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The performer's experience: psychological, philosophical and educational perspectives

Portfolio of published papers and critical analysis

This thesis is submitted in fulfilment of the qualification Doctor of Philosophy (PhD by prior publication)

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Abstract

This portfolio represents a body of original research into components of elite performance that had hitherto not been investigated. There are three main categories of focus. New perspectives on learning and memorisation, and also expressive use of timbre in elite performance are offered. Additionally, a substantial body of work is concerned with investigating whether certain psychological characteristics may figure as determinants of the ability to perform at elite level. The submission is strengthened by collaboration with other disciplines - predominantly sports psychology and psychoacoustics, but latterly, also with education and philosophy.

The purpose of this *Critical Analysis* is to specify originality and coherence within the portfolio and to evaluate its strengths and weaknesses. The contemporary relevance of the work, in all but the most recent paper, is shown by consideration of ideas suggested by the findings, in the context of subsequent research. In the interests of on-going research in a similar area, for the most recent paper, perspectives that further develop the most interesting emergent themes are offered.

Qualitative and quantitative methodologies are critically evaluated in relation to the studies undertaken and limitations are acknowledged. Reference to recent developments in research techniques and processes provides some insight into potential refinement of the chosen research methods that might inform future similar research.

Introduction

What is the relationship between the performer and the performance? This question lies at the heart of my research, and one way of addressing it is through dialogue with the performer. Most music performance research is concerned with study of the performer and/or the performance as phenomena that can be observed and measured – that is, looking from the outside in. In contrast, I look from the inside out - an approach that both underpins and unifies the originality of my work. My aim has been to fill a gap in existing knowledge of live musical performance – a gap at least in part created by the divergence of research interests between those whose principal focus is scholarship and those who are principally engaged in performing and/or composing (cf. Boulez, 1987).

Recognising this apparent dichotomy, my submitted portfolio brings a further dimension to existing and on-going music performance research by integrating both scholarship and creativity in the investigation of elite concert performance.[i]

Against this broad backdrop, my research falls into three main (interrelated) categories:

i) Learning and memorisation, specifically the role of advanced technique and exceptional insight in these processes at elite level (Holmes, 2005)

ii) The contribution of personal characteristics to the development of expertise (MacNamara, Holmes & Collins, 2006; 2008)

iii) The nature, function and significance of timbre in expressive music performance (Earis & Holmes, 2003; 2007; Holmes, 2011)

All three categories reflect the substantial emotional and intellectual engagement with music and music performance that is embodied by elite musicians, and their consequent sense of identification with their art. These qualities were consistently revealed through qualitative studies undertaken with a range of highly meta-cognitive elite performers (Holmes, 2005; MacNamara, *et al.*, 2006; 2008). For the third category, my research was extended into quantitative studies designed to give more scientifically substantiated evidence of the working methods, approaches and priorities fundamental to elite performance. For this I chose to focus on the least researched, arguably the most significant and certainly the most elusive performance dimension, timbre (Earis & Holmes, 2003; 2007; Holmes, 2011).

Despite a substantial existing body of research into expressive music performance, there had been no previously published account of the main findings contained in my papers. In most cases related research has been (and is) undertaken by scientists (psychologists, acousticians and neuroscientists)[1] which, although moving steadily forward in terms of our understanding of expression, perception and communication in musical performance, perhaps inevitably, centres on *outcomes* of expressive performance. Yet the embodied experience of the performer is very different from that of the listener – what Frith refers to as "…a gap between what is meant (the body directed from the inside) and what is read (the body interpreted from the outside)" (Frith, 1996: p.206). I therefore investigate performer-generated *input*, specifically the motivations, working methods, artistic purpose and subjective reactions of the performer.

[1] Notable examples currently are Patrik Juslin (Uppsala University, Sweden), Stephen McAdams and Robert Zatorre (McGill University, Montréal, Canada), together with their colleagues.

There have been some attempts by scholarly performer/composers clearly to distinguish psychological and aesthetic differences between performing (participation + perception) and listening (observation + perception) (e.g. Boulez, 1987; Lerdahl, 1987), but there has still been little empirical research that puts theoretical observations into practice from the perspective of the elite performer. I suggest that a significant reason for this omission might be that there has been remarkably little collaboration between scientists and elite concert performers (Windsor, 2009; cf. Levitin & Cuddy, 2004). That these two groups of expert practitioners generally pursue overall divergent paths is not surprising, given the degree of commitment needed to develop the highest levels of expertise in either field of activity, but this division may mean that the reality of the performer's role is not always fully appreciated. For an elite performer, most preparation time is spent alone, which is in contrast to other performance domains, where practice is either supervised, undertaken in groups, or both. In sport, for example, at elite level a coach will both supervise and analyse practice. In dance, learning and practice are both supervised and undertaken in a group setting. One outcome of musicians' relative solitude is that, at elite level, their thought processes in relation to *how* and *why* they engage with performance are rarely investigated. Elite musicians seem to embody their art (Frith, 1996), thereby evincing a sense of musical purpose that makes the person and the music inseparable (MacDonald, Hargreaves & Miell, 2002; Holmes, in 2011). This deep engagement with the creation and execution of a performance is consistent with the ability to achieve levels of virtuosity and insight that are outside the experience of the 'ordinary' practitioner.[2] One might reasonably assume that there is an intuitive element in elite level performance, but this, in turn, makes meaningful empirical research something of a challenge. Such empirical studies that do cast light on the physical, mental and emotional

[2] Likely sources of such engagement are referred to by McPherson & Williamon (2006).

building blocks of elite performance suggest that the associated cognitive processes function in unexpected and highly idiosyncratic ways and are far more integrated than is generally revealed by the quasi-theoretical approach of the listener/observer (Chaffin and Imreh, 2001; Holmes, 2005 & 2011; Chaffin, Lisboa, Logan & Begosh, 2010).

Reasons for the lack of collaborative research among scientists and performers were proposed by Boulez who, writing about timbre in composition, identified the fundamental dichotomy between research interests and objectives among 'scientists' and 'artists', suggesting that quantitative research sits unhappily with the more intuitive, artistic interests of the performer/composer who is "not interested in measurement or objective analysis. What matters to them is the function of timbre, […] and even more so the affectivity created by the perception of timbre in the context of the work." (Boulez, 1987: p.162).

Drawing on Boulez, I argue that on the one hand, since researchers are more likely to identify with the familiar activity of listening than with performing, research tends to gravitate towards investigating the outcomes of expressive performance, rather than the input (e.g. McAdams, Depalle & Clarke, 2004: Clarke, 2005; Krumhansl, 2000). On the other hand, elite performers, driven by strong internal motivations (Persson, 2001), are more concerned with finding means of giving voice to their expressive intentions (Holmes, 2005), than analysing *why* they might be making particular choices, or even what the perceptual outcomes might be (Boulez, 1987; Lindström, *et al.,* 2003). Many years are spent developing the necessary skills (Ericssson, Krampe & Tesch-RÖmer, 1993), which become so well-practised as to seem instinctive and so the higher order refinements of technique that distinguish elite performance are not usually obvious; their true significance can then be overlooked by the

non-expert. Furthermore, generative processes leading to choices in performance are not freely discussed; the language to do so is limited and non-verbal communication is generally more effective (Davidson & Good, 2002; Davidson, 2005).

These issues are addressed throughout my portfolio, but specifically, Holmes, 2005 & 2011 reveal that the individual performer's identification with the music is fundamental - so much so as to be the generator of all other aspects of performance. Decisions are achieved not so much by theoretical analysis, knowledge, or the wish to fulfil a specific brief, but by the desire to reproduce the sound "in my head" – to satisfy the artistic self (Holmes, 2005: p.225; cf. Persson, 2001).

An underlying hypothesis in my submission is that, at a fundamental level in music performance, some individuals are intrinsically more engaged and engaging than others and through the audible, and possibly visual manifestations of these attributes are able to induce significant emotional affect. However, the concept of innate talent is contentious (e.g. Howe, Davidson, & Sloboda, 1998) and perceived in numerous ways, often to the detriment of the individual. As an educator, I am therefore particularly interested in investigating 'best practice' in preparation for performance so that empirical or theoretical findings might usefully inform pedagogical approaches at all levels, thereby encouraging aspiration through wider understanding of the apparent 'magic' of performance. A recurring and potentially valuable sub-plot in my papers is that a number of results give very clear indications of how teaching methods and resources might become more enlightened – from both artistic and sociological standpoints (e.g. MacNamara, *et al.*, 2008; Earis &Holmes, 2007). In interpreting such indicators I make no apology for the fact that in some respects, potential benefits

translate into advocacy: I see it as a strength that ideologically, my chosen subjects and methods of analysis allow this to happen.

I feel qualified to undertake this type research for two reasons. My own background as a concert performer, as both soloist and ensemble player, gives me a range of insights into working practices within the domain of elite concert performance; such insights, born of experience, may not normally be available to academic researchers, however musically informed. Experience also enables me, from a phenomenological perspective, to understand the degree and significance of the considerable developmental differences between elite and other performers. This view is substantiated by recent advances in neuroimaging techniques that demonstrate training-related, instrument specific specialisation in a number of different areas of the brain (Stewart, 2008). (Here, it should be noted that although evidence of structural and functional brain specialisations related to specific skills includes higher order functions of the brain, the interface between this aspect of elite performance and motivation has not been extensively explored.)

This account of the degree and significance of originality within my research is extended by reference to subsequent relevant research and is presented in two main sections. First, I address the degree of originality of each paper (or group of papers); this includes research context at the time of writing, hypotheses with supporting rationales, applications and potential applications of results, and the significance of my findings in the light of later developments. I address each of the six papers individually, although in one case (where the second paper has developed directly from the previous one), the papers are paired for the purposes of the narrative. In the second section I substantiate and reflect upon the

effectiveness of the methodologies of all six papers. The focus is primarily upon phenomenological research methods, particularly recent developments (e.g. Ashworth, 2008; Finlay, 2009), since that approach is key to understanding the performer – as demonstrated in my sole authored papers: it also forms a significant part of the two papers that investigate the contribution of personal characteristics to the ability to achieve elite status (MacNamara, *et al.*, 2006; 2008). I also outline quantitative methods as used in two of the four co-authored papers. Since all the papers share topic areas and general direction, throughout this document I address and develop common themes that have particular current significance in terms of future research. The degree of integration within the submission is shown in that papers are often represented in more than one sub-section.

Part I

(The Portfolio - originality and subsequent developments)

1.1 Imagination in Practice: a study of the integrated roles of interpretation, imagery and technique in the learning and memorisation processes of two experienced solo performers' (Holmes, 2005)

1.1.1. Instrumental Specificity

Fundamental to this paper is that it extends psychological theory and concepts relating to musicians' working methods to include instruments not previously represented in the literature. Prior to this study, almost all such empirical research had been conducted among pianists. As a pianist myself, I could identify with many of the findings, but having worked closely with other instrumentalists at elite level, I strongly suspected that their working methods and associated cognitive processing are very different from my own. For example, Chaffin & Imreh (1996) demonstrate why pianists need to spend roughly the first third of total practice time on making logistical decisions regarding the configurations of notes on the keyboard and the distances covered. Such decisions are made in relation to the ultimate speed and character of the performance and will be followed by extended practice on some sections, which is necessary in order to ensure secure execution; the fine detail of interpretative decision-making seems to come after this initial period, rather than being an integral part of it. From my own experience I see no reason why (with allowance for individual variation) these findings should not be taken as general for pianists' working methods. However, such methods will result in specific mental representations being formed during learning – critically, during the process of encoding. My initial hypothesis was built from the supposition that when players must themselves form each note in order to produce

a sound (as on most instruments), a range of mental representations evolves that is specific to the working demands of each instrument - if working methods vary, so will the corresponding conceptual images. In support of this assertion, at around the same time that my study was in progress, it was shown that imagery relating to physical movement does, in fact, activate representations specific to individual parts of the body (Ehrsson, Geyer & Naito, 2003). My findings are also consistent with evidence that environmental influences affect cortical volume (Elbert, Pantev, Weinbruch, Rockstroh & Taub, 1995) and that consequently there appears to be a direct correlation between motor control relating to instrument specific tasks and the evolution of brain structures in the associated area(s) (Bangert & Schlaug, 2006; Altenmüller, 2008).

In order to establish degrees of instrumental specificity in learning patterns, it was necessary to investigate individual perceptions of structure. This decision was supported by Winner and Martino's suggestion that "sensitivity to the structure of music" is a determinant of a high level of musical ability (cf. McPherson & Williamon, 2006, p.243). However, as can be seen from the participants' responses, in the context of musical performance, 'structure' can be defined in numerous ways. My starting point, therefore, was the generally accepted definition of musical structure – that revealed by analysis of the music itself. Previous studies had shown not only that an understanding of musical structure is a significant feature in memory capacity and duration (e.g. Hallam, 1998; Rubin-Rabson, 1937, 1940b; Miklazewski, 1989; Chaffin & Imreh, 1996), but also that factors influencing perception of structure are performer and/or instrument specific (Rink, 2002). Furthermore, by researching the role of retrieval structures in memorisation, Williamon & Valentine (2002) suggest, with reasonable authority, that perception of structure might be highly idiosyncratic - not necessarily based

on structural boundaries specified by formal methods of analysis. It follows that an individual's perception of structure is derived from a direct and idiosyncratic relationship with the music, rather than an externally imposed 'blueprint'.

By focusing on the learning and memorisation processes of elite performance, I was able to demonstrate that this is indeed the case. I went a stage further, by proposing that for instruments where the player must physically form the sound (i.e. non-keyboard), decisions about its characteristics and quality will (at elite level) be informed by interpretative choices, and executed according to the individual's degree of technical competence. In other words, interpretation drives technical decisions so that imagery relating to both technique and interpretation is encoded simultaneously; mental structures formed during learning are then more integrated than those formed when the learning process is more sequential.[3] Moreover, I found that interpretation and technique are integrated to an even greater extent than I had thought, and this is where the real interest of this paper lies.

1.1.2. Motor Imagery and mental rehearsal

Probably the most novel aspect to emerge from the interview data was that I was able to identify a range of complex cognitive processing for which there was no existing description or evidence in the domain of music performance. I describe this phenomenon as *motor imagery* – the mental simulation of movement. Widely known in the field of sports psychology, motor imagery has been defined as "…a force-generating representation of the self in action from a first person (internal) perspective (Holmes & Collins, 2001), but with

[3] More recent research suggests that in fact multiple sites in the brain are activated during music learning, which further validates my hypothesis. (e.g. Levitin, 2006)

the exception of an early allusion by Seashore,[4] motor imagery had not previously been mentioned in relation to playing a musical instrument. I subsequently encountered the same term being used in the context of music performance, but in the sense of mimetic audience participation, in this case describing listeners' mental images of observed music making (Cox, 2006). The experience to which Cox refers is thought to take place through the activity of mirror neurons (cf. Gallagher, 2005: p.77), but there is an important distinction between observing and participating in that the neurons concerned "code the inferred goal of the action rather than the action itself" (Decety & Grèzes, 2006: p.6). In other words, the observer will interpret observed actions according to his own perception; however familiar the material, it is not possible for him to have the same experience as the executor.[5]

Cox does not explore motor imagery in the sense in which I use the term, but does recognise that there is a difference between the "embodied engagement" of the listener and the creative experience of the performer - the *source* of the sound (p.56). From my two participants' vivid descriptions of their thought processes during learning, it was clear that motor imagery embodies a wealth of images far richer than those associated with physical (technical) movement in the sense of motor, or kinaesthetic, *memory*. Evidence that such images are stronger in experts than in novices (Calvo-Merino, Glaser, Grèzes, Passingham & Haggard, 2005) supports my hypothesis that they are totally integrated with the interpretative process from the start, and to some extent explains why this feature of the expert's learning processes had not previously been recognised.

[4] Seashore wrote about the concept of "imagining in music" (1938/1967, p.169)

[5] This strong neuroscientific evidence further supports my decision to base my research on performer, rather than listener experience.

By using the actual words of the participants I was able to extend my findings to show how these examples of good practice might usefully inform pedagogical practice in instrumental tuition. Deliberate use of imagery is not unknown to musicians as a strategy, particularly among singers (for whom the instrument is not visible), but the concept of motor imagery is not widely understood. Yet in sport, numerous demonstrably effective practice strategies have been developed, following systematic investigation of use of imagery - for example, research showing the functional equivalence of mental preparation and performance by analysis of relevant active neural patterns (Holmes & Collins, 2001). There is no certainty that a movement and the mental image of that movement prompt *identical* neural activity (Michelon, Vettel & Zacks, 2006), but it has been known for some time that both are related to the same motoric representation system, and also have common temporal features (Decety & Grèzes, 2006). Furthermore, Michelon *et al.* put forward strong neurophysiological evidence that motor imagery and motor *preparation* have the similarities described by my participants (Holmes, 2005). It is interesting that Michelon *et al.* conducted this experiment using participants' hands (albeit in simple tasks and with hands separately: since the hands are critical in instrumental technique, one might usefully speculate that a similar methodology, but using complex hand tasks (more akin to instrumental technique) might further strengthen their results.

Closer scrutiny of the body of literature concerned with motor imagery in sport shows a striking number of other parallels with music performance. However, in terms of instrumental tuition, mental rehearsal, although clearly normal practice for elite performers (for example, see Holmes, 2005), is still not advocated in any consistent and organised way at

sub-elite levels, as it is in sport. Further inter-disciplinary collaboration seems long overdue here, since many practical benefits from engaging in conscious mental rehearsal would also apply to instrumental performers. Space does not permit an extensive account, but particularly worth considering is the significance of other senses (for example, peripheral vision)[6] in the evolution of a motor image (Holmes & Collins, 2001) and the associated benefits in terms of multisensory learning. In view of my findings regarding the integration of interpretation and technique, the evident interaction between imagery, perception and emotion must be similarly significant.

1.1.3. Proprioception

Even less familiar to musicians, yet influential in motor control and a component of motor imagery is *proprioception* (Shenton, Schwoelbel & Coslett, 2004*).* There is still some debate about the precise definition of this term and the roots and significance of proprioception in practice (Montero, 2006), but it is generally agreed that as a sensory system it refers to awareness of the parts of one's own body moving in space (Batson, 2009), in relation both to the other parts and to the immediate environment. Understandably, this ability is accepted as necessary for dancers, specifically in the context of injury avoidance, but both the value of proprioceptive awareness in the learning process and its participatory role in expressive expert performance have also been recognised (Batson, 2008). This aspect of performance had not previously been identified in the context of playing a musical instrument though; indeed, a commonly held view is that conscious awareness of bodily movement might actually be detrimental in the execution of a skill (Wulf, 2007). However, it was clear from my interview data that both particpants have similar proprioceptive awareness to that of

[6] Peripheral vision was also mentioned by one of my participants in this context.

dancers (Holmes, 2005: p.2).[7] This was particularly evident in relation to memorisation and mental rehearsal as well as motor imagery. Furthermore, the data gave vivid evidence that the aesthetic qualities of music are integral to the awareness of movement, for example, when the guitarist referred to the execution of a shift[8] that might be either relaxed or energetic, according to musical context. His avoidance of the more obvious terms 'fast or 'slow' suggests that the necessary physical movements (gestures) have their roots in the interpretative process. Indeed, it has been suggested (in the context of embodiment that lies beyond motor-processing) that although there is usually a conceptual distinction between instrumental and expressive movements, there is also a direct relationship between the two (Gallagher, 2005). A complementary and apposite extension of my finding is contained in the strong argument made by Montero (2006) that proprioception is also an aesthetic sense and that performers perceive the character of music through the movement required to bring it to life. Although referring largely to the beauty or character of movement in dance, Montero also gives a clear illustration of how the same process might apply in music (p. 234). It is significant in terms of the focus of my study that in a later paper, Montero argues plausibly that this level of awareness is more likely to be found in expert performance than non-expert (Montero, 2010). One can interpret this assumption in the sense that in the expert, non-conscious proprioceptive *information* is fully integrated with focused, conscious *awareness* (cf. Gallagher, 2005). Furthermore, Cole & Montero (2007) explore the possibility that movement itself might give rise to an embodied sense of pleasure – what they refer to as "affective proprioception" (2007, p.302). They suggest that the flow between intention and action (experienced by elite performers) in itself gives rise to feelings of satisfaction, as distinct from aesthetic pleasure based on the *quality* of movement – in other words,

[7] Proprioception was unfamiliar to me at the time of the study and does not therefore form part of the original analysis.
[8] Movement of the left hand (and by implication, also the arm) any distance up or down the finger board of stringed instruments.

rewarding, but without being dependent upon feedback.[9] Cochrane reinforces this insight by drawing on both jazz improvisation and visual art to show how the emotional state of the performer arises (at least partially) from the physical processes associated with playing an instrument. The pianist Charles Rosen gives a vivid account of this experience when he refers to "the intimate relationship between physical effort and expression" (2002: p.20), and testifies to the feeling of the physicality of playing that is associated with the realisation of sound as

> "…a physical need for the contact with the keyboard, a love and a need which may be connected with the love of music but are not by any means totally coincident with it. This inexplicable and almost fetishistic need for contact with the combination of metal, wood and ivory is, indeed, conveyed to the audience and becomes necessarily part of the music." (Rosen, 2002: p.10)

All three Montero articles postdate mine, but (in addition to supporting my own hypotheses) my participants give good evidence to support the claims and indeed, that the disciplines of sport, dance and music are close in this respect. An unprompted, but revealing example of this was the use by one participant of the term 'choreography' as a metaphor for movement in a defined space during playing. This last example and a number of others contained within the same interview data might usefully inform future study of gesture in music performance, specifically, its origins within the performer.

The above quotation from Rosen also typifies an apparently universal embodied experience in music performance; awareness of the instrument as an extension of the self. Since Cole and Montero (2007) acknowledge the philosophical concept of 'embodiment' in the relationship of the body with sound production, I wonder whether this phenomenon, in

[9] Cole & Montero give good anthropological and neurophysiological evidence why this phenomenon should be.

some way, might also contribute to the sense of 'oneness' that characterises the affinity with a particular instrument that can be felt by performers of any level. If so, it would give strength to the oft-voiced argument that, where possible, learners should be allowed to choose the instrument towards which they feel most naturally drawn, on the grounds that development is then more likely to satisfy. (I recently had the opportunity to observe a group of young children on a 'try an instrument' day,[10] during which it was clear to me that when a child showed obvious fascination and engagement with an instrument s/he had not tried before, this was echoed by a natural sense of comfort with the physicality of playing that instrument. Not surprisingly, this was followed by a keen attention to the quality of sound produced).

Similarly, in line with my interest in carrying research into an educational context, I note that for a dancer, proprioceptive awareness is not only considered to be essential, it can also be tested for, and if necessary, developed through specific training strategies (Batson, 2009). This approach has not so far been considered in the context of music performance preparation, but could well be the means of "enhancing technique and performance" (Batson, 2009: p.40) in the way that it does for dancers, since the demands of advanced instrumental performance parallel the extreme physical, mental and emotional demands of dance (albeit within a more localised framework) (cf. Brandfonbrener, 2009; 1997). Based on evidence that proprioceptive interventions can improve specific and common playing-related disorders such as focal dystonia (e.g. Rosenkranz, Butler, Williamon & Rothwell, 2009), teaching and learning strategies in music might well draw on those advocated in dance (e.g. Batson, 2009; 2010) in order to avoid adverse reaction associated with intensive training.

[10] Bromley Youth Music Trust, Bromley, Kent, 4 September 2010

Further thoughts combining motor imagery with proprioception

To conclude this section on Holmes (2005), I would like to widen the argument regarding proprioception, by offering further thoughts on its nature and function in terms of the mind of the performer. During a recent conversation with the guitarist participant in my 2005 study, he made a very interesting observation which, if investigated, might further our understanding of how motor imagery and proprioception inter-relate in the context of music performance. The observation was made following performances he had given, playing the guitar onstage, alongside dancers of the Royal Ballet.[11] Not only were their strength, suppleness, energy and maximal levels of physical and mental commitment sources of wonder to him (when observed at close quarters) - he was also very enthusiastic about using the movement of the dance as a source of creative energy in terms of his own playing, and particularly, in composition. His spontaneous reactions may reflect the fact that elite performers have keen sensory awareness, imagination, and engage in imagery more naturally than others. I have yet to pursue in any detail this apparent extension of my preceding observations, but from this informal conversation, it seems that he was imaging both the movement and the aesthetic sense of both music and dance simultaneously in terms of his own music-making – forming what might be seen as a further layer of imagery. If this is so, it seems to demonstrate some form of extended cognition in that sources of mental representations lie outside the mind of the participant, whose own emotional involvement appears to be founded upon an eclectic (and not necessarily predictable) range of internal and external influences (cf. Cochrane, 2008; Noë, 2009).

[11] *Winter Dreams* (ballet) - Royal Opera House, Covent Garden, October 2010

1.2. 'The pathway to excellence: the role of psychological characteristics in negotiating the challenges of musical development' (MacNamara, Holmes & Collins, 2006)

1.2.1. The significance of psycho-behavioural characteristics

The next two papers in my portfolio give further evidence of the potential for music training methods to draw upon other disciplines to inform effective development – this time from sport. My discussion with sports psychologists, during attempts to discover more about motor imagery, led to an invitation to contribute towards a project intended to investigate the role of individuals' psychological characteristics in their ability to achieve excellence in music. The ensuing studies are reported in MacNamara, *et al.*, 2006 & 2008.

The role of psychological characteristics as key determinants of the ability to achieve optimal development in sport had already been shown (Abbott & Collins, 2004, Gould, Diffenbach & Moffatt, 2002). Additionally, by drawing on an existing model of excellence in sport (Orlick, 1992), results from a small-scale qualitative study had suggested that some similar characteristics exist among elite music performers (Talbot-Honeck & Orlick, 1998). These findings are supported by evidence that a high degree of intrinsic motivation is essential, as is the development of coping strategies (Burland & Davidson, 2002): the ability to "…reflect positively and practically on negative experiences" (Burland, 2005: p.3). While these and other characteristics (e.g. focus and determination) appear to be common in both music and sport, enough variation had been found (Talbot-Honeck & Orlick, 1998) to suggest that further investigation of the (so far under-represented) characteristics common to elite

musicians would be worthwhile. Use of imagery and mental preparation were found to exist among musicians, but in a somewhat idiosyncratic and random way, unlike the systematic and efficient training that elite sportspersons undergo; there was no established imagery training model in music. We therefore wished to test to what extent earlier findings might be common in the domain of music performance, specifically, with a view to investigating the possibility of fostering favourable characteristics during the different stages of musical development.

Although certain characteristics had been identified as typical in high-achieving individuals in sport (Abbott & Collins, 2004; Gould, *et al.*, 2002), this work was relatively new at the time of our initial collaboration and the theoretical basis had not been tested in other domains. As a backdrop to understanding the context of our two studies (2006; 2008) it is therefore worth summarising some of the salient points that emerged from preceding literature focusing on selection and training of elite performers in sport. In Talent Identification (TI), thinking had moved away from the 'snapshot' approach where potential (and by implication, access to training) is assessed on achievement rather than aptitude. This model relies on unstable indicators such as anthropometric characteristics and current performing ability, ignoring the on-going impact of characteristics such as creativity and self-motivation (the former typical in high achievers [Feldhusen, 1986/2005] and the latter certainly having an identifiable link with success in music [Sosniak, 1985]). It was thus argued that an individual's psycho-behavioural characteristics play a significant part in their ability to fulfil their own potential in terms of the demands of the task, and also to be able to aspire to elite level, should they possess sufficient domain-specific engagement to support them through inevitable challenges. Significant characteristics such as motivation, focus, commitment, goal-setting, and the

ability to evaluate one's own potential were termed by Abbott and Collins as Psychological Characteristics of Developing Excellence (PCDEs) (Abbott & Collins, 2004).

Also crucial to our first study were suggestions that appropriate training can lead to *development* of favourable psychological characteristics – unlike personality traits, which have a stronger genetic basis (Williams & Reilly, 2000). We recognised that if PCDEs could be shown to be present in successful musicians, this might also have significant implications for musicians' training. This sport based paradigm was the foundation of the study in which, through interviews with eight world-class musicians with a range of different instruments and backgrounds, we were able to show that similar characteristics are, in fact, typical among elite performers in music (MacNamara, *et al.*, 2006). Although this phenomenon had been observed in passing, it had not previously been tested, either with, or without drawing on an extra-musical discipline. The possibilities of defining and developing key characteristics were certainly not represented in any organised or accepted way in musicians' training and practice methods.

In addition to identifying characteristics common to elite musicians, our findings highlighted two areas that are of particular interest to music educators, namely, talent (a term that is still used somewhat ambiguously) and use of imagery. First, musicians can learn much from sport in attitudes to, and management of (so-called) talent; similarly, the dynamic and multi-faceted nature of talent is not widely understood, with the result that training methods are not geared towards talent development as such. Second, use of imagery in preparation and performance is not formalised in musicians' training (at any level), although it is widely and

effectively used in sport.[12] Talent (in relation to music performance) is discussed in the following subsection and imagery in Section 1.3.

1.2.2. Gifted or talented….

In many spheres of activity, but perhaps particularly in music, 'talent' means different things to different people. It is often held to be the demonstration of innate abilities (or 'gifts'), but common usage tends to be unclear as to what extent such apparent abilities might be truly innate, or whether learned and practised behaviours might count as talent if executed with sufficient skill. Some clarity was established by Gagné, who, through a theoretical model of talent development, argues that aptitudes (gifts) fall into different domains and are available to be transformed into talents: the stronger the genetic basis of the aptitude, the greater the potential for 'talent' (Gagné, 1991/2003). Gagné's model is now generally accepted in that 'gifts' are innate, whereas 'talent' is demonstrated by performance; yet measurement and identification of talent is still methodologically complex (unless limited to discrete measurable variables) and in some instances, ideologically contentious. For example, when trying to establish levels of ability, or identify talent, is there any justification for trying to distinguish between innate characteristics (aptitudes) and developmental influences? Bearing in mind that talent development is a dynamic process and that genetic factors that predispose an individual towards success are not stable, we do not base our argument on on-going discourse regarding the balance between genetic and environmental influences that are held to contribute towards talent. Rather (and in line with practice in sport) it stems from the basic assumption that though both nature and nurture are inevitably significant,

[12] Holmes (2005) showed that imagery is a significant feature in elite performers' learning and memorisation processes, but this appeared to be an outcome of intensive engagement and practice, rather than a conscious strategy.

individuals also possess (in differing degrees) a range of favourable characteristics and abilities, and that it is worthwhile to identify and foster these (cf. MacNamara *et al.*, 2008). In addition to domain specific engagement¸ excellence in any performance domain requires a complex range of psychological and physical attributes, of multigenic origin. Although recognising that there is always a degree of innateness in an individual's characteristics and abilities, we did not set out to establish their extent or origin. Our purpose was to test whether similar characteristics are common in individuals who excel in either sport or music performance; a further stated purpose was to investigate whether effective approaches to training in sport might similarly benefit musicians.

To this end, accepting that circumstances impact upon an individual's ability to succeed (Stewart & Williamon, 2008), our contribution to the nature/nurture debate is to show that psychological characteristics such as engagement, motivation and determination can enable developing performers to *overcome* unfavourable circumstances and still rise to the top of the music profession. As a further dimension to the same debate, our studies suggest that some characteristics essential for achieving elite level (specifically engagement) are usually evident early in a person's life – in the case of our participants, as far back as they were able to recall. However, it has also been suggested that although there must be an ultimate level of achievement that is predetermined, this is only obtainable in suitably supportive environments (Wolstencroft, 2004) and so the benefits of fostering and encouragement are not precluded. Our evidence makes a significant contribution towards existing theories of the origins of talent by clearly showing that success in music is dependent upon a balance of both genetic and environmental factors; as well as showing absorption with music from a very early age, participants valued and flourished in favourable environments as and when they occurred (e.g. MacNamara, *et al.*, 2006; 2008: pp.291-292).

In the light of the participants' clear sense of engagement with music (and to further on-going debate about the existence and/or origins of talent) it is worth exploring our findings in the light of Subotnik and Jarvin's assertion that there are three critical elements in elite performance that cannot be taught: intrinsic motivation, musicality and charisma (Subotnik & Jarvin, 1986/2005). This plausible assertion is supported by studies that argue persuasively for a high degree of motivation being predicated upon keen sensory awareness (Gagné, 2003), particularly auditory awareness (Csikszentmihalyi, 2008), which, together with early sensitivity to elements of musical structure (e.g. harmony, rhythm, melody, timbre) (Winner & Martino, 2000) constitutes 'giftedness'. Charisma is harder to define than motivation and musicality, but is alluded to by Gagné, who refers to *socio-affective* as one of four abilities that are present in gifted individuals, including social and affective abilities such as communication, perceptiveness and persuasion (Gagné, 2003: p.61). The participants in our studies were all demonstrably highly motivated and showed a strong sense of engagement with music from a very early age. They also have the ability to communicate through music - to "draw listeners" (Subotnik & Jarvin, 1986/2005: p. 345). It is therefore reasonable to assume that these particular characteristics (and possibly others)[13] define a level of musical gift normally associated with elite performance, and by doing so, generate a partial theoretical basis for talent identification in music. In practice these characteristics are interdependent: for example, it has been recognised that all elite performers share the degree of motivation that drives them to undertake many thousands of hours of focused deliberate practice over a sustained period of time – a commitment that is not necessarily inherently enjoyable (Ericsson, *et al.*, 1993; Simonton, 1999). The source of such motivation (or "intention") might well lie in exceptional innate musicality, but sustainability depends on

[13] For example, creativity (see Gardner, 1993)

goal centred determination and an appropriately supportive environment (Runco, 1986/2005: pp.303-306).[14] If the goals spring from within the person, rather than being externally imposed, it is likely that engagement will be apparent and will manifest itself in terms of communication. We showed not only that favourable psychological characteristics are apparent in elite musicians, but also that favourable environments are necessary for maximal development of such characteristics. A proposal for the development of such favourable environments is discussed in the following paragraph.

1.2.3. Educational perspectives and potential initiatives

As can be seen, our studies make a significant contribution to existing PCDE literature in that they provide good supporting evidence from a non-sporting domain; they also further understanding of the relationship between developmental processes and environment. Particularly interesting is the range of non-musical skills that emerged – interpersonal skills, goal setting, confidence and sustained and realistic performance evaluation. However, even given a favourable genetic package, the environment is still critical for optimal development. During the development of non-classical musicians the environment seems to be particularly significant, due to less structured, formal and systematic training methods (Kamin, Richards & Collins, 2007), which lends a further dimension to discussion regarding the degree of environmental 'control' necessary for optimal development among classical musicians. What exactly does constitute an ideal environment for the developing musician? Simonton argues that according to Darwinian theory, potential is realised through a complex evolutionary interaction of innate capacities and "ecological niches" (Simonton, 1999: p.454), both of which are unique to the individual. In other words, the ideal would be for each individual's

[14] Runco also offers some interesting and constructive perspectives on how this might be encouraged.

innate capacities to be nurtured and developed through the provision of individual-specific opportunities for development.[15] Talent needs to be nurtured, but in music education there is often a general lack of understanding, or perhaps just a lack of consistency in delivering the sort of finely judged opportunities and encouragement that really do nurture and facilitate development of potential, as opposed to measuring achievement through externally imposed goals – a tempting, but fairly unproductive tendency towards "reducing learning to measurable outcomes" (Pitts, 2004: p.223). This is no less apparent in specialist tertiary education where, although significant thought is given to developing necessary musical skills, development of non-musical skills and characteristics is not prioritised (Burland, 2005). However, since the need for better overall support at this and other levels has been identified (Burland & Davidson, 2002), we propose that a possible solution could be found by taking as a model an educational initiative known as *Developing the Potential of Young People in Sport (DPYPS)* – an approach to sport training and development that was developed by Abbott, Collins, Sowerby & Martindale (2007) and extensively tested under the aegis of Sportscotland (cf. Wolstencroft, 2004). The DPYPS programme, which ran successfully in a number of Scottish primary schools, recognised how important it is that key psychological characteristics are developed alongside fundamental motor abilities, in an organised and systematic way. The acknowledged benefits of integrating generic psycho-motor (e.g. balance), cognitive (e.g. decision-making) and psycho-behavioural (e.g. commitment) training within curricula also appear to extend beyond the immediate activity into other spheres of learning (Abbott, *et al.*, 2007: p.8). Simultaneous learning is already part of good educational practice and so, with a view to potential implementation of a music programme similar in design to DPYPS, I next give a specific example of a current initiative in music education that in some ways bridges the gap between DPYPS and generic UK government provision of music

[15] Examples within different educational contexts can be found in Feldhusen, 1986/2005.

training in primary schools. It is a scheme that shares some aims with DPYPS, although delivery and outcomes have more limitations in terms of individual development.

Psychological characteristics and behaviours encouraged within DPYPS (those that also facilitate learning generally) include, amongst the former, confidence, motivation and (possibly) self-awareness, while the latter are goal-setting, imagery, focus and planning. These particular characteristics and behaviours are also ideologically similar to those encouraged by the Wider Opportunities scheme (WO), which is designed to allow UK primary school children the experience of playing a musical instrument (Bamford & Glinkowski, 2007). As with DPYPS, WO is limited to a specific population of children and by availability of funding,[16] but there are significant methodological differences. DPYPS is a structured and staged sporting curriculum, where activities and progression are clearly set out, with a view to developing both individual potential and self-reliance. WO is aimed towards engaging children in musical activities, awareness, and some degree of motor skill, in a medium to large group setting. While this latter approach has some impact on development of characteristics such as confidence, enthusiasm and self-esteem, and social skills such as team work, the benefits to the individual in terms of musical development are limited by the large group teaching context and lack of continuity. Future such projects might benefit from a more individualised approach, by creating favourable environments that encourage productive self-reflection, self-evaluation and individual goal setting. In terms of egalitarian educational principles this may seem counter intuitive, since characteristics that determine success (commitment, engagement, determination, evaluation etc.) can manifest as excessive preoccupation with the self. Nevertheless, this sense of absorption was implicit in our data (although not in itself forming part of our original analysis) and should therefore

[16] There is a degree of ideological divergence regarding selection in the fact that WO chooses participants according to a particular political ideology, whereas DPYPS was run as a pilot study.

be given serious consideration in terms of planning music training opportunities at all levels. Taking this line of thinking a stage further, in the light of evidence from our 2006 and 2008 studies and others, this would seem to be a good example of both innate capabilities and environmental opportunities being influential in facilitating development of individual potential; sport based models could both inform and guide music training programmes in this respect.

Intrinsic limitations of WO stem from the fact that there was less background to draw on in terms of similar training than there was in sport. The team that developed DPYPS drew on widespread knowledge and experience gained through researching and working with elite sportspersons, and framed their findings in a specific curriculum that accommodated both general stages of development and the acknowledged need to integrate both psycho-behavioural and psycho-motor elements. The result is a detailed blueprint of an integrated developmental training programme that concentrates on psychological dimensions, supported by the fundamental motor skills required for participation (Abbott *et al.*, 2007: p.1). On the other hand, WO is based on a more generalised approach to educational psychology and musical development and a concentration on learning music through the instrument, rather than developing individual expertise. Although positive outcomes are clear, they are limited in scope compared with the more focused and consistent DPYPS approach. At best, WO classroom activities do integrate psycho-, cognitive- and motor-behaviours and a degree of personal and social benefit is generally acknowledged. A logical next step could therefore be for educators to create a music learning programme designed with similar aims, focus and structure to DPYPS.

1.3 'Negotiating transitions in musical development: the role of psychological characteristics of developing excellence.'(MacNamara, Holmes & Collins, 2008)

1.3.1. Introduction

In an attempt to cast further light on key findings of our 2006 study, we set out to show that certain psychological characteristics (PCDEs) can enable musicians successfully to negotiate *transition* stages in their development. We had already identified PCDEs that are essential for achieving optimum potential at different stages of musical development, but prior to our 2008 study, the critical importance of such characteristics during the greater challenges associated with transitions *between* stages was not known. Our earlier study shows the emergence of two stages that are particularly critical in the development of elite performers, namely, the transitions into full-time music education and from there into the music profession. These two stages had already been identified as challenging for young musicians (Pitts, 2004; Burland & Davidson, 2004), but the emphasis in previous studies had been more on the nature of the challenges and the possibilities of adjusting environmental circumstances to make situations less challenging, than on developing the individual's ability to cope (Burt & Mills, 2006), despite the fact that the latter ability seems to characterise elite musicians (MacNamara *et al.,* 2008; Burland & Davidson, 2004). Recognising that a range of diverse challenges are always part of performance at elite level, we used sport-based evidence of PCDEs to seek ways of enabling individuals to cope with such challenges. To this end we focused on the individual's personal characteristics in relation to their ability to cope with known challenges associated with transition stages in musical development.

A primary purpose of our 2008 study was to discover whether there is any correlation between musicians' self-reported psycho-behaviours and skills, and characteristics previously identified in talent development (TD) literature in other domains. In this respect we were, indeed, able to further understand the role of psycho-behavioural factors in negotiating key transitions. For example, the development of expertise in adolescents is easier for those who have already acquired habits and characteristics conducive to cultivating talent and for whom the "depth of involvement" necessary for sustained progress is not a problem (Csikszentmihalyi, Rathunde & Whalen, 1993/1996: p.14). This integration of characteristics and musical engagement facilitates development of the musician's sense of identity (cf. Davidson & Burland, 2006; Burland & Pitts, 2007), during which process (from about the age of seven), active participation in musical activities forms a key part (Lamont, 2002). Although we did not mention identity as such, it would appear that some of the characteristics that emerged as determinants of high levels of expertise in musicians do also have a bearing on the development of musical identity, which must be sustained through both micro- and meso-stages of transition, such as changes of technique, teacher, and/or institutional environment. Existing literature does not specify which (if any) personal characteristics contribute to the development of musical identity, but it is acknowledged that it will be shaped by a wide range of circumstances and experiences, including the individual's personality (MacDonald, Hargreaves & Miell, 2002). Identity development is a complex and dynamic process in which it would be worthwhile to investigate the relationship of personal characteristics with other contributory factors, particularly at challenging transition stages in development.

1.3.2. Domain specific PCDEs

The majority of favourable skills and characteristics we identified had previously been found in successful sportspersons. However, it was also clear that there is some variability across different performance domains in the transition-related challenges that are encountered, and the characteristics necessary to survive these. Most TD models have been developed in sport and domain-specific differences have not been investigated. It is therefore worthy of note that we were able to identify skills and characteristics that deviate from existing sport-based models. For example, the development of particular social and interpersonal skills during the transition into the music profession was regarded by our participants as important, but they had not been identified as such in sport. It could be that since entry to the music profession usually relies on individual initiative (as opposed to the scrutiny and monitoring that distinguishes the same stage in sport), social skills are indeed critical. There would be obvious benefits to musicians from gaining further understanding of the significance of developing necessary social skills, both in terms of the relationship between skills and characteristics,[17] and also how these might be developed in the context of music education. In this respect, there is some evidence of the nature and importance of interactive skills in ensemble rehearsal and performance which, critically, shows that such skills are employed in a more sophisticated and efficient way among elite musicians than others (Davidson & Good, 2002; Davidson, 2005). Also, potentially contentious issues surrounding non-musical interaction between performer and audience have been explored (Griffiths, 2010), giving insight into areas of musical performance that, although clearly significant for the performer, are not always acknowledged. The need to develop interactive social skills among musicians is becoming more widely accepted in the earlier stages of musical

[17] For example, certain characteristics might be shown to be key in fostering interactive and social skills.

development, but in the later stages of elite performers' training, (with the possible exception of singers [Wapnick, Darrow, Kovacs & Dalrymple, 1997]), these issues tend not to be effectively addressed. (The economic climate [at the time of writing] suggests that this type of research could be low in order of priorities, but possible extrapolations into the realms of general development should not be overlooked).

1.3.3. Imagery in sport and music

On the other hand, in terms of sport specific PCDEs, it is notable that the musicians did not refer to imagery as such in either of our papers, although use of imagery receives much attention in sport. As shown by Holmes and others, elite musicians do engage in imagery (Holmes, 2005; Connolly & Williamon, 2004; Clark, Williamon & Aksentijevic, in press), but perhaps do not think to report it, since it is not usually formally taught, or necessarily even mentioned and its significance can be underestimated. It also seems to characterise elite performance (as it does in sport [Gregg & Hall, 2006]), rather than sub-elite levels. Deliberate use of imagery is now used consistently in training elite sportspersons (Martin, Moritz & Hall, 1999), (and indeed, was prominent in DPYPS) but for clarity in comparing music with other disciplines, it seems necessary to make a distinction between the type of intrinsic, spontaneous imagery referred to by Holmes (2005), and the more extrinsic, systematic use of imagery that forms an integral part of training in sport. The former is highly idiosyncratic, appears to evolve and exist as an essential part of the rich internal landscape of the elite performer, and is focused on the music itself.[18] The latter refers to deliberate use of specifically targeted imagery interventions. So, how might the musician's capacity for diverse

[18] It should be noted that although this observation was clear from my own interview data (Holmes, 2005), there is not yet enough similar research to allow generalisation.

forms of mental imagery be enhanced and usefully directed towards more formal, applied use of imagery? A logical start has been suggested, in that by drawing on an applied model of imagery use in sport (Martin, *et al.,* 1999), it might be possible to establish both the modality (primarily, auditory, visual, motor) and the purpose of elite musicians' use of imagery (cf. Gregg & Clark, 2007). To some extent this has already been done in singing, where the value of individually tailored technical and motivational forms of imagery ("mental training") has been advocated (e.g. Gertz, 1998: p.21). Singing is unique in that the focus of both sound production and musical engagement is internal, but in terms of mastery of a musical instrument, so little is known about the extent and benefits of use of imagery, that recent developments testing specific interventions should provide fertile ground for further development of applied imagery training for musicians (e.g. Clark & Williamon, in press).

Referring to my earlier discussion of spontaneous use of imagery as a signifier of musical talent (pp.17-18 of this Critical Analysis), we do not yet know to what extent this might be an innate individual characteristic that can be developed through deliberate learning of imagery techniques. It may be that these both spontaneous and learned sources of imagery can usefully co-exist, in which case it is more than ever necessary to discover more about imagery as practised by elite performers, so that interventions can be framed in an optimal way. One example of how this might be implemented would be in the use of mental rehearsal for reflection and evaluation – already shown to be common practice among elite musicians. Elite performers clearly possess the necessary ability to evaluate their own performances realistically and effectively (e.g. Holmes, 2005 & 2011; Chaffin & Imreh, 1996), a skill that is needed in order to achieve optimal performance. This level of metacognitive awareness is held to typify "creative achievers" (Feldhusen, 1986/2005, p.64; cf. Gardner,

1993) and should therefore be fostered and encouraged during earlier stages of development. It has been suggested that study skills should be part of music training (Burt & Mills, 2006), and so with appropriate systems of feedback in place, it should also be possible to encourage positive evaluation. Similarly, elite performers' ability to regard challenges in a positive light and to cope effectively is surely something that could be engendered from an early age.

1.3.4. Concluding comments

Through collaboration with sports psychologists I have had the opportunity to draw theories of talent development into the world of music performance. Our studies showed that personal characteristics contributing to the development of potential in sport are similar to those found in expert musicians; the implications of these findings are worthy of attention in relation to both the practice of music and to theories of musical talent.

MacNamara, Holmes and Collins discovered significant overlaps in characteristics and behaviours of elite performers in sport and music, but our interesting and timely findings also show that there is scope for further research (within a musical context) to enable better understanding of the nature of both generic and specific challenges likely to be met during the different stages of musical development, together with the characteristics, skills and competences required to meet them. Some progress has since been made, with the publication of a longitudinal study of psychological characteristics in relation to musical development in young players (MacNamara & Collins, 2009) where it was clear that different PCDEs become critical at different stages of development. Results also showed the significance of external influences in promoting PCDEs in the earlier stages of development,

which suggests that domain-specific and even individual-specific training should be developed and tested in relevant settings, to better understand the potential effectiveness of a PCDE-based approach to talent development in music.

For the purposes of this Critical Analysis it has been possible to make only brief mention of the need for and possibility of, developing educational initiatives in music that reflect and draw on evidence contained in our research. However, I have proposed some specific ways by which it might usefully be continued, all of which address both individual development and the educational context. I have also given examples of how musicians' training could be enhanced by enlightened reference to practice in elite performance in sport. Egalitarian ideologies, either political or educational, can prioritise collective, rather than individualised approaches to developing talent; but, conversely, talent can be exploited by an over intrusive control of training methods and activities, to the exclusion of allowing personal psychological characteristics (among other factors) to develop in line with general development. There are well-documented (and sometimes disastrous) cases of prodigious talent being unsustainable in such circumstances (Freeman, 1991) and so there is a need for enlightened TID research in music that takes individuality in innate capabilities and characteristics as a starting point for developing individual potential, while also recognising the role of the individual's dynamic interaction with their environment (cf. McPherson & Williamon, 2006). At the very least, outcomes might include realistic and workable educational initiatives that properly address individual needs. Ultimately, theoretical propositions might be generated that have a bearing on music education on a wider scale, particularly as regards ideal ways of fostering talent. Much has been written about what constitutes exceptional musical talent, or 'giftedness' (e.g. Runco, 1986/2005; Ziegler, 1986/2005), but individual ability is not predictable in terms of outcomes; optimal environments therefore need to be carefully considered: there is still

significant room for educational planning and strategies that are effective in fostering individuality, and for careful consideration of what constitutes a favourable environment.

1.4. a) *'Quantitative analysis of tone quality: a study in the acoustic properties of individual guitar sounds.' (Earis & Holmes, 2003)*

b) *'The role of timbre in expressive musical performance: a case study of Bach's Prelude BWV 998 played on the acoustic guitar.' (Earis & Holmes, 2007)*

Introduction

The next two papers follow a different line of research, nevertheless, it is one that also intimately concerns the music practitioner at elite level. Recognising the central (but not always fully appreciated) role of timbre in expressive music performance, the first author and I set out to explore first, the potential for valid measurement of live guitar tone, second, why timbre should be such an indispensable tool for musicians and third, the relationships between the tonal spectrum, the music and the interpretation.[19] A further purpose was to investigate the possibility of representing elite level management of guitar timbre in a way that can inform and educate other guitarists, including developing a means of giving real-time feedback.

The first author is a musician with postgraduate specialism in computer science whom I first met when he was engaged in setting up studies designed to extract performance parameters from acoustic, recorded piano music. Measurement of timbre was proving particularly challenging, and so I suggested that he apply a similar approach and techniques of analysis to

[19] A much fuller account of the significance of timbre in elite performance is given in the paper submitted under Section 1.5.

guitar sound, where less complex, measurable properties may allow cleaner data. In order to test my observation, we agreed to collaborate in a pilot study, the method and results of which form the basis of Earis and Holmes, 2003. Testing and applying the results in a live performance situation were reported in Earis and Holmes, 2007 and a paper reporting a more extended version of this experiment is currently awaiting revisions for *Musicae Scientiae*.

1.4.1. (a) Quantitative analysis of tone quality – research context

In the first of the two submitted papers, we studied the measurable properties of live acoustic guitar timbre (or tone quality). We showed how this study relates to other studies that test performance dimensions,[20] deducing that there appeared to be no existing studies showing measurement of timbral variation in live guitar playing. We were also somewhat surprised to find that, although creative use of tone colours is at the heart of communication in musical performance (Hadja, Kendall, Carterette & Harshberger, 1997; Gabrielsson & Juslin, 1996; Panksepp, 1995), as an expressive device in performance, timbre was still little researched. Reasons put forward for this apparent omission have been firstly, that technological limitations preclude controlled quantitative experiment (Hadja, *et al.*, 1997) and secondly, that notational language to describe timbre is extremely limited in relation to the significance of its function (Silverman, 2007; Wessel, 1979; Kanno 2007). In terms of affect associated with timbre perception it has also been suggested that a direct correlation between timbre and emotion might be problematic because the structure of experienced feelings is not well understood (Gabrielsson & Juslin, 1996). My own view is that, in addition to these inhibiting factors, the importance of timbre to performers and composers is not

[20] For example, Rasch & Plomp, 1999 (pitch); Gabrielsson, 1999 (intonation); Clarke, 1998 (loudness and articulation) and Repp, 1990 (timing – note onset and offset)

generally appreciated, not least because means of manipulating timbre effectively are neither obvious, nor generally available to the player of limited technical expertise (Holmes, in 2011). For this reason, we were concerned with measuring how (and to what extent) the performer can alter tone quality, rather than modelling the acoustic properties of synthesised sound (or of the instrument itself), as had been previously undertaken by psychoacousticians (for example, McAdams, Winsberg, Donnadieu, De Soete, & Krimphoff, 1995). Neither were we (at this stage) investigating aural processing or perception.

Instead, through quantitative measurement of this one aspect of expressive musical performance, we were able to demonstrate objective study of tone quality as produced 'live' by the performer.[21] We were able to show, with a reasonable degree of reliability that, as expected, sound quality does indeed alter according to the plucking technique deliberately chosen by the performer. Differences are largely due to the predominance of particular harmonics characteristic of each technique, although the degree of variation was shown not to be consistent across techniques. In practice, these techniques will function simultaneously, but it is of considerable interest to both practitioners and theorists to be able to view them separately in this way. One particular point of interest in terms of developing guitar technique is that the weakest effect was produced by the most basic plucking technique (*tirando/apoyando*) and the strongest, by the most advanced (balance of nail/flesh in the attack).[22] This expertise-related observation shows how this type of analysis might usefully allow accurate analysis of the timbral elements of performance in a range of contexts. Our

[21] For a fuller account of research methods see Part II of this document (Quantitative methods)
[22] We recognise that the *tirando/apoyando* differential may seem less apparent due to other factors, for example, the polarisation of the string vibration was not measured in these experiments.

later project was therefore to attempt to measure (by the same basic means) the timbre of each note of a musical phrase, played live, by the same participant as before.

1.4.2. (b) The role of timbre in expressive musical performance

The background and overall thrust of this research has been outlined above, but developments in both our own aspirations for what might be achieved, and in techniques for analysis, led to results in the second paper that are well worth separate mention.

When planning Earis and Holmes (2007) we had three main aims: the first was to develop and refine our analytical techniques so that we could undertake reliable measurement of timbres produced within a live musical performance; the second was to present data in a way that is instantly clear and persuasive; the third was to use both data and analysis methods to suggest ways by which this research might be of benefit in an educational/pedagogical context. It is clear within the paper that the first two of these aims were in large part achieved; our third aim gradually crystallised into the idea that our methods might be adapted in order to give real time feedback to players, along similar lines to when a mirror is used to help establish good technical habits. We have not yet achieved this, but consider it a worthwhile and achievable application of this research.

1.4.3. Concluding comments and suggestions for application

This research has many implications in terms of studying and playing the guitar. In the introduction to Section 1.4 I put forward the claim that control of timbre is fundamental to expressive musical performance. It follows that, by aiding the development of techniques necessary for an increasingly sophisticated degree of tone control, a quantitative visual measure of the effects of different types of tone could have valuable applications. The 'timbre space' presented in these papers could be developed into a more multi-dimensional version (including the 'piano roll' representation of data shown in Earis & Holmes, 2007), according to specific potential applications. It is notoriously difficult to hear one's own playing accurately and even harder to form an objective formative evaluation. Verbal descriptions of different tone colours are not consistent and so if differences in timbre can be seen, as well as heard, this type of feedback could be a valuable resource for both players and teachers (cf. Traube, 2005). Using similar techniques, it would be possible to investigate timbral effects within a longer melodic line, in relation to a contextual perception of sound. In addition, other parameters might be similarly studied which would allow this research to be extended to other instruments.

It is a strength of both studies that their approaches have the potential to give real time visual feedback to instrumentalists; timbral variation seen as well as heard would be of educational benefit in a number of contexts, not least, in creating a novel resource for practice.

There is much still to learn about the perceptual impact of timbre, but it is undeniable that it can be used as a persuasive expressive device: a significant contributor to the 'tingle factor' identified by Sloboda (1992). We hope that, by facilitating understanding of the nature, production and effects of timbre, these studies will enable performers of all levels further to realise the potential of timbre as a powerful channel for direct communication.

*1.5. 'An exploration of musical communication through expressive use of timbre: the performer's perspective.' (Holmes, Psychology of Music, (**published online, 16 March, 2011)***

1.5.1. Challenges in timbre research

This last paper in my portfolio represents much of my recent thinking on the phenomenon of elite performance; approached, in this instance, through the medium of timbre. There are three main reasons why I chose to focus on timbre from the performer's perspective. First, it is the one variable performance parameter without which others (e.g. pitch, timing, dynamics, articulation and vibrato) cannot exist. Second, despite increasing evidence of the degree of physiological and emotional affect associated with processing and perceiving sound (Hodges, 2009; Thaut, 2009), timbre is the least researched and arguably, the least understood. Third, from my own observations and experience I know how significant timbre is to both performers and composers as a means of expression and communication in music, particularly in relation to affective responses associated with expectation.[23] There appears to be good reason for this: for example, Patel's argument that timbre "is as important as pitch as a perceptual feature of music" (2008: p.28) is supported by evidence of its power to induce strong affective response (e.g. Warrier & Zatorre, 2002).

While these perspectives form a valid baseline for my study, I recognise that, in addition to some general lack of awareness of the real function of timbre in performance, inherent ambiguities, and misunderstandings can create further challenges; not least that 'timbre' is too vague a word to be used without further qualification (Hadja *et al.* 1997/2002; Howard

[23] Expectation is a feature of music extensively explored by Meyer (1956) and more usually associated with structure (Juslin & Västfjäll, 2008; Lerdahl & Jackendoff, 1983).

and Angus, 2006). Also, unlike other performance parameters, timbre is multidimensional, being principally constituted from a balance of intensity, frequency and time (McAdams, *et al.,* 1995; 1999; Krumhansl and Iverson, 1992; Traube, Depalle and Wanderley, 2003) and on most instruments (including the guitar) an elite performer has considerable control over amplitude (including attack and decay) and spectral and temporal profiles. This degree of variability complicates empirical study of timbre perception, which has mostly centred on similarity judgements (cf. Patel, 2008), rather than comparisons within the same performance. It also hinders the search for a clearly defined account of *how* the individual is affected by timbre. Sound can be perceived in very different ways (McAdams, Depalle & Clarke, 2004), sometimes startlingly different, as can be seen from the wide-ranging case studies narrated by the neurologist, Oliver Sacks (2007). I am also aware that personal characteristics and experience ensure that subjective responses vary in nature and degree of affect (Thaut, 2009); similarly, both context and motivation have a bearing (Sloboda, 1992; Konečni, 1982). It is reasonable to assume that this will be as true for the performer as for the listener, but as yet, we do not know; little is known about the performer's subjective (physical or emotional) awareness of timbre.

A further reason for a relative lack of performance based timbre research is the very limited degree of collaboration between scientists and elite concert performers (Windsor, 2009; cf. Levitin and Cuddy, 2004). It is not surprising that these two groups of expert practitioners generally pursue overall divergent paths, but this division may mean that the all-pervading function and significance of timbre in elite performance is not always fully appreciated. Boulez, when writing about timbre in composition, identified a fundamental dichotomy between the two groups' research interests and objectives, suggesting that quantitative research sits unhappily with the more intuitive, artistic interests of the performer/composer

who is "not interested in measurement or objective analysis. What matters to them is the function of timbre, […] and even more so the affectivity created by the perception of timbre in the context of the work." (1987: p.162). So, on the one hand, researchers are more likely to identify with the familiar activity of listening, than with performing; research therefore tends to gravitate towards investigating outcomes of expressive performance (e.g. McAdams *et al*., 2004; Clarke, 2005; Krumhansl, 2000) rather than input. On the other hand, elite performers are driven by strong internal motivations (Persson, 2001) and are concerned with meaning in a more universal and undefined sense, rather than the transmission of any specific message (Peacocke, 2009). This is evidenced by preoccupation with finding means of giving voice to an idiographic[24] concept of meaning (cf. Holmes, 2005; cf. Noë, 2009), rather than analysing *why* expressive choices are made, or even what the perceptual outcomes might be (Boulez, 1987; Lindström, *et al.,* 2003). Many years are spent mastering the complexities of tone production (cf. Ericsson, Krampe and Tesch-Römer, 1993), which in many ways becomes so well-practised as to seem instinctive. The higher order refinements of technique that distinguish elite performance are not usually obvious and their true significance can be overlooked by the non-expert. Furthermore, generative processes leading to choices and production of timbre are not freely discussed; the language to do so is limited and non-verbal communication is generally more effective (Davidson and Good, 2002; Davidson, 2005; cf. Williamon & Davidson, 2002).

While I recognise (and where possible address) the concerns outlined above, I do not regard them as counterproductive to my declared aims, which were to further understand how and why performers make decisions regarding use of timbre, and their awareness of its function in expressive performance. I set out to investigate sources of imaginative energy within the

[24] [24] Idiographic in this sense is taken to mean the individual's personal processing and perception of sound.

individual, the relationship of timbre with musical structure and other performance variables, the significance of timbre as a medium for emotional communication, and the degree to which variation is either deliberate or spontaneous. Within the scope of the study, these proved to be achievable aims, as long as the focus remained with the performer's experience.

1.5.2. Timbre, expression and emotional affect

I found it impossible to study timbre in elite performance without also considering its role in inducing emotional affect. Emotion was not initially intended as a principal focus of the paper and so literature relating to affect and communication was not explored to any great extent, yet, as shown by my results and analysis, these issues are central to timbre production in performance. In the following paragraphs, I therefore offer some further perspectives on the relationship between timbre and emotion in music performance. I contend that in general, affect induced in, or by, the performer (particularly emotional response dissociated from sound production) has a different, but related psychological foundation from the more commonly investigated listener affect (cf. Holmes, in 2011); the following cross-disciplinary discussion encompasses both perspectives, preceded by a brief historical backdrop.

From an evolutionary perspective, it is clear from the numerous musical instruments that have been discovered, that music was of significance in early human societies, (Altenmüller, 2007; Cross, 2001). We know little about the functions of music some 30 – 40,000 years ago, but its existence at that time (possibly even pre-dating language as a form of communication) suggests that it played a key role (Cross, 2006; 2008). It follows that the sonic characteristics

of music were probably as much part of the communication process as its structure, in that then, as now, they could be instrumental in inducing emotional affect (cf. Lavy, 2001).

Given these persuasive indicators of music's ecological significance, it is not surprising that, for many years, emotion as a dynamic constituent of music performance has held a fascination for researchers from a wide range of disciplines (Juslin, 2009b). But despite (or maybe because of) an accumulation of psychological, neurological and anthropological evidence (e.g. Panksepp, 1995; Altenmüller, 2007), as an area of study, it gives rise to interesting ontological and epistemological problems. Findings are inconclusive regarding the nature of affective response to music, and were it possible to define, it would seem impossible to find ways to convey a subjective musical experience to others with any degree of accuracy (Cook, 1990). (From a different perspective, I note that the philosopher Wittgenstein supports this view, suggesting that words cannot give a general meaning reflecting an underlying reality: rather, as with use of metaphor for timbre, words only obtain meaning when being used in specific contexts by specific people [1953/2009].)

Similarly, although it is possible to discover the locations in the brain of music related neurological activity (e.g. Levitin, 2006), we cannot be sure in what form and with what degree of conformity the individual perceives or imagines sound. This is an important point, since, even in the absence of a sound source, the sophisticated powers of imagery associated with elite performance can be the source of significant, self-generated affect (Holmes, 2011). I suggest that, in addition individual-specific modes of conceptualisation, elite performers may well experience timbre in a different and perhaps more embodied form, due to their high level of expertise and integrated emotional and physical engagement with music (cf. Holmes, 2005; Holmes, 2011; Noë, 2009: p.100). Experiments in neuroscience show that elite

performers have relatively low levels of cognitive activity during performance, reflecting both their fluency in executing the physical demands of the task (Milton, Solodkin, Hlustik & Small, 2007), and their consequent freedom to concentrate on the 'wider picture'. Given that their focus is neither on conveying specific meaning, nor on the mechanics of sound production, what exactly does fill the available conceptual space? In seeking to answer this question and as a potential key to the qualitative differences between expert and non-expert involvement, it is worth considering the more recent philosophical interpretations. It is also worth examining timbre-related emotional affect in the light of other music-related sources of emotion.

In recent years, Juslin and Vjästfäll have identified opposing views as regards affective/subjective responses that reflect on-going philosophical debate (2008), which centres on suggestions that although music *itself* is not emotional (cf. Hanslick, 1854/1986), it triggers emotional response in others through its *resemblance* to subjective emotional states (Budd, 1985/1994; Peacocke, 2009). The idiographic nature of performers' experiences of sound (audible or imagined), would seem to typify the interface between objectivity and subjectivity that such philosophical questions imply. Based on my participant's responses, in this context I tend to agree with Gallagher, who suggests that awareness is beyond observation and that perception might be key to "self-consciousness and personal identity" (2005: p.7).

As an extension to this line of thinking, I now address a related issue that is of considerable interest to both performers and educators: namely - is it possible that manipulation of timbre (and indeed, other dimensions of performance) can still function as an effective expressive tool when such manipulation is not the outcome of at least some degree of the performer's

investment of self? If so, one might ask whether artistic emotional engagement within the performer is, in practice, necessary for a successful (i.e. affective) performance. It is possible for the performer to experience intense emotion that has a range of unintended emotional outcomes - as Juslin asserts "We may be able to perceive that a performer is playing expressively, yet we remain untouched by the performance." (2009b: p.377). Conversely, the performer might appear relatively uninvolved emotionally, but subjective emotional response in the listener can still be reported and measured. This has interesting implications in terms of the underlying sources of emotion in music performance and whether truly emotive playing can actually be learned. My study suggests that the converse is true; a key finding was that my participant, driven by strong internal motivations, uses timbre as a means of giving life to his concept of musical structure, both independently and to enhance other performance dimensions. The embodiment of the self in the physical creation of music was also evident and appears to represent perception of the score on a different and decidedly non-utilitarian level (cf. Frith, 1996). His frequent use of vivid metaphor in this respect (Holmes, 2011) supports the theoretical contention that emotion and expression in music performance are entirely metaphorical and that although metaphorical experience can be described verbally, it is essentially non-linguistic (Peacocke, 2009). This view gives rise to intriguing speculation about exactly *what* constitutes the perceptual experience of a musician. Self-reporting undoubtedly has limitations, but could further illuminate this point through studies based on closer scrutiny of all aspects of gesture (both globally and in detail) in conjunction with the sound produced and any other influential factors.[25] Similarly, further analysis of parallels between language and music that recognises the limitations of a symbolic system to represent either sound, or subjective emotional experience might be productive. This could provide a useful theoretical backdrop for on-going research into the

[25] This suggestion stems largely from my own observations that there is not necessarily a correlation between the affectivity of a performance and the magnitude of the performer's playing related gestures.

nature and degree of neuroscientific and psychological parallels (or divergences) between music and speech, particularly in terms of the role of timbre in inducing affect, in both forms of communication. (cf. Patel, 2009).

1.5.3. The composer's perspective

I anticipated that the great importance attached to timbre by composers (e.g. Boulez, 1987; Lerdahl, 1987; Schönberg, 1911; McAdams and Giordano, 2008) would be reflected in performers' working practices. The potential expressive power of timbre has been evident throughout the development of Western music,[26] but before the advent of recorded music, we have no way of knowing exactly how the timbral elements in music were performed, or in what ways enculturation and perceptions governed timbral choices. From existing evidence, it seems that timbre has only relatively recently been regarded as an imaginative basis for sound systems in Western music. One early proponent of this approach was Schönberg, who advocated that logical progressions could be created from tone colours alone (Klangfarben) (Schönberg, 1911) and demonstrated the power of tone colour as the principal element of musical structure in his *Fünf Orchesterstücke, Opus 16*. In this work, written at the beginning of his atonal period and initially without titles, melody is replaced by shifting individual and collective instrumental colours that are particularly evident in the third piece, *Farben*. As a holistic artistic concept, *Klangfarben* has remained relatively undeveloped,[27] but manipulation of tone colours remains an important compositional technique in most styles of music, for example, the technique of changing from one instrument to another within the

[26] I recognise that this is equally, if not more significant in music of other cultures, but here, I confine myself to issues raised by the portfolio study in question.

[27] Detail is beyond the scope of the current document, but Patel offers good technical and perceptual reasons why this should be. He also suggests that in in sound systems where timbre is salient, there is a dictinct similarlty with linguistic sound systems (Patel, 2008: p.28-37)

same musical figure (a form of hocketing), as demonstrated in Stravinsky's abstract ballet *Agon* (1957), in which changes of tone colour parallel interaction between the dancers. Timbre is particularly significant in non-tonal music, where, according to Lerdahl's model of the perception of atonal music (1989), musical structures are inferred through association, and the relative salience of musical events, such as timbral prominence.[28] My participant reflected the value placed on timbre by Schönberg, Stravinsky, Boulez (and many others), which suggests that further integrated investigation of the perceptual and imaginative aspects of timbre in both composers and performers would be worthwhile, not least to cast light on the extent and significance of the performer's (interpretative) input in relation to the composer's original concept.[29] In educational terms, it is worth considering whether young composers, familiar with synthesised, rather than acoustic sound, might actually lose the ability to write idiomatically and whether this is necessarily a disadvantage. In view of what appears to be earlier composers' evident engagement with acoustic sound as a source of inspiration, I suggest that the optimum position would be to recognise that, synthesised and acoustic sound offer two distinct forms of expression and creativity, and that the ability to draw on both should be the aim.

[28] See also Dibben, (1999) regarding the role of associations based on salience of acoustic features such as timbre in the encoding of hierarchical structures.

[29] It is worth considering whether consistent use of synthesised sound in composition actually inhibits the ability to write idiomatically. Acoustic and synthesised sound.

Part 2

(Research methods)

Introduction

Analysis of research methods used in my portfolio begins with the premise that the perfect methodology does not exist and that methodological weaknesses will limit the scope of interpretation (cf. Giorgi & Giorgi, 2008/9: p.47). Not only have I recognised this, I have also sought to address it by taking care to ensure that, as far as possible, methods are based on a thorough understanding of the research context and selective use of the most theoretically consistent research models available at the time - that is, methodologies that are best suited to the nature of the data. This careful approach should be apparent in the following key stages of my work: first, for each research project I made an initial (and discriminatory) assessment of its value in relation to related contemporary research activity and also its place in a wider context – either theoretical or applied; second, I attempted to ensure that my chosen methods were as widely informed and as suitable for purpose as possible; third, with the exception of papers under Section 1.4 (where novel quantitative methods are key to originality) I used established techniques of analysis throughout, although my data sometimes necessitated drawing on a range of unfamiliar disciplines in order to interpret results in a meaningful way.

In learning about design, methods of data gathering, and particularly methods of analysis, I have been well-served by continued expansion and development of qualitative research methods in the social sciences over several decades. This development is reflected in refinements in my own methods that are evident over the course of time. My research differs

in focus from social science research (particularly in choice of participants), but methods are justifiably similar, since investigation of individual experience is the primary aim.

In the papers under Section 1.4 we were able to take advantage of similar expansion of quantitative methods – in large part due to rapid growth in computer based technologies and the comparative ease with which data can be collected and quantitative calculations made and represented. However, for reasons that will become clear, qualitative research methods form the majority in my research, while quantitative methods are used for specific objective studies where the resulting data are then firmly embedded in the artistic purpose of performance. The quantitative papers under Sections 1.4 and the qualitative paper under Section 1.5 have added interest when taken together as a whole, in that they report investigations of the same performance dimension (timbre) undertaken from different perspectives and with different methods.

A distinctive and unifying factor is that my research illustrates the benefits to be had when researchers themselves, through their own practical experience, have understanding of the context and practice of their investigations. It is significant to my choice of research methods that all researchers are (or have been) expert practitioners in their own right; not least, this gives them a keen awareness of topic areas and populations that would most benefit from well-judged and rigorous research of this nature. These aspects of my methodology might be criticised on the grounds that researchers' prior specialist knowledge might introduce an unwelcome element of subjectivity. I take the converse view and argue that, if research is carried out with appropriate authority and integrity, then the advantages of prior expertise outweigh the disadvantages – an informed understanding of the phenomenon of elite performance allows more meaningful interpretation of data (cf. Patton, 2002: p.49). This

approach is supported by Smith, who suggests that 'understanding' in both senses of the word is relevant in that the researcher should be able to make sense of the phenomenon and also empathise with the participant (Smith, 2008/9: p.54). I suggest that both perspectives are apparent in my research, although true subjectivity (in the sense of the researcher having had the *same* experience as the participant) is not.

Drawing on a range of methodologically focused research literature and on the studies themselves, I next outline reasons for the suitability and effectiveness of my chosen research methods. This discussion is supported by reference to recent theoretical contributions to qualitative research in psychology.

2.1. *Qualitative methodologies*

2.1.1. Justification – why qualitative methodologies?

Qualitative methodologies form the backbone of my portfolio; the reasons for this need to be understood in relation to the studies' declared aims and purposes. Many aspects of performance that are studied in my research and the questions I address would be poorly served by quantitative measurements. These might not best address the many unpredictable participant responses – often the most interesting and illuminating data were those that were not anticipated.

A fundamental premise of my research is that the subjective experience of individuals at particular points in space and time is a crucial and irreducible element of music performance. I realise that this raises questions at the methodological level, and therefore necessarily precede discussion of methodology with reference to my ontological and epistemological starting points. In other words, my research in founded on the related questions - 'what is?' (ontology) and 'what is there to know?' (epistemology) - followed by 'how can it be studied?' (methodology) (cf. Hay, 2002). During the course of the following paragraphs of this subsection I relate these questions to my own research, emphasising how the methods chosen flow from the ontological and epistemological premises. Specifically, I show how the qualitative methods are uniquely suited to the questions posed in the papers that form my portfolio.

My studies are investigative rather than comparative (apart from a comparative element in 1.1) and idiographic in that that they are designed to allow insight into individuals' experiences of performance – in the sole-authored papers, specifically, the exploration of personal representations of emotional and structural communication is central. From critical examination of research methodologies chosen by others, it seemed that, for studies of this nature, the most information rich data is gathered from performers' own descriptions of their experiences (cf. Chaffin and Imreh, 2001; Clark, Lisboa & Williamon, submitted). The considerable expansion of qualitative research methods during recent years has been marked by developments in theoretical approaches and techniques for analysis and interpretation that give the researcher an increasingly reliable tool with which to investigate a wide range of human experience. This focus is steadily moving away from the foundations of behaviourist-type, positivist approaches to empirical work in psychology, which centre on objective measurement of behaviours, with an associated tendency to deny the validity of the potential role of participants' perceptions.[30] Behaviourist views were prevalent in psychology research during the middle decades of the twentieth century, but even at the time, there were sceptical voices: notable among these was that of Michael Polanyi, who put forward a prescient argument against behaviourist research, on the grounds of logic – that "To objectivize the parts of conscious behaviour must make us lose sight of the mind and dissolve the very image of a coherent behaviour." (Polanyi, 1965/1969: p.215). More cognitive approaches gradually superseded, which, once established, allowed consideration of factors such as consciousness, meaning and idiography (hitherto held to be unreliable indicators) (Ashworth, 2008/9). However, in terms of experiment, cognitive psychology shares with behavioural psychology a commitment to measuring variables that are held to demonstrate a subject's inner processes, but are chosen according to hypotheses. Neither

[30] Interestingly, this ontological and epistemological shift is also evident in other disciplines, for example, see Hay, 2002: pp.59-88

cognitive nor behavioural approaches to experiment recognise the potential significance of people's accounts of their own experiences though – the possibility of capturing "…the way in which the phenomenon is experienced within the context in which the experience takes place." (Giorgi & Giorgi, 2008/9: p.28). The value of Giorgi and Giorgi's phenomenological approach is reflected by Noë, who makes a highly plausible case that experience is the essence of consciousness, which, in turn, is dependent upon the individual's interaction with the environment, rather than being the product of functional neural activity as is sometimes suggested (Noë, 2009). It seems highly appropriate to explore these issues in the context of elite music performance, which is a constantly dynamic process. This has not been done to any great extent, which means that empirical work in psychology can be limited, in that variables are chosen by the researcher, according to theoretical constructs of experience.[31] This seems generally unsatisfactory in terms of wider understanding of individual conceptions of reality, and indeed, almost counter-productive in terms of discovering the life world of the performer. In an attempt to address this apparent methodological deficiency I have drawn on earlier and recent work of a growing number of qualitative theorists in turning more towards incorporating principles of phenomenology into psychological research (e.g. Ashworth, 2008/9; Finlay, 2009). A phenomenological approach allows individual experience to be the focus of experiment in the quest for "...embodied, experiential meanings." (Finlay, 2009: p.6). This is such a key development as regards my own research that I next explain my own methodologies in terms of the basic tenets of phenomenological research (particularly where they are corroborated by recent further developments in techniques for analysis).

[31] Much generally respected empirical research in music psychology falls into this category e.g. Sloboda, 1992; Gabrielsson & Juslin, 1996.

Despite Husserl's central role in the development of phenomenology (Husserl, 1913/1983), I follow more the hermeneutic tradition of Heidegger (1927, trans. 1962), in that I accept that one will interpret, rather than fully understand another's experience (Patton, 2002), and also that language is fundamental to interpreting individual experience (Ashworth, 2008/9: p.20). This seems appropriate, given that my studies mostly investigate the generation and manifestations of performance as experienced by performers, rather than the effect of such manifestations on the self. Aspects of elite performance under consideration here are not necessarily clear to an observer, nor quantitatively measurable, and unless this inherent methodological challenge is recognised and addressed, assumptions may be made about the inner world of the performer that, being rooted in the experience and expectations of the observer, have little foundation in reality. The phenomenological approach is part of a trend towards diversifying and refining qualitative methods to allow more holistic and enlightened perspectives on "…taken-for-granted understandings about our world…" (Ashworth, 2008/9: p.13). Such 'revelations' are apparent in my research (albeit on a small scale) particularly in the two sole-authored papers. It is therefore well worth continuing to follow developments in phenomenological methods in order to investigate the experience of music performance. By taking an idiographic stance within the framework of phenomenology, my data reveal something of the idiosyncrasies of the performing artist, and by doing so, should engender enthusiasm for further similar research.

A common criticism of studies that rely on self-reporting is that, for various reasons, the data may not be a true representation of the phenomenon under investigation. There may be a philosophical interpretation of 'true' that supports this argument but, for research purposes, a more realistic evaluation of what is possible is necessary and indeed, perception will always colour individual experience. Qualitative researchers are increasingly likely to counter

epistemological criticism by asserting that 'scientific' research in psychology (that is, research claiming to acquire knowledge through scientific method) is actually no more scientific than well-conducted, criteria led qualitative research (cf. Ashworth, 2008/9). In this respect the former can be seen as a poor relation to the physical sciences, where *proof* should follow *evidence*. But even 'proof', although equipping us with knowledge about specific phenomena, does not aid understanding of those phenomena within the context of people's lives. It is not possible to prove a subjective experience, but knowledge is mediated by understanding (perception), without which, research into the experience of performance must inevitably be hindered. This distinction between knowledge and understanding is increasingly acknowledged across a number of disciplines, strengthened by recognition that the term 'science' has become a widely used and non-specific descriptor and that research methodologies have become less polarised anyway (Ockelford, 2009). It may be too early for a convenient epistemological solution, but in pragmatic terms, 'human science' (used in relation to social science research) would seem to bridge the gap – providing its meaning is commonly understood in a modern research context. Used consistently, it also recognises the value of allowing wider understanding of artistic endeavour such as music performance, through reflection on, and interpretation of individual experience.

My defence of qualitative methods has developed from my own experience: by following my earlier epistemological contention and by drawing on an eclectic research base, I have been able to reveal more of 'what there is to know' about the experience of music performance than had hitherto been known. An additional strength of my qualitative approach is that throughout my submitted portfolio, it is clear that participants' verification of their experiences were both strongly held and consistent. Responses showed that a great deal of thought had been given to the matters under discussion – to the point where both the

experience and the thinking had clearly become intensified and refined over a period of time. I suggest that (although I did not test this) the data represent firmly embedded views – reliable in that they are likely to be replicated, were the experiment to be repeated.

Interestingly, the certainty (and fluency) showed by participants also appeared to demonstrate a degree of objectivity, despite the intensely subjective nature of their lived experiences; although reporting on experiences that are undoubtedly a large part of their own identities (and in some circumstances can also be problematic) this is a significant divergence from most social science research, which mostly concerns adverse effects caused by the impact of particular experiences on the self. As can be seen from the published portfolio, all studies were carried out in accordance with the degree of ethical consideration required at the time of undertaking the research (i.e. up to early 2009), but, although full anonymity and confidentiality of data were assured, these issues appeared to be of less concern to participants than they might be in sociologically based studies. Indeed, as pedagogues, participants were generally keen to share their experiences. These are reasons why, when seeking ethical guidance for this aspect of music performance research, while bearing in mind potential sensitivities associated with use of human participants, I am increasingly inclined also to investigate the potential usefulness of qualitative methods from disciplines other than sociology.

2.1.2. Procedures

The four qualitative papers in my portfolio share a number of methodological processes. Since the procedural choices I made are key to the results that emerge, I next give reasoned analyses for my choices in the light of both research existing at the time and also subsequent wider developments.

- **Sample size**

My papers present research that is undertaken with small sample sizes, but, within that overall category, still falls into two groups: the two sole-authored papers (1.1 and 1.5) have two and one participants respectively; the co-authored papers (1.2 and 1.3) both have eight.

These methodological decisions are amply vindicated in that, in all cases, it is clear from the interview data and subsequent analyses that a greater number of participants would not necessarily have resulted in richer data. This approach is supported by Smith, for example, who argues the case for small sample sizes on the grounds that it allows the topic to be explored in greater depth (Smith, 2004). In all my studies, the small numbers of participants also allowed a range of related issues to be explored during interviews, while remaining within the framework of the planned interview schedule. Halling suggests that the depth achievable in interview with a single participant allows more abstract and reflective analysis - beyond that of the experience itself (Halling, 2008), and I have certainly found this to be the case. In support, I suspect that a further level and direction of analysis of wider aspects of the same data might reveal even more about the reality of being a musician - from both experiential and abstract perspectives (cf. Halling, 2008). I don't claim generality on the strength of the sample sizes in my studies, but further research conducted along the lines of recent developments in phenomenological research in psychology might well be particularly appropriate for an artistic medium such as music.

Some critics of qualitative/phenomenological methodologies would propose a note of caution with my approach, specifically, that since it is not possible to establish participant recollections as true representations of the performer's thoughts, a small sample size weakens the research. I would counter this by arguing that such in-depth studies *are*

worthwhile in that they bring to light aspects of performance that have previously been neither recognised nor explored. Ultimately, the test would be in the replication of my studies on a much wider scale.

- **Choice of participants**

Participants were chosen for their status as elite performers, that is, those who have reached the highest possible level in their chosen field.[32] As such, in all my studies they were purposefully sampled in terms of their "relevance to the research question" (Willig, 2001/8: p.58). Decisions to conduct research among elite performers were made on the grounds that the most information-rich data would be gathered from investigating performers whose mental and physical powers in respect of music performance are the most highly developed. This is a reasonable assumption, since there is ample evidence that neural (and local muscle) activity will be reduced in performers with a high level of expertise (e.g. Gray, 2004). Basically, so much of the cognitive and motor demands of the task have become automatic, that they can focus on the wider demands – for the musician, this means a more global perspective (cf. Milton, Solodkin, Hlustik & Small, 2007). Not surprisingly, performers of the highest level seem most likely to have sufficient confidence to be able to focus on the music (particularly emotional and musicological events) rather than being distracted by issues relating to perceived deficiencies in themselves (Waterman, 1996). This allows as true a representation as possible of the conscious experience of performance.

- **Semi structured interviews**

The semi-structured, conversation-style interview is the ideal tool for the empirical research that I have conducted, in that it gives both structure and flexibility, and allows optimum

[32] For definition of 'elite performer' please see endnote.

depth of response. Indeed, the most interesting and worthwhile data that emerged might not have done so with a less open approach.

All interviews were supported by interview guides that focused on topics key to the aims of the study (Robson, 1993/2002; Patton, 2002). In most cases, questions proceeded from the fairly general to the more specific, although it was sometimes helpful to deviate from the scheduled order. Probes to elicit elaboration were useful in terms of gleaning extra information, particularly since the studies tend to explore areas of performance preparation that are not generally articulated.

The interview data is not personally sensitive to participants in the same way that it is in much sociological research; my participants tended to talk about broadly pleasurable experiences rather than problematic ones. In papers 1.3 and 1.4 some participants did describe a range of very difficult circumstances, but within the broad remit of fulfilling their chosen pathways. This clearly means that the researcher in performance psychology has to contend with different methodological considerations from the sociologist. My participants were willing to speak openly about their experiences and in some cases, were enthusiastic to share their ideas: I frequently formed the impression that they found it a very positive experience to be asked to delve a little deeper into their thought processes than they normally might. This is a positive aspect of my chosen methods, since insight into personal representations of emotional and structural communication and other aspects of performance preparation and experience is central to my aims.

- **Analysis and interpretation**

In the context of my overall aims, I have found Interpretative Phenomenological Analysis (particularly later refinements of the technique) to be the most productive methodology (Patton, 2002; Smith & Osborn, 2008/9). IPA involves interviewing within an appropriate framework, which, together with informed analysis can allow particularly illuminating data to emerge. As regards further qualitative methods, I was aware of potential criticism that my own expert knowledge might, in some way, be detrimental to the conduct of my studies; therefore, throughout the analyses of 1.1 and 1.5, I tried to remain consistent to the principles of Grounded Theory (Charmaz, 1995; 2008/9). However, with hindsight, I tend to agree with Giorgi and Giorgi's assertion that phenomenological research and Grounded Theory are not compatible (2008/9) due to fundamental divergences in theoretical bases and guiding principles of data collection and analysis. Indeed, to remain 'grounded' in the research question, for me, would often have been counterproductive in that a more inductive process might have precluded concentration on the individual's experience(s). As an attempt to make analysis as rigorous as possible, in paper 1.3 we secured a degree of triangulation, by asking an independent researcher to check that the analysis reflects the quotations.

In view of the potential difficulties of exploring some of the more aesthetic, intangible aspects of expression in performance, one analytical framework to which I could usefully refer was Juslin's functional five-stage model of expression in performance – in the case of Holmes (in press), as a paradigm for study of one specific performance parameter. Juslin asserts that musical communication is effected through a chain of events: the composer's expressive intention - the performer's expressive intention - the acoustic performance

parameters - the listener's perception - the listener's affective response (Juslin, 2005). I was primarily concerned with the performer rather than the listener, but I found this sequential model gave an element of structure that provided a useful focus in both interview design and analysis. A comparable tactic was used in 1.3, where we created a personal timeline for each participant, by dividing their musical careers into stages and transitions (MacNamara *et al.*, 2006).

In the sole-authored papers I did not employ computer software in qualitative data analysis, since in order to be able to interpret and extract meaning from non-verbal behaviours such as gesture, nuance and emphasis, as well as linguistic choices, it seems to me essential for the researcher to embed him/herself in participant responses. This is integral to the recognition that meaning is the central focus of the analysis, and that the researcher needs to "…understand the content and complexity of those meanings rather than measure their frequency." (Smith & Osborn, 2008/9: p.66). In all my papers, the manner in which participants delivered their responses formed part of the analysis – but in a sense, this is part of the double hermeneutic of the interpretation process referred to by Smith, where both participant and researcher are trying to make sense of the phenomenon under investigation (Smith, 2008/9: p.53). The same interpretative process is particularly evident in papers 1.1 and 1.5, where use of metaphor is a distinguishing feature. Metaphor connects thinking and language and as such, forms the backbone of much linguistic interaction in music; data from my interview studies are no exception. For this reason (although in 1.1 and 1.5 I did take both the vividness and frequency of metaphorical language into account) I think it could be worth re-visiting my data, with the aim of undertaking some kind of organised analysis of metaphorical language. This could usefully include the patterns of metaphor use in relation

to intensity of emotional engagement (cf. Cameron, 2006). In the light of contemporary philosophy of mind (cf. Peacocke, 2009) I am also curious to investigate whether use of metaphor in elite performance is representational, or whether, as is possible in other art require imagination and may well have implications for the study of gesture in elite forms, the participant might be experiencing the music *as* the metaphor. If so, this would performance, in turn suggesting that the role of metaphoric gesture in music performance might also be worth considering (Cienki & Müller, 2008). It is accepted that spoken language has limitations as a form of interaction in music (Holmes, in 2011), but further systematic analysis of the style and substance of language used by participants might well prove worthwhile in either supporting results, or providing a novel theoretical contribution to the function of metaphor (or both).

2.1.3. Further theoretical perspectives

Some of my subsequent research is concerned with the theory of musical expectation, in which the hypothesis is that expectations can be created 'in the moment', while listening to unfamiliar, contemporary music. This paper, entitled 'The influence of timbre expectations on the listener's emotional experience' is largely theoretical, but both psychological and philosophical research is reviewed, in order to support suggestions for empirical studies.[33] This subject area is particularly apposite in relation to my submitted work, in which motivation, emotion and expression (communication) emerge as recurrent themes. However, I have found that at present there are contradictory theories regarding the sources of emotion and expression in music and indeed, the role of individuals in the communication of emotion through music performance. On the one hand, psychologists posit the

[33] At the time of writing, this paper has been submitted to and is awaiting revisions for *Music Perception.*

possibilities of unravelling the component parts of expressive performance so that a working paradigm can be found (e.g. Juslin, 2003; Woody, 2000). Conversely, philosophers tend to adhere to the view that there is something ineffable and mystical in the ability of some individuals and indeed music itself to have a profound emotional effect on others through the medium of music performance (e.g. Scruton, 1997). These divergent approaches reflect distinctly separate ontologies, which supports my claim that, when trying to unravel the more esoteric aspects of something as universal as music performance, it is well worth developing a wider range of analytical strategies. As a strategy in itself, this may seem somewhat ambitious, but in view of an increasing body of interdisciplinary research, it is particularly necessary to be open to approaches and viewpoints that may, initially, be relatively unfamiliar. Disciplines are increasingly interdependent (Hay, 2002: p.5) and there is growing evidence for the value of inter-disciplinary investigation in general (Thaut, 2009).

I am mindful that, whether research is inter-disciplinary or not, assumptions and variables from other disciplines will inevitably influence the main line of reasoning and should be taken into consideration, hence my suggestions for a cross-disciplinary approach towards analysis. Given that alternative (and even opposing) viewpoints are pertinent to aims and hypotheses in much of my work, it seems reasonable to gravitate towards a more deductive theoretical framework, in order to support initial assumptions from which hypotheses are built.[34] This line of reasoning is in keeping with a phenomenological approach and with the inconclusive nature of existing theory in performance psychology - as evidenced by the 'openness' with which the most active and enlightened researchers in the field present their work for discussion (e.g. Juslin, 2003; Juslin, Friberg & Bresin, 2001-2). It is also in line

[34] Methodological approach derived from Hay, (2002: p.3)

with some current questioning of the real value of quantitative methodologies in respect of the more ephemeral, subjective aspects of performance (Patton, 2002; Ashworth, 2008/9).

Such debates are not unique to research in performance psychology, which suggests it might be both reasonable and productive to widen the social science based search for appropriate methods. A start could be made by reference to the work of the political scientist, Colin Hay, who sets out a number of dissentions and dilemmas pertinent to contemporary analytical theory in politics (Hay, 2002), many of which bear considerable similarity to those faced by researchers in music performance psychology. For example, Hay addresses terminology, including the epistemological concern of what the terms 'political' and 'science' actually mean in the current context of his own discipline; he also assesses both strengths and weaknesses of diverse analytical strategies, whilst always considering the wider ethical backdrop. A particularly striking example is the chronological and methodological similarities in behaviou*ralism* (political analysis) and behaviou*rism* in psychology – one aim of the former approach is to "… develop an inductive science of the political capable of generating predictive hypotheses on the basis of the quantitative analyses of human behaviour at an aggregate level" (Hay, 2002: p.12). These are methodological issues with which I have contended, like Hay, coming to the conclusion that, for the most interesting research questions, there are no easy solutions. It is not appropriate to develop this line of reasoning further here, but I suggest that in the long term, it may considerably enlighten analytical methods in psychology.

In the foregoing paragraphs I have quoted a number of authors who are acknowledged as key contributors to on-going developments in qualitative research methods. Although most

of these publications postdate my submitted papers, I have found it informative to revisit my own methods in the light of later developments, and enlightening to expand my understanding of the multi-disciplinary foundations of qualitative research. This is consistent with the cross-disciplinary nature of much of my work, for which I have found it necessary to draw on, in particular, philosophy, neuroscience, musicology, education, acoustics and sports science. The boundaries between disciplines are never clear though (cf. Hay, 2002), which for me, is where the interest and the challenges lie.

2.2 Quantitative research methods

2.2.1. (a) Quantitative analysis of tone quality

The two papers under 1.4 employ quantitative methods, with the express purpose of representing the physical properties of sound in a live performance situation. The first of these studies is based on the hypotheses that a) there can be distinct, measurable variation in acoustic guitar timbres and b) these audible variations can be manipulated at will by the performer. The study is designed according to an existing statistical model (cf. Field, 2005/2009), but the data analysis techniques belong to computer science and acoustics.

In order to test our hypotheses, we used spectral analysis techniques to carry out a quantitative analysis of individual guitar notes, representing the results in graph form (for clarity) and particularly in order to enable comparisons (Earis & Holmes, 2003; 2007). In both papers the technical expertise of the participant was paramount since, for the reliability of the study, it was essential that he be able to produce consistently, and repeat with as little variation as possible, the range of sounds specified.

However, even with an optimally high degree of participant control, this methodological approach embodies inherent challenges relating to the dichotomy between theoretical (mathematical) and practical (aural) representations of sound. In the context of our studies, this dichotomy can be illustrated by considering the fundamental frequencies of guitar strings. An 'ideal' string (with zero thickness and perfect elasticity) will vibrate at frequencies that are integral multiples of the fundamental frequency of the string. But real strings have thickness and stiffness, and so this relationship is not truly harmonic, resulting in the higher

modes becoming progressively sharper (although this effect is only very slight on the classical guitar).

Measurement of timbre had previously centred on synthesised sound, where the researcher has a high degree of control of variables (e.g., McAdams, *et al.*, 1995). Compared with the main body of existing research, we therefore had to recognise that our approach might be considered limited in terms of accuracy, and design our studies accordingly. With potential limitations in mind, we aimed to test a minimum number of measurable variables consistent with meaningful data. In consequence, the three variables we defined were based on the following distinct right hand techniques - chosen because each technique can be performed independently, and varied on a continuous spectrum (according to the skill and imagination of the player):[ii]

- The location of the right hand along the length of the string (*sul tasto/sul ponticello/*natural)
- The articulation of the attack (*tirando/apoyando*)
- The balance of nail and flesh used in the attack

In fuller versions of this or similar studies, we intend to further clarify these explanations by including diagrams of guitar and fingers, such as might appear in a guitar tutor book.

In order to compare acoustic outcomes from the three techniques, we conducted three experiments that were designed to measure the differing relative amplitudes and decays of the first ten harmonics of each note and their overall decays. To strengthen the data, and

recognising that for stopped strings, the influence of the left hand is likely to have a noticeable effect on tone quality, for each experiment, we asked the participant to repeat each note three times at the same volume (as near as possible) and to use only open strings.

For the same reasons we made recordings in a non-reverberant acoustic, in order to minimise the complicating effect of sympathetic resonance. A stereo microphone was placed 50cm from the guitarist's right hand, when at rest and in normal position (i.e. over the sound hole). (Recordings were made on Digital Audio Tape at a sampling rate of 44.1kHz at 16 bit stereo and the sound files manipulated using the sound wave editing package, Audacity [3]). With hindsight, I think it may also have been useful for other researchers had we also recorded the proportionate distance from the bridge of the point of string excitation (*tasto/ponticello).*

We then made quantitative comparisons between individual notes, by measuring the properties of individual harmonics as they showed on the spectrographs. The cross sections of each spectrograph correspond to the first ten harmonics of each note, plotted against time. We chose amplitude and decay times in order to compare waveforms of sound produced by different timbres.

In terms of the relative strength of the individual harmonics, we demonstrated (visually) that there is clear variation in sound quality according to which technique is being used, representing results by a two-dimensional space of amplitude and decay time. Graphs were plotted indicating, for example, substantial changes in decay times, as well as overall differences between the upper and lower harmonics. For future studies, interpretation could

be further grounded by inclusion of statistical representations showing the degree to which playing technique affects amplitude and decay times. Bearing in mind that this study was exploratory, we also recognise that there would be benefit from a more explicit assessment of the balance and relationship between different harmonics, so that clearer distinction between playing styles could be made.

2.2.2. (b) The role of timbre in expressive musical performance

Methodologically, Earis & Holmes (2003) can be regarded as a pilot study. For our later study we used similar, but further refined techniques to quantify spectral qualities of pre-specified guitar timbres. We then used these recordings as a control, against which we could compare timbres produced in a 'natural' performance of a musical phrase (for detail see Earis & Holmes, 2007: p.183).[35]

In Earis & Holmes (2007) we also achieved clearer presentation of data in terms of numerical statistics in that we produced coloured piano-roll type scores of each performance that unfolds along the same timeline as the audio recording (Earis & Holmes, 2007: p.185). Considerably more data was collected and analysed in the course of these experiments than it was possible to include in this conference paper, but even with this limitation, clear development from the earlier paper is apparent, as are clearer directions for applications and future research.

[35] The opening bars of Bach's *Prelude* BWV 998

Conclusion

Throughout my submitted portfolio and in this associated Critical Analysis I have given illuminating and sometimes unexpected insights into the human phenomenon of elite musical performance. Given that the published papers have already undergone both scrutiny and approval, criticism of that body of work has not been a major feature of the current document. When it does occur it takes the form of constructive suggestions for future development of ideas, or refinement of methodologies.

In analytical terms, in addition to defending the originality and value of my research, I have examined particularly interesting aspects of it in the context of subsequent literature, continuing (and in some ways expanding) the cross-discipline perspectives of my papers, with a tentative view towards investigation of inter-disciplinary theoretical approaches. Based on the findings of my studies and further exploration of related topics, I will therefore use this Conclusion as an opportunity to offer further thoughts on what, to me, seem interesting and worthwhile avenues of related research into elite performance.

First, in the preceding sections, I have made a number of references to theories of talent and talent development. On reflection, I realise that 'talent' is as vague a word as 'timbre' and is similarly diverse in intended meanings, but however inconsistent, it cannot be ignored as a constituent part of elite performance. Working with PCDEs, MacNamara *et al.* suggest that a

significant source of motivation is an "innate empathy with music" (2008: p.337), which, indeed, seems to be at the root of 'talent'. This would also account for early engagement with sound that characterises early development of musical abilities (Holmes, 2011; Czikszentmihalyi, Rathunde & Whalen, 1993/1996; Gagné, 1991/2003). It is relevant to note my participant's comment that, as a listener, he finds a performer's evident deep commitment to the music is something he finds inspiring in others' performances; in other words, a signifier of affect (Holmes, 2011). In practice, this commitment will manifest as concentration and likely intensity, which may well be characterised by a minimal, or reduced level of gestural activity. This seems a somewhat circular argument (at this stage based largely on my own observations) but I have referred to gesture several times in the current document, which suggests that further informed and controlled experiment could be a fascinating source of new perspectives.

Second, my research has been conducted with an acknowledged view to its potential in terms not only of knowledge dissemination, but also of practical applications and associated educational benefits. To this end, results from all six papers have given insights into working practices and motivations at elite performance level that, although sometimes surprising, can be developed in different ways to guide both performers and educators in terms of best practice. This aim, however, creates an intriguing side issue, in that revealing more of the 'mystery' of performance could, by undermining the aesthetic experience, become self-defeating. On the whole, I do not think this is likely, since my research has also shown that elite performance requires a blend of characteristics, motivations and abilities that are unique to the individual and might be imitated, but not replicated. This idiographic foundation seems to be at the heart of elite performance. It characterises the philosophical

notion of the 'essence' of identity as referred to by Husserl (1913/1983: p.25) and "Ohne innere Wärme", identified by Hanslick (1854),[36] both of which serve as metaphorical descriptors for individual engagement with music. The affective power of music has been of primary concern in aesthetics since antiquity and it is therefore not surprising that a philosophical dimension and focus of thinking about the sources and substance of musical engagement proves enlightening. Although philosophy and psychology stem from different roots, recently, the two disciplines have begun to acknowledge that the other could offer useful (not to say essential) perspectives on the more intangible elements of music performance, and increasing numbers of authors' works reflect this trend in that their work encompass a range of related disciplines (e.g. Gallagher, 2005; Bowie, 2007; Noë, 2009).

My diversions into philosophy and other unfamiliar disciplines have, in all cases, been driven by the nature of the interview data itself and do, I suggest, strengthen both the originality and wider value of my research. Through informed interview schedules, I/we were able to elicit participant responses that illuminate aspects of elite performance that would not normally be verbalised. As shown by this body of published work, 'the performer's eye view' is a rich source of information, so far under explored in both theoretical and empirical research. At a more utilitarian, but philanthropic level, such insights could also inspire and benefit players at all levels, if presented in pedagogically sound ways. I have drawn on my own experience in elite level performance to inform and guide studies undertaken with others, and by doing so, have enabled further understanding of the intrinsic substance of elite expertise. It is to be hoped that, in addition to encouraging cross-discipline approaches,

[36] This quotation refers to the concept of an inner spirit emerging through music.

my studies will help to make the 'building blocks' of elite performance more accessible on a wider scale.

END NOTES

[i] For full understanding of my portfolio it is essential that the term 'elite performer' be differentiated from the term 'expert performer' - hitherto widely used in the field of music psychology to describe a player with a good degree of competence. Since this can range from advanced students (e.g. Lindström, et al., 2003) to a world-class concert pianist (e.g. Chaffin and Imreh, 2001), the term is clearly not precise enough to prevent misinterpretation. Since performers selected for investigation in my studies largely fall into the world class concert performer category, I draw on the definition given by Ericsson and Charness (1994), who describe such experts as "exceptional" or "top-level". Although this is in the context of discussion on the existence of innate talent, the terms are in accord with the sophisticated conceptual approach, experience, motivation and dedication to musical communication that characterises this level of performer as opposed to other 'experts'. (cf. Holmes, in 2011)

[ii] Fuller explanations of guitar techniques:

- *sul ponticello* – towards the bridge (giving clarity and brightness)
- *sul tasto* – over the fingerboard (giving a warmer, sweeter sound)
- *natural position* – over the sound hole
- *tirando* – (free stroke - normally predominant) - the string is plucked upwards and then resonates freely as the finger moves clear. This is particularly effective harmonically, as in arpeggio passages.
- *apoyando* – (rest stroke) – the finger strikes in a downward direction, then resting on the string below. This stroke allows a more incisive attack and potentially greater depth and fullness in individual notes.
- nail – more perpendicular strike and harder sound
- flesh – softer sound

In practice, players will normally use a combination of nail and flesh.

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Appendix

Published articles and Conference Papers

1. **Holmes, P.** (2005) 'Imagination in practice: a study of the integrated roles of interpretation, imagery and technique in the learning and memorisation processes of two experienced solo performers', *British Journal of Music Education* 22(3): 217-235.

2. MacNamara, A., **Holmes, P.** and Collins D. (2006) 'The Pathway to Excellence: The Role of Psychological Characteristics in Negotiating The Challenges of Musical Development', *British Journal of Music Education* 23(3): 285-302.

3. MacNamara, A., **Holmes, P.** and Collins D. (2008) 'Negotiating Transitions in Musical Development: The Role of Psychological Characteristics of Developing Excellence', *Psychology of Music* 36(3): 335-352.

4. Earis, A. and **Holmes, P.** (2003) 'Quantitative analysis of tone quality: a study in the acoustic properties of individual guitar sounds. Paper delivered at the 5th Triennial ESCOM Conference, Hanover University of Music and Drama, Germany, September 8-13.

5. Earis, A. and **Holmes, P.** (2007) 'The role of timbre in expressive musical performance: a case study of Bach's Prelude BWV 998 played on the acoustic guitar'. Published in *Proceedings of the International Symposium on Performance Science,* Porto, Portugal, November 22-23.

6. **Holmes, P.** (2011) 'An Exploration of Musical Communication through Expressive use of Timbre: the Performer's Perspective' *Psychology of Music*, pre-published online, 16 March, DOI: 10.1177/0305735610388898.

Note:

The institution cited throughout the portfolio as **Trinity College of Music** is now known as the **Music Faculty** of **Trinity Laban Conservatoire of Music and Dance.**