deliberative Planning; positive associations of instances with Improvised Planning; positive associations of instances and duration with Evaluating and positive associations of duration with Monitoring.
Table 7.11 Correlations of Attentional Focus with SOLO rating of compositions

<table>
<thead>
<tr>
<th>Problem</th>
<th>Deliberate Plan</th>
<th>Improvise Plan</th>
<th>Trial</th>
<th>Transcribe</th>
<th>Monitor</th>
<th>Evaluate</th>
<th>Problem</th>
<th>Deliberate Plan</th>
<th>Improvise Plan</th>
<th>Trial</th>
<th>Transcribe</th>
<th>Monitor</th>
<th>Evaluate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOLO Time 1</strong></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td><strong>SOLO Time 1</strong></td>
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<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trial</td>
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<td></td>
<td></td>
<td></td>
<td>Trial</td>
<td></td>
<td></td>
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<tr>
<td>Transcribe</td>
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<td>Transcribe</td>
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<tr>
<td>Monitor</td>
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<tr>
<td>Evaluate</td>
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<td></td>
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<tr>
<td><strong>SOLO Time 2</strong></td>
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</tr>
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<td>0.63*</td>
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<td>-0.46</td>
<td>-0.24</td>
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<td>Define</td>
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<td>0.73*</td>
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<td>-0.09</td>
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<td></td>
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<tr>
<td>Transcribe</td>
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<td></td>
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</tr>
</tbody>
</table>

* < 0.05
SOLO score at Time 2, Instances and Duration: High SOLO score for compositions at time 2 were significantly associated with positive relationships between instances and Deliberative Planning; positive relationships of duration with Problem Definition, Deliberative Planning and negative relationship of duration with Trialling. Substantive but non-significant relationships were associated with positive associations of instances with Problem Definition, negative associations of instances with Trialling and positive associations of instances with Evaluation. Substantive and non-significant relationships were associated with positive associations of instances with Problem Definition, negative associations of instances with Trialling and positive associations of instances with Evaluation. Substantive and non-significant relationships were associated with positive associations of duration with Monitoring and Evaluating.

Discussion

The study investigated individual differences in reported dispositions that mediate attentional behaviours and compositional outcomes. The study took measures at two different times separated by a 14 week period. Two-way ANOVAS demonstrated that the composers were operating somewhere between the level of Clusters 1 and 2 in Study 1. Further, the analysis did not demonstrate any significant differences in the allocation of Attentional Foci. Thus it is concluded that the composers did similar things at both Time 1 and Time 2.

For those composers with high levels of expertise in theory, the patterns of attentional focus were on Deliberative Planning as the major category of planning. They were less likely to rely on higher order Deliberative Definition of the musical problem to be
addressed and thus reflect the type of rule-based and imitative schemas found in theory papers. Thus for these composers the task is more likely to be addressed from the perspective of the well-defined schemas that this type of learning would require and not to be able to deal with the abstract construction of higher-order Ideas and to be able to coherently address the uncertainty of the abstract global planning and to be able to deal with the possibilities beyond the given knowledge base.

Approach to learning has been the subject of much research indicating individual differences in how a task is conceptualised. For ‘deep’ learners there is an affective orientation to engage with the task of composing because of an intrinsic interest in the task and of adopting strategies likely to satisfy their curiosity by imposing personal meanings the composer intends to apply. Therefore a ‘deep’ orientation to composing would engage in a more open-ended epistemology in that the composers implicitly acknowledge both less certainty in the knowledge being constructed, and a greater possibility of imposing personal meaning on the composition. For composers at this level of expertise, they attended to Problem Definition, Deliberative Planning, and some Improvised Planning but were unlikely to engage in Trialling. The more expert composers in this cohort were able to focus attention on higher levels of meaning and thus spent less time on trialling and transcribing than the more novice-like composers and were able to allocate attention to relating and integrating a global sense to musical composition.

Differences in how composers understand the ‘the how, the when and the where’ to plan and monitor the ongoing construction of the composition process involves individual differences in the efficiency of self-regulation (Cantwell & Moore, 1996). Efficient self-
regulation is being able to adaptively plan and monitor the ongoing cognitive activity of
the construction of the composition. Two components of effective planning include
firstly, the need for structuring and organizing appropriate content knowledge and
implementing appropriate strategies, and secondly, for engaging in open rather than
closed reflection concerning optimal approaches to the task prior to actual task
engagement. Two components of monitoring include firstly, the preparedness to adjust
processing behaviours in response to perceived changes in task demands and secondly,
a preparedness to evaluate the efficacy and utility of strategic decisions in the face of
new and/or dissonant information. Ineffective self-regulation is characterised by
inflexibility and confusion. Two types of inflexibility is firstly, where strategy-task
incongruence’s are either not recognised or are recognised and not acted upon, the
second type involves the persistent use of the same habitual routines and algorithms
rather than task-specific requirements. Two components of confusion is firstly,
difficulties in generating coherent strategic plans, generating coherent content structure,
generating links between content and strategic planning, and secondly, during
processing, orchestrating content information across levels of meaning and in
conceptualising appropriate strategic alternatives to resolve processing impasses.

Adaptive dispositions were correlated with attentional focus on Problem Definition and
Trialling with some Monitoring but no Deliberative Planning or Evaluating, thus
suggesting that for this level of expertise that while open reflection may have occurred,
this was thwarted by use of Trialling indicating limits both in orchestrating content
information across levels of meaning and in conceptualising appropriate strategic
alternatives. Limited time to Monitoring also suggests capacity to evaluate the efficacy
and utility of strategic decisions in the face of new and/or dissonant information. A
maladaptive disposition of Inflexibility was correlated to attentional behaviours of Improvised Planning and some Trialling with Evaluating and did not engage in reflective and open planning in Problem Definition or engage in Deliberative planning or Monitoring. Thus these composers relied on habitual routines and schemas of improvisation to generate appropriate content knowledge. The task thus became one of writing out the improvisation. Those composers reporting a bias towards Irresolute self-regulation tended to give some time to Problem Definition and spent most time in Improvised Planning and Evaluating. These composers were unlikely to engage in Deliberative Planning, Trialling and Transcribing. Thus indicating a limited capacity for engaging in open reflection before engaging in the task but then relying on habitual schemas of improvisation to generate content but unsure whether the improvisation met their internal conception of the task and thus not committing to transcribing the music.

Those composers reporting self-confidence to engage in specific aspects of planning the composition focused attention on behaviours of Deliberative Planning, Monitoring and Evaluation. Thus indicating a capacity to deal with specific content level planning but not able to deal with more abstract and strategic issues associated with Problem Definition.

It would be predicted that better composers would be able to find some coherence between these dispositions and that this would be reflected in greater attention given to the extremes of the attentional categories. Thus compositions were graded on a three point scale to reflect the SOLO taxonomy. As predicted those compositions reflecting high scores on the SOLO taxonomy tended to give more attention to Problem Definition, Deliberative Planning, Improvised Planning, Monitoring and Evaluating,
and were unlikely to devote time to Trialling. Thus, these composers were likely to be able to spend some time in reflective planning but were unable to keep an open reflection on the optimal approach to the composition task relying on the use of Deliberative Planning and Improvised Planning for generating content structure. The development of content structure relied on habitual schemas of Improvised Planning and thus indicated a restricted conception of the possibility of the musical ideas necessary for a thematic sense of coherence between meta-schemes (Sloboda, 1986; Ohlsson, 1993) and content. Such limitations are in keeping with the classification of an intermediate level of expertise (e.g. Patel & Groen, 1991).
CHAPTER 8

Music composition as metacognition in action

Before addressing the major themes emerging from the studies reported in chapters 5 to 7, I propose to restate the theoretical position as expressed in Chapters 1 through 4. This will be followed by a discussion of the research findings as presented in Chapters 5 through 7. Next, the theoretical and practical implications will be discussed, followed by a brief discussion of further research directions emerging from unanswered questions arising from this thesis.

The thesis aimed to develop a theory of the underlying processes in the composition activity of both novice and experts and to examine the role of individual differences within these groups that may help explain the quality of compositional activity and the progression of compositional competence.

Empirical research literature, as described in Chapter 2, has conceptualised the process of musical composition as creative problem-solving of either defined or ill-defined problems. The literature was shown to be limited to descriptions of perceptual differences in the substantive knowledge and strategies of composers as they resolve musical problems and assemble parts into coherent wholes. Perceptual aspects of cognition may be seen as lower – order cognitive processes and thus restrict interpretations of what composers do in real – time to Gestalt interpretations or Stage Theories of the application of ‘techniques’ or ‘craft’ of harmony to the construction of
musical compositions. The literature does not extend to an account of the role of attention in the composing process.

The thesis was concerned with differences in what individuals attend to as a function of domain knowledge. “Attention” in this thesis was premised on the construction of “meaning”: an active process driven by the quality of prior knowledge and underlying intention. This process was described in terms of a “SOLO” cycle of increasing structural complexity within and across developmental stages. SOLO is a useful measure for assessing discrepancies between intention and action as a result of developmentally constrained mental models. However, SOLO is an outcome measure and does not address individual differences in how attention is allocated during the composing process. Hence the need to imbed developmental models of learning within models of individual differences.

The chapter then drew upon current theoretical and empirical work surrounding Cantwell’s (2004, 2010) and Vermunt’s (1998) models of internal processes in human learning. These frameworks were seen as allowing for intention to play a central role in explaining cognitive activity through the interactions between cognition, affect and metacognition. Under this model, what composers attend to in real – time compositional activity was seen as being driven by the quality of intentions, and the quality of planning undertaken as compositional tasks are engaged (sub-domain of metacognitive regulation). However, intention formation and planning were also seen as being affected by external factors such as context, task, environment, time etc., with internal factors driving the interpretation of how these external factors are to be met. These internal factors include both theories and judgements of self as a composer (affective domain)
and constructed theories and judgements about composing (sub-domain of metacognitive disposition). In interaction, these were argued to provide the internal parameters for establishing the planning and processing activity for musical composition.

Understanding the quality of planning in composing was premised on a taxonomic framework (see Chapter 3) acknowledging that meaning may be constructed at multiple levels. Underlying the taxonomic model of attentional focus is the assumption that intention in learning and composing will typically constrain processing activity to particular levels of meaning. I hypothesized a relationship between possibilities and intention and that this would play out through the attentional range. Given the theoretical and empirical link between intention and process described in the student learning literature, shifts in attentional focus represent a potentially transformational process driven by qualitatively different conceptions of the possibilities and purposes of the process itself. Therefore each level was described in terms of qualitative different processes in how attention plays out in the composing process:

- Attending to an integrative focus
- Attending to a categorical focus
- Attending to a reproductive focus

Constructed meanings contain both cognitive and affective components. If composition is understood as ill-structured, then the task is replete with uncertainties: uncertainties in the personal concerns of contributing a ‘good’ and worthwhile ‘new’ composition; and in the personal judgements and assessments of self to engage with, manage and adapt to the ill-structured nature of the task. Understanding how composers deal with these
issues may have implications for how the music education field addresses issues of curriculum and pedagogical design as well as assessment.

Given this theoretical background, the following research questions were addressed in this study:

4. What do composers do when composing?

5. Is there a relationship between compositional behaviours and compositional outcomes and the prior knowledge the composer brings to the task?

6. If we control for prior knowledge, are there other internal processes that mediate compositional behaviours and which may predict compositional outcomes?

As a prelude to addressing these questions, a methodology for capturing and describing real-time attentional behaviours had to be developed. This methodology was described in Chapter 4. It was argued, that observation of compositional behaviours (what the composer ‘does’), would be reflective of different qualities of internal decisions made as compositional goals are selected, implemented and evaluated. To access composer’s internal concerns, a multi-method design was developed. Concurrent verbal protocols made available current cognitive concerns in short-term memory while retrospective protocols were seen as accessing metacognitive dispositions and affective thoughts held in long-term memory. By triangulating videos and transcribed verbal protocols, seven categories of attentional foci were observed. The categories were developed by reference to the literature on problem-solving (e.g. Lawson, 1991) as well as idiomatic activities of composers such as Improvisation (Sloboda, 1985; Hargreaves, 1986) and Exploration (Kratus, 1989).
The verbal categories were converted to step-graphs to visually represent the attentional processes in composing. The resulting graphs provide two data sources – firstly, a measure of time devoted to each category before shifting to another category of activity, and secondly, the number of instances devoted to each category. Thus shifts in attention can be taken as indicative of shifts in compositional activity. Variations in attentional focus were argued to reflect different layers and qualities of intention. This in turn implied different qualities of knowledge use and strategic behaviours. Thus the resulting graphs were argued to represent real-time composing activity.

Summary of findings

1. What do composers do when composing?

It was hypothesised that if composers are selected on the basis of their prior knowledge (novice – expert continuum) and are given a common, open-ended composition task then the differences in prior knowledge ought to be reflected in differences in the distribution and direction of attentional behaviours, independent of the music composed. For this study two professional composers were selected as representative of expertise in composition, and five novice composers were selected from University students studying to become professional composers.

Independently of a priori participant grouping, the Graphs of Attentional Foci were visually grouped into like-patterns. Initial clustering supported two clusters. Expert composers were in one cluster and novice composers in the other. Further analysis of the novice composers enabled these composers to be divided into two clusters. Thus the final groupings resulted in three clusters - discriminated by the proportion of time devoted to higher and lower-level attentional foci. Less Proficient Novices (LPN) were
marked by high composer activity devoted to the central (less metacognitively demanding and less musically meaningful) categories of Improvised planning, Trialling and Transcribing with little or no time devoted to the extreme categories of Problem Identification and Evaluation. More Proficient Novices (MPN) were marked by the increased attention given to Problem Definition and Monitoring. This represented a significant step in metacognitive control. Finally, The Expert Composers (EC) devoted significantly greater proportion of time to the extreme categories of Problem Definition, Deliberative Planning, Monitoring and Evaluation, the more cognitively demanding and more musically meaningful categories. This in turn suggests a more sophisticated conception of the task that requires a congruent sophistication of metacognitive control.

2. Is there a relationship between compositional behaviours and compositional outcomes and the prior knowledge the composer brings to the task?

Analysis of the verbal protocols provided the basis for constructing an eight level Taxonomy of Compositional Skills (see Chapter 6) thus providing a basis for describing the structural complexity evident in the composer’s in-situ musical concerns from the concurrent verbal protocols. The elements in the Taxonomy ranged from structurally less complex elements of Features of Notation, Notes/Signs, Intervals, Clusters, Motifs/Note groups, to more structurally complex elements of Ideas/Musical Phrases, Main Ideas and Musical Themes. The focus of attention links to the structural complexity of processing. Experts, with their focus on thematic elements, global planning and evaluation, represent relational/extended abstract outcomes in SOLO terms, where the novice groups varied between multi-structural and uni-structural outcomes.
In summary, the graphs of Attentional foci represent the temporal management of the composing processes. Composers have to continuously shift between planning at a global level, implementing these at a focal level, translating this into written symbols and monitoring and evaluating the effectiveness with which the external symbols and musical sounds meet their internal conceptions of the composition. This continuous shifting gives the composing activity its cyclic nature and depends on the strategic and recursive ordering of different sub processes. Therefore the direction of attention to each of these processes is both ‘mindfully’ and intentionally distributed over the composing process. Thus the substantive knowledge base requires more than the application of lower-order cognitive processes. Implied in the higher-order levels of the Taxonomy of Compositional skills are the metacognitive dispositions to compose with meaning, dispositions towards planning and monitoring and self-efficacy beliefs in a sense of agency to compose effectively.

Observed differences in attentional behaviour within the EC composers and the LPN composers provided evidence of a mediating effect of attention that is independent of prior expertise. This was the basis of the third research question:

3. If we control for prior knowledge are there other internal processes that mediate compositional behaviours and which may predict compositional outcomes?

In Study 2 a different cohort of university students intending to pursue a career as a professional composer were invited to participate. The procedures were the same as in
Study 1 with the addition of three self-report questionnaires measuring individual differences in approach to learning, strategy control and self-efficacy were completed at two different times – the beginning and the end of a 14 week university semester.

As in Study 1, the verbal protocols were categorised and graphed to indicate shifts in Attentional Foci. It was predicted that there would be interactions between prior learning (as measured by level attained in performance and theory) and the distribution of attention. Secondly, it was predicted that there would be interactions between individual measures of dispositions as measured by SPQ (Biggs, 1987), SFQ (Cantwell and Moore, 1996) and Self-efficacy (designed for this study) and direction and distribution of attentional behaviours. Finally, it was predicted that a high score on dispositional measures would correlate with high grades allocated to the compositions.

There was an association in the data between measures of individual differences, Attentional Foci and scoring of the compositions. Composers reporting a higher Deep approach, Adaptive control and self-efficacy tended to spend more time in Problem Identification, Deliberative Planning, Monitoring and Evaluation and were associated with the highest rating on the composition scale. On the other hand, those reporting a higher Surface approach, maladaptive Strategic Control and Self-efficacy tended to concentrate their time on the more central categories of Trialling, and some Monitoring and scored the lowest rating on the composition scale. The data supports an association between the quality of higher – order metacognitive knowledge and beliefs driving the quality of Attentional Foci and the quality of the compositional product.
Attention to the extreme categories of Problem Identification, Deliberative Planning, Monitoring and Evaluation implies greater cognitive complexity underlying the processing of musical knowledge. It could be that coherence of composition may reflect coherence of the knowledge brought to the task. Given that even the experts in Study 1 used Trialling and Improvisation (as well as the higher order planning and evaluation categories), it is evident that the act of composition still requires ‘mindful’ attention to the specifics even where driven by a more coherent sense of intention and purpose. The weaker composers engaged in sense creation through trial and error, where more expert composers, like the expert composers in Study 1, used planning and monitoring to ‘confirm’ sense.

Overall, this thesis supported four broad findings:

1. Graphs of Attentional Foci provide a mechanism for capturing real-time composing activity and a metric for its measurement and representation.

2. Composers attend to different things while composing

3. Between group differences of graphs of Attentional Foci were mediated by quality of prior substantive and strategic knowledge and different qualities of constructed understandings of the nature of composing.

4. Individual differences were reflected in the underlying dimensionality of metacognitive dispositions governing the metacognitive decision-making of the composers.

This thesis is grounded in a model of learning that emphasises the role of dispositional factors and quality and accessibility of prior knowledge in driving the decision –
making processes of composers. These results were within the expectations of the theoretical model outlined in Chapter 3.

In summary, all composers engaged in ‘mindful’ regulative compositional behaviours. Mindfulness means that we think before acting – novices do that as well, just without the direction and sophistication of the more expert like. Underlying attention were the metacognitive dispositions driving the regulative decisions and the quality and accessibility of the prior knowledge brought to the task.

Theoretical implications

The only previous attempt to graphically represent differences in novice – expert problem solving activity was reported by Schoenfeld (1987). He graphed time spent in the activities of reading, analysing, exploring, planning, implementing and verification. The graphs did not try to represent a hierarchical relationship of the relative cognitive complexity of each activity and Schoenfeld did not measure metacognitive dispositions. On the other hand the unique methodology designed for this thesis has demonstrated that it is possible to describe real-time activity in the process of composition. Graphs of Attentional Foci have been sufficiently robust to represent developmental differences as well as individual differences in regulative behaviours of composers, and provide a mechanism for its measurement.

Two findings have theoretical implications. Firstly, expertise can be seen to develop as an interaction between substantive knowledge, strategic knowledge and metacognitions, and secondly, individual differences in the underlying metacognitive dispositions guide regulative decision-making in the composing process.
Previous research by Colley, Benton, Down and Pither (1992) demonstrated that expert composers differed from novices in the quality of their cognitive resources - differences in cognitive knowledge base (stylistic features of a genre) and strategic knowledge. This thesis adds another layer of understanding to the complexity underpinning composing by drawing attention to the importance of higher - order metacognitions to the composing process. Composers seek to make sense of the world of sound. These abstractions or understandings interact with the substantive and strategic knowledge that direct the regulatory behaviours of the composing process.

To date, the research literature on music composition has not examined the nature and role of individual differences on composer’s regulatory behaviours. In this thesis, individual differences in more general metacognitive dispositions were evident in a constellation of dispositional beliefs, attitudes and understandings (Approach to learning (Biggs, et al 2001); Self-regulatory control beliefs (Cantwell & Moore, 1996) and Self-efficacy) about composing. These more general dispositions interact with the more specific musical knowledge base.

Multiple dispositions as well as domain specific epistemology evident in both studies reported in this thesis lend support to Cantwell et al’s (2012) call for a multi-dimensional account of metacognitive activity. Cantwell et al (2012) suggest the possibility of interactions between multiple sources of individual differences, including epistemological and metacognitive activity. It is suggested then, that at a minimum, the substance of regulatory decision-making emerges from a complex interplay between intellectual, affective and contingency factors and may be best thought of as an
“Epistemic Metacognitive Framework” (Cantwell, et al 2012). The research reported in this thesis is at least suggestive of a similar interplay in compositional activity, and suggests that individual composers may be distinguished by differences in the underlying ‘epistemic metacognitive framework’.

In summary musical composition is as much an intellectual process as a musical process. A metacognitive account of musical composition provides a necessary but not sufficient condition for an account of process in musical composition. Perhaps the process is multi-dimensional. For example, are there special musical abilities that underpin the metacognitive framework? Even if there is an underlying musical ability, then how that ability is enacted comes back to metacognitive theory.

Applied implications
This thesis described qualities of ‘mindfulness’ in how composers directed their attention whilst composing. Two dimensions identified as restricting attention were ‘understandings’ and secondly metacognitions. Understandings have implications for constructing curriculum, and metacognitions have implications for pedagogic interventions.

As an initial step towards specifying ‘understandings’, this thesis has identified three levels of attentional focus at which understandings represent qualitatively different conceptions of the possibilities and purposes of compositional knowledge: an integrative focus; a categorical focus and a reproductive focus
If the concern of music teaching is to develop students’ understandings of the compositional process, then appropriate methods need to address both substantive skill and strategies and the required metacognitive dispositions towards meaning making.

Advance Organizers (Ausubel, 1963) have been designed to facilitate higher –level understandings. A number of studies in a range of domains have demonstrated the efficacy of using advance organisers to facilitate deeper processing of information (Kirby & Cantwell, 1985; Kiewra et al, 1996; Githua & Nyabwa, 2008; Mayer, 1979). Kirby and Cantwell (1985) found that the provision of advance organisers aimed at the processing at either the main idea or thematic levels facilitated greater processing at the thematic level amongst higher ability 10th grade readers. In other words, where instructional processes are explicitly cued to focus attention to processing information at higher levels then it promotes greater depth of processing, providing that the underlying lower-level skills are in place. However, the literature suggests that the cueing of higher level processing operations does not necessarily ensure transfer of these operations across tasks unless the interventions incorporate the ‘mindful’ application of explicit metacognitive components (Palinscar & Brown, 1984; Alexander et al 1998; Salomon & Globerson, 1987; Schoenfeld, 1987). Thematic level processing is unlikely to occur unless the underlying motivational goals force the activation of these operations. For deep learners, this association is implicit: The desire to develop and construct personalised understandings necessarily forces the activation of theme-level processing if such understandings are to be achieved. For surface learners, the focus of the motivational goal is extrinsic, little value is placed on non-literal elaborations. Consequently processing activity beyond the level of literal comprehension is rarely achieved.
The studies reported in this thesis were limited to case studies of composer’s real-time composing activities. For purposes of this thesis such restrictions were largely a conscious design factor and represent limitations in the availability of composition majors at university level as well as the intensive methodology employed in the data analysis. Despite these limitations, the results of the studies provide illustrative examples of the theoretical position outlined in Chapter 4. The graphs of Attentional Foci did provide a metric for the representation of real-time compositional process. However, the limited sample size in Study 2 did not allow for an extension beyond simple correlation analyses of relations between Dispositions, Attentional Foci and Compositional outcomes. For the development of theory it is essential to extend the research to predictive studies to test the direction and strength of these predictive relationships.

The design of the instruction given to the composers asked them to compose anything that they wanted to. This instruction may have contributed to the bottom up processing evident in most of the composers who participated in the study. Perhaps a different instruction asking the composers to reflect on potential compositional projects may have produced patterns of Attentional Foci that were reflective of global planning in the initial stages of the process. It is therefore recommended that further research investigate the relationship between task instruction and patterns of Attentional Foci.

While the current research focussed on university and professional composers, it is anticipated that future research needs to address the differences between successful and less successful composers across the full developmental spectrum. For example what
are the differences in attentional allocation of younger composers? It is known that within reading comprehension studies (e.g. Reynolds 2000) a superior decoding skill frees attentional allocation to the higher level comprehension of the text under consideration. It is assumed that a parallel development occurs in the shift from decoding musical notation and the construction of higher order strategic knowledge. Thus there is a need for further studies that make explicit the relationship between intention and implementation of musical content in younger composers.

Implied in the graphing of attentional focus is that as composers attend to the extremes of the categories that processing capacity increases. While this assumption is derived from text processing literature, it is not specifically tested for in this current research. It is suggested that future research investigate the relationship of working memory capacity to the allocation of attention to the regulative process.

Finally, the theoretical model outlined in Chapter 4 suggests that compositional skills is not only a knowledge of musical theory, but also includes the integration of various dispositions as an essential part of the ‘mindfulness’ with which the composing process is addressed. This suggests the need for intervention studies that target specific dispositions that are theorised to provide better qualities of outcome for composition students.
REFERENCES


**Policy and Implementation: International Perspectives** (pp. 85-96): Hirosaki University Press.


Pegg, J. (2010). Promoting the acquisition of higher order skills and understandings in primary and secondary mathematics.


APPENDIX I:

Demographic Information

Participant No:

Gender:

Age:

Instrument:

AMEB Grade or equivalent standard on your INSTRUMENT

(Please circle your level of attainment)

1 1\textsuperscript{st} grade
2 2\textsuperscript{nd} grade
3 3\textsuperscript{rd} grade
4 4\textsuperscript{th} grade
5 5\textsuperscript{th} grade
6 6\textsuperscript{th} grade
7 7\textsuperscript{th} grade
8 8\textsuperscript{th} grade
9 Associate
10 Licentiate or above
AMEB Grade or equivalent standard in THEORY or MUSICIANSHIP:

(Please circle your level of attainment)

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>1st grade</td>
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<td>3</td>
<td>3rd grade</td>
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<td>8</td>
<td>8th grade</td>
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<tr>
<td>9</td>
<td>Associate</td>
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<tr>
<td>10</td>
<td>Licentiate or above</td>
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</table>

Thank you
APPENDIX II

STRATEGIC FLEXIBILITY QUESTIONNAIRE

This questionnaire contains questions about how you go about the various tasks you are given in your studies.

There are no right or wrong responses to the items in this questionnaire. How you respond depends upon your own individual method of composing music. No two people would be expected to give the same response to each item.

How to answer:

For each item, there is a row of numbers from 1 to 5 to the right of the question. Indicate your answer by circling ONE of the numbers in the row.

The numbers stand for the following responses:

5 – this item is always or almost always true of me
4 – this item is frequently true of me
3 – this item is true of me about half the time
2 – this item is sometimes true of me
1 – this item is never or only rarely true of me

Answer every item, and do not spend too long on each item.

Your answers are CONFIDENTIAL.

Thank you for your co-operation.
# STRATEGIC FLEXIBILITY ITEMS

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>Not true of me</th>
<th>Very true of me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I find that I have one good way of going about composing new music and this is effective nearly all the time.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>2</td>
<td>When preparing for a composition task I often find the ideas and methods I come across when studying new compositions are more confusing than helpful.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>3</td>
<td>I place a lot of importance on adjusting my composing methods to meet the requirements of particular composing tasks.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>4</td>
<td>While I know that different musical styles sometimes require different approaches, I am usually happier to stick to tried and trusted methods.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>5</td>
<td>Although the composition I am working on may require me to use several different ways of composing, I usually end up sticking to my normal methods.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>6</td>
<td>Before starting work on a particular composing problem I like to play with a number of possible ways of attacking the problem.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>7</td>
<td>While I usually feel quite confident that I understand how to go about composing a piece of music, I often find it hard to keep track of all the detail I need to fit into the score.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>8</td>
<td>I often feel that the hardest part of composing new music is knowing how to do it rather than knowing what to do.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>9</td>
<td>I find it challenging when the composition task I have been given requires me to find different ways of composing.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>10</td>
<td>While I usually like to focus on the musical ideas and notation of a piece I am composing, I also like to explore different ways of putting the piece together before I finally finish the composition.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>11</td>
<td>Once I have found a satisfactory way of approaching composition, I feel it is safest to stick with this method.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>12</td>
<td>I prefer to follow my usual methods of composing, even if this isn’t exactly what the piece requires.</td>
<td>1 – 2 – 3 – 4 – 5</td>
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<tr>
<td>13</td>
<td>I rarely change the way I compose new music, regardless of particular requirements of the composition.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>14</td>
<td>I often find the most interesting part of composing new music is in discovering new ways of expressing sounds, and this often leads me to change the way I go about completing the composition.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>15</td>
<td>I often find I use the same way of composing no matter what the particular style of music of music it is that I am composing.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>16</td>
<td>Although I usually understand the information I should include when composing a piece of music, I often have difficulty deciding where and when I should use that information.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>17</td>
<td>While I usually feel confident about my purpose in composing a particular piece, I often lose direction when dealing with detailed musical information, and find myself uncertain of how to deal with this.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>18</td>
<td>I often look forward to discovering new or different ways of mastering new composition problems I have been given.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>19</td>
<td>I believe that every composition problem I am given has a particular way of being completed, and I adjust my way of attacking it accordingly.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>20</td>
<td>Although I often know the general ideas relating to a particular style of music, I often get caught out when trying to master the details, and I’m never sure how to overcome this.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
<tr>
<td>21</td>
<td>I find I am easily distracted from my line of thought as I am working, and this often makes my composition disjointed and uneven.</td>
<td>1 – 2 – 3 – 4 – 5</td>
</tr>
</tbody>
</table>
APPENDIX III:

STUDY PROCESS QUESTIONNAIRE

The instruction guide and Study Process Questionnaire (modified for music composition)

This questionnaire contains statements about your attitudes towards your usual ways of composing music.

There is no right way of composing. It all depends on what suits your own style of composing and the genre you are working in. The following questions are carefully selected to cover the more important aspects of composing. It is therefore important that you answer each question as honestly as you can.

How to answer

For each item, there is a row of numbers from 1 to 5 at the bottom of the screen. Indicate your answer by typing ONE of the numbers in the row.

5 – this item is always or almost always true of me

4 – this item is frequently true of me

3 – this item is true of me about half the time

2 – this item is sometimes true of me

1 – this item is never or only rarely true of me

Answer every item, and do not spend too long on each item.

Your answers are CONFIDENTIAL.
<p>| 1   | I worry that I may not be able to get a good mark in composition, even though I have done my best | 1 - 2 - 3 - 4 - 5 |
| 2   | I find that at times composing gives me a feeling of deep personal satisfaction | 1 - 2 - 3 - 4 - 5 |
| 3   | One of the most important considerations in choosing to compose in a particular style is whether or not I will be able to get top marks in it. | 1 - 2 - 3 - 4 - 5 |
| 4   | I generally restrict my composing to what is specifically set as I think it is unnecessary to do anything extra | 1 - 2 - 3 - 4 - 5 |
| 5   | In composing a new piece, I often find that I’m continually reminded of music I already know and hear these pieces in a new light. | 1 - 2 - 3 - 4 - 5 |
| 6   | I try to begin composing as soon as possible after the task is given out. | 1 - 2 - 3 - 4 - 5 |
| 7   | I am very aware that my teacher knows a lot more than I do and so I concentrate on what they say is important rather than rely on my own judgement. | 1 - 2 - 3 - 4 - 5 |
| 8   | I feel that composing in any style of music can be highly interesting once I get into it. | 1 - 2 - 3 - 4 - 5 |
| 9   | I would basically see myself as an ambitious person and want to get to the top of the class in composition, whatever I do. | 1 - 2 - 3 - 4 - 5 |
| 10  | I tend to compose music by focusing on the way in which music follow rules rather than the way that I think it should sound | 1 - 2 - 3 - 4 - 5 |
| 11  | I find that I have to do a number of drafts of my composition before I am satisfied with the final product | 1 - 2 - 3 - 4 - 5 |
| 12  | I listen to suggested music and include this as part of my development in composition. | 1 - 2 - 3 - 4 - 5 |
| 13  | I am discouraged by a poor composition mark and worry about how I will do in the next one | 1 - 2 - 3 - 4 - 5 |
| 14  | I usually become increasingly absorbed in my composing the more I do | 1 - 2 - 3 - 4 - 5 |</p>
<table>
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<tbody>
<tr>
<td>15</td>
<td>I have a strong desire to succeed as a composer</td>
</tr>
<tr>
<td>16</td>
<td>I think that the process of composition is about essentially about putting one note after another until the task is finished</td>
</tr>
<tr>
<td>17</td>
<td>I find most new compositions I hear interesting and often spend extra time trying to find out more information about the style I have to use</td>
</tr>
<tr>
<td>18</td>
<td>Once I know the submission date for my composition I try to work consistently on my composition and allow enough time to review my composition</td>
</tr>
</tbody>
</table>

1 – 2 – 3 – 4 – 5
APPENDIX IV:

SELF-EFFICACY QUESTIONNAIRE

This questionnaire contains questions designed to gauge how confident you are at doing tasks now. There is no right or wrong response to these questions. How you respond depends on how confident you feel you are at doing these tasks now.

How to answer:

For each item there is a space for you to write your response in a space after each question. Rate how confident you are that you can do them as of now. Rate your degree of confidence by writing a number from 0 to 100 using the scale given below:

0 Cannot do at all
10 Moderately certain can do
20 Certain can do
30
40
50
60
70
80
90
100

Answer every item and do not spend too long on each item.

Your answers are CONFIDENTIAL.

Thank you for your co-operation.
### SELF-EFFICACY SCALES

<table>
<thead>
<tr>
<th>0</th>
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<th>20</th>
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<th>70</th>
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<th>90</th>
<th>100</th>
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<tbody>
<tr>
<td>Cannot do at all</td>
<td>Moderately certain can do</td>
<td>Certain can do</td>
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</table>

Please rate your confidence to perform the following tasks:

<table>
<thead>
<tr>
<th>Items</th>
<th>Rating (0 - 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 I can effectively plan my composition when given a composition task.</td>
<td></td>
</tr>
<tr>
<td>2 I can overcome most problems I encounter when composing.</td>
<td></td>
</tr>
<tr>
<td>3 I can develop effective composition skills when the need arises.</td>
<td></td>
</tr>
<tr>
<td>4 I can compose good music.</td>
<td></td>
</tr>
<tr>
<td>5 My composition reflects what I have learnt about music in my course.</td>
<td></td>
</tr>
</tbody>
</table>