BINDING SERVICES
Tel +44 (0)29 2087 4949
Fax +44 (0)29 20371921
e-mail bindery@cardiff.ac.uk

MUSICAL ABILITIES IN MIDDLE CHILDHOOD: INTRA-PERSONAL, SOCIAL AND TEMPORAL CONTEXTS

REBECCA HELEN SHEPHERD
BA (Hons) M.Phil (Cantab)

A Thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy
2006

School of Social Sciences

Cardiff University

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

This thesis is dedicated to my parents Audrey and Bert Shepherd for all of their love, support and opportunities that they have given me throughout my life.

Acknowledgements

I would like to thank my supervisor Dr. Wyn Bellin and Professor Brian Davies of the School of Social Sciences at Cardiff University for their guidance, enthusiasm and encouragement throughout this study.

I am especially grateful to the pupils and teachers of the nine schools who took part in this research, for giving so generously of their time and completing all of the research materials.

Finally, I would like to thank my family for all their help and support during my time at Cardiff.

Abstract

The aim of this research was to examine relationships between musical abilities and general intelligence, initially using Gardner's (1983) theory of multiple intelligences, which contend that they are separate. The intra-personal and social contexts of musical ability were then investigated to clarify whether immediate contacts operated distinctly from those in wider contexts. Finally, using Dickens and Flynn's (2001) theory of intelligence, the temporal context of musical ability was examined to see if musical abilities can be self-enhancing. The research sites used were nine schools in England and Wales, representative of different social strata and musical specialisation, including state primary, choir and independent schools, from which 433 pupils, aged 7-11 (middle childhood) took part. Measures used were the Bentley (1966a) Measures of Musical Ability, Heim and Simmonds' (1974) Group Tests of General Reasoning, National Foundation for Educational Research Tests in English and Mathematics (1994a, 1994b) and Bellin and Rees' (2004) adaptation of Harter's (1988) self-perception scales for self-concept. A musical experience questionnaire was also devised.

It was found that musical ability and general intelligence are not separate intelligences in the way that Gardner's multiple intelligences theory would suggest. The closeness of the relationship between musical ability and general intelligence justified applying notions from Dickens and Flynn's (2001) theory of intelligence to musical ability. Relationships between musical abilities and self-concept concerned the sense of academic competence in non-specialist as well as specialist schools. Historic changes such as music in the curriculum seem to have boosted musical abilities in middle childhood in state, specialist and independent schools. The most powerful influence appeared to be learning to play a musical instrument. However, contrary to assumptions of multiplying effects of social influences, musical abilities do not appear to be self enhancing.

Table of Contents

List of Tables

Chapter Three

Chapter Four

Chapter Five

Chapter Six

List of Figures

Chapter Two

Chapter Three

Chapter Four

Chapter Five

Chapter Six

Chapter One

Musical Abilities in Middle Childhood

1.1 Introduction

The research issue pursued in this thesis is how to reconcile the universal availability of music in contemporary cultural environments with a persistent belief that only a few with a 'special gift' are destined for musical excellence. In doing so, two approaches relevant to teaching music to all have tended to be followed. The first appeals to the way musical education can improve pupils' conceptions of themselves, the second to the view that all children have mutiple intelligences and benefit from developing their 'musical intelligence' alongside others (Gardner, 1983, 1993). Both run the risk of focusing on individuals while devoting insufficient attention to either social or temporal contexts. In contrast a developmental-contextual perspective (Lerner, 1986, 1991, 1996) would have a wider focus, viewing changes in musical abilities and self concepts both within pupils' immediate network of social contacts and wider institutional and cultural contexts, as well as temporal contexts of age- and history-graded influences (Lerner, 1996). During infancy, the most immediate social contacts are caregivers, with a widening circle of peers during pre-school and school. Notions, such as 'middle childhood', are dependent on the history of universal primary education in the West, given the way that educating children together between seven and eleven years has been institutionalised.

In schools in England and Wales, music is offered up to the end of Key Stage 3 at 14 as a subject that it is hoped that all students can respond to and be involved with. In advanced economies, more music is listened to by a greater variety of means than ever before. Yet, according to a British survey (Davis, 1994), the belief that most people are without a 'special gift' is widespread, even among music educators, more than three quarters of whom believed that children could not do well in the subject unless they had innate gifts. Draper and Gayle (1987), in surveying 108 early childhood education textbooks published between 1887 and 1982 (the majority between 1973 and 1982), discovered that the reason for teaching music cited by 70% of their authors was to provide opportunities for self-expression and creative pleasure, thus influencing self concept.

1.2 Musical intelligence and developmental contexts

Howard Gardner (1983) in *Frames of Mind* regarded musical intelligence as one of seven intelligences, all of which could be developed through personal experience and formal education. His approach to musical abilities in children aged seven to eleven (middle childhood) placed heavy emphasis on how abilities are organised within individuals, that is to say, the intra-personal context, susceptible to development through experience, existing alongside language and personal intelligence, or the psychological perception we have of others and ourselves, forming a group of 'object free' intelligences. The others - logical-mathematical,

spatial and bodily-kinaesthetic - formed a group of 'object related' intelligences. Gardner argued that a better understanding of each of them, or clarification of the intra-personal context of development, was the way to clear up confusions about the need for special gifts. In later work, Gardner (1999b) added an eighth intelligence, naturalist.

Gardner's theory about the organisation of abilities within individuals or intra-personal contexts was developed at the same time as theories about child development began to adopt a 'developmental contextual' perspective associated with the work of Lerner (1986, 1991), predicated on the notion that it is misleading to look only within individuals. Developmental changes entail relations between what is within individual children and the social and temporal context where life courses are enacted. Here musical abilities are viewed as resulting from a two-way relationship where changes within individual children influence their social and temporal contexts and resulting changes in contexts, in turn, influence abilities and their organisation within children; their level at any one time will be a product of influences in social and temporal contexts and reaching it will result in changes in them. From such a perspective, there is no tension about teaching music to all, especially when wider social and cultural context include institutional arrangements like a National Curriculum in Music and diverse delivery platforms for listening to music.

1.3 Schooling as an age–graded influence

From a developmental contextual perspective (Lerner, 1996) formal education changes relations between individuals and contexts of development by introducing age-graded influences provided by institutions other than the family. In this research, middle childhood is the focus of consideration for a number of reasons. Firstly, I am a teacher of this age group, in a position to investigate musical abilities in specialist music choir schools and non-specialist schools, both local authority controlled and independent. The relevance of musical abilities for conceptions of the self can be expected to differ in specialist and non-specialist schools. Before entering specialist schools, children's pre-school and other early experiences would have set them on course for its relatively intense milieu. Such a preparation could be expected to give rise to distinctive patterns of difference in musical and other abilities important for such schooling, such that the relevance of musical abilities for self conceptions can be expected to differ between specialist and non-specialist schools. Secondly, although research on musical abilities has hitherto been concerned predominantly with infancy and adolescence, the study of middle childhood need not be any less fruitful than these of infancy or young people of secondary school age with respect to the issues with which I am concerned.

1.4 Before middle childhood: inheritances

Performances during middle childhood, such as hitting a target note in singing or recognising a particular chord, cannot be regarded as manifestations of innate gifts as, apart from the needing to explain changes with age, what are considered exceptional performances are dependent upon cultural contexts and historical time periods. Human newborns enter their social worlds with adult-like hearing organs in the inner ear and some intra-uterine acoustic experience that allows recognition of the sound of a familiar voice (De Caspar and Fifer, 1980). Infancy research has paid considerable attention to early perception, processing and production of melodic sounds and suggests that musical capabilities can develop from both genetic and environmental factors and emerge prior to birth. Vocal sounds can be modified in terms of the same qualities for both communicative and musical purposes, namely pitch, intensity, timbre, melody, rhythm and harmony. Human speech includes additional phonetic qualities that enable the production of consonants and syllables and, although it and vocal music may seem to represent two different categories, their intimate relationship makes separation difficult. It is also difficult to say which one appeared earlier during human evolution.

In infant-directed speech, parents intuitively guide infant vocalization towards melodic modulations, displaying models and using its melodic profile as the first categorical messages about their momentary, vital

circumstances. Infants also use melodic modulations for vocal play and later for singing which tend to remain in their vocal repertoire after they have learned to speak. Parents also support infant use of melodic contours for vocal play, often singing nursery rhymes, songs and lullabies. Papousek and Papousek's (1981) research has shown that infants can both imitate nursery rhymes and improvise their own melodies. They also start to learn songs with lyrics when they use words and sentences.

Sandra Trehub (2003) explained how infants exhibit a propensity for processing pitch and timing patterns of a musical nature, having a preference for vocal music, attributing capturing and maintaining attention to emotional impact that motivates creative personal and cultural embellishments that make music truly unique. It can be assumed that being born into different cultures brings differences in emotional appeal that tend to result in differences in seeking out certain kinds of musical experience, entailing interplay between the social environments and infants' predispositions known as 'environment matching'. It may be readily appreciated that environment matching or 'appetite' could lead to 'aptitude' (Ridley, 2001).

1.5 The temporal context

Expressions of early musicality have been approached in studies on early perceptions of musical patterns and infant-directed singing. According to Trehub's (1990) review, infants can detect changes in melodic contours,

pitch and timbre. They discriminate different melodic patterns on the basis of relational information at the age of five or six months (Chang and Trehub, 1977a). Infants, like adults, can discriminate between contrasting temporal and rhythmic sequences as well as contrasting timbres. Clarkson and Clifton (1985) showed that infants can respond to tonal complexes that signal acquisition of speech and support the development of musicality.

Papousek (1995) stressed the biological meaning of singing behaviour. Musicality can be assumed to originate in vocal play when the vocal tract functions very early as a vehicle for it in early infancy. This can be connected with intrinsic motivation for exploration, concept formation and modification of existing concepts. Trehub and Henderson (1994) have reported that infants have a special sensitivity to lullabies and that it was important that caregivers sang them. Linking this with reactions to vocal play in their immediate social context enhances understanding of how biological inheritances and social influence interact as infants go through a process which Trehub and Henderson refer to as 'enculturation'. Age-graded influences manifest themselves with nursery rhymes, which usually emphasise the pitch content of the basic scales in cultures. Early appetite for them can lead to aptitudes for musical performance regarded as appropriate for particular age ranges in differing cultures.

In learning the basics of language, very young children acquire the production of consonants and syllables. Parents seem to aid such

development by stimulating infants with rhythmic games and melodies, which go on to influence speech and the development of musicality. Although infants seem equipped with a universal kind of pitch perception and other sensory abilities relevant to musical achievement, it may be that very small differences in stimuli of a musical nature may be more perceptible to some children in early childhood than others. While infants less than one year old do not appear to be capable of imitating melodies, according to Sloboda (1985) Shuter-Dyson and Gabriel (1981) demonstrated an effective way of teaching a child of fifteen months to sing the first four bars of Haydn's *Surprise Symphony* very well.

By early childhood there is evidence of knowledge that a melody is still the same after transformations. Sloboda (1985) showed that at age five a child is capable of singing the same song at different speeds or pitches. Zenatti (1969) played children a three-note melody followed by a second melody in which one of the notes had been changed in pitch. When children were asked to identify the changed note Zenatti found that five-year-olds had difficulty but by the age of six or seven, children could identify what was different about the two melodies.

1.6 The social context

Perspectives on the earliest development of musical abilities have focused on the interplay between immediate, relevant social contexts (care giving and responsiveness to vocal play), more distal environments (infant and rest of family) and wider cultural contexts. Differences in

family social position as well as biological characteristics are important for individual development. Historical time and age are important when the most distal environment exercises influences on individual abilities. For example, Sloboda, Davidson, Howe and Moore (1996) examined some non-western cultures to look at the musical achievements of children. They reported amazement, for example, at the musical abilities of children in Nigeria who, under the age of five, could sing hundreds of songs individually and in groups. However, for such cultures, history-graded changes, such as migration to cities, could well lead to such demonstrations of musical ability disappearing as more proximal social environments, such as village and family influences, lose their potency in mediating wider, cultural influences.

Cross-cultural research supports the assumption that more distal influences in social contexts are mediated by more immediate or proximal social environments. Within western culture, very strong social contextual influences tend to be less immediately apparent. Dowling (1994) studied infants from three different musical environments, professionally musically orientated, non-professional but musically orientated and non-musically orientated homes. Infants' mothers were observed and distinctive differences between the three groups were found. Mothers from non-professional but musically orientated homes were much more active in their music making than others by singing more to their children.

In older age groups, there is further evidence of the importance of immediate social contacts for influencing musical abilities. Sloboda and Howe (1991a) found that even among highly successful young musicians, the majority freely admitted that without strong parental encouragement to practice they would never have done the regular amount needed to make good progress. Sloboda, Davidson, Howe and Moore (1996) found that the rate of progress of young musicians in a given year was most highly correlated with the amount of practice and teacher input in that same year. Given that it is conceivable that some children practice more than others because they have some kind of innate potential which encourages them to do so, they compared children at different levels of success on the amount of practice time required to make the same amount of progress between music exams. On that comparison, there were no significant differences between highly successful young musicians and other children. Influences from their immediate or more proximal social environment, which encouraged greater amounts of practice, were found to have a strong influence, as well as the practice itself.

Popular thinking about 'special gifts' as leading to musical achievement tends to see the influence as uni-directional. From a developmental contextual perspective, as with environment matching, there has to be influence of individuals' current states on their environments and, in turn, environmental influence on intra-individual contexts. By middle childhood, such bi-directional influences create a spread of abilities within

any generation and this particular kind of relation between individuals and their social and temporal contexts is known as 'environment matching'. Dickens and Flynn (2001) included environment matching in a set of assumptions made to explain individual differences in performance on intellectual tests, such that individuals with particular sets of abilities seek out contexts in which such abilities can be exercised and their skills enhanced. Persons with such enhanced skills are more likely than others to socialise with people of similar levels of skill, ensuring that groups of people with similar levels of skill come together, intermingling to produce average levels that will be higher than usual. Individuals mixing in such a group not only keep up exercise of the skill in question but also receive and provide influences which can raise the group average even higher, the socialisation patterns going on to cause each group member's skill to improve. If the more distal social environment places value on the skills in question, so groups will tend to go on to perform even better at them. The Dickens and Flynn's (2001) account of why overall levels of performance on intellectual tests may improve is an example of applying a developmental contextual perspective, which could well be directed towards musical abilities. Such a view offers an alternative to the world entailed in Gardner's theory of multiple intelligences.

1.7 Gardner's assessment and the curriculum

There are two reasons for exploring an alternative to Gardner's (1983) theory. Firstly, there are problems with how 'intelligences', including musical, may be assessed. Gardner (1999b: 98) acknowledged that:

> 'I once thought it possible to create a set of tests of each intelligence - an intelligence-fair version to be sure - and then simply to determine the correlation between the scores on the several tests. I now believe that this can only be accomplished if someone developed several measures for each intelligence and then made sure that people were comfortable in dealing with the materials and methods used to measure each intelligence.'

It is not clear why this approach has not been followed, though one reason could be because such testing might lead to labelling and stigmatisation. Questions about what would happen if Gardner's own suggestions were followed seem to have been left unanswered, especially with regard to musical abilities. The theory has been linked to the employment of 'authentic assessment' by means of portfolios and other kinds of work (Kornhaber, 2004) and profiling (Shearer, 2004), rather than scores on tests.

Secondly, the importance of Gardner's (1983) theory for the school curriculum is regarded by some as clear. According to Kornhaber (2001: 276)

> 'The theory validates educators' everyday experience: students think and learn in many different ways. It also provides educators with a conceptual framework for organising and reflecting on curriculum assessment and pedagogical practices. In turn, this

reflection has led many educators to develop new approaches that might better meet the needs of the range of learners in their classrooms'.

Yet there seems to be vagueness about how the theory would translate into specific objectives in a curriculum. Gardner's theory would seem to require that musical intelligence should receive as much attention as other kinds of intelligence. Much of the application of the theory to teaching rests on case studies of practice by individual teachers (Gardner, 1994) and such reliance on case studies is also a feature of work by Kornhaber and Krechevsky (1995), Kornhaber (2004) and Hickey (2004). In those described by the latter and others it is not clear where music would appear other than in conjunction with work addressing other Gardnerian 'intelligences'. While, for instance, singing might co-occur with instruction about the civil war in the US, attention thus being given to more than one 'intelligence' at once, it is not clear whether it should have a place in the curriculum as a subject.

Where educators include music education on the grounds that musical abilities, individual experience and opportunities influence the self-concept, the only requirement for the curriculum is to provide an opportunity for self-expression and creative pleasure. There needs to be clarification about the self-concept of the individual and how it might be influenced.

From a developmental contextual perspective, a major historical change in a National Curriculum whose implementation is subject evaluated in a formal inspection system amounts to a history-graded influence on the development on musical abilities. Such a between generation change cannot be ignored when interpreting within-generation individual differences.

1.8 General research questions concerning musical abilities in middle childhood

In terms of the arguments briefly adduced above there would appear to be three broad ways of conceptualising and researching relations between the universal availability of musical experience, music education for all and belief in 'special gifts', implying that only a few can attain high levels of musical achievement. The first would involve following Gardner's insistence that one should think in terms of 'intelligences' and consider the failure of the school system to address all seven of them as responsible for confusion about 'special gifts'. The second would lead us to accept developmental perspectives that acknowledge inborn differences but explain the relative lack of attainment by many in terms of the interplay between environments and inherited abilities. The third would locate the benefits of music education in improvement in individual self-concept rather than development of musical abilities. These have given rise to the following general research questions, which have oriented my investigations.

1. Should musical intelligence be regarded as separate from other kinds of intelligence and what makes up musical abilities? (Chapter Four).

2. How embedded in school experience is music education and could it have a 'boosting' effect on overall levels of musical ability? (Chapter Five)

3. Can influences from the social environment contribute to cumulative changes in musical abilities over time, possibly inducing self-enhancement of abilities? (Chapter Six)

Their pursuit will be prefaced by a more systematic consideration of the key ideas entailed in each approach (Chapter Two) and the research methods chosen for their investigation (Chapter Three).

Chapter Two

Intelligences, Experiences and Musical Abilities

2.1 Musical abilities in context

The question framing my research problem is how to handle the tension between the widespread belief that musical abilities are a special gift and the fact that musical education is intended for all pupils. From a developmental-contextual perspective (Lerner 1986, 1991, 1996), the issue of how pupils think of themselves and their abilities has to be considered, with attention to both the social and temporal contexts in which development takes place. According to Lerner (1991) the basic process of development entails change in person-context relations, in the case of musical abilities, as others, involving organisation and re-organisation of the intra-individual context as a result of interaction with the external environment. Terms such as 'musical abilities' cannot be used indiscriminately; there has to be attention to sets of abilities and accompanying conceptions of the self within this context.

2.1.1 The intra-individual context: musical abilities

The earliest research in the area attempted to delimit musical abilities, Révész (1946) defining them as 'the ability to recognise chords and intervals, transpose, improvise and compose music'. Seashore (1938: 67) had suggested that:

'Musical talent is not one but a hierarchy of talents, branching out along certain trunk lines into the rich arborisation, foliage and fruitage of the tree, which we call the musical mind.'

However, there has been little agreement on the use of terms such as 'talent'. For example, while Lundin (1953) proposed that the term 'musical talent' should be used to refer to capacity for musical performance, 'musical ability' was to refer to 'inborn traits', a view shared by Seashore (1938) and Schoen (1940). In contrast, Gordon (1976) pointed out that the terms 'ability' and 'talent' were often confused with aptitude and achievement.

A second issue pursued since the time of early research concerned the role of musical experience. Lundin (1953) insisted that even people who believed that musical ability was inherited also allowed that environment was important. At the same time, many who dismissed inherited abilities still admitted that inheritance and development were not entirely independent and, on any view, environment had a big part to play. Researchers like Farnsworth (1958) and Lundin (1953) thought that musical abilities were acquired after children were born. Wing (1948) sought to establish that the ability to perform the music tests that he devised was not unduly influenced by opportunity to hear music. Arnold Bentley (1966a: 67), in devising a test of musical ability, conceded that 'whilst there exists no agreement on what musical ability is, we may be able to recognise it, or think we can, but we cannot define it yet',

suggesting it to be that 'characteristic that distinguished 'musical' from 'unmusical' persons', though admitting that the difficulty of defining 'musical' and 'non musical' had not been overcome in his work. He described the tests he developed as designed to 'measure the kinds of basic judgements that are necessarily involved in music-making.'

2.1.2 Principal elements of musical abilities and the importance of experience

Gardner (1983) was very confident that musical abilities could be changed by experience and, as to defining them, asserted that:

> 'There is very little dispute about the principal constituent elements of music, though experts will differ on the precise definition of each aspect. Most central are 'pitch' (or melody) and 'rhythm' [...] next in importance only to pitch and 'rhythm' 'timbre' and the characteristic qualities of 'tone.' (Gardner, 1984: 104)

He placed the 'affective' aspects of music very close to what he referred to as these 'cores':

> 'From the point of view of 'hard' positivistic science, it would seem preferable to describe music in terms of objective, physical terms: to stress the pitch and rhythmic aspects of music [...] yet hardly anyone who has been intimately

associated with music can forbear to mention its emotional implications.' (Gardner, 1984:104)

While Gardner conceded the role of audition as crucial to all musical participation, he argued that there might be other aspects of musical experience accessible even to those unable to appreciate its auditory sounds. In his view, not only rhythmic organisation but also other 'intelligences' might be significant factors in the development of musical ability.

Gardner (1984) attributed lack of progress in most children's musical abilities during their school years to the relatively limited niche that musical attainment, in comparison to linguistic competence, occupied within our culture, where musical illiteracy was the norm. It is still not very clear as to what levels of competence we should expect at different ages in music. In England and Wales, a National Curriculum, including Music, is largely based on assumptions regarding 'stages' of musical development although, at any age, this can vary enormously between individuals. As well as believing that music was not generally valued in Western society, accounting for the undeveloped state of musical competences, Gardner argued that assumptions about innate abilities tended to further undermine and inhibit confidence among the uninitiated. In African tribal societies, in contrast, music was much more highly valued and almost everyone became competent musicians, taking part in musical activities from an early age.

2.2 Musical intelligence as one among many

Gardner (1983: 101-2) argued that musical ability functioned like an 'intelligence', which composers called 'logical musical thinking' and the 'musical mind'. An intelligence was a:

> 'biological and psychological potential; that potential is capable of being realised to a greater or lesser extent as a consequence of the experiential, cultural, and motivational factors that affect a person.' (1995: 202).

As we outlined in Section 1.2, he described musical ability in *Frames of Mind* as constituting a separate 'intelligence', among six others, which divided into three main groups: object-related, including mathematics and logic; object-free, including music and language; and personal, the psychological perceptions we have of others and ourselves. Logical–Mathematical Intelligence (being 'number/reasoning smart') consisted of the ability to detect patterns, reason deductively and think logically, and was most often associated with scientific and mathematical thinking. Linguistic intelligence (being 'word smart') involved having a mastery of language, including the ability to effectively manipulate it to express oneself rhetorically or poetically, as well as affording means to remember information. Spatial intelligence (being 'picture smart') gave the ability to manipulate and create mental images in order to solve problems but was not limited to visual domains. Musical intelligence (being 'music smart') encompassed the capability to recognise and compose musical pitches,

tones and rhythms, the first two requiring auditory functions. Bodily-kinaesthetic intelligence (being 'body smart') was the ability to use mental abilities to coordinate bodily movements. Interpersonal intelligence (being 'people smart') allowed understanding of interpersonal feelings and intentions of others, while intrapersonal intelligence (being 'self smart') was the ability to understand one's own feelings and motivations. These latter intelligences were separate from each other though, because of their close association in most cultures, were often linked together. In *Multiple Intelligences For the 21st Century,* Gardner (1999b) added 'naturalist intelligence' (being 'nature smart'), the ability to discriminate among living things (plants, animals) and sensitivity to other features of the natural world (clouds, rock configurations), abilities clearly of value in an evolutionary past as hunters, gatherers, and farmers which continue to be central in such roles as botanist or chef. Moreover, the ability to recognize cultural artefacts, like cars or kinds of shoes, might also depend on naturalist intelligence.

Although separate intelligences could become dissociated from each other in certain neurological conditions, Gardner claimed that they very rarely operated independently and argued that there were both biological and cultural bases for multiple intelligences which were common to all cultures, though different societies value different types, the cultural value placed upon abilities to perform certain tasks providing motivation to become skilled in those areas. While particular intelligences might be

highly evolved in many people of one culture, they might not be as developed in the individuals of another.

2.3 Assessing Gardner's intelligences, including musical abilities

Gardner's theory of intelligences was developed in contrast to the statistical or psychometric approach to intelligence testing dating back to Spearman (1927), which relied heavily on logical and linguistic abilities. Mainstream intelligence tests assumed a general intelligence subsuming other intellectual performance, such as his putative 'musical intelligence'. In *Intelligence Reframed,* Gardner (1999b: 203) contended that 'The theory of multiple intelligences has helped break the psychometricians' century long stranglehold on the subject of intelligence.' He contended that individuals could perform well on some areas of intelligence but not necessarily on others, such that, for example, children who were gifted musicians scoring highly on a musical intelligence test might not do so well on a linguistic test. For such reasons, followers of Gardner, such as Shearer (2004), set out to measure individuals' potential by estimating more than one of their intelligences, rather than by a single score on a traditional intelligence test. They believe that failure of school systems to address all seven intelligences leads to confusions about 'special gifts' with respect of music abilities or other kinds of intelligence and failure to address their needs.

They would contend that applying multiple intelligence theory in classrooms involves encouraging teachers to structure their presentation of material in styles that engages most or all of them. Activating a wide assortment of intelligences in this manner facilitates deeper understanding of subject material. According to Gardner, children have unique sets of intellectual strengths and weaknesses, which determine the ease with which information presented in particular manners in learned, commonly referred to as learning style. Many can be found within any classroom, making it impossible, as well as impractical, for teachers to accommodate all of them in every lesson. But, at the same time, they can show pupils how to use their more developed intelligences to assist in understanding subjects that would normally employ their weaker intelligences (Lazear, 1992), for example, suggesting that an especially musically intelligent child might learn about historical events by making up a song about what happened. However, it is claimed that Gardner's theory has been inspirational for teachers in the United States, seeming to resolve some tensions about teaching music to all.

Gardner still considers the education system to be biased towards stressing the importance of developing mathematical and linguistic intelligences and that assessments of pupils are based only on measured skills in those two. Given his view that children do not all learn in the same way, he insists that they ought not to be assessed in such a uniform fashion. Knowing how each student learns, based upon individual 'intelligence profiles', is prerequisite to allowing teachers to properly

assess their progress and make more informed decisions on what to teach and how to present information (Lazear, 1992, Shearer, 2004).

Plucker, Callahan and Tomchin (1996) evaluated the reliability and validity of a battery of instruments used in such a manner, including teacher checklists and performance-based assessment activities developed for identification of talent in culturally diverse and/or low-income kindergarten and first-year students. Acceptable reliability but questionable validity was found in the battery of instruments, abilities outside the realm of verbal and mathematical skills being particularly difficult to assess. They cautioned educators to be aware of validity problems when using performance tasks to assess 'multiple intelligences', especially when they are used for student placement. Callahan, Tomlinson, Moon, Tomchin and Plucker (1995) subsequently researched Project START, a large scale application of Gardner's theory, a multiple intelligences approach to identifying and promoting talent in students who are at risk of failing, finding no significant gains in either achievement or self concept for students who participated.

Gardner's antipathy to traditional tests of general intelligence would apply to tests devised by music researchers, such as Seashore (1960), Wing (1968) and Bentley (1966a), although these were predicated on the view that scores on tests of musical ability could fail to predict those in traditional intelligence tests. Seashore (1938) and Bentley (1968), indeed, saw no correlation between them, while Gordon (1965) believed

that children of all degrees of intelligence might have high musical ability, reflecting the view taken by Gardner. In contrast, Schoen (1940), Mursell (1937) and Farnsworth (1958) had reported a positive relationship between musical abilities and general intelligence, while Sergeant and Thatcher (1974), Phillips (1976) and Shuter-Dyson (1985) found that high musical ability scores were related to high intelligence test scores. Edmunds' (1968) research showed that low musical ability went together with low intelligence, though when a certain level of IQ was gained (90 for children aged between twelve and thirteen), intelligence no longer played a significant part. Wing (1948) reported that low intelligence scores and low musical ability scores went together on his tests but found it difficult to analyse results where individuals had high intelligence scores but low musical ability. Hobbs (1985) obtained a positive correlation (r = .33) between music aptitude and scholastic aptitude and regarded such a correlation as weak enough to indicate that the tests measured different aspects of cognition. Higher correlations were found between music aptitude and academic achievement (r = .56), although this was interpreted as only a moderate relationship.

In *Frames of Mind,* Gardner (1983) had defined a set of core operations as characteristic of intelligence, basic information processing mechanisms in the brain that take a particular kind of input or information and process it. Those of musical intelligence are pitch, rhythm, timbre, and harmony. In like manner, Bentley (1966a) constructed his tests to measure the kinds of basic judgements that are necessarily involved in

music-making, involving four subtests: pitch discrimination (comparison between two notes); tonal memory (comparison between two five note motifs that differ by just one note, without any contour changes); chord analysis (two, three, and four note chords); and rhythmic memory (comparison between two rhythmic figures with four beats and no change in pitch). Judging solely by face validity, Bentley's subtests can be regarded as ways of assessing the core operations of musical intelligence which, when administered along with a test of general intelligence, the Moray House Reasoning Test, to 166 children with IQs ranging from 70 to 140+, correlated significantly at the 99% confidence level, but were low. With 144 boys and girls aged eleven, all with an IQ of 100 or above, Bentley tested the relationship between IQ and pitch discrimination, tonal memory, rhythmic memory and chord analysis. He found a significant relationship between IQ and pitch discrimination but not between IQ and tonal memory, rhythmic memory or chord analysis. From the point of view of Gardner's theory, it should be noted that a general intelligence test was used here rather than assessment of linguistic or logico-mathematical intelligence. In Chapter Four, these issues are re-examined in an attempt to decide whether to rely on Gardner's theory when teaching music to all pupils.

2.4 General intelligence and musical abilities

While Gardner was developing his theory of multiple intelligence, Carroll (1993) was engaged in retrieving and then re-factor analysing the data from 461 of the major psychometric post-1925 data sets. Contrary to

Gardner's conclusions about the non-existence of a unitary general intelligence, Carroll decided that abilities vary in their generality from fairly specific or narrow (e.g., memory span, associative memory and free recall memory), to broader ones (e.g. general memory and learning) and the most broad (general intelligence), proposing that human cognitive abilities could be conceptualized hierarchically. He identified 69 specific, or narrow, abilities and conceptualized them as Stratum I abilities. These narrow abilities were grouped into broad categories of cognitive ability (Stratum II), which he labelled Fluid Intelligence, Crystallized Intelligence, General Memory and Learning, Broad Visual Perception, Broad Auditory Perception, Broad Retrieval Ability, Broad Cognitive Speediness and Processing Speed. Stratum III was the the general level of intelligence representing general intellectual ability, as originally posited by Spearman (1927).

The narrow abilities which come together as broad auditory perception included musical discrimination and judgement, maintaining and judging rhythm and absolute pitch, as well as linguistic skills, such as phonemic awareness and basic auditory skills, such as sound localisation. In evaluating a theory of multiple intelligences, while Bentley's original work leaves open the question as to whether or not musical abilities are best regarded as a separate intelligence, or abilities belonging to a broad category of auditory abilities which, in turn, might relate to general intelligence, hypotheses based on Carroll's work would have to be tested against predictions from Gardner's theory.

2.5 The self in context in middle childhood

Given that in Gardner's theory experience of school is crucial in the development of musical abilities, alongside other 'intelligences', appealing to his ideas could be regarded as one way of resolving tensions about teaching music to all pupils. An alternative view would be to rely on the notion that teaching music could change children's conception of self. In claiming that music education is beneficial for self-concepts, Brandt (1980) and Martin (1983) assumed that differences in accomplishment do not prevent music education from encouraging positive views of the self. However, such claims are problematic since there are age-graded changes in the way children conceive of themselves in middle childhood. During middle childhood, self-concepts become differentiated, mainly because children's abilities change at different rates in different areas of achievement. Changes within children, whether in musical or other kinds of abilities, arise from person-context relations with their social environments. Accounts of such changes divide social contexts into the immediate networks of contacts, or more proximal influences and wider or more distal influences, such as kind of institution and widespread cultural assumptions. Harter (1988: 61) claimed that:

> 'the ability to observe, evaluate and criticise the self must develop through a series of stages that begin with an awareness that others are evaluating the self and with the ability to compare oneself to one's social reference group'.

Harter (1999) regarded middle childhood as the time when a further stage in the self-concept develops. Much younger children are able to observe others but unable to recognise that those in their immediate network of contacts may be observing them in the same way. At a second stage of progression, children are able to understand that others are evaluating and observing them and, with this realisation, come to rely on the judgments of others as validation of the self rather than making direct appraisals of themselves. At a third stage, around eight years of age, observations of others become internalised or incorporated into self-perceptions and children begin to compare themselves to each other, simultaneously observing others and themselves.

The importance of the middle childhood age range in Harter's theory is, then, that within this age range, new abilities, including musical abilities, are paralleled by children's attempts at self-definition. Components of the self concept, such as beliefs about one's abilities, are reflections not only of what one can do but also internalisations of feedback from significant others in the immediate network of contacts. References to athletic ability and physical appearance also appear, although, more importantly 'children often indicate the process through which they arrive at such a generalization' (Harter 1988: 49), that is to say, attributions start to be made. Harter (1988) used the example of 'smartness', which is inferred from past performance. 'Self-attributes become logically organized, integrated within domains which are differentiated from each other' and such attributes are found to be stable over time. Although stable, Harter

(1982, 1985, 1988, 1999) has always insisted upon the self-concept having multiple dimensions, allowing individuals to evaluate the self differently within different domains of their lives. This also involves a notion of 'global self worth' – how happy children feel about their ways of doing things and the kinds of people they are becoming. This may or may not accompany positive or negative self-evaluations in other domains, such as athletic prowess or behaviour.

Differentiation of the self-concept in middle childhood means that more than one dimension underlying the construct has to be assessed after any length of time in a primary school. Harter's research concerns five domains for middle childhood - physical appearance, athletic prowess, how well one does in studies (scholastic self-concept), how well one behaves and how well one relates to peers. Longitudinal studies of middle childhood, such as that of Cole, Maxwell, Martin, Peeke, Seroczynski, Tram, Hoffman, Ruiz, Jacquez and Maschman, (2001) confirm the importance of considering multiple domains, as well as Harter's assumptions about age-graded changes. Between Grades 3 and 6 (7-8 and 10-11 years old), age-graded changes tend to be in the direction of more positive self-evaluations for scholastic domains, peer relations and athletic prowess. Cole et al. explain these changes by assuming strong influences from the immediate network of peer contacts. The changes reflect social processes, such as selective social comparison and strategic association with others whose successes yield vicarious benefits. In the domains of physical appearance and

behavioural conduct, very different patterns emerge. Self perceived physical attractiveness declines for females but not for males. For both girls and boys, perceptions of their conduct decline and to a lower level for boys. Cole et al. (2001) attributed such changes to the more distal social context. As primary school children approach the transition to secondary school, punishment for misbehaviour tends to outpace reward for good behaviour. Gender difference in perceived physical attractiveness is attributed to the widest or most distal social context – cultural expectations about female beauty. Such explanations of changes in conceptions of the self are consistent with Lerner's (1991) advocacy of a developmental contextual perspective.

2.6 The temporal context: prospects for age-graded changes and history-graded boosting of musical abilities

Gardner's theory can be criticised for its lack of clarity about the course of development and regarded as problematic because of his attitude towards traditional assessment methods. There are alternative accounts of development giving full acknowledgement to influences such as educational innovation and intervention, based on the assumption of a strong correlation between genetic endowment and social environment. Dickens and Flynn (2001) explained individual and history-graded differences in performance on intelligence tests assuming that genes and environment are strongly correlated. By middle childhood, social processes, such as strategic association with others whose successes yield vicarious benefits, will be well in place. They use the example of

basketball: '(I)f someone's genes predispose them to be good at basketball, then somewhat better play alone is likely to lead him or her into an environment supportive of better performance' (p. 349) including, for example, advanced coaching and opportunities to play with and against better players. Given this and other considerations circumstances can arise in which 'genes get credit for some of the work that is actually being done by the environment'. (p. 353). Dickens and Flynn (2001: 349) claim that the upshot of this is that:

> 'Our model of the effects of environment on IQ shows that the potential impact of even very small changes in environment could be very large, even if we accept the largest estimates of the heritability of IQ'.

Within immediate networks of contacts, Dickens and Flynn assume that processes like social comparison take place which drive up the average IQ of the network and at the same time influence the skills of its individual members. These are age-graded changes and, because such social processes take place right across whole nations, national average scores on intelligence tests have been found to increase over decades of the twentieth century. The gains have been highest on the most abstract tests, particularly implicating history-graded changes in work and leisure after World War II that placed greater social emphasis on more cognitively demanding activities, triggering a 'social multiplier' that has resulted in higher test scores. Their model shows that gains of 20 points in IQ over a generation are not implausible.

On this view of interaction between nature and nurture, this so-called Flynn Effect is capable of turning modest genetic advantage into huge performance advantage through feedback between talent and environment. Any slight advantage arising from difference that invites social comparisons will have the capacity to influence the social environment. Genetic advantages relevant to social comparison upgrade individuals' environments, which then enhances their skills, with such a feedback effect applying to any socially relevant difference between individuals. While ostensibly true, the Flynn Effect is not restricted to those who have a 'modest genetic advantage' but appears to be an 'across the board' effect. History graded change is explained by the general principle that relatively small environmental differences between generations gain enormous potency, in the same way as small genetic differences between individuals do in a single generation.

Though Dickens and Flynn were concerned with intelligence as measured by intelligence tests their arguments and assumptions may also apply to musical abilities. The first assumption implies that among a child's inheritances will be predispositions that become matched to the nearest social environment. These may be in a broad category relevant to but not specifically musical, such as broad auditory perception. In the case of music, there might also be a stronger urge to explore the self than in other infants, leading to more vocal play. In a responsive, immediate social environment, a correlation will result between incipient musical

abilities and experience in that environment. Environment matching is a key assumption. Musical and other abilities may be misleadingly regarded as 'special gifts' because of failure to appreciate how environments where music is important may be sought out, even when abilities are incipient. The second key assumption is that the process that produces environment matching can act as a multiplier of environmental influences. Responsiveness to vocal play might well increase as caregivers realise that it is enjoyed. Others in the more distal environment (such as visiting relatives) might join in. The third key assumption suggests that environmental influence on musical abilities is a kind of average of a number of environmental effects. This assumption is commonly made by researchers who appeal to experience rather than 'special gifts' in explaining differences in musical abilities. For example, Gagné (1991) argued that some persons or provisions in the environment can be either positive or negative catalysts for developing musical ability, assuming some kind of average of effects. Likewise, McPhee and Stollery (2001) regarded some experiences as 'crystallising' musical abilities and some as 'paralysing', assuming that to increase them a predominance of crystallising experiences must be ensured. The fourth assumption is that anything that acts as a multiplier has enormous potential for social change. If there is a historical change in a culture that either takes away or adds an influence, such as wider availability of keyboards or other electronic means for making music, there is a potential for change.

The third assumption (averaging of environmental effects) is often made on its own). For example McPhee and Stollery (2002) carried out interviews with music pupils in Scottish schools, identifying one set of their experiences as 'crystallising' and another as 'paralysing.' 'Crystallising' experiences might happen in a number of areas in the child's musical experience, including: parental ability to afford music tuition; pupils receiving feedback which enhanced self-esteem; motivation by music teachers; and motivation from a member of the family, encouraging practice. The most frequent positively motivating factors were praise and enhancement of self-esteem, parental encouragement and support and inspiration from a gifted teacher. 'Paralysing' factors with respect to musical experience featured poor teaching, negative comments from teachers, insufficient opportunity to take part in musical events, families not seeing music tuition as a priority and its cost and the practice time required to become proficient. The most commonly adduced demotivators were identified as poor or inadequate teaching, negative attitudes on the part of music teachers and lack of school opportunities. They reported that paralysing factors outnumbered crystallising factors by almost two to one. McPhee and Stollery (2002) also observed music being played to children as an introduction to the school day. On coming in from the playground they were very excited but listened to this music with much thought.

If the four assumptions (environment matching, multiplying effects, averaging of environmental effects and historic change) are made

together, belief in the wider or most distal cultural influences bringing about musical achievement on a mass scale is quite plausible. It was noted in Section 1.6 that Sloboda, Davidson, Howe and Moore (1996) reported on musical abilities of children in Nigeria who, at under the age of five, could sing hundreds of songs individually and in groups. If some children in such a culture are predisposed to more vocal play than others, under the influence of their more distal social environment, their caregivers will be very responsive. There will be a correlation between their incipient abilities and the immediate environment, or, in the terminology of Dickens and Flynn (2001), the interplay between their vocal play and the responsiveness of caregivers will act as a 'multiplier'. Children in their more distal environment might well be included in any activities related to these incipient musical abilities. The environment will begin to provide what Dickens and Flynn (2001) term social level multipliers as well as those at individual level. The amount and quality of musical experience in the environment will increase. As children get older, those with increasing abilities will gain more attention in contexts where music is important and their company may be sought out by children who started with fewer abilities. Grouping children with similar singing abilities can raise average level performance in groups more and more until such situations, as reported by Sloboda (1991), are brought about, not by any 'special gifts' but by environment matching and further influences from the nearer and more distal social environments. Of course, there can be no assumption that environment matching leads only to an upward spiral in abilities. If the wider culture changed in a new

historical time period, interests might become keener. Although in such a context there might still be a fondness for singing, musical abilities could enter a downward spiral as a result of diminished interest. Enjoyment would be reduced and listening or performing would decline.

In cultures with lesser interest in music, individuals born with any kind of biologically based advantage are likely to enjoy an environmental advantage relevant to other cultural forms. Just as with musical abilities, there will be inevitable confounding of initial genetic and environmental advantages where music is highly valued. Initial genetic advantage does not have to be in an easily recognisable musical ability, such as pitch perception but may be in any predisposing factor that induced seeking out musical experience. Their possessors would very likely be born into families where parents had strong musical interests. Initial genetic advantage may itself be very small but, through interplay of ability and environment matching, can evolve into escalating or upwardly spiralling musical abilities. Processes by which individuals' ability and their environments are matched can increase the influence of any initial difference in ability, whether genetic or environmental. In fact, Dickens and Flynn refer informally to the operation of age-graded multipliers as 'snowballing', a useful metaphor for the parallel whereby a small amount of material can be used to start off the process, so long as it allows for snow to be compacted around itself. Multiplier effects work in both intra-personal and social environments; as long as snowballs are not too tightly packed, they can be compacted together to create larger spheres, as

when a snowman is built. Exercising musical abilities, especially performing, is an intensely social form of activity. If people with upwardly spiralling musical abilities can be brought together and the quality of the musical experiences they jointly create improves, the mean level of ability in any group will be boosted and, as the quality of experience improves, boosting may extend beyond the immediate group. Following Dickens and Flynn (2001), this process in the interpersonal or more distal social environment can be called the 'social multiplier'.

2.7 Boosting and snowballing in educational settings

The kind of developmental perspective on musical abilities put forward here is based on the way Dickens and Flynn (2001) explained rises in levels of scores on intelligence tests between generations in countries with advanced economies. But how can genes and environment both be powerful in shaping musical ability? Consider young children with a minor predisposition toward singing songs and enjoying music. They may start out by singing in nursery class at a very young age, along with other children. Such experience, by itself, may confer only a small edge, though it may be enough to make their musical ability greater than average and induce them to sing more than their friends and to improve their singing over time. After a while, they will tend to be considerably better than most children of their age, making it likely that they will be picked first to sing solo in the end-of-term nursery play. When they are older, such children may join a school musical activity where they are given exhaustive practice and professional coaching in singing or playing an instrument.

Their musical ability may now be far superior to that of their old playmates, through a series of boosting effects, their initial minor advantage will have snowballed into discernible overall gain in ability. Genes tend to get matched to complementary environments and some of the power of the environment is marked and attributed to genes. Only environmental effects shared by all children in the same family and those that are uncorrelated with genes may be counted as true environmental influences. The effect of genetic differences is boosted by positive feedback loops. Small initial differences are snowballed by processes whereby initially varying abilities are matched to complementary environments that cause them to diverge further.

2.8 Musical ability and experience

There have been parallels between debates about musical abilities and general intelligence. Individual differences in musical behaviour from the earliest years of life have for many tended to suggest that musical intelligence has a high heritability (Gardner, 1982; Piechowski, 1993; Torff and Winne, 1994). On the other hand, Dowling (1986) interpreted his findings that children as young as three displayed ability to respond to the degree of tonality of musical stimuli as indicating the importance of environmental factors. Nursery songs in the environment of infants usually emphasise the pitch content of the basic scales in the culture. Growing up in a musical environment, a child will have the opportunity to acquire knowledge of pattern structure and tonality schema and become sensitive to atonal melodies. Specific, genetic predispositions may require

particular sets of environmental circumstances in order to manifest themselves.

2.9 Music in the school curriculum

We have seen, according to the developmental perspective on abilities put forward by Dickens and Flynn (2001), that wide-ranging changes can be initiated by the more distal social environment. As well as scope for snowballing musical abilities by inducing environment matching and multiplier effects at individual and social levels, it is possible for environmental elements, 'exogenous factors' or 'triggers' unconnected with the individual's biology or organisation of abilities, to have effects. In Lerner's (1991) terminology, these are history-graded influences, while Dickens and Flynn (2001) refer to them informally as boosting influences. Including Music in a National Curriculum cannot be expected to eliminate individual differences in musical abilities, although if it can facilitate the working of an appropriate social multiplier, snowballing and boosting them might happen across a much wider range of social groups than has happened in the past. Acording to Ofsted (2004), at Key Stage 1 the percentage of children rated as excellent or good in Music rose from 31% to 39% between 1996/7 and 2002/3 and for Key Stage 2 from 34% to 39%, compared to 35% at both Stages and dates in all Foundation subjects. While the 'lumpiness' or precision of key-stage measurement should serve as a source of caution, here is some evidence of Music 'on the move'.

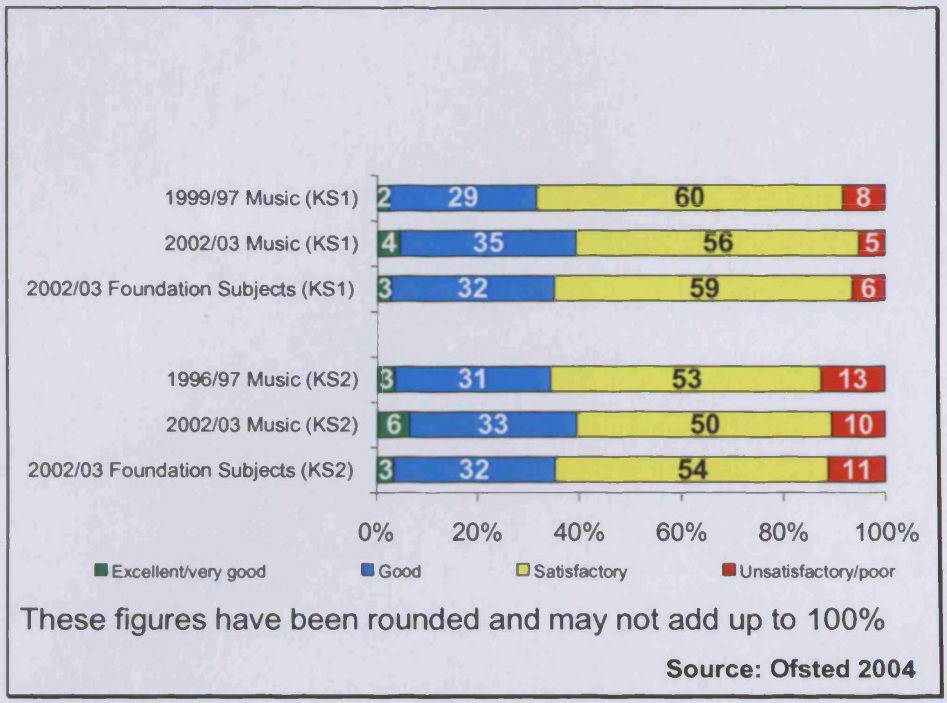


Figure 2.1 Pupil achievement in Music and all Foundation Subjects at KS1 and KS2 in 1996/97 and 2002/03 in England, by Ofsted categories

Classroom teachers, being concerned with broader educational goals, are more inclined to be concerned with musical achievement than with musical ability. Unlike instrumental teachers, who may wish to use some form of testing in the selection of pupils for specialist instrumental tuition, classroom practitioners are required by law to teach Music in the National Curriculum to all children between the ages of three and fourteen, regardless of their abilities. All classroom teachers have a statutory duty in the National Curriculum to ensure that adequate provision is made for less able pupils and that programmes of study are sufficiently differentiated to take account of needs, backgrounds and stages of musical development.

The National Curriculum in Music, introduced in 1991, an important point in the history of British music education, was part of a wider social and cultural trend manifested in education as making music experiences more available to all, with mixing of different genres. It took primary music beyond singing to a range of musical activities. No longer was music simply an accompaniment to school assemblies or the preserve of a selection of 'musical children'. Statutory provision required teachers and schools to provide an all-round music curriculum in performing, composing and appraising. The first and unique aim of music education was to raise and critically explore a number of musical procedures, its second aim being to engender participation in musical events in the community and contribute to the rich possibilities of music in society. Paynter (1992) argued that all four elements of the National Curriculum for Music - performing, listening, composing and evaluating - are necessary. Its integral elements were intended to be part of pupils' development. In becoming aware of new styles through listening, it was expected that they should have the skills to judge what had been heard; Music was regarded as creative, as well as recreative. Its requirements, according to Pratt and Stephens (1995), meant that musical experience needed to be divided into separate elements of attainment aimed at a holistic experience through providing performances of compositions followed by listening and appraisal or, after listening to and appraising a piece, creating a composition which led to performance. Music curriculum guidelines clearly stated what they expected children to be taught at which stage of their education. At each stage of education,

various aspects needed to be covered, with tasks increasing in technical difficulty to suit pupil learning.

The performing and composing elements at Key Stages 1 and 2 of the music curriculum state that children should be able, among others things, to improvise musical patterns, explore, create, select and organise sounds in simple structures, use sounds to create musical effects and record their compositions using symbols, where appropriate. It is regarded as important that pupils listen not only to music representing diverse cultures but also to their own musical creations. Key Stage 1 of the curriculum requires them to recognise how sound can be created through different actions, such as blowing, humming or shaking something. It is also important at this stage to show how different styles of music create different feelings or emotions, such as when a slow, quiet movement may portray sadness or a lively, fast piece excitement and enjoyment.

Pratt and Stephens (1995) provide guidelines for working within the National Curriculum while interpreting it to give a more holistic experience. The content of the orders for Music as a foundation subject within the National Curriculum might be said to have emanated from ideas of music educators and academics in the 1960s and 1970s, not least Paynter (1992) and Swanwick (1968, 1979, 1988, 1994) and to represent the competing demands of a dominant Western Art Music tradition, leavened by concern for pupil creativity and performance and

regard to the wider world of musical experience (Wright, 2006). It would be beyond the scope of a single dissertation to decide whether our National Curriculum has proved to be or is capable of becoming a major factor in boosting musical abilities, either operating as an identifiable exogenous factor or contributing alongside wider changes. But it is important to investigate how it is experienced by individual children in particular schools, especially those selected to represent contrasting kinds of experience, as Wright has attempted to do.

2.10 Outline of the remainder of the study

The study's rationale is described in Chapter Three, while the contention by Gardner that musical abilities represent a separate 'intelligence' is taken up in Chapter Four. The closeness of measures of musical ability, in particular pitch perception, to verbal intelligence, outlined above, is interpreted as evidence against Gardner's view. It can still be argued that very strong environmental influences on intelligence levels are masked by major historical changes in Western culture. The claim in Chapter Four is, then, that musical abilities and intelligence are related closely enough to justify applying theories from intelligence to musical abilities.

Chapter Five is concerned with the embeddedness of music in school experience and whether core abilities can be influenced in spite of wide differences in attainment. The chapter is based on Dickens and Flynn's (2001) notion of boosting as applied to musical abilities.

Chapter Six attempts to take further the account of musical ability drawing on Dickens and Flynn's (2001) view of intelligence and spatial abilities. It concerns more than one wave of testing musical abilities in the same school and is based on Dickens and Flynn's (2001) notion of 'snowballing.'

2.11 Refinement of the research questions

Following the literature search that has been outlined in this chapter and Chapter One, the three general research questions given in Section 1.10 were made more specific, as follows, and then cast in hypothetical terms, becoming, respectively, the focus of Chapters Four, Five and Six:

1. What makes up musical abilities and should they be regarded as a separate 'intelligence' from other kinds of intelligence? (Chapter Four).

    1.1 Is there a relationship between musical ability and general intelligence in middle childhood?

    1.2 If general intelligence and musical ability are related, is this relationship close enough to allow for theories that are applied to intelligence to be applied to musical abilities?

2. How embedded in school experience is music education and could it have a 'boosting' effect on overall levels of musical ability? (Chapter Five)

2.1 Is music so embedded in the school curriculum, regardless of the kind of school, that it influences pupil's sense of academic competence, rather self worth or global self worth?

2.2 Would the Bentley test show strong effects of musical experience on core musical abilities even where opportunities for music education are limited?

2.3 How important is learning to play an instrument as an individual performer compared to classroom experience with instruments as well as singing?

3. Can influences from the social environment contribute to cumulative changes in musical abilities over time, possibly inducing self-enhancement of abilities? (Chapter Six)

3.1 Will more than one wave of testing with the Bentley test in the same school indicate a sustained effect of musical experience, or a cumulative advantage from the most powerful environmental differences?

These detailed considerations are prefaced in the next chapter by an account of the methods and their rationale employed in their pursuit.

Chapter Three

Methodology and Rationale of the Research

3.1 Introduction and background

The very general issue that framed the research described in this thesis was the tension between the persistence of the notion that musical abilities are a 'special gift' and the necessity of giving music education to all pupils. We first examined the notion that one way of dealing with this tension was prompted by Gardner's theory of 'multiple intelligences' (Gardner, 1983, 1999b) and his claim that educators should seek to foster all of them, including the musical, rather than pursuing a curriculum narrowly defined in terms of logico-mathematical and verbal intelligences. Gardner's ideas prompted questions as to what made up musical abilities and whether they should be regarded as a separate from other kinds of intelligence. The first of three phases of the research, whose methods and rationale are described in Section 3.2, addressed this general question, focusing on the intra-personal context, the organisation of intellectual and musical abilities within the person. Section 3.3 then addresses musical experience, musical abilities and the self-concept and Section 3.4 deals with changes over time in musical abilities.

3.2 Phase One - musical and other intellectual abilities

Those who follow Gardner would insist that musical abilities are readily dissociated from other kinds of intellectual ability reflected in patterns of correlation between tests and subtests. Assuming that logico-

mathematical intelligence, linguistic intelligence and musical abilities are separate, inter-correlations between subtests for each of them will be high, while those between tests of different intelligences will be lower. Carroll (1993; 393), who rejected Gardner's notions, re-analysed a large number (146) of separate data sets and concluded that there were several independent sets of musical abilities within a higher level stratum of abilities which be called 'broad auditory perception'. They related to: discrimination and sequences of tones by pitch, intensity, duration and rhythm and judgments of complex relations and discrimination of tonal patterns in musicality with respect to melody, harmony, and expression. Such a set co-occurred with other abilities, such as distinguishing between phoneme and syllable stress, while 'broad auditory perception' was, in turn, dominated by general intellectual abilities or general intelligence.

Were Carroll to be correct, correlations between tests of what Gardner would regard as separate intelligences would be significantly high, despite the latter's rejection of the idea that there is a set of broad mental functions that operates across domains, regardless of content. The situation is complicated because differences between Gardner's stance and that of the followers of Carroll extend to methods of assessment. Carroll based his conclusions on statistical analyses of test scores, whereas Gardner was doubtful about traditional testing on the grounds that it led to stigmatisation and labelling of pupils and disempowerment of teachers. Carroll could back up his claims by showing that the variance

in a set of test scores associated with a musical factor could be accounted for partially by a unique component and partially by a general or shared intelligence. In contrast, reliance exclusively on the kind of 'authentic' assessments favoured by Gardner, involving profiling across project work and group activities, render it unclear how questions about the organization of abilities within a person could be investigated and even less clear how they might be seen to change over time within the same person.

But although averse to traditional tests, Gardner did define 'intelligences', such as musical, as possession of a potential, each having basic or 'core' operations, including pitch, rhythm and timbre. Given this, assessments giving scores that reflected ability to perform these core operations must be regarded as suitable for addressing the question of the relation of musical to other intellectual abilities and would permit the kinds of analysis adopted by Carroll (1993), providing the test of musical abilities had direct relevance to actual educational contexts and the exercise of abilities, such as learning a musical instrument. Such means would respect the importance of confidence that assessment methods used to decide between their points of view allowed for valid inferences about different sets of abilities.

3.2.1 Tests of musical abilities

Though Gardner (1983) dismissed assessments of music ability that test pitch discrimination of simple tones on the grounds that they reduced

music to an entirely 'objective' form and denied its affective power, interest in them dates back to Seashore (1938), who divided musical abilities into a number of potentially unrelated elements that could be regarded as culture free. In contrast, Mursell (1937) and Wing (1948) insisted on measuring musical ability as a whole and were the chief critics of Seashore and his measurements. Shuter–Dyson and Gabriel (1981) reviewed a number of musical ability tests and concluded that the majority were conceived in terms of Western tonality. In a Western educational context these were the abilities which environmental factors, such as the home and schooling were most likely to influence in middle childhood. The objection to the goal of devising a culture free test was that analysis into bare, constituent elements destroys music and that tests of musical ability should consist of actual musical material. Even if an 'objective' test without cultural bias were possible, the kind of test appropriate in an educational context would have to concern the culture within which it was embedded.

3.2.2 Listening tests for the classroom

To address the question of whether musical abilities should be regarded as a separate intelligence, rather than a set of abilities belonging to a broader category of intellectual abilities, it was decided to adopt tests devised by Bentley (1966a). These are listening tests using recordings that have to be played in a distortion-free room. There are four subtests. The first is pitch discrimination (comparison between two notes). There are twenty pairs of different tones and children have to say whether the

second tone of the pair is higher or lower than the first. The difference in pitch extends from half a tone to one ninth of half a tone. The second subtest assesses tonal memory (comparison between two five-note motifs that differ by just one note, without any contour changes). For each five-note melody, children have to say which note has been changed when the melody is played a second time. There are ten pairs of melodies. The third test, chord analysis (two, three, and four note chords), is similar in design to a music test developed by Wing (1968) where children have to decide how many notes are played in a chord that is heard only once. The chord analysis subtest has twenty items. The fourth subtest is rhythmic memory (comparison between two rhythmic figures with four beats and no change in pitch or loudness) with ten items. Only the rhythm has been altered the second time a figure is heard.

The use of the Bentley test has continued from the 1960s to the present, when it is still in use in primary schools in Scotland. Given the view that a potential for musical excellence is inherent in all pupils, McPhee and Stollery (2002) described how the Bentley measures are used both to assess suitability for musical instrument lessons and to match a range of opportunities for ensemble group music making, often outside the normal school day, to pupils identified as musically able.

3.2.2.1 Content Validity

The Bentley test has clear relevance to the, albeit differing, English and Welsh National Curriculum for Music. Inspectors, in their reports on both,

comment on the accuracy with which pupils reproduce pitch, rhythm and tunes, which are essential elements of the Bentley test, as is listening, also an integral activity for Music in the National Curriculum orders, which enjoin that, through listening to different types the pupils gain a knowledge and familiarity of different styles and sounds of music. The Bentley test can be administered to whole groups at a time and completed in a single class music lesson, the whole battery lasting 21 minutes. There are advantages and disadvantages of any group testing of music ability, which had, for our research purposes, to be taken into account before the final choice was made. One of the advantages of the Bentley tests was that more children could be tested within a limited time than by individual test methods and that they might reveal high musical abilities in children who had previously shown none. They measure separate elements within musical ability so that, for example, they can locate individuals who may have a good ear and sense of pitch but whose rhythm is not so developed. Among the disadvantages of the Bentley tests are that they are culturally biased, but biases in any mainstream culture tend to be followed in its educational contexts. It cannot be applied to children who are not old enough to clearly understand from the recorded tape what they have to do, the minimum age for which seems to be seven years old.

Choosing the Bentley tests for this research meant taking the side of those who believe that test materials should aim at assessing the unitary experience of musical stimuli. At the same time, scores on such tests

would have content validity for making inferences about Gardner's (1983) specific 'cores' (pitch, rhythm and timbre) and, given that without prior exercise of the 'core' of abilities emotional responses cannot take place, there is no rejection of the insistence that emotional/affective aspects are crucial components of experiencing music.

3.2.2.2 Validity evidence from external criteria

Correlation with exam board grades

The choice of the Bentley tests allowed investigation of more questions than those raised by the notion of 'separate intelligences', providing robust and valid evidence across other parts of the research. In the case of children learning instruments, significant correlations between Bentley test scores and grades obtained in Associated Exam Board (AEB) music exams are reported in Chapters Four and Five, revealing that, of the total of 433 children who took the test, 180 were learning musical instruments and had obtained AEB grades, of whom 51 obtained grade 1, 32 grade 2, 40 grade 3, 29 grade 4, 20 grade 5, 3 grade 6, 3 grade 7 and 2 grade 8. The correlation between their grades and their Bentley test scores was 0.384 with a significance level, for 180 people, of less than 0.0001.

Exceptional Abilities

Considering all the children who took part in all the phases of the study - the 253 who were not learning an instrument and the 180 for whom there were grades - it is possible to plot descriptive statistics for the relationship between AEB grades, where available, and Bentley Test Scores, as in

Figure 3.1. For those at each grade and others who did not have a grade, a box stretches from the 25th percentile of that group (the lower hinge) to the 75th percentile (the upper hinge), therefore containing the middle half of scores for that group of children. Of the children for whom there was no grade (the leftmost box in Figure 3.1), half had scores between 27 and 39 on the Bentley Test. The horizontal line inside boxes corresponds with the median for that group of children, while the vertical lines extending from the boxes are known as 'whiskers', which end in 'fences' which are one step beyond the hinges, a 'step' being defined as 1.5 times the H-spread, the difference between the 25th percentile (the lower hinge) and the 75th percentile (the upper hinge). 50% of a group's scores will lie between the hinges and 99% of scores in a group will lie between the fences. Scores outside the fences are extreme values and are shown as small circles. The case number is put near the small circle for ease of identification in a data set. There is one person in the group for whom there were no grades who scored higher than 99% of that group. The Bentley tests were sensitive to the possibility that individuals could have exceptional musical ability, even though they might not be learning an instrument. There were three children who had attained grades 4 and 5 but scored lower on the Bentley test than 99% of children with the same grade. While there were 30 children at grade 4 and 20 at grade 5, there were only three at grade 6 and two at grade 8. Though these latter two in particular are very small, the existence of low scores untypical of an examination grade need not be regarded as inhibitory to making valid inferences about musical ability from the test scores.

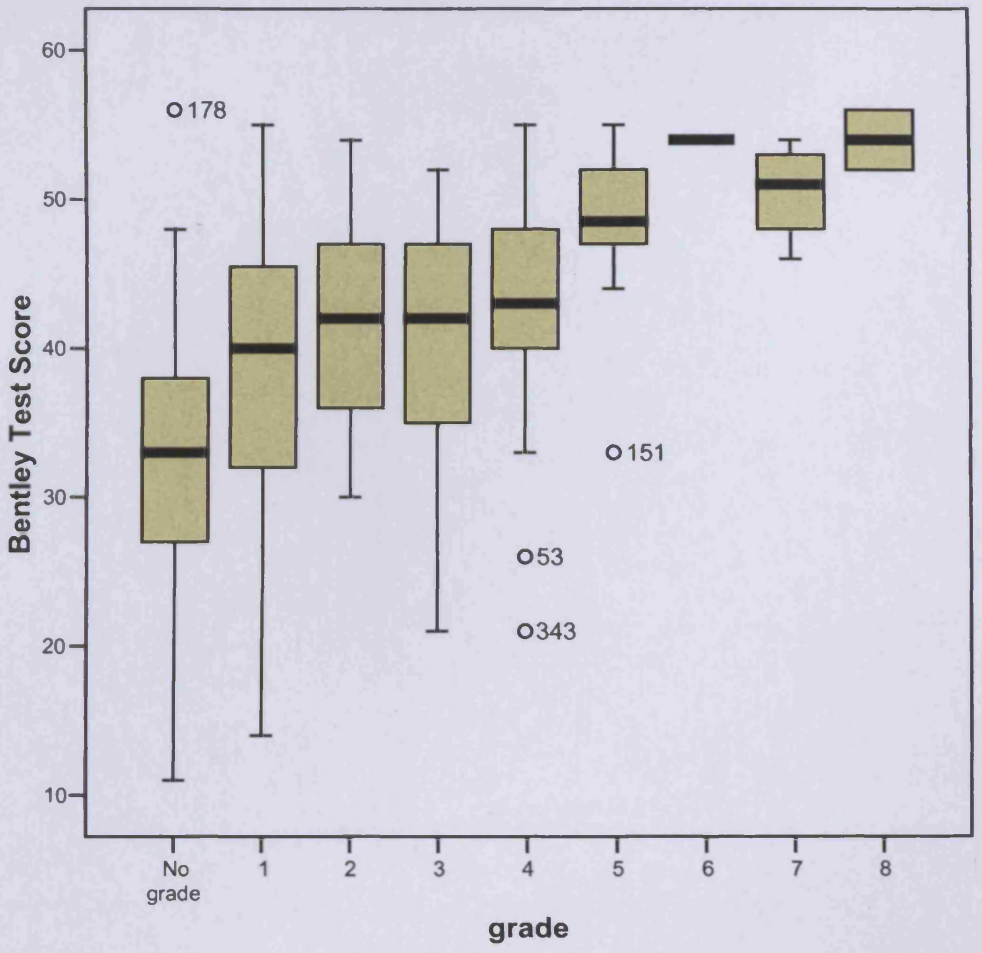


Figure 3.1 Associated Exam Board grades and Bentley (1966a) music test results for all pupils in the study.

General Intellectual Ability

The Heim, Watt and Simmons AH3 Group Tests of General Reasoning (1974), which is in three parts and assesses verbal, perceptual and numerical ability, was chosen as an appropriate test of intelligence for 10-year-olds and upward. All items are in multiple choice form and all three parts assess reasoning, the verbal test specifically not being a vocabulary test and the perceptual test not simply being a test of spatial perception or visual acuity. It was decided to administer half of the test, rather than

the whole test, thus halving the time period required for its completion and making its administration possible within a single lesson period. Twenty items from each subtest were given, following a stepped gradient of difficulty. This commonly used shortening procedure can be problematic with children who adopt a test-taking strategy that aims at celerity rather than accuracy. Since the AH3 difficulty gradient is steep, children soon reach items that require considerable concentration, so that such strategies are very rarely encountered. Each pupil could gain a maximum of 60 marks from this way of administering the test.

3.2.3 Gaining access to participants of Phase One

To investigate how scores on the different subtests and tests would be related to each other, it was important to have a spread of ability (or abilities) in a sample of children, without skewness in the distributions of either musical abilities or intelligence test scores because of children who might be exceptional in their performance on either.

Access to three primary schools in a county town in the South East of England was made possible by a local authority music advisor and was arranged by school heads and Year 6 teachers. The pupils recruited for Phase One of this research were aged 10 and 11. These schools were selected and suitable for this research because the music advisor had identified schools as all being within different catchment areas of the town and it was hoped that this would provide a cross section of ability scores. This school year was chosen for two reasons: firstly, in the research

literature studied, there seemed to be much more research concerning infancy and secondary age. Secondly, the Bentley (1966a) music tests used in the research were devised for this age group. The first school (referred to as Primary School One) was in an area which was not considered disadvantaged, with only 16% of its children receiving free school meals. It was possible to access 21 Year 6 pupils, 13 females and 8 males. The second school (Primary School Two), in which 11 boys and 9 girls took part, had 22% of pupils claiming free school meals, while at the third (Primary School Three), in which 14 girls and 15 boys took part, 13% of children claimed free school meals. This gave a total of 70 pupils for Phase One of the research. The data collection for Phase One took place between November 2000 and February 2001.

3.2.3.1 Ethical considerations

Access was very readily provided to me as a teacher of music, experienced in the primary school age range, once the general aims of my investigation were explained. In educational research in the UK, class teachers and head teachers are regarded as being *'in loco parentis'*. Full cooperation and enthusiasm was shown from all of the schools and the teachers involved. The Bentley tests were regarded as having educational merit, since the abilities they set out to measure are important for listening to music. In the case of the AH3, the whole test was not being used and there was no intention of calculating intelligence quotients for each child, simply to assess performance on the content of three subtests. Ethical guidelines are provided by both the British

Educational Research Association (BERA) and the British Psychological Society (BPS) for any researcher who is also a teacher concerning procedures in which participants will become involved and the educational benefits that may be engendered. Pupils in all schools used in the research were made aware of the process in which they were to be engaged, including why it was necessary, how it was used and how it would be reported. All necessary steps to reduce the sense of intrusion were taken and pupils were put at ease by conducting the tests in their music lesson slot on the timetable. Throughout I recognised participants' entitlement to privacy and accorded them confidentiality. Pupils in all the schools used were aware that my interest was music in schools and were assured that their responses would be totally anonymous. Emphasis on confidentiality was important not only with regard to ethical considerations but also because this aspect can prove crucial to the investigation itself. Pollard (1987) argues that self-presentation is vital for researchers, as pupils always want to know who they are and whether they can trust them. While the guarantee of confidentiality to teachers and parents was expected to contribute to successful data-collection, disclosing my identity was essential to the research design intended to give focus to the quality of data collected. Introducing myself as a music teacher who wanted to know about the musical life of their school provided assurances that responses in the musical experience questionnaire and Bentley tests may be thought of as reliable text.

3.2.3.2 Suitability of the sample for the first phase of the research

In the first phase of the research it was important that the distributions of both the Bentley and intelligence tests showed no extreme scores, which might affect reliance on correlational techniques. Whereas the distributions of scores in Figure 3.1 concerned the entire number of children tested throughout the project, in Phase One (reported in Chapter Four) only seventy children took part in all. Box plots for both their Bentley and intelligence test scores are given in Figure 3.2.

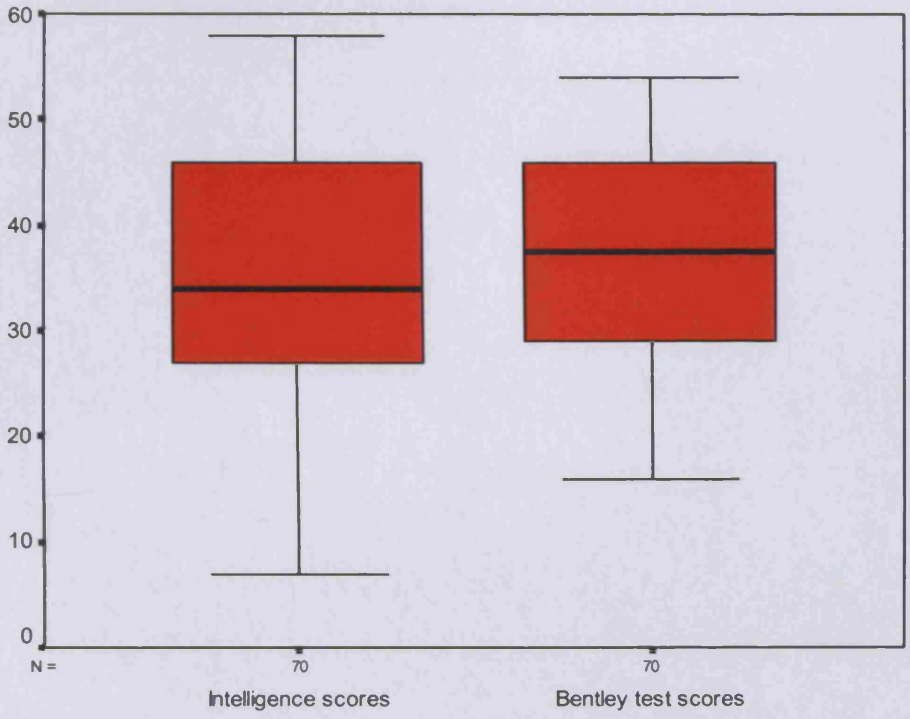


Figure 3.2: Box plots for the intelligence scores and music test scores of respondents in Phase One.

These showed that the distribution of both sets of scores for the three schools had an absence of extreme values. This gives confidence about the inferences drawn from analysis of the scores discussed in Chapter Four.

3.2.4 Phase One methods of data analysis

The choice of methods of data analysis for investigating the organisation of abilities, as assessed by AH3 intelligence subtests and the Bentley musical ability test, was based on Carroll (1993), where the correlation coefficient is used to compare tests or subtest scores two at a time. Techniques of factor analysis are available for examining large sets of scores and Carroll (1995) defends the particular choices that he preferred among those techniques.

3.3 Phase Two - musical experience, musical abilities and the self-concept

Five different schools were used in the second phase of the research: Choir School 1, Choir School 2 and Choir School 3, where there was considerable social advantage and access to specialist teaching in music, along with a tradition of choral music; and two local authority primary schools. Primary School 4 and Primary School 5 based in Cardiff, where delivery of the National Curriculum for Music relied on non-specialist teaching and where social deprivation, indexed by entitlement to free schools meals, was high, at 38% and 35%, respectively. Years 5 and 6 (middle childhood) were chosen for Phase Two of the research because it was the same year as the participants in Phase One and also because, at this age, pupils become more aware of their own selves. By middle childhood, not only does the wider social environment impact on changes in pupils' opportunities and abilities but pupils' views of themselves are

influenced by particular experiences that come their way. The research in Phase Two paid full attention to pupils' social background, what kinds of musical opportunities were available and which opportunities might be taken up. At the same time, within any social background, middle childhood involves changes beyond the attainment of additional abilities, including the self- concept.

3.3.1 Rationale for the selection of schools

The purpose of selecting these schools was to allow investigation of whether there was a simple, one-way, or, as was anticipated to be more likely, a rather more complicated relation between musical abilities and self worth across maximal variations in social context.

3.3.2 Musical abilities and the self-concept

A straightforward, one-way relation between abilities valued in the curriculum and wider culture and self worth would not be expected from a developmental, contextual perspective (Lerner, 1991) where age-graded changes are seen as changes in relations between developing individuals and the multiple contexts in which they live. Time, *qua* history and chronological age, cuts through all levels of such relations between individuals and contexts. By middle childhood, the concept of the self has become differentiated (Harter, 1999), an age-graded change. In the social context of children's development, research by Harter (1990) and others would suggest that more distal influences, like a National Curriculum and wider cultural changes, create arenas where appraisals of

the self and others are made as a result of attaining academic goals. As a result, a sense of academic competence develops, which may or may not be associated with changes in global self worth. If exercising musical abilities becomes part of the way children think about their academic competence, then scores on a test of musical abilities can be expected to correlate with scores for sense of academic or scholastic competence but not necessarily with global sense of self worth. Any assessment of self-concept needs to assess or test more differentiated domains, such as the academic or scholastic, rather than just global self worth.

Dickens and Flynn (2001) proposed a model of how diversity (variation) in scores on tests of general intelligence is produced within generations as a result of relations between individuals and their social contexts. Major changes across generations in cognitive demands in the work place and the use of symbols in the wider culture cut across these relations. Such unplanned history-graded changes are credited with causing overall levels of scores on general intelligence tests to rise across generations in the last half of the twentieth century, as readily demonstrated in advanced economies. If history-graded influences can be so important for general intellectual abilities, maybe boosting of musical abilities can be brought about by either planned intervention, such as introducing a National Curriculum with Music as a foundation subject, or 'unplanned' expansion of access platforms to music. Our attention is confined to the former, 'school music', delivered in the main by non-specialist teachers in state primary schools and by variously experienced specialist teachers in

private and specialist 'primaries', where pupils tend to come from relatively privileged social backgrounds. Specialist teaching is the norm in virtually all secondary schools. Changes in official policy for the school curriculum are, of course, not sufficient evidence for a history-graded change impacting on individual schools. The chain of events between the state and classrooms is long and complex, as Wright (2006) makes clear in explicating the ideas of Bernstein (1996) and Bourdieu (1984). However, a form of documentary evidence of the extent to which a National Curriculum is being implemented is available in England and Wales since legislation in 1996 created a system of school inspection by OFSTED in England and Estyn (formerly OHMCI) in Wales, whose reports are in the public domain. In independent schools inspections are run by the Independent Schools Inspectorate (ISI) whose teams always included an OFSTED inspector to ensure that the same strict regulations are followed by ISI as OFSTED. Whereas their language dwells upon collective levels of attainment, in our terms, it might be anticipated that to bring about overall boosting of musical abilities in relatively disadvantaged schools with non-specialist teachers would require their association by pupils with conceptions of academic competence. Investigation of these possibilities called for assessment of children's musical experience, their views of themselves and their musical abilities with a test relevant for education.

3.3.3 Children's school musical experience

There were two ways of finding out about the kind of musical experience received by pupils in participating schools. Firstly, use was made of documentary evidence in terms of inspection reports made as near as possible to the time of conducting the research. Second, a musical experience questionnaire was devised and administered.

3.3.3.1 Using school inspection reports

In conformity with the broad framework for school inspections set out in the Schools Inspection Act, 1996, inspectors followed a five-point scale in grading the teaching and learning of National Curriculum subjects ranging from 1 to 5. Its values were: 1, very good, many good features, some of them outstanding; 2, good, good features and no major shortcomings; 3, satisfactory, good features outweigh shortcomings; 4, unsatisfactory, some satisfactory work but shortcomings in important areas; and 5, poor, many shortcomings. Inspection reports for all of the schools participating were consulted. The local authority schools' reports were approximately two years old at the time of the research but there had been no change of teachers during that time. In the private, specialist choir schools, reports had been published approximately one year before data collection. Reports were examined to see what activities were reported upon and whether grades had been assigned to pupils' skills in composing, performing, listening and appraising activities appearing in statutory curriculum orders.

3.3.3.2 Devising a musical experience questionnaire

To find out about the experience of the pupils participating in the research, a questionnaire was devised. Its first section contained demographic questions concerning age, school name and parents' occupation, while the second assessed children's degree of involvement with music, first in terms of whether they played a musical instrument; how long they had been learning an instrument; what proficiency grades had been attained and the frequency of practice and lessons. They were then asked why they had first started playing and how parents influenced them. The third section of the questionnaire concerned the musical life of the school; the opportunities it offered and their uptake; participants' musical experience outside school; how much listening they did in their own time in terms of a list of different genres of music; and whether their parents played an instrument or not. The questionnaire is detailed and results discussed in Section 5.6.2.

3.3.3.3 Choosing a self-concept questionnaire

Given that the self-concept becomes differentiated by the time of middle childhood, doubts are often expressed (see Harter, 1999) about the value of any assessment of general self-esteem. As it is often stated that a benefit of teaching music to all is raising self-esteem, a self-concept questionnaire which included global self worth and five other broad domains - scholastic, peers, athletic, physical and behaviour - was chosen (Bellin and Rees, 2004). There were six items for each domain,

giving a total of 36 in all, yielding scores for global self worth, how positively children saw themselves in each of the other five domains.

In addition to these self-concept and musical experience assessments, the Bentley test of musical abilities, described in Section 3.2.3, was administered.

3.3.4 Gaining access to participants of Phase Two

I worked as Head of Music in one of the participating choir schools during the second phase of the research and undertook discussions with staff and head teachers, once again explaining why they were invited to take part and eliciting their agreement to do so, assured that their responses would be totally anonymous and that no one else, including other teachers, would see their responses. As in Phase One, the tests of musical ability and questionnaire about musical experience had direct relevance for the curriculum and head teachers saw relevance for Personal and Social Education in the kind of reflection called for when their pupils completed the self-concept questionnaire. The second phase of the research was concerned with how musical abilities can develop in a changing social context, so it was important to investigate pupils' musical ability, experience and their self-concept in contrasting schools. The schools chosen for Phase Two of the research were, therefore, music specialist schools and local authority schools, again using pupils from years 5 and 6, with the exception of choir school three, which had pupils from years 4, 5 and 6. It was possible to access 46 pupils (24

females and 22 males) from Choir school 1, 43 pupils from Choir school 2 (26 females and 17 males), 71 pupils from Choir school 3 (46 females and 25 males), 47 pupils from Primary school 4 (20 females and 27 males) and 29 pupils from Primary School 5 (14 females and 15 males). As I was working as Head of Music in Choir School 3 at the time when the research took place, it was possible to incorporate Years 4 and 5 into the research, giving a total of 71 pupils for Choir School 3. The total number of participants in Phase Two of the research was 236 pupils: 130 females and 106 males. The data collection for Phase Two took place between October 2001 and March 2002.

Cooperation from my peers in other schools led to my being promised access to records of attainment in academic subjects other than music: National Foundation for Educational Research (NFER) tests in English and Mathematics in the Choir schools and Key Stage 2 levels of attainment in English, Mathematics and Science in the local authority schools. However, one of the primary schools was very reluctant to give out Key Stage scores at the time when fieldwork took place.

3.3.4.1 Suitability of the Phase Two sample

Table 3.1 gives the number of pupils participating in each school.

	Choir School 1	Choir School 2	Choir School 3	Primary school 4	Primary school 5
Males	22	17	25	27	15
Females	24	26	46	20	14
Total	46	43	71	47	29

Table 3.1: Number of pupils by school in Phase Two

The choice of schools was intended to contrast those with very specialist teaching and those without.

Figure 3.3 shows the box plot for Bentley Test scores for each of the schools.

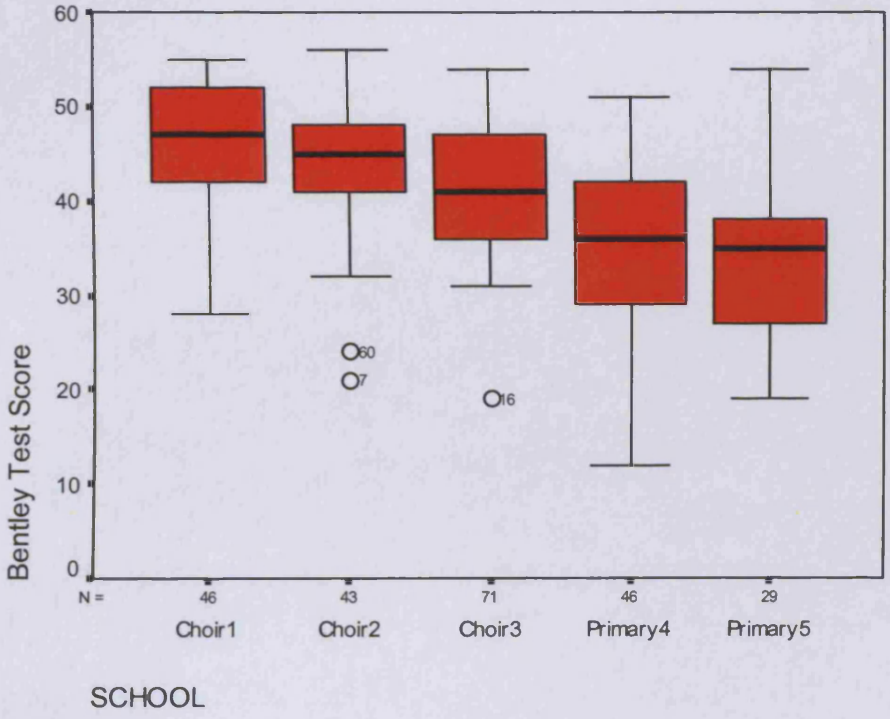


Figure 3.3 Bentley Test scores for Phase Two schools

Within school outliers. The small circles in Figure 3.3 indicate individuals who scored lower than the nearly all their fellow pupils (99%) at the school. What was an unusually low score in a choir school was, however, in the same part of the overall range as the lower 25% of the respondents in local authority schools, which is unsurprising given that the choir schools used selection to safeguard their musical tradition, even though it would be in their interests to also have pupils who might excel in other fields.

Absence of ceiling and floor effects. Considering the box plots for each school, the choice of musical abilities test seemed very appropriate given that in each, half of the pupils had Bentley Test scores ranging from just below 30 to just above 50. An unusually low score within a school was still near to others from other schools. There was little danger of ceiling or floor effects, as might be the case if a test of musical abilities had showed that nearly all pupils scored near the ceiling in specialist schools and near floor level in non-specialist schools.

3.3.5 Analysing Phase Two results

In Phase Two, contrasting sets of schools were chosen in order to maximize variation in social backgrounds and access to experienced and specialized music teachers. Wampole and Serlin (2000) complained that not enough notice is taken of ways of analysing results in the form of test scores in such circumstances. Authors such as Kirk (1995) explain how hypotheses about factors like gender and learning to play a musical

instrument should be tested in such circumstance (see especially Kirk, 1995: 484). Wampole and Serlin claimed that researchers often forget that groupings, such as girls and boys and those learning a musical instrument, as opposed to others, are nested within different schools from which results are drawn. Testing statistical hypotheses needs to be done in ways that avoid bias by adjusting error variances to allow for dependence between scores from children within the same school, regardless of the factors with which researchers are most concerned. Care was taken, therefore, to follow the ways in which error terms for testing hypotheses needed to be calculated throughout the statistical analyses reported in Chapter Five.

3.4 Phase Three - changes over time in musical abilities

Central to the model proposed by Dickens and Flynn (2001) to explain across-generation rises in scores on intelligence tests was their account of how diversity (variation) in scores is produced within generations. They claimed that what happens within generations is a result of reciprocal relations between individuals and their immediate circle of social contacts. If this notion is applied to musical abilities, we would picture that having a given level of them will influence socialisation patterns which will, in turn, affect that level. For tests of general intelligence, Dickens and Flynn assume a multiplier effect induced by the proximal social context, such that socialising with people who have a certain level of intelligence and exercising intelligence together will alter the group's average level. A raise in group level will, in turn, raise

individual members' levels. Dickens and Flynn refer to this social multiplier effect informally as 'snowballing'. An obvious socialisation pattern of interest for this account is taking up the learning of a musical instrument. If musical abilities can be both a product and producer of environments that will raise individuals' levels, then they could become self-enhancing. They might also be following as a consequence of following a National Curriculum that constituted a curricular presence more appropriate than that of its predecessor.

In Chapter Five the importance of learning a musical instrument for the level of musical abilities at a particular time is demonstrated. However, if a social multiplier or snowballing were to be operating for musical abilities, it would be important to follow the same children over time in order for this effect to be discerned. If snowballing is at work, the gap between average scores for instrument learners and children not learning an instrument will get wider over time, and this should happen in non-specialist schools and specialist choir schools.

3.4.1 Gaining access to children who could be followed over time

A change to my teaching post as Head of Music and a move to a different kind of school, which will be referred to as Independent School made possible a study of a group of children in a non-specialist institution over three years. Data collection for Phase Three took place between September 2002 and November 2004. My head teacher and school management were aware of my purposes and no ethical dilemmas were

apparent, since the National Curriculum was being followed and administering the Bentley test was considered unproblematic, given that listening and appraising were curriculum activities. An independent check on how the National Curriculum was being delivered came from an OFSTED-style inspection conducted at the time of the second wave of testing. An attempt was also made to involve colleagues in the other independent schools that had participated in Phase Two of the research in order to see how their pupils had changed over time. However, there had been changes of employment and re-organisations, which meant that only Choir School 3 was able to run the Bentley tests on the same pupils still in the school two years later.

3.4.1.1 Suitability of the Phase Three sample

The school where it was possible to teach the National Curriculum in Music and administer the Bentley tests over three consecutive years was a girls' independent school which did not specialise in music. The school was in central London and had 350 pupils. Although it did not specialise it had a very strong emphasis on music, with many extra-curricular activities taking place weekly and over 250 pupils were having individual instrumental lessons each week. In the first year of testing, there were 33 children aged between 7 and 8, 36 between 8 and 9, 29 between 9 and 10 and 31 children between 10 and 11 years. Figure 3.4 is a box plot for each age group at the first time of testing.

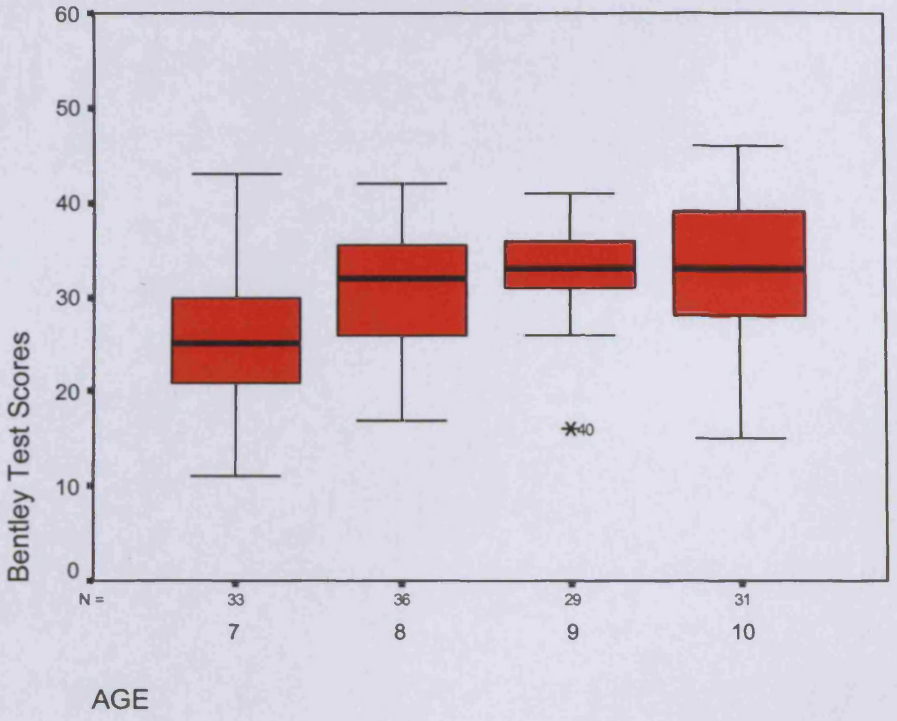


Figure 3.4 A box plot for age groups of Bentley (1966a) test scores at initial testing in Phase Three

There was one nine-year-old pupil who scored much lower than her peers, though her scores were within what might be expected of children just a year or two years younger. The educationally important feature of the spread of scores was that there was considerable room for improvement over time.

3.4.2 Analysing Phase Three results

The general problem with following children in school over time is that no matter how large the sample at the outset, older ones leave and, even among younger children, attrition occurs, for example because of changes in family circumstances. Singer and Willet (2003) discussed how to conduct significance tests for such data collected over time,

stressing that the entire sample for whom results are available in any year are kept in the analysis, meaning that variance calculations are based on as many participants as possible. Peugh and Enders (2005) explained how to perform the calculations with well-known packages for checking the significance of changes over time and it was important to use the techniques they described, as, if a kind of snowballing was taking place, the gap between average scores for children learning an instrument and others would be expected to widen over time. Should it simply remain a gap, the operation of a social multiplier within the generation would be in doubt.

This chapter has overviewed the rationale of the study and the main methods used. The schools used have been only briefly described since the research questions called for analysis of test results rather than 'rich', ethnographic descriptions. However, that does not mean there should be doubt about the value of employing alternative methodologies to investigate how children are affected by both stability and change, either in school circumstances and the status of music in their curriculum or the wider culture.

Chapter Four

Intelligence and musical ability

4.1 Objectives

The overall aim of this chapter is to investigate how closely musical abilities, as assessed by the group-administered Bentley Test of Musical Abilities (1966a), relate to scores on subtests of a general intelligence test, the Heim, Watt and Simmons AH3 Group Tests of General Reasoning (1974). My objectives were to test assumptions made by two approaches to the organisation of abilities in individual children, whose rationale was described in Chapter Three. This chapter looks at the data from Primary Schools 1, 2 and 3 to examine this relationship.

Gardner (1983: 101-2) identified the objective features rhythm, pitch, harmony and timbre as the basic core of musical intelligence. However, he also contended that there were crucial emotional and affective aspects of music, insisting that it was impossible to reduce it to an entirely 'objective' form or to deny its affective power, for:

> 'none of the claims with respect to musical breakdown suggest any systematic connection with other faculties (such as linguistic, numerical, or spatial processing): music seems, in this regard, *sui generis*, just like natural language' (ibid., p. 120).

The activities/behaviours that he listed as reflecting musical intelligence were:

Rhythmic Patterns

Environmental Sounds

Vocal Sounds/Tones

Instrumental Sounds

Musical Composition/Creation

Singing

Percussion Vibrations

Tonal Patterns

Humming/whistling

Music Performance.

According to his theory of multiple intelligences, musical abilities that might be assessed belonged to a 'musical intelligence' and subtests of the general intelligence tests to separate 'intelligences' other than 'musical intelligence' (Gardner, 1993, 1999b). In contrast, on the basis of J. B. Carroll's survey of factor analytic studies (Carroll, 1993), a 'stratum' or level in analysis can be expected where children's scores on any of the subtests of musical ability would predict those on subtests of abilities assessed in intelligence tests.

A common criticism of Gardner's work has been that his theories derive rather more strongly from his own intuitions and reasoning than from a

comprehensive and full grounding in empirical research. As to devising any kind of assessment of musical intelligence, his attitude seems to be the same as that towards assessing others of his intelligences. He acknowledges that he once thought it possible to create a set of tests of each intelligence and then simply to determine the correlation between their scores. He seems subsequently to have moved towards suggesting that researchers should develop several measures for each intelligence, while ensuring that people are comfortable in dealing with the materials and methods used to do so (Gardner 1999b).

Besides there being tests of musical abilities that subdivide them very closely to Gardner's definition of the core of musical abilities, there are widely available intelligence tests, such as the Heim, Watt and Simmons AH3 group tests of general reasoning (1974) which assess what Gardner describes as separate intelligences as subtests of a general intelligence test. The opposition between Gardner's view and belief in a general intelligence invites investigation of whether a test in use that corresponded to Gardner's core abilities for musical intelligence might behave as his theory would predict. Following Gardner, core musical abilities can be expected to be strongly inter-related and tests of 'logico-mathematical' abilities can be expected to be strongly inter-related but any measure of relationship across the two sets of abilities will be weak.

4.2 Research sites

I had contacted the local education authority to ask for information on the socio-economic status of the schools and their surrounding areas used to be told that Primary Schools 1 and 3 in this investigation were predominantly middle class, while Primary School 2 was more mixed, with more pupils from working class backgrounds. Given these assurances, somewhat corroborated by the free school meals information reported in Section 3.2.3, it was decided not to broach the difficult question of asking children about their family backgrounds. Given that these schools appeared to meet the criteria outlined there, I contacted the schools and meetings were set up with their head teachers. All three were very interested in the research and were more than willing to provide samples of children from years five and six. The most recent OFSTED reports for each school were available and are referred to below, though full reference to them is withheld on grounds of anonymity.

The locations and types of schools are as follows:

School	Location	Type of school	Sample size	Females	Males
Primary school 1	Cambridge	State	21	13	8
Primary school 2	Cambridge	State	20	9	11
Primary school 3	Cambridge	State	29	14	15

Table 4.1 Phase One respondents, locations and schools

4.2.1 Primary School 1

The school was a local education primary school set in a predominantly middle-class area for children aged four to eleven. There were 112 children on roll, of whom 16% were claiming free school meals. Children were taught in mixed ability classes organised by age. Music had always played an important part in the life of the school and in year six was taught at Key Stage 2 via a forty-minute lesson each week by a non-specialist. In these lessons, children were given opportunities to develop their understanding and enjoyment of music through performing, composing, listening and appraising. They were also given opportunities to sing with tuned and un-tuned instruments and learned to play the recorder from year two, the school having a recorder orchestra. Instrumental lessons were provided through the local education authority, with children learning the violin, cello, clarinet or flute, the school aiming in future that all children at Key Stage 2 would be able to do so. According to its most recent inspection report:

> 'at both key stages, pupils listen carefully to music in whole school gatherings. The school has one music teacher who works part time at the school. Music is often effectively used to enhance pupils' learning experiences in lessons. In key stage two, pupils make very good progress in composing, performing and evaluating their work. Pupils work very well together in groups to produce appropriate sounds and rhythms. They have a very good understanding of the need to vary the pitch and make very good

use of descriptive vocabulary. They observe each other's directions very closely. Pupils appraise their own and others' performances in music lessons making good suggestions on how they can improve both the composition and their performance of it. They can define an ostinato and have a very good ability to emulate clapped rhythms. They know that they must give their notes the correct value and they have a clear knowledge and understanding of musical terminology. The extra–curricular activity of the school orchestra helps the pupils to develop their musical ability'. (OFSTED Report, School 1, reference withheld}

The sample used from School 1 comprised the whole of year six (twenty one pupils, thirteen females, eight males).

4.2.2 Primary School 2

This school was a local education junior school with 200 children aged seven to eleven years from a predominantly working–class area. 22% of whom were claiming free school meals. The school had one music specialist and classes in each year were taught Music for an hour once a week. In these lessons, which, every other week, included listening and appraisal, history and rhythm work, recorders seemed to take priority. Peripatetic woodwind tuition was available at the school and was taken up by a few pupils. Associated Board exam (AEB grades) preparation was undertaken by the instrumental teachers at the school. The Associated Board of the Royal Schools of Music holds music

examinations each term, ranging from the prep test (a beginners' music test) to Grade 8, which is considered as the pinnacle of all of the grade exams in a variety of instruments, such as piano, strings, woodwind, percussion and brass. Many extra-curricular activities took place each week after school, including a recorder ensemble and choir and concerts occurred twice a year, at Christmas and in the summer. The specialist music room used for all lessons was well equipped with both tuned and untuned instruments. The music teacher stressed that children who did well were those who took advantage of extra-curricular activities and the school's latest inspection report stated that:

> 'Overall, standards in music were well below average at the time of the last inspection in 1997. There has been considerable improvement over the last few years and standards are now in line with national expectations. Instrumentalists regularly accompany the singing in assemblies, sight-reading the notation. The choir, consisting of pupils from the junior classes, confidently sings songs with complex rhythms. There are about thirty-five pupils in this choir, which is an indication of their enthusiasm and commitment. Pupils in Year One identify high and low pitch.
>
> The teaching observed during the inspection was good or very good. The scheme of work ensures progression throughout the school and the combined singing sessions taken by the head teacher ensure that there is a challenging repertoire. Pupils have

access to the music of a variety of western composers. Parents are extremely supportive of the subject. Their enthusiasm has contributed to the increased profile of the subject. The provision for music makes a good contribution to pupils' social and cultural education.' (OFSTED Report, School 2, reference withheld)

The sample used from year six comprised twenty pupils (nine females and eleven males).

4.2.3 Primary School 3

This school served children from five to eleven years old, 13% of them claiming free school meals, primarily from a middle-class catchment area mainly the city centre and neighbouring areas. The school contained approximately 120 children accommodated in four classes. The school had no full time member of staff specialising in music but employed a peripatetic music teacher from the local education authority for two and half hours per week whose duties included singing in assembly and taking responsibility for Key Stage 1 and 2 Music. In Year Six, children were taught for one hour per week, focusing on rhythm and melody work. The school had no orchestra or choir at the time when fieldwork took place, although it had two recorder groups and children sang in assembly. Two other peripatetic teachers (flute and clarinet) gave lessons to four children from year six. Its most recent inspection report claimed that:

'Pupils achieve standards that are expected of their age in this school. This is an improvement since the previous inspection, when attainment at the end of Key Stage two was below national expectation. The head teacher recognized the need to develop this subject. A peripatetic teacher has been employed to teach each class. She has very good subject knowledge and a high degree of personal enthusiasm that is reflected to pupils. By the end of Key Stage one, pupils can sing simple songs in tune and control the volume and tempo of their voices. They show enjoyment in singing action songs. They listen attentively and describe sounds made by shaking, scraping, plucking and blowing.

The peripatetic teacher ensures that all lessons are very well planned but has limited opportunity to develop skills in the short time allocation. She makes very effective use of the keyboard and demonstration of singing techniques. Pupils respond positively to her suggestions and show enjoyment in singing. The school has established a clear policy and scheme of work since the previous inspection. These are now central to teacher's planning. The school has adequate resources that are well organized and accessible.' (OFSTED Report School 3, reference withheld)

The sample used from year six consisted of fourteen females and fifteen males, giving a total of twenty-nine pupils.

4.3 Research measures

The Bentley Measures of Musical Ability (1966a) was used to test musical ability; this is a group test designed for those aged seven to twelve, the age range concerned in the investigation, which measures components of musical ability separately, making it possible to identify whether children have strengths and weaknesses in particular areas. It has four elements, pitch discrimination (20 questions), tonal memory (10 questions), chord analysis (20 questions) and rhythmic memory (10 questions), and is similar to other group tests, such as the Seashore (1960) and Wing (1961) music ability tests, which also measure basic elements involved in music making. The Bentley tests were conducted in distortion-free rooms in all schools, with all children facing the loudspeaker from which the stimuli came. They were replayed on tapes that were in good condition and free from distortion in the classrooms. The loudspeaker was positioned with the volume adjusted so that all the children could hear without straining and pupils were informed that they must listen carefully to the instructions on the tape, which would tell them exactly what to do.

The tests are based on the assumptions that the most elemental form of music is the melodic phrase, which comprises tonal configuration within a rhythmic framework. The appreciation of a melody is impossible without the ability to recall, in detail, sounds that have been heard and this depends upon the ability to apprehend the constituent factors of melody, pitch and timbre. Finer than semitone pitch discrimination is essential in singing and all instrumental playing, except at the keyboard, in order to

achieve the necessary good intonation. Where chords are not fundamental to melody, it is necessary for singers or instrumentalists to be aware of the different sounds of other singers or players in performance and the greater their awareness the more appropriate their own contribution to the ensemble is likely to be.

The first test, pitch discrimination, measures a sense of pitch using twenty pairs of different tones. Children have to say whether the second tone of the pair is higher or lower than the first, for differences in pitch extending from half a tone to one ninth of half a tone. The second test, tonal memory, uses a melody which has five notes, subjects having to say which note has been changed when the melody is played a second time. The third test, chord analysis, is similar in design to a music test developed by Wing where children have to decide how many notes are played in a chord that is heard only once. The final test, rhythmic memory, keeps pitch and loudness constant while altering the rhythm a second time round, following a test by Seashore in that respect.

The tests do not measure musical ability in total, of which there is no existing, generally agreed definition. However, they do measure the child's ability in the basic judgements that are needed in music-making and reveal very wide ranges of ability at any given chronological age. In order to provide a variety of types of judgment functions, they are presented in the order of pitch discrimination, tonal memory, chord analysis and rhythmic memory. For simplicity in the recorded presentation

of the tests and on answer forms, these are referred to as pitch, tunes, chords and rhythm, terms unlikely to confuse even the youngest pupils. The recorded instructions and samples are such as can be easily understood by most seven-year-old children upon a single hearing, and without further interruption from teachers or test administrators; they are virtually self-administering. The whole set of tests, including completion of the few details required at the beginning of the answer form, can be completed in half an hour. The maximum possible raw score for the test is 60. A copy of the Bentley (1966a) Measures of Musical Ability can be seen in Appendix 1. The reliability coefficients obtained by Bentley (above 0.80) are high, in spite of the tests having only 60 items in total. Given the very wide ranges of scores in the Bentley norms, standardised scores based on those of participants in this research were used in preference.

The Bentley test still has relevance for contemporary education, measuring elements of music that are currently used in all of the attainment targets of the National Curriculum for Music and, hence, all those that school inspectors look for in their music inspections, such as pitch, rhythm, chords and tunes. It was chosen for this research for its relevance to current educational practice and content relevance to Gardner's theory that rhythm, pitch, harmony and timbre are at the core of musical intelligence.

The test of intelligence used for this research in Primary Schools 1, 2 and 3 was the Heim, Watt and Simmons AH3 Group Tests of General

Reasoning (1974), which is in three parts and assesses verbal, perceptual and numerical ability, thus spanning more than one of Gardner's 'intelligences' which, according to psychometric theory, belong to general intelligence. The tests are appropriate for age groups of ten years and upward and all items are multiple choice. All three parts assess reasoning, the verbal test specifically not being a vocabulary test and the perceptual test not simply being a test of spatial perception or visual acuity. The purpose of testing was not to give a detailed profile of each child or detect any bias towards one or more of the ways of thought processing. Thus, only twenty items from each subtest were given (half the full number) and time limits were correspondingly halved, allowing the test to be administered within a single lesson period (see Section 3.2.2.2 for further detail).

4.4 Data analysis techniques

Tests were administered to females and males from the same year group (year six, age ten) in three different schools in a nested design. All comparisons between schools were made to check that data from all the individuals could be put together. Bivariate correlations were used to see how strongly subtests of the same test were inter-related. Finally factor analytic techniques were used to see if the number of variables could be reduced and classified on the basis of a structure between them.

The question was, 'would a test in use that corresponded to Gardner's core abilities for musical intelligence behave as his theory would predict?'

This led on to the hypothesis concerning the Bentley test, that intercorrelations between scores on its subtests will be strong.

According to Gardner, logical-mathematical reasoning is a separate intelligence. This leads to the hypothesis that intercorrelations between parts of the Heim test will be strong. The theory also asserts that intercorrelations across parts of the two tests should be weaker, otherwise musical ability and intelligence are not readily separable. Carroll's theory raises the question of what would happen in a factor analysis.

The following hypotheses are examined, acceptance of the first of which would support Gardner's theory and the second lead to its rejection:

i) There will be a separate music factor and a separate logical–mathematical factor;
ii) There will be only one general factor when all the correlations are entered.

A theory of separate intelligence would predict that intelligence tests could be shown to be measuring something different from musical ability, as assessed by a test such as the Bentley. Opponents of Gardner would predict that components of the Bentley test could be subsumed under a general intelligence factor.

4.5 Analysis of data

4.5.1 Between-School Differences

The Heim (1974) test scores from the three primary schools are shown in Table 4.2.

School	Sex	Number of pupils in the sample	Average Heim intelligence score	Standard deviation
Primary School 1	Female	13	47.23	7.90
	Male	8	42.63	7.05
Primary School 2	Female	9	36.11	8.45
	Male	11	26.45	12.66
Primary School 3	Female	14	31.79	12.60
	Male	15	30.40	10.52

Table 4.2 Primary School 1, 2 and 3 Heim (1974) intelligence test scores

Primary School 1 showed the highest average intelligence score of 47.23 for females. School 3 which, like it, had a relatively middle class catchment area, showed an average score of 31.79, which was lower than that of School 2 (36.11) in a relatively working-class area. The same pattern was obtained for boys' scores across the three schools, though overall gender difference was not significant. School 1 showed a relatively narrow spread of results, with a standard deviation of 7.90 for females and 7.05 for males, with larger spreads for both elsewhere, particularly for males in School 2 (12.66) and females in School 3 (12.60).

Analysis of variance for a nested design (individuals within schools) was carried out before putting together the data from the three schools. Testing effects in nested designs requires careful choice of error terms for calculating F ratios.

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
SCHOOL	Hypothesis	2666.821	2	1333.411	13.255	.070	.930
	Error	201.196	2	100.598(b)			
SEX	Hypothesis	451.742	1	451.742	4.486	.165	.685
	Error	207.498	2	100.695(c)			
SEX(SCHOOL)	Hypothesis	201.196	2	100.598	.935	.398	.028
	Error	6883.756	64	107.559(d)			

a .986 MS(SCHOOL) + 1.389E-02 MS(Error)

b MS(SEX(SCHOOL))

c .986 MS(SEX(SCHOOL)) + 1.389E-02 MS(Error)

d MS(Error)

Table 4.3 Two-factor nested ANOVA to test for school and sex/gender effects on the intelligence test

The ANOVA reported in Table 4.3 revealed no main effect of school, sex, or interaction (sex differences depending on which school). The school effect could have occurred by chance between five and ten percent of the time (p=.07).

The original norms of the Bentley Musical Ability Test allowed classification of children according to whether or not they fell in the top grades (A and B) or below. Table 4.4 shows how they could be grouped in this way in the three schools, according to sex.

School	Sex	Top 20% (AB) according to Bentley norms	Among the 80% (CDE) grade according to Bentley norms
Primary School 1	Female	13	0
	Male	8	0
Primary School 2	Female	6	3
	Male	3	8
Primary School 3	Female	9	5
	Male	8	7
Total		47	23

Table 4.4 Distribution of children in Primary Schools 1, 2 and 3 according to Bentley Music Test (1966a) original norms.

According to the original norms, all the children in Primary School 1 had relatively high scores, on the basis of the 1966 norms.

Table 4.5 shows descriptive statistics for the numerical scores on the Bentley test of musical ability across primary schools one, two and three.

		Bentley Test Scores		
SCHOOL	SEX	Mean	Std. Deviation	Number of pupils
Primary 1	Female	45.54	5.562	13
	Male	48.00	4.243	8
	Total	46.48	5.134	21
Primary 2	Female	34.89	8.007	9
	Male	29.55	6.330	11
	Total	31.95	7.451	20
Primary 3	Female	35.21	9.192	14
	Male	32.87	7.110	15
	Total	34.00	8.120	29
Total	Female	38.86	9.087	36
	Male	35.35	9.499	34
	Total	37.16	9.390	70

Table 4.5 Mean scores on the Bentley Test of Musical Ability according to school and sex within school

A two-factor ANOVA was used to check for significance of school differences and sex within school differences.

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
SCHOOL	Hypothesis	2594.713	2	1297.356	16.821	.056	.944
	Error	154.253	2	77.126(b)			
SEX	Hypothesis	50.454	1	50.454	.657	.501	.244
	Error	156.337	2	76.753(c)			
SEX (SCHOOL)	Hypothesis	154.253	2	77.126	1.534	.223	.046
	Error	3216.937	64	50.265(d)			

a .986 MS(SCHOOL) + 1.389E-02 MS(Error)

b MS(SEX(SCHOOL))

c .986 MS(SEX(SCHOOL)) + 1.389E-02 MS(Error)

d MS(Error)

Table 4.6 Two-factor nested ANOVA to test significance of school effects and sex/gender effects on the Bentley Test of Musical Ability.

Although the superiority of the scores in the one school is close to significance, the range of abilities for the schools taken together is not a problem for deciding whether musical ability is a 'separate intelligence'. There would only have been a problem regarding choice of research sites if all three schools had obtained average standardised scores as high as those for the first.

4.5.2 Internal Structure of the Heim Test

It was of interest to investigate the internal structure of the Heim intelligence test, so a Pearson Product moment correlation analysis was carried out on it, which can be seen in Table 4.7. A Pearson correlation is conducted when variables are continuous. The Verbal, Number and Perceptual scores of the Heim tests were all significantly positively correlated with each other. A positive correlation indicates that as one variable increases (here the verbal part of the Heim test) the other also increases.

		VERBAL	NUMBER	PERCEPTUAL
	N of cases	70		
VERBAL	**Pearson Correlation**	1	.629(**)	.648(**)
	Sig. (2-tailed)	.	<.0001	<.0001
NUMBER	**Pearson Correlation**	.629(**)	1	.644(**)
	Sig. (2-tailed)	<.0001	.	<.0001
PERCEPTUAL	**Pearson Correlation**	.648(**)	.644(**)	1
	Sig. (2-tailed)	<.0001	<.0001	.

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.7 Correlations between subtest scores on the Heim test.

4.5.3 Internal Structure of the Bentley Test

From the analysis in Table 4.7, it can be seen how closely the parts of the Heim intelligence test were related to each other. The scores on its subtests correlated with each other more strongly than those found on the Bentley test: a Pearson product moment correlation analysis, presented in Table 4.8, showed that Pitch, Tunes, Chord, and Rhythm scores were, in turn, all significantly and positively correlated with each other. A positive correlation indicates that as one variable increases (Pitch) the other variable also increases. The size of the correlations was consistent with treating them as scores on a single set of abilities.

		PITCH	TUNES	CHORD	RHYTHM
	N of cases	70			
PITCH	**Pearson Correlation**	1	.642(**)	.425(**)	.362(**)
	Sig. (2-tailed)	.	<.0001	<.0001	.002
TUNES	**Pearson Correlation**		1	.461(**)	.267(*)
	Sig. (2-tailed)		.	<.0001	.025
CHORD	**Pearson Correlation**			1	.257(*)
	Sig. (2-tailed)			.	.032
RHYTHM	**Pearson Correlation**				1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 4.8 Correlations of the subtests on the Bentley Test of Musical Ability

4.5.4 Correlations Between Subtests of the Heim Test And Bentley Test

Statistical analysis of the internal structure of the Heim test and the Bentley test showed that each could be considered tests of a single set of abilities. But if they were to be regarded as separate intelligences, inter-correlations between subtests from the two tests should be weak. The relevant correlations are presented in Table 4.9. Pearson correlations reveal that Verbal, Number and Perceptual scores were all significantly, and positively, correlated with Pitch, Tunes, Chord and Rhythm, indicating that as one variable increased (e.g. Verbal), the other variable also increased (e.g. Pitch). Perceptual scores from the Heim test correlated as highly with Pitch scores (0.62 $p<0.01$) as with other subtests of intelligence.

		HEIM SUBTESTS		
BENTLEY SUBTESTS		**VERBAL**	**NUMBER**	**PERCEPTUAL**
		70		
PITCH	**Pearson Correlation**	.548(**)	.453(**)	.622(**)
	Sig. (2-tailed)	<.0001	<.0001	<.0001
TUNES	**Pearson Correlation**	.476(**)	.329(**)	.528(**)
	Sig. (2-tailed)	<.0001	<.005	<.000
CHORD	**Pearson Correlation**	.410(**)	.312(**)	.353(**)
	Sig. (2-tailed)	<.0001	<.009	<.003
RHYTHM	**Pearson Correlation**	.323(**)	.266(*)	.387(**)
	Sig. (2-tailed)	<.006	<.026	<.001

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 4.9 Correlations between the subtests on the Bentley test of Musical Ability and the Heim Intelligence Test

4.5.5 Factor analysis

Factor analysis was used to see if the entire matrix of correlations could be regarded as having a single factor structure. The subtests of the Bentley music test and the Heim test were all subjected to Principal Components factor analysis. The number of factors retained was determined using the scree plot criterion (Cattell, 1978). A scree plot is used to determine how many factors to retain. One should retain all factors on the plot until the one where the line starts to level off. In the plot in Figure 4.1, a 1-factor solution is retained.

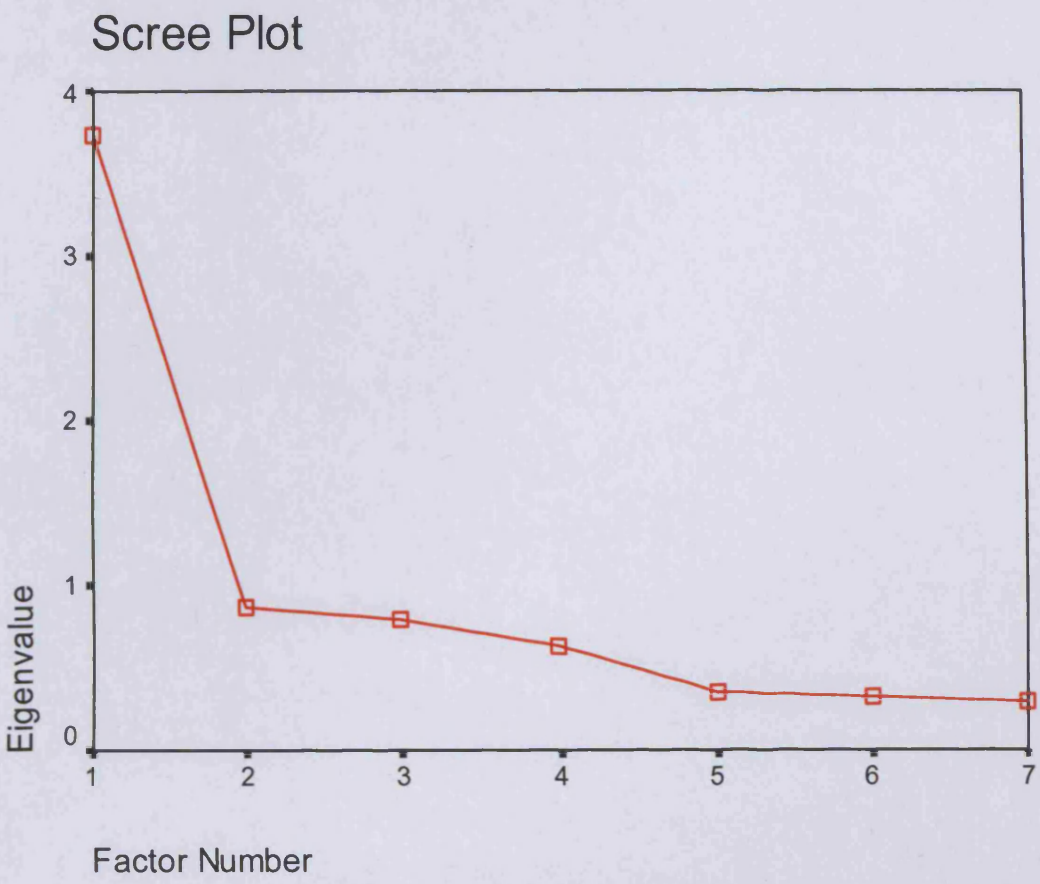


Figure 4.1 Scree Plot criterion of the Bentley Music Abilities test and the Heim Intelligence test

Using principal component analysis, there is only one eigenvalue greater than one, which indicates that the one–factor solution is entirely acceptable, this one factor explaining 53.37% of the variance.

Factor Matrix	Factor One
Verbal	.81
Number	.73
Perceptual	.84
Pitch	.81
Tunes	.73
Chord	.61
Rhythm	.52

1 component extracted

Table 4.10 Principal Component Analysis and the sub-scores on the Bentley and Heim tests

Carroll (1993) argues for conducting factor analyses of tests and subtests using the method of principal axis factoring. If this is done the result is as indicated in the scree plot – only one factor has to be considered.

Factor Matrix	Factor One
Verbal	.776
Number	.667
Perceptual	.827
Pitch	.775
Tunes	.672
Chord	.528
Rhythm	.439

Extraction Method: Principal Axis Factoring.

1 factor extracted. 5 iterations required.

Table 4.11 Factor Matrix of the subtests of the Bentley test of Musical Ability and the Heim Intelligence test

All of these items on the two tests - verbal, number, perception, pitch, tunes, chord, and rhythm - load positively on Factor I, whichever method

of factor analysis is used. The seven subtests can be regarded as alternative ways of measuring one generalised construct.

4.6 Discussion of results

In Section 4.4, the following hypotheses were presented:

i) There will be a separate music factor and a separate logical–mathematical factor;

ii) There will be only one general factor when all the correlations are entered.

The main question to be addressed concerned the closeness of the relationship between musical ability and the Heim intelligence test. Investigation of the relationship between the two tests required examination of the internal structure of both sets of data with Pearson product correlations and principal components analysis to see how many factors were involved.

To examine the first hypothesis, the correlation matrixes for the seven subtests were compared. The issue is whether two factors are involved, a musical intelligence factor and a general intelligence factor, or whether there is just one general ability. Table 4.9 gave the correlation matrix for each subtest of the IQ test and the musical abilities test, from which it can be seen that the perceptual scores ($r=0.62$, $p<0.01$) on the Heim test correlate as highly with pitch scores on the Bentley test as with other subtests of intelligence.

Factor analysis has been used in this analysis because it detects structures without making contentious assumptions about the direction of causality. It shows how closely musical ability and intelligence are related without making claims that one causes the other. The results do not make any distinction between absolute and confirmatory use of factor analysis. The usage is mainly heuristic (thinking about a topic that is convenient, even if not true), except where this chapter tries to choose between alternative solutions as to which abilities belong with each other within music and intelligence test scores. When the correlations between subtests of different sets of abilities were examined, they were too strong to support a 'separate intelligences' viewpoint. Results supported the interpretation of musical abilities, as assessed by the Bentley test, as belonging to a general set of intellectual abilities. Using factor analysis and the techniques favoured by Carroll (1993), support was found for the claim that both the musical abilities and intelligence test assessed a stratum of abilities having a general factor in common. It appears that there may be evidence against Gardner's (1995) view that there is a separable musical intelligence. It is argued that the simpler solution that implies close relations between musical abilities and intelligence fits the results well. While this does not necessarily rule out Gardner's contention that there are multiple sets of abilities, it gives a basis for preferring directions in music education which accept that they are closely related. These results, therefore, failed to support the first hypothesis, showing

that musical ability and general intelligence may be more closely related than Gardner's theory suggests.

On the other hand, a problem for claiming a single all-round ability factor is that the Bentley Test results indicate that school effects very near to statistical significance can be obtained. Heim intelligence scores seem much less likely to show school effects than Bentley test scores. Calculating intra-class correlations (an estimate of how much variance is attributable to school differences rather than individual differences) revealed that intelligence and musical abilities tests do not behave in the same way. To check the relative homogeneity of pupils' scores on a test within schools, intra-class correlations were calculated. In the case of the musical ability test, intra-class correlation was 0.54 ($p<0.01$). For musical ability, school means differed and there was not much variation within the schools. The situation was similar for overall intelligence scores but intra-class correlations were considerably lower ($r=0.37$, $p<0.01$). Box plots of the scores, given as Figure 4.2, indicate the way in which the two tests behaved differently, the intelligence test showing wider within-school variation and outlying scores while the Bentley test showed less within-school variation.

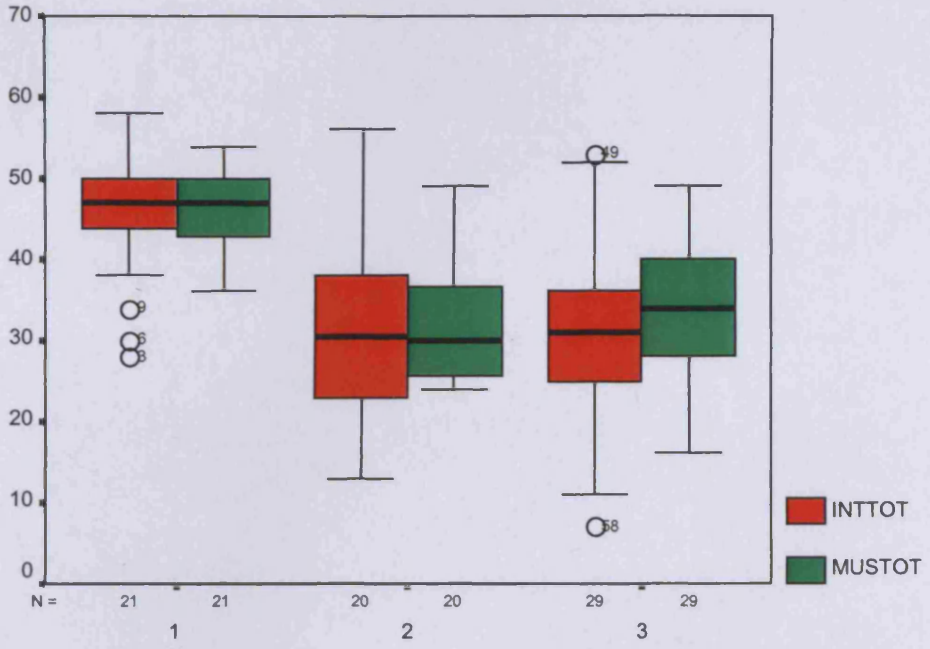


Figure 4.2 Box plots of intelligence and music scores in Primary Schools 1, 2 and 3

4.7 Summary of results

In analysing the relationship between musical ability and general intelligence, two hypotheses were proposed: (i) that there would be separate music and logical–mathematical factors, which cannot be supported, as musical ability and intelligence were too closely related to uphold this hypothesis, and (ii) that there is only one general factor, which can be supported by the results shown in this chapter.

The internal structures of the Heim test and the Bentley test indicate that there is much in common between the perceptual scores on the Heim test and pitch scores on the Bentley test, such that a single factor solution is

superior. As against the notion of multiple intelligences, it is difficult to unravel musical abilities from other kinds of abilities. However, it is acknowledged that the evidence presented here is from a limited number of children in quite a high musical ability range. At the same time, school inspection reports for the participating schools contained comments on performances such as 'emulating clapped rhythms', 'giving notes their correct value', showing understanding of the need to vary the 'pitch', 'identifying pitch in male and female voices when speaking', and 'understanding musical terminology' such as 'timbre' 'although they do not use it when describing the sounds they hear'. These were all attainments that presupposed abilities assessed by the Bentley test and further strengthen claims for the validity of conclusions from the pattern of results in this chapter. The finding that general intelligence and musical ability could not be clearly separated does not necessarily require reversion to the factor analytic view.

4.8 Conclusion

While Gardner's (1983) theory of multiple intelligences has had strong influence in making the case for universal access to musical education, there are also theoretical positions that do not rely on rejection of traditional approaches to assessment and may be preferred. Musical abilities and intelligence appear to be more closely inter-related than Gardner's (1995) theory implied, for there is evidence that concepts and terminology from the study of intelligence may be applicable to musical abilities.

It could be argued that any attempt to measure a specifically genetic predisposition is doomed to failure if the genes responsible require a particular set of environmental circumstances in order to manifest themselves. Without the environmental conditions necessary for the expression of a particular genetic trait (e.g. musical aptitude), there will be nothing left. It is compatible with acceptance of a genetic component to insist on very large environmental effects being responsible for changes in intelligence. The developments in showing how intelligence can be self-enhancing and not just self-sustaining can be followed up with reference to musical abilities. If the kind of self-enhancement of intelligence levels proposed by Dickens and Flynn (2001) also occurs with musical abilities, it may be that both musical abilities and intelligence scores might correlate with level of musical experience. Further implications of the application of such concepts and explanations to musical abilities are explored in Chapter Five.

Chapter Five

Musical Abilities, Experience and Conceptions of the Self

5.1 Background

Chapter Four sought to deal with the issue that concepts and terminology applicable to more general intellectual abilities may also apply to musical abilities. It was found that tests of intelligence and Bentley tests of musical ability were related closely enough to uphold this idea. It has also been suggested that it may be that environment selection in the case of cognitive skills means that individuals with higher levels of musical skill tend to join circles of immediate contacts with similar levels of skill, initiating a reciprocal contextual effect or positive feedback loop: that is to say, cognitive skills can become self-enhancing. Such thinking has not been applied to musical abilities before.

The general question to be addressed in Phase Two of the research is whether there could be indications that the kinds of influence invoked as explanatory factors for 'boosting' overall levels of general intelligence might be at work on levels of musical ability. More particularly, the question to be addressed in this chapter is whether any indications can be found in very different kinds of school for boosting effects on overall levels of musical ability via music education. Dickens and Flynn (2001) were confident that strong environmental influences on the development of general intelligence that they unmasked would apply to

other sets of abilities. Given evidence presented in Chapter Four that musical abilities, as assessed by the Bentley Test, can be considered as among a stratum of abilities that belong with general intelligence, it became important to see whether support for Dickens and Flynn's confidence could be found in their respect.

Until the 1990s, discussion of the development of children's abilities could be described as focused upon intra-individual contexts and within-generation or age-graded changes in what children could do. In considering social contextual influences, emphasis was very much laid on immediate or most proximal circles of contacts - families in early childhood and immediate circles of peers in middle childhood. Influences from more distal social contextual elements, such as curricula and school systems, tended to be regarded merely as background to what was changing within the person. Between-generation changes (history-graded changes) were not given the amount of attention that they came to receive from a developmental, contextualist perspective, where Lerner (1991, 1999) and others changed emphases such that development came to be thought of as a change in relations between intra-individual contexts and factors in social and temporal contexts.

Under the influence of such views, the study of children's abilities widened from what was within children in relation to unidirectional influences of their parents and peers toward seeing such abilities as resulting from children of a given age,

with a given level of ability, influencing their social context and, over time, having that level of ability, in turn, influenced by that social context. Within the latter, the most proximal circle of contacts, such as parents in infancy, siblings within the family and, during middle childhood, peers within the same school class, continued to be given importance as influences, but so did more distal influences, such as between-generation (history graded) changes in what is expected at school.

In an application of this way of thinking to general intelligence, Dickens and Flynn (2001) insisted that history-graded changes in the wider temporal context must be considered in order to unmask effects of factors outside individual persons on levels of general intelligence, as assessed by traditional intelligence tests. In the case of general intelligence, they invoked history-graded changes in cognitive demands of the work place and increased use of symbols in the wider culture as explanatory factors for changes in average score levels in countries with developed economies. Informally, they referred to these effects on overall levels of scores on intelligence tests as 'boosting' effects: history-graded changes resulting in persistent effects in individuals' most distal social contexts in terms of such emphases on cognitive demands in the workplace and extensive use of symbols in the wider culture. These effects were regarded as persisting throughout individuals' life courses, mediated by immediate social contexts, so that over the life course, individuals were affected. Those born into contemporary families come to show behaviours relevant to abilities that have

come to be valued in wider cultural contexts. Such behaviours will be responded to in ways that will nurture them, while behaviours irrelevant to valued skills will tend to be discouraged. Given such initial nurturing, persisting over time, contacts outside the family (age-graded changes) are likely to be more frequent with people whose behaviour has also been nurtured to accentuate what is valued in the wider culture. Thus, children tend to follow socialisation patterns that are not only produced by early individual differences but which, in turn, have the effect of raising levels of the same abilities in them and the immediate circle of contacts. Dickens and Flynn (2001) refer to this reciprocal influence as a 'social multiplier' or, more informally, 'snowballing'. They assume a within-generation or age-graded effect on abilities as well as a between-generation or history-graded effect. This chapter is concerned with indications that a change, such as including Music in the National Curriculum, can engender a boosting effect of the type described above, while in Chapter Six we will look for indications that snowballing can happen with musical abilities.

While all student participants in the investigation described in this chapter could be regarded as being within middle childhood, it is assumed that cumulative environmental effects had already been at work within them. Within any particular institution, or unit, such as a class or year, children will have a more immediate circle of peers. The families from which they come will have tended to gravitate towards other families with similar values in their communities. For

such reasons, children within very similar social contexts, as judged by economic or other indicators of social position, can still be expected to follow very different ways of describing themselves.

5.2 Objectives

The objectives of the research described in this chapter concern influences on musical abilities, as assessed by the Bentley test. Its overall aim is to begin evaluation of a boosting and snowballing model of musical abilities in contrast to approaches to music education that emphasise non-musical goals. It contains evidence from five maximally different schools concerning the kinds of change that may have been engendered in them by the inclusion of Music in the National Curriculum for England and Wales. The assumptions of a boosting and snowballing model closely follow those of age-related and inter-generational change in intelligence test scores. Both take a 'developmental contextual perspective' (Lerner, 1986, 1991) in which assigning a place in the National Curriculum for Music could be expected to have increased children's musical abilities across the range of schools, from specialist and privileged to disadvantaged. As such it might represent the beginning of an inter-generational change in the general level of musical abilities throughout England and Wales.

In Chapter Four, using Primary Schools 1, 2 and 3, analysis of quantitative data suggested that a widely used test of musical ability, the Bentley, used along with

a test of logico-mathematical intelligence, the Heim, supported the claim that there is a 'stratum' or level of generality from which both sets of ability come. For the pupils in the schools studied, the subtests of the Bentley and most subtests of the intelligence test fell within a single factor. Such a result supports approaches to musical abilities that do not involve insistence on rejecting traditional forms of assessment.

If the social environment is thought of not only in terms of the nearest or most immediate circle of people but also more distal social influences, like the organisation in schools, both may be regarded as properly implicated in developmental changes in abilities. Dickens and Flynn (2001) claimed that historical changes impact on individuals' social environments throughout the life course. Following their approach to musical abilities, the question arises as to whether historical changes in music education have an impact at the level of individual children. Even more particularly, the question becomes whether the introduction and implementation of a National Curriculum framework that includes Music can be shown to have impacted on schools spanning a wide range of social variation and whether these are felt at the level of individual pupils.

The possibility was raised at the end of Chapter Four that research on the influence of environmental selection on intelligence might be applicable to musical ability. It may be that in any institutional environment, children tend

move among peers whose interests and abilities in music are very similar to their own, for example, as assessed by Bentley scores for musical ability. In schools whose ethos and selection criteria heavily favour those with musical abilities, it may be even more the case that those whose abilities and interests are unlike those of the majority will gravitate towards each other.

Draper and Gayle (1987) argued that the most commonly cited reason for teaching music, mentioned by 70% of authors, was to provide an opportunity for self-expression and creative pleasure, thus influencing the self-concept. The cultural value of exercising musical abilities, as reflected by the Draper and Gayle survey, seemed more to do with children's feelings of global self worth, as described by Harter (1988, 1999), than the prospect of raising overall levels of musical abilities. There are measures of the way children think of themselves in middle childhood which cover global self worth (Harter, 1988; 1999; Bellin and Rees, 2004), as well as academic and athletic competence and other domains which have, by then, become differentiated. At the same time, it should be recognised that a history-graded, institutional change has affected the value placed on children's musical abilities with the introduction of a National Curriculum. Far from music lessons being regarded as a break from the school curriculum, or even needing justification as a way of raising feelings of global self worth, our education system from 1989 has treated them as a means of producing intellectual development. Music was included as a foundation subject in the National Curriculum of England, Wales, Scotland and Northern Ireland as

a subject where skills, knowledge and understanding were to be improved up to the age of 14 (Paynter, 1992). If such a change, along with wider cultural influences on musical abilities, could have a boosting effect, raising overall levels of musical ability, there should be evidence of increasing levels on relevant test scores. Moreover, such evidence should be available in maximally different kinds of schools. However, in spite of such changes, if music is mainly to do with self-expression, creative pleasure and feelings of global self worth, we might expect an absence of indications of raising overall levels of ability among students outside specialist environments. If the introduction of a National Curriculum is to be thought capable of raising overall levels of ability, musical abilities and attainments should be related to feelings about academic competence, rather than global self worth. It would not affect the argument if musical abilities and attainments turned out to be related to global self worth as well as a sense of academic competence. But that should only happen where other curriculum subjects are related to both. If musical skills are treated as part of intellectual development and are fully integrated into the school curriculum, music should be influencing children's conceptions of themselves in the same way as English or other subjects already well established in the curriculum.

The objectives of this investigation described in this chapter were to go into very different kinds of schools and investigate whether musical experience could lead to raised levels of core abilities, in spite of very large differences in musical opportunities. The second objective is concerned with how musical abilities feed

into the conception of the self as other academic subjects. High global self worth can be maintained in spite of lacking attainment in curriculum subjects. If the National Curriculum was experienced as policy intended, music should influence the self concept in the same way as other subjects. Higher musical abilities should raise the sense of academic competence but have very little or no influence on the global sense of worth.

5.3 Research design

This second phase of the overall study used children whose average age was 10.34 years (*SD*=1.01) in schools selected to represent maximum variation in opportunities for music education. To investigate relationships between assessments of their music ability, academic attainment, self-concept and musical experience, pupils at five establishments - three specialist, music choir schools and two local authority state primary schools - were selected. Their musical experience was assessed by a questionnaire of my own devising, while the tests of academic attainment were widely-used measures and obvious choices for our purposes, given their relevance to the National Curriculum.

5.4 The institutional contexts of the schools

5.4.1 Music in the National Curriculum for England and Wales

Participating schools were in the West of England and South Wales. The National Curriculum, introduced in primary schools in England and Wales

between 1989 and 1996, aimed to give all children a broad and balanced education and also to ensure that what happened in lessons conformed to a single programme of study (Pratt and Stephens, 1995). English, Mathematics and Science were specified as core subjects, compulsory up the age of 16. Music, along with Design and Technology, Information and Communication Technology (ICT), History, Geography, Art, and Physical Education, were specified as foundation subjects, compulsory up to the age of 14. The curriculum began changing again from the year 2000, Music remaining a foundation subject.

5.4.2 School inspections

State schools are required to receive and fee-paying schools may invite inspections from non-ministerial government departments, in both England and Wales. The kind of inspection follows legislation laid down in 1996, its timing having been adjusted by further legislation in 1997 and again more recently. Inspection reports contain evaluations based mainly on written evidence submitted to a closely specified format by each school, as well as what was observed during a limited sampling of lessons taught during a visitation that may last from two days to a week and be conducted by two or more persons, depending upon school level and size. Their evaluative comments not only concern core subjects of the curriculum but also foundation subjects, including Music. Some fee-paying or 'independent' schools are inspected by a non-governmental Independent Schools Inspectorate, almost always involving individuals with at least former experience of conducting statutory inspection,

subject to the same regular cycle and resulting in the same kind of report as those received by state schools. Independent schools do not have to implement the National Curriculum but many underline a claim that they do, and more.

The inspection reports used for state schools in this study were those from the inspection round which had preceded the time of data collection, and were kept as guidance for the next round in the cycle. Under the 1996 legislation, these inspection reports were available to any enquirers. Those for independent schools were made readily available and had taken place within two years of the research being carried out in October 2001. The level of cooperation with teachers in all schools was very high. Information culled from them stood alongside that from a questionnaire administered to students concerning their individual musical experiences (see Section 5.6.2) and a sub-sample of students also responded to a questionnaire assessing six domains of their conceptions of themselves (see Section 5.6.3).

5.5 Choosing schools and sampling students

5.5.1 Seeking school contrasts

It was decided to conduct the research in maximally different kinds of schools, since a goal of the National Curriculum was to require that all its elements should be experienced by children, whatever school they attended. To some extent, school inspection systems' rationale is to establish whether schools

follow National Curriculum specifications. Given that there are schools specialising in music, opportunities and access to specialist teaching in them can be expected to differ considerably from what can be provided in those regarded as disadvantaged. However, student and parental motivations for school choice can be very complex and take-up of opportunities can be expected to vary in state schools and even within the same specialist school. For this reason it was important to find out how pupils described their experience of the music curriculum, as well as considering reports of school inspections.

Schools, then, were selected on the basis of maximum variation in musical provision and experience to allow comparison between those that represented the longest traditions of specialising in music and others that might be regarded as disadvantaged. As the investigation was school-based, it was regarded as important to follow distinctions made by education authorities and the Inspectorate. Specialist and state schools were represented in order to ascertain what differences were discernible with regard to the musical opportunities which they offered and relationships between them and music ability and intelligence of their pupils between the ages of seven and eleven. It was hoped that choosing schools in both England and Wales, given the strong tradition of music in Welsh schools and the extent of difference between *Cwricwlwm Cymreig* and the English version from which, at numerous points, it departed, would be a source of insight rather than 'noise' when analysing data.

Though schools that teach through the medium of Welsh often have strong links with the Eisteddfod and other music festivals in Wales, the Welsh schools used in this study were all designated English medium.

Following the National Curriculum was intended to give access to the same elements or activities to all pupils: performing, listening, composing and appraising or evaluating music (Paynter, 1992). In that case, there should be evidence of the presence of those elements in both specialist musical schools and local authority schools, even those regarded as disadvantaged. Opportunity to access such contrasting schools was afforded to me as a part-time postgraduate student working as full-time Head of Music in a Choir school, having contact with teachers in two other such schools and with non-specialist teachers in local authority schools.

5.5.2 Access to pupils and school information

My position as a teacher of children at the same key stage of the National Curriculum as cooperating teachers ensured a high level of cooperation. They assisted in the administration of the musical ability test and questionnaires and made attainment data available for individual children. In choir schools, the attainment data was National Foundation for Educational Research tests in English and Mathematics (Hagues and Courtenay, 1994a and 1994b, respectively). In the local authority schools, one was able to provide National Curriculum standard assessment tests in English, Mathematics and Science.

The average age of the children who took part was 10.34 years (*SD*=1.01) and all fell within Key Stage 2, Years 3 to 6, in the age range of 7 to 11 years. Having older children from Key Stage 2 afforded more confidence in using a questionnaire, as well as other measures, than might have been possible with younger age groups. The two local authority primary schools approached were in South Wales, one in Cardiff, the other west of Cardiff, and were different schools to those used in Phase One (see Section 3.3.5). At the level of 'macro' social differences, the former served parents from very mixed or lower socio-economic positions in society. Primary School 4, with nearly four hundred pupils on roll, 38% of whom claimed free school meals, well above both the local authority and national averages, served an inner city area of Cardiff, with over 80% having English as an additional language, for whom bilingual classroom assistants were employed. There were two large, main infant and junior buildings with an additional purpose-built nursery block located on the ground floor adjacent to the infants' section. Primary School Five had 250 children from three to eleven, including a nursery and two Special Teaching Facilities (STF) classes for pupils with Special Education Needs (SEN). Less than 5% of pupils were learning English as an additional language. According to the inspector's report, most of its catchment area was economically disadvantaged, with 35% of pupils entitled to receive free school meals. Music lessons took place in a spare classroom and visiting teachers of instrumental lessons had to teach in the school gym.

The three choir schools were selective, using Common Entrance and scholarship examinations, located in Wales and the West of England and recruited from a different social stratum. Choir School 1 had four hundred and fifty fee-paying pupils on roll, none of whom were entitled to free school meals and, as with the local authority schools, pupils from years five and six were used in the investigation, including choristers. For two hundred of its pupils, music was their main focus and excellence was pursued through expert tuition. Considerable emphasis was placed on individual practice as well as coaching in a wide variety of chamber music groups and ensembles. The school had a purpose-built music technology block and a world music room equipped with a wide range of instruments, including a Javanese Gamelan. Choir School 2 had three hundred fee-paying pupils on roll. Two choirs worked to the highest musical standards and enjoyed national renown, boy and girl choristers participating fully in the life of the school. Again, pupils in Years Five and Six acted as respondents, including choristers. The music department had extensive facilities. There were many opportunities for members of the school's Junior Section (years 3 to 6) to be involved in music, including Junior Choir and Chamber Choir and an instrumental group for those who wished to take up a musical instrument. Choir School 3, at which I worked at the time when fieldwork took place, had three hundred and sixty fee-paying pupils, none of whom were entitled to free school meals. It provided both for choristers (5% of the school) under eleven and many others. All pupils in Years 3, 4, 5 and 6, including choristers, participated in the study. Its music department was very

well accommodated in a comparatively new set of rooms, which included a teaching area and sixteen practice rooms. Table 5.1 gives the numbers of children from each school who acted as respondents.

Kind of School	School	Female	Male
Choir Schools	Choir 1 (Wales)	24	22
	Choir2 (West of England)	26	17
	Choir3 (Welsh borders)	46	25
Local Authority Schools	Primary 4 (Cardiff)	20	27
	Primary 5 (West of Cardiff)	14	15
Total number of participants		130	106

Table 5.1: Schools and participants in Phase Two

5.6 Measures and methods

In addition to collecting details of school contexts and examination of inspection reports to see which musical activities in the National Curriculum programme of study were delivered, a questionnaire was devised and administered to elicit pupils' self-reports of their background, family-initiated experience with music and experience of music in lessons, as well as their awareness of musical opportunities in their schools, thus permitting further investigation of social contexts, separating out networks of immediate social contacts with different levels of interest in music and whether a musical instrument was being learned. Specific questions were addressed as to whether or not a musical instrument was played and to establish information about the musical experience of pupils in and outside school. Musical abilities were assessed using the Bentley test

(Bentley, 1966a). Five domains of the self-concept, including global self worth, were assessed with a self-perception profile localised for the UK, adapted from Susan Harter's Self-Concept Profile (Bellin and Rees, 2004). These were completed by 236 pupils across the five schools.

As the head teachers of the choir schools would not allow time for the Heim test to be administered, the National Foundation Educational Research (NFER) tests administered on an annual basis at all three schools were used instead. I considered them to be thorough tests of children's attainment and suitable for our purposes. Time limitations also made assessing educational attainment difficult to arrange in both local authority primary schools, where there was also reluctance to allow me yet more lesson space in addition to that required for Bentley testing and questionnaire administration. Primary Schools 4 and 5 were, therefore, asked if they would mind giving access to National Curriculum Key Stage pupil test scores, commonly referred to as SATs. This was allowed in Primary School 4 but not 5, allowing for some analysis, albeit less detailed than was possible with the choir schools, to take place.

5.6.1 Assessing Musical Abilities

The Bentley Test of musical abilities has already been described in Chapters Three and Four. In terms of the original set of norms for the test, children in the choir schools were predominantly in the top 20%, as might be expected. In the local authority schools, boys had a higher proportion than expected in the highest categories.

School	Sex	Top 20% (AB) according to Bentley norms	Remaining 80% (CDE grades) according to Bentley norms
Choir School 1	Female	17	7
	Male	14	8
Choir School 2	Female	23	3
	Male	17	0
Choir School 3	Female	35	9
	Male	18	9
Primary school 4	Female	8	12
	Male	17	9
Primary school 5	Female	6	8
	Male	10	5
Total		257	176

Table 5.2 Bentley norms for pupils, by schools, Phase Two

5.6.2 Pupils' musical experience

Although the matter was considered, insufficient time was available for visiting schools for pupil interviews, although, for certain purposes, it might well have had advantages in the elicitation of some aspects of musical experience from some sorts of pupils. A four-page questionnaire in four sections was, therefore, devised, to be administered alongside the Bentley test. It was used to ask children about their musical experience and gather background information. The main question about experience in learning to play an instrument appeared on the middle of the first page, leaving those who did do so only eight further questions to answer. The schedule (reproduced as Appendix 2) was intended

to be completed with the assistance of collaborating teachers, not least in order to assure that Bentley test results and the completed questionnaire schedules for individual pupils did not get parted. For this reason and the schools' convenience, the questionnaire asked for name, age, gender and school year, as well as mother's and father's occupation. However, to preserve anonymity, collaborating teachers, after collating the scores and forms, were to hand over case numbers, rather than names, as identifiers. There were questions about aspects of musical experience on the third and fourth pages, which would have benefited from piloting and better choices for categories of response.

The question asking children whether they played a musical instrument or not required them to state whether they were learning to play at school, out of school or both. A categorical response was required about their reason for starting to play and frequency responses regarding the length of time for which any instruments had been played and how often practice took place. On the second page, they were asked to report about music lessons in school and school performances. Categorical responses were required as to which teachers took music lessons, which musical activities took place and what opportunities for musical participation their school offered. Frequency responses were requested regarding participation in choirs, school performances and take-up of other opportunities for participation offered by schools. A final question about their own listening to music required a frequency response to four genres, including classical and jazz/blues. A last question

used a categorical response to find out what instruments, if any, either of the child's parents played.

The questionnaire's presentation was important in terms of rapport and trust-building with pupils. I administered it in person within class time, as required, in each school in a classroom group setting. Respondents were given enough time to ensure that questions were answered at a relatively appropriate speed. Items were planned so as to allow even slower pupils to complete all items and to be manageable at literacy levels typical of the age being researched. I was presented to them as a music teacher in the hope that this would facilitate co-operation in securing written responses. Having introduced myself, I emphasised confidentiality and guaranteed anonymity, inviting children to give their own answers without consulting friends, since variability in their responses would be highly appreciated.

The purpose of devising the musical experience questionnaire was to shed light upon pupils' individual experience with music and the extent of differences in opportunity to do so afforded by aspects of their educational and social environments across five schools displaying *a priori* very considerable ones. Validity questions, therefore, concerned whether it revealed social background differences that were important for musical experience and related to a standardised measure of musical ability. For purposes of assessing validity

evidence, schools could be divided into the categories 'state or local authority schools' and 'choir schools'.

5.6.3 Assessing children's conceptions of themselves

In order to see what influence children's views of themselves had on their musical abilities, I had initially intended to use the Harter Self-Perception Scale Profile for Children (1988). However, Bellin and Rees (2004) had investigated a problem with the format of Harter's (1988) scale and had discovered that, in responding to the test, children had experienced difficulty in deciding which description, 'really true for me' or only 'sort of true for me', on either side of the page, best fitted them, tending to lose their place on the paper, so that researchers, consequently, lost results. Bellin and Rees (2004) presented a case for modifying Harter's 1988 format, which was adopted for this research.

While teacher support was given during administration of the musical experience questionnaire, pupils filled in the form, given as Appendix 3, without assistance so as to assess the self-concept. Global self worth was assessed, as well as five other broad domains of the self-concept, scholastic (sense of academic competence), peers, athletic, physical and behaviour domains. There were six items for each domain, giving a total of 36 items in all. On the schedule, items from the same domain were kept apart. Three items from each domain were worded positively and three negatively. For example, the first item was 'Some children feel that they are very good at their school work', a positively worded item assessing the scholastic domain of the self-concept.

Then items assessing other domains appeared before the next item pertaining to scholastic self-concept, which was negatively worded. One of the items was "Some children are often unhappy with themselves". This was a negatively worded item assessing global self worth.

All items permitted one of four categories of answer:

Describes me very poorly

Describes me quite poorly

Describes me quite well

Describes me very well.

These were given number codes, reversed for negatively worded items. Numbers for each domain were summed, the minimum possible score for each domain being 6 and the maximum possible score 24.

Each child received a score for global self worth, how positively they responded to the scholastic domain, how positive they seemed about relations with peers, how they felt about athletic prowess, how positive they were about their looks and how positively they responded to items about behaving very well. The full set of items is given as Appendix Three.

Since the self-concept scale was adapted from one developed in the USA by Susan Harter, it was necessary to check the reliability of the adaptation.

Coefficient alpha was used to check the internal consistency of scores for each domain. These reliability statistics are given as Table 5.3 alongside the sets of items on which they are based. Alpha coefficients are calculated to determine the consistency with which respondents endorse a set of items. Values of alpha near to or greater than .70 are considered acceptable (George and Mallery, 2003). Those near to or less than .60 are considered questionable.

Domain	Positively worded items (position in list in brackets)	Negatively worded items (position in list in brackets)	Coefficient alpha
Scholastic	"Some children feel that they are very good at their school work", (1) "Some children feel they are just as clever as other children of their age," (7) "Some children do very well at their class-work".(25)	"Some children are pretty slow in finishing their school work"(12) "Some children often forget what they learn" (19) "Some children have trouble working out the answers in school".(31)	0.70
Peers	"Some children have a lot of friends",(8) "Some children are popular with others their age",(32) "Some children are always doing things with a lot of children".(20)	"Some children find it hard to make friends",(2) "Some children would like to have a lot more friends",(13) "Some children wish that more people their age liked them" (25).	0.74

Athletic	"Some children do very well at all kinds of sports",(3) "Some children think they could do well at just about any new sports activity they haven't tried before",(15) "Some children feel that they are better than others their age at sports (21)	"Some children wish they could be a lot better at sports" (9) "In games and sports some children usually watch instead of play", (26) "Some children don't do very well at new outdoor games".(33)	0.68
Physical	"Some children are happy with they way they look",(4) "Some children are happy with their height and weight", (10) "Some children think that they are good looking".(34)	"Some children wish their body was different",(16) "Some children wish their physical appearance (how they look) was different",(22) "Some children wish something about their face or hair looked different".(27)	0.79

Behaviour	"Some children usually do the right thing", (11) "Some children usually act the way they know they are supposed to", (17) "Some children behave themselves very well".(35)	"Some children often do not like the way they behave" (5) "Some children usually get in trouble because of the things they do", (23) "Some children do things they know they shouldn't do" (29).	0.65
Global	"Some children are happy with themselves as a person", (18) "Some children like the kind of person they are", (24) "Some children are very happy being the way they are". (30)	"Some children are often unhappy with themselves" (8) "Some children don't like the way they are leading their lives" (11) "Some children are not very happy with the way they do a lot of things".(36)	0.73

Table 5.3 Items and reliability coefficients for the Self-Concept scales

5.6.4 Attainment measures

In the choir schools, attainment scores in English were collected by using the National Foundation for Educational Research tests, where they were undertaken annually. The NFER Progress in English 8-13 (Hagues and Courtenay 1994b) series of six English Language tests covers the age range from 7 to 13+ years. Aspects of language performance, such as spelling, grammar, punctuation and comprehension, are tested. The content of the tests is divided between editing exercises and reading exercises. For Mathematics,

the choir schools used the National Foundation for Educational Research tests (Hagues and Courtenay, 1994a), intended for group administration in two sections, taken separately, principally covering numbers, measures, shape, space and handling information. Scoring treats the test as a whole so that it functions as an assessment of overall mathematics attainment at a particular point in a pupil's school career.

In the two local authority schools standard assessment tests in English, Mathematics and Science as required by the Curriculum Authority at that time, were in use. These are Government statutory tests in the core and foundation subjects of the National Curriculum, taken by all pupils in Local Authority Schools in England, Scotland and Wales at the end of Key Stage 1 to 3 (ages 7, 11 and 14 in England and Wales). They are sometimes referred to as 'SATs' (Standard Assessment Tasks). SATs show what pupils have learnt and retained during the year. Year 6 pupils are tested in English, mathematics and science. The English test comprises of reading, writing (45mins), spelling and handwriting. The Mathematics test includes mental maths and two written papers (45 mins). Finally, the Science test covers two written papers (45mins). The year 6 SATs are sent away for marking and the results sent back to the school show whether or not the pupil has reached the expected National Curriculum Level for their age group. Because of the timings of my fieldwork and school testing, only one of the schools was able to provide results, in the other, data collection had taken place before standard assessment tests had been

administered. National Curriculum standard assessment tests in English, Mathematics and Science were used, then, from Primary School 4 only, as results were not available from Primary School 5.

5.6.5 School differences: intake, facilities, curricular and extra-curricular features

The schools had been chosen in order to represent the extent to which institutions providing music education in middle childhood can differ from each other. Table 5.4 shows how they differed in pupil intake and the kinds of facilities available for music education.

Pupils	Choir Schools	Local Authority Schools
Numbers on roll	450 (Choir school 1), 350 (Choir school 2), 250 (Choir school 3)	400 (Primary 4), 250 (Primary 5)
Fee paying	All	None
English as an additional language	None	80% (Primary 4), 5% (Primary 5)
Claiming free school meals	None	38% (Primary 4), 35% (Primary 5)
Facilities	**Choir Schools**	**Local Authority Schools**
Buildings for teaching music	Music technology block, world music room, practice rooms (Choir 1); Multi-purpose studio, keyboard studio, recording studio, orchestral and choral practice rooms (Choir 2); Department with teaching area and 16 practice rooms (Choir 3)	School hall and instrument lessons in corridors (Primary 4); Spare classroom for music, instrumental lessons in gym (Primary 5)

Table 5.4 School differences by intake and facilities

Nevertheless, in spite of such differences, the same National Curriculum was to be followed, giving attention to all four elements, performing, listening, composing and appraising or evaluating (Paynter, 1992). The question that arises on considering inspection reports is whether the comments they contain reflect the presence of the four elements in both of these types of schools, musically favoured and those lacking specialist teachers or facilities. Table 5.5 shows which elements of the curriculum received comment.

Inspectors' comments	Choir Schools	Local Authority Schools
	Timetabled lessons	
Performing (singing)	Comments on the standard of recordings being made as well as performance	Comments on accuracy of pitch in singing and listening to each other
Performing (with instruments)	Comments on very high standards of instrumental skills and their incorporation into lessons	Comments on individuals performing well
Composing and Listening	Comments on the standard of composing, listening to melodies and then later creating suitable accompaniments	Mentioned for indicating successful focusing on pitch, rhythm, beat and dynamics
Appraising & Evaluating	Commented on as part of performing, composing and listening	Commented on as part of performing and composing
Other kinds of Activity	Frequently performing choirs and chamber groups, weekly clubs for different kinds of instrument and theory clubs	Eisteddfod, Welsh folk dancing, Indo-Cymry choir, percussion group (Primary 4); Eisteddfod, Singing club (Primary 5)

Table 5.5 Inspectors' comments on the four elements of the National Curriculum Music, by school type

If we regard these reports as valid sources of comparison with respect of our local authority and private choir schools, the main curricular difference commented upon was that lessons in the latter appeared to have included more composition and other musical activities crucial in the musical experience of pupils during their school years and which the Bentley tests targeted. This could

not have been simply a matter of time, for in both sorts of schools, two lessons a week were allocated to Music. Children in local authority schools were said to be performing well in singing and had good listening skills, while in choir schools, more comments were made on the composition element of the National Curriculum, as well as performing and listening skills. Providing access to performing, composing and appraising or evaluating did not seem to be achievable without very good facilities and specialist teachers. Indeed, composing and theory were not given gradings by inspectors in Primary Schools 4 and 5, suggesting that they did not observe these activities at all and that it was more difficult to provide all the musical activities that the National Curriculum required in such schools.

If primary school inspection reports had little discussion of composition, those of the choir schools contained much. For example, in Choir School 3, the compositions of some Year 5 pupils were said to be advanced for their age and full of character and others scrutinised during the inspection were often assured and effective. Moreover, extracurricular work with choirs and chamber groups in all three choir schools was said to be of a very high standard, some music departments making recordings of pupils' compositions and performances. For all three choir schools, standards of attainment in class lessons were somewhat above those found nationally and were mainly in line with expectations for the pupils concerned, while weekly extracurricular activities taking place showed pupils also to be attaining high standards, as in the case of a senior string

ensemble in Choir School 3 where accuracy in pitch and intonation were noticeable features. The strength of general music provision in choir schools was the incorporation of pupils' instrumental skills into timetabled lessons, giving them an atmosphere of live music making.

While generally no more time was allocated to Music in choir than local authority school timetables, more extracurricular activities were certainly reported to be taking place in the former, such as string ensembles, theory and other musical groups, on a weekly basis and that which was observed with choirs and other musical groups was said to be of a high standard. In contrast, fewer extracurricular activities were observed by inspectors in the local authority schools, though some were praiseworthy and music-making was reported to be important in both, one drawing on established tradition, with an Eisteddfod and singing club, and the showing evidence of creating new or hybrid cultural forms in terms of its Indo-Cymry choir. It could be argued that such exploitation of what was in their localities would have been likely to occur without a National Curriculum, since carrying forward past traditions and creating new cultural forms clearly contributed to the overall standing of both schools. In the case of the independent schools, it could be argued that music might not have be the main basis of their appeal for some parents.

While, then, it is true to say that while the National Curriculum was being implemented in both types of school, whether well or badly, what Inspection

comments suggested was that what was actually offered represented maximum variation in musical opportunity. Such contrasts were also clear in questionnaire responses concerning parental socio-economic status, opportunity for learning to play instruments and AB grades, which Table 5.6 juxtaposes.

Parents' Occupation	Choir Schools	Valid cases	Local Authority Schools	Valid cases
Father having a 'professional' occupation (a)	46%	160	17%	76
Mother having a 'professional' occupation (a)	23%		12%	
Mother in paid employment	10%		44%	
(a) According to the OPCS (1991) Standard Occupational Classification. London: HMSO				
	Choir Schools	**Valid cases**	**Local Authority Schools**	**Valid cases**
Having a parent who plays an instrument	38%	160	21%	76
Learning one or more instruments	85%		47%	
With extra instrument tuition out of school	26% (a)	136	0%	35
Having attained Grade 1 or not yet entered	38% (b)		66%	
Grade 2 or 3	31%		26%	
Grade 4 or 5	25%		9%	
Grade 6 or above	6%		0%	
(a)There were no children who received instrument tuition solely out of school. (b) "Grades" refers to Associated Board of the Royal Schools of Music Grades				

Table 5.6 Parents' occupation, learning instruments and AB grades, by types of school

In Table 5.6, whereas all children responded to items on parental occupation and whether or not they were learning an instrument (n=236), the number of valid cases drops to 171 for further questions about learning to play an instrument because children who did not do so could omit them.

There was large disparity in the distribution of parental occupations, as reported by pupils, across the two types of schools, almost a half and a quarter of mothers and fathers, respectively, of choir school children being classified as Social Class I or II on the OPCS 1990 scale (which I have termed 'professional'), in comparison to 17% and 12% in local authority schools. Moreover, whereas almost half of mothers of children in the latter were in paid employment, only one in ten choir school mothers were so employed. Even given the inevitable limitations of relying on and interpreting children's responses to such questions, we may take them as affirming expected differences in family status, income and resources and as indicating, underlying the very choice of schools with which I was working, the capacity and willingness to fund instrumental tuition for their progeny and differences in 'habitus' (Bourdieu, 1984), not least in relation to musical tastes, expectations and experience. While the National Curriculum ensures access to musical experience and the four activities, such as composition, it cannot succeed in levelling advantages where there are contrasts in human capital and cultural resources.

Most choir school children (85%) learned to play an instrument, while nearly half of those in local authority schools also claimed to do so, the latter all receiving education from peripatetic teachers, with none receiving lessons out of school. Local authority provision of this kind has varied over time and between areas, with periods of financial stringency and local funding and management of schools tending to reduce it. But it is reasonable to assume, at the same time, that the presence of performing both with instruments and singing in National Curriculum requirements have kept up some pressure on continuing provision.

Extra facilities and more affluent class family background, mainly mediated by the likelihood of getting extra instrument tuition out of school, meant that attainment of higher grades than the fourth Associated Board grade was much more likely in the choir schools. There were also other differences relevant to attainment with instruments, which are not apparent from Table 5.6. Choir schools held the Associated Board examinations as normal events at school each term, making it easier for pupils to take them as part of the school day. Local authority schools would have had to arrange for children to take trips out to an exam centre, difficult events to fit into their timetables. Parents were therefore responsible for getting pupils to exam centres, where children were required to perform in unfamiliar surroundings, unlike those of their schools.

While Table 5.5 attempts to show how implementation of the National Curriculum elements was reflected in comments in inspection reports, Table 5.7 shows how it was reflected in children's reports of their musical experiences. The number of valid cases drops for Table 5.7 because of some attrition, probably through response-fatigue, since the relevant questions came later in the questionnaire, as well as some answers proving not clear enough for inclusion in counts. Pupils were very clear and agreed in the choir schools about what went on. With a predominance of specialist teachers taking lessons children, no doubt, found it easy to recognise different activities. In contrast, what the children reported about their experiences in the local authority schools, other than singing taking place, might be regarded as indicating lack of recognition, as much as agreement/disagreement about whether or what activities were provided.

Music lessons	Choir Schools	Valid cases	Local Authority Schools	Valid cases
Taught by specialist teacher	91%	156	25%	71
Taught by class teacher	4%		60%	
Music lessons happen	**Choir Schools**	**Valid cases**	**Local Authority Schools**	**Valid cases**
Once a week	32%	155	35%	67
Twice or more	57%		47%	
Music lesson activities include	**Choir Schools**	**Valid cases**	**Local Authority Schools**	**Valid cases**
Singing	94%	155	75%	67
Listening	95%		40%	
Composing	96%		49%	
Playing instruments	91%		56%	
Music theory	97%		13%	
Computer music	65%		29%	

Table 5.7 Pupil perceptions of music lessons, by activities and school types

Extra-curricular activities available	Choir Schools	Valid cases	Local Authority Schools	Valid cases
Orchestra	94%	155	45%	67
Recorder club	71%		79%	
Keyboard club	32%		32%	
Theory club	61%		0%	
Extra-curricular activities taken up	**Choir Schools**	**Valid cases**	**Local Authority Schools**	**Valid cases**
Orchestra	31%	145	38%	35
Recorder club	15%	109	17%	59
Keyboard club	12%	52	17%	24
Theory club	21%	93	0%	74

Table 5.8 The availability and take-up of extra-curricular activities, by school type.

Less than half the children in local authority schools reported having an orchestra and in both types of schools pupils reported having a recorder group and keyboard group. In the choir school 61% of pupils report there being a theory club but only 21% take part in the club. These features apart, reported take-up rates were not very different in both kinds of school. Moreover, of those responding, Table 5.9 reveals little school type difference as to parents choosing which instrument was learned (one in three), reminding about practice (almost all) and playing an instrument (two in five). The influence of learning to play an instrument on children's own listening to classical and jazz musical

genres differed between school types, players in choir schools being twice as likely as those in local authority schools to listen to both.

Parental factors	Choir Schools	Valid cases	Local Authority Schools	Valid cases
Parents chose which instrument	30%	128	33%	30
Parents remind about practice	98%	128	91%	32
A parent also plays an instrument	44%	127	38%	34
Influence on own listening (a)	**Choir Schools**	**Valid cases**	**Local Authority Schools**	**Valid cases**
Listens to classical	67%	127	33%	34
Listens to jazz and blues	54%	127	27%	34
(a) Less than 25% claimed to listen to classical or jazz if they did not learn an instrument in either kind of school.				

Table 5.9 Influences on children learning to play an instrument, by school type

5.7 Relationships between musical experience and abilities

The contrasts between the two kinds of schools were so extensive that the 'null hypothesis' would be that any differences in relations between experience and musical abilities could be attributable to selection processes and social position. Choir schools' overall mean scores on the Bentley test of musical abilities were nearly ten points higher than those in local authority schools. The maximum possible score on the Bentley test being 60, the overall mean for choir schools was just over 40 (M=43.07, SD=6.96) and for local authority schools, 34.72 (SD=9.57). The size of the difference in the overall means was only to be

expected, given that facilities, human resources and opportunities with music were so different in the two kinds of school.

However, if the adoption of a National Curriculum with Music as a subject reflects wider cultural influences, together with the effects of teaching, then the key factor in explaining levels of scores on tests will be the amount of musical experience that individual children had undergone, regardless of the kind of school attended. An important individual difference within schools was between those who were learning to play an instrument and those who were not. The large majority of pupils in choir schools (78% of girls and 83% of boys), in local authority schools, nearly two thirds of the boys (25 out of 41) but only 26% were of the girls (just 9 out of 34) were doing so, as shown in Table 5.10.

		Choir Schools	Local Authority Schools
Female	**Not learning to play an instrument**	21	25
	Learning to play an instrument	73 (78%)	9 (26%)
Male	**Not learning to play an instrument**	11	16
	Learning to play an instrument	55 (83%)	25 (61%)

Table 5.10 Learning to play an instrument or not, by gender and school type

In considering the determinants of musical abilities, as assessed by the Bentley test, the question became whether individual musical experience was as

important as school level differences. Means for Bentley test scores, by gender, kind of school, and whether or not an instrument is being learned are given as Table 5.11. Girls in choir schools who were learning to play an instrument were the highest scorers on average, followed by boys in local authority schools.

		Bentley test scores			
		Playing An Instrument			
		Not playing		Playing	
		Mean	Standard Deviation	Mean	Standard Deviation
Female	**Choir Schools**	38.10	8.34	45.79	5.81
	Local Authority Schools	30.68	8.19	35.78	9.73
Male	**Choir Schools**	43.18	3.87	41.33	6.79
	Local Authority Schools	28.38	7.37	42.44	6.60

Table 5.11 Means and standard deviations on Bentley test scores for children learning to play an instrument and children not learning to play an instrument, by gender and school type

The methods for using SPSS to conduct significance tests for cross-sectional data are described by Peugh and Enders (2005). Peugh and Enders explain how tests of significance where individual differences are nested in kind of school differences can be conducted using the SPSS MIXED procedure. The important question was whether or not any difference between kinds of school was dependent on whether or not the children were learning to play an instrument. In analysis of variance terms, the hypotheses to be tested were not

just whether there were school-level differences or differences between boys and girls, but also whether there were significant interactions between the kind of school, gender and whether an instrument was being learned or not. The results of such significance testing are summarised as Table 5.12.

Source	Degrees of freedom	F	Sig.
Kind of School	1,2354	13.10	0.0003
Sex/gender	1,223	0.08	0.7714
Learning to play an instrument	1,6	21.70	0.0031
Interaction between kind of school and learning to play	1,6	4.59	0.0763
Interaction between sex/gender and learning to play	1,225	0.07	0.7987
Three way interaction (kind of school, sex/gender and earning to play)	1,225	15.64	0.0001

Table 5.12 Analysis of variance, by gender, school type and whether learning an instrument.

Significance testing procedures confirm that while the difference between kinds of school would be very unlikely to occur by chance, the effect of learning to play an instrument was highly significant. But what happens if an instrument is being learned depends on both sex and the kind of school (a three-way interaction). It is not simply to do with being in one kind of school or the other and learning to play an instrument. This more complicated picture can be appreciated by using a graph. The significance testing procedure giving the results summarised in Table 5.12 provides confidence limits for estimates of

means as well as F tests. Such confidence limits indicate where, over large numbers of repeats of an investigation, the mean scores might occur 95% of the time. The actual means from Table 5.11 surrounded by bars showing the confidence limits are depicted as Figure 5.1.

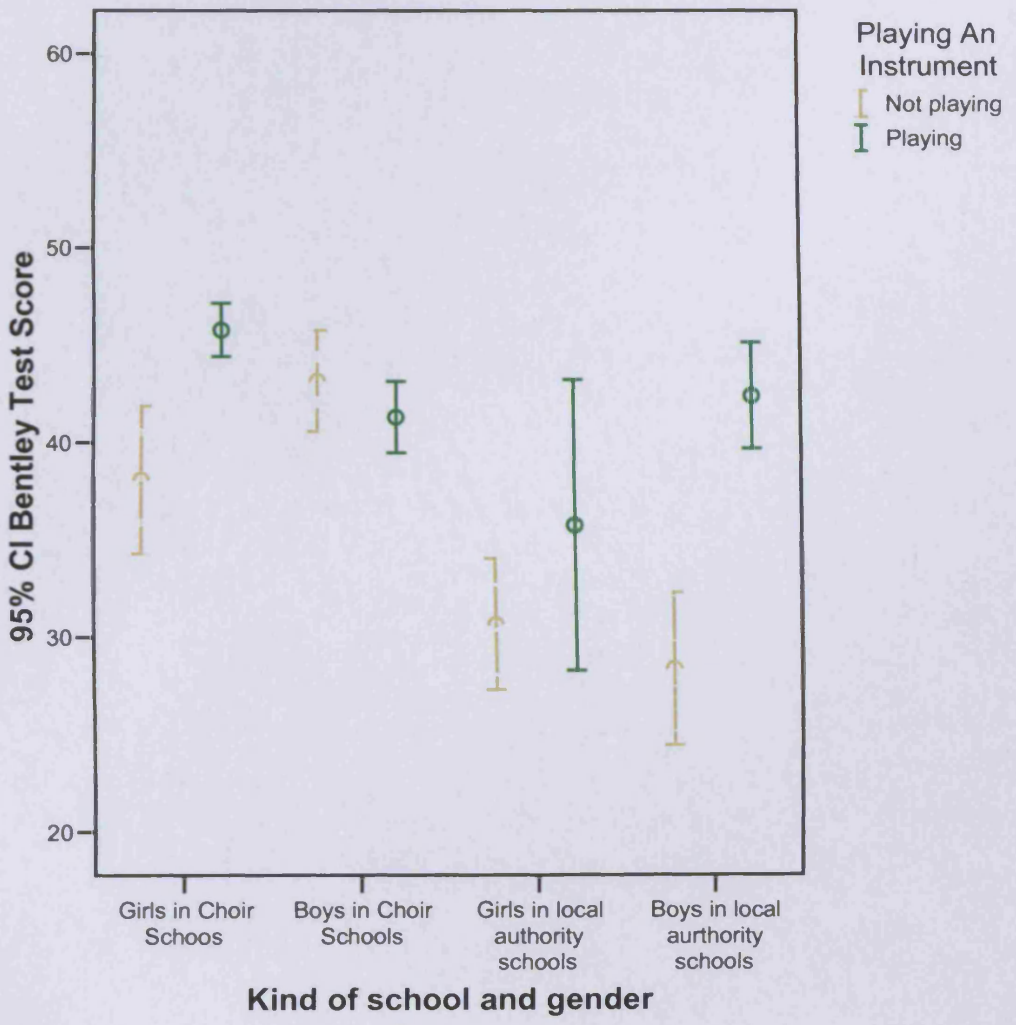


Figure 5.1 Means for Bentley scores with bars indicating 95% confidence limits

Figure 5.1 depicts a situation where girls in choir schools who learn to play an instrument are significantly different from all other girls and boys in local authority schools who do not learn an instrument. This difference is highly significant, $t(225)=3.95$, $p<.001$. But they are not significantly different from choir school boys, regardless of whether those boys play an instrument or not or, even more interestingly from the point of view of the importance of musical experience, boys from local authority schools who learn an instrument, who are not separable from the highest scoring subgroup, $t(225)=0.29$, $p=.77$.

To probe further into why boys in local authority schools scored at such a high level on the Bentley test, questionnaire responses were reconsidered. It could have been that these particular local authority schools had an unusual share of musically gifted boys. However, answers to the questions about how long children had been learning an instrument and what happened in lessons highlighted even further the importance of experience with learning to play an instrument. Table 5.13 shows a breakdown of the sample according to gender, kind of school and five levels of experience with musical instruments.

	Female		Male	
	Choir Schools	Local Authority Schools	Choir Schools	Local Authority Schools
Experience with Instruments	Number	Number	Number	Number
Reporting none	5	16	3	10
Experience as part of classroom activity only	17	9	8	10
Learning to play less than 6 months	3	3	3	4
Learning to play 6 months to a year	22	4	19	5
Learning to play up to 2 years	9	1	6	2
Learning to play more than 2 years	38	1	27	10

Table 5.13 Levels of experience with musical instruments, by gender and school type

While girls in local authority schools who were learning to play an instrument were unlikely to have been doing so for over a year, twelve out of the 25 boys had been learning for over a year and ten for more than two years. While we have no basis for understanding this disparity, such experience of playing musical instruments would have been much more likely than 'giftedness' to be the factor which led to them scoring as highly as children in selective specialist schools.

Besides receiving individual instrumental tuition, it is possible to have instrumental experience in classroom lessons. Forty-four children reported such experience, even though they did not learn to play as individual instrumentalists.

Table 5.14 gives the mean scores for the Bentley Test as for each category of experience.

	Choir Schools		Local Authority Schools	
Experience with instruments	Mean	SD	Mean	SD
Reporting none	36.13	8.59	29.71	8.78
Experience as part of classroom activity only	40.28	6.97	31.70	6.94
Learning to play less than 6 months	44.17	8.13	39.50	4.43
Learning to play 6 months to a year	42.51	6.51	38.22	8.93
Learning to play up to 2 years	42.33	5.37	45.00	9.54
Learning to play more than 2 years	45.42	6.39	45.55	4.61

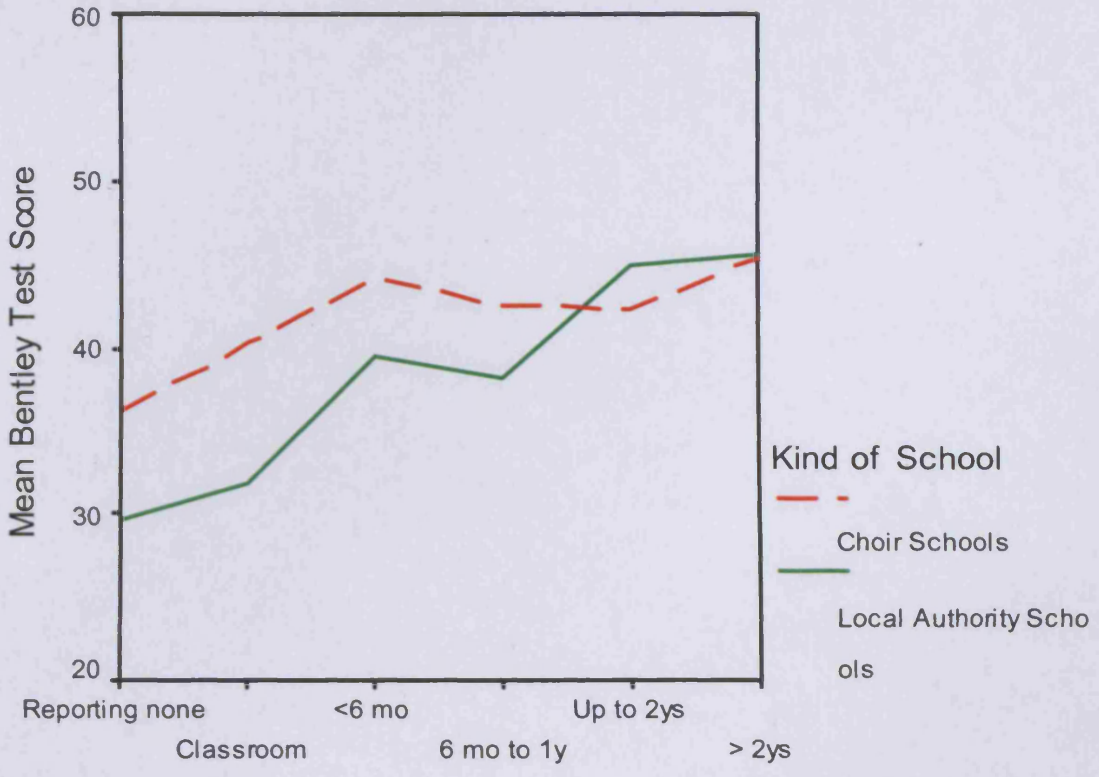
Table 5.14 Mean scores on the Bentley test, by school type and experience with instruments

To check the significance of such differences, an analysis was again conducted following the procedures described by Peugh and Enders (2005). The overall F tests showed that the influence of the various categories of experience differed according to the kind of school. In analysis of variance terminology, there was an interaction between the kind of school and the experience factor. The F test values are given in Table 5.15.

Source	Df	F	Significance
Kind of school	1,14	6.58	0.022
Experience with instruments	5,219	13.66	<0.001
Interaction (kind of school and experience with instruments)	5,219	2.44	0.036

Table 5.15 Analysis of variance for effect of school type and level of instrumental experience on Bentley test scores

That the interaction effect is significant can be appreciated from a line plot of the means with a separate line for each kind of school. The plot is given as Figure 5.2.



Key to Figure 5.2

Classroom	Experience as part of classroom activity only
<6 mo	Learning to play less than 6 months
6 mo to 1y	Learning to play 6 months to a year
Up to 2 ys	Learning to play up to 2 years
>2 ys	Learning to play more than 2 years

Figure 5.2 Line plot of mean Bentley Test Scores, by reported level of experience with musical instruments.

The reason why an interaction effect is significant is apparent from the line plot. With up to two years of experience at learning a musical instrument, both lines come together, scoring higher than 40 points on the test. However, this result is

very similar to what was found solely by considering whether an instrument is played or not. This further breakdown says more about experience because it includes the category of having classroom activities with instruments, as well as learning to play as an individual. In choir schools, the classroom activities mean is nearer to the mean for novice learners (learning less than six months). In local authority schools, the classroom activities mean stays at the level of pupils reporting no experience. This difference is significant - $t(221)=3.10$, $p=.002$ - indicating that activities with instruments can increase the level of scoring. This could be because many instruments of different kinds were available in choir schools. It could also be because the initial level of musical abilities of their respondents was higher. In either case, the results show that the most important element in musical experience for raising scores on the Bentley test is learning to play an instrument for several years, even though, in very favourable circumstances, instruments in lessons will help.

5.8 Relations between musical abilities, experience and self- concept

5.8.1 The self- concept sub-sample

In a world of musical education that still debates the relative merits of the necessity of 'a special gift' for music with the importance of teaching music to all, appeal to possible effects of musical attainment on the self-concept is of some importance. What educators have in mind in appealing to the self-concept (see Chapter Two) is a generalised view of the self, or global self worth.

It was important, therefore, to investigate whether musical experience that raises musical abilities also raises such a sense of global self worth. Not all the sample in Phase Two completed the self-concept questionnaire. The total size of the sub-sample was 159, comprising all participants from the local authority schools but not all those in the choir schools. The majority of Choir School 1 (27 out of 46) and Choir school 3 (44 out of 71) participated, but only a minority (6 out of 43) of Choir School 2 did so, due to practical difficulties of timetabling the during the research period. It was possible to see whether there was anything about the choir school members of the sub-sample in terms of English and Mathematics attainment data that might make them different from their fellow pupils. Table 5.16 gives these results.

	Choir Schools	N	Mean	Standard. Deviation	t(158)	Significance
Age	Others	76	10.86	1.17	4.84	<.001
	Subsample	84	10.05	0.90		
Bentley Test Score	Others	76	42.68	7.21	0.66	.508
	Subsample	84	43.42	6.74		
English Marks	Others	76	107.01	12.77	3.59	<.001
	Subsample	84	114.80	12.16		
Maths Marks	Others	76	112.14	12.25	.925	.356
	Subsample	84	113.99	12.88		

Table 5.16 Comparison of self concept sub-sample and others, by Bentley and NFER Maths and English scores

The differences that attained significance were age and English marks. Members of the sub-sample were ten months older on average and were better at English than their peers in the same schools. There was no difference in the level of scoring on the Bentley test. Thus, when drawing conclusions about relationships with self concept, in the case of the choir schools, it must be borne in mind that the pupils assessed were on average slightly better in English and some months older than those who did not complete the self-concept questionnaire.

5.8.2 Differentiation of the self-concept

The fact that the children completing the self-concept questionnaire were nearer eleven years of age than nine meant that their conceptions of themselves would be more differentiated, as claimed by Harter (1999) and corroborated by studies such as that of Cole et al. (2001). Between seven or eight years old and ten or eleven years old, children seem to make more positive self-evaluations for the scholastic domains, peer relations and athletic prowess. Cole et al. (2001) followed Harter (1999) in explaining these changes in terms of strong influences from the immediate network of peer contacts. The changes reflect social processes, such as selective social comparison and strategic association with others whose successes yield vicarious benefits. So for children in this study, overall levels of self-concept could be expected to be positive and, given differentiation, academic success could be expected to influence scholastic self-concept but not necessarily global sense of self worth.

5.8.3 School attainment and self-concept.

In choir schools there were significant positive correlations between attainment in both English ($r(84)=.36$, $p<.001$) and (Maths, $r(84)=.30$, $p<.001$) and scholastic self concept. However, such attainment does not predict global self worth, in whose sustenance there are many possible, alternative, social comparisons to be made and neither English marks ($r(84)=-.11$, $p=.338$) nor mathematics marks ($r(84)=.04$, $p=.737$) correlated significantly with it. In local authority Primary School 4, a score was compiled from National Curriculum assessments by summing levels for English, Mathematics and Science. Its correlation with scholastic domain scores was significant ($r(21) = .468$, $p=.032$) while its correlation with global self worth was, once more, not significant, ($r(21)=-.329$, $p=.146$).

5.8.4 Bentley Test score as a predictor of level of Self- Concept

The day-to-day social comparisons believed to result in differentiation of the self-concept are more proximal influences than school or institutional level influences. However, there is need to check whether or not school level factors do have an effect. However, since hypothesis testing concerns six domains of the self concept, it is important to follow the procedures for multivariate tests where they can be considered together with kind of school (or school type) as a school level predictor and children's scores on the Bentley test as an individual level predictor. The basis for procedures for conducting significance tests for such data sets are described in text, such as Snijders and Bosker (1999, Chapter 13) and can be carried out using the SPSS procedures described by

Peugh and Enders (2005). First of all, an omnibus test for all the six domains of the self-concept taken together is conducted. This set of results is used to decide whether the Bentley test score predicts one or more of the six self-concept scores and, if so, whether separate lines should be fitted for the different kinds of school.

Table 5.17 gives the result of the omnibus, multivariate test. It shows that choir schools and local authority schools did not have to be considered separately. The effect of kind of school was not significant when the level of the Bentley score is a predictor of the level of self-concept (F (6,6138) =.138, p=.991). But the Bentley test score did predict one or more of the self-concept scores (F(6,156)=2.345, p=.034).

Source	Degrees of freedom	F ratio	Sig.
Kind of School	6,6318	.138	.991
Bentley test score	6,156	2.345	.034

Table 5.17 Multivariate F tests for influence of the Bentley test score on multiple domains of the self concept

Identifying which particular domains of the self-concept are predicted by the Bentley test score requires tests of significance for individual regression coefficients. These are summarised in Table 5.18

Bentley Test score as a predictor of	Intercept	Std Error	Regression coefficient	Std. Error	T(156)	Sig.
Scholastic self concept	17.03	0.87	0.09	0.03	2.63	0.009
Relations with peers	17.86	0.90	0.05	0.04	1.24	0.217
Athletic self concept	16.62	0.89	0.02	0.04	0.53	0.599
Physical appearance	17.29	0.93	0.00	0.04	0.09	0.928
Behavioural self concept	17.02	0.91	0.10	0.03	3.34	0.001
Global self worth	18.75	0.89	0.02	0.04	0.55	0.583

Table 5.18 Regression parameters and significance tests for identifying which domains of the self concept are influenced by the Bentley test score

Table 5.18 shows that the domains of the self-concept predicted by the Bentley test score are scholastic and behavioural. Global self worth is not predicted to a significant extent (t(156)= 0.55, p=.583). The best-fit lines, according to these results, are shown as Figure 5.3

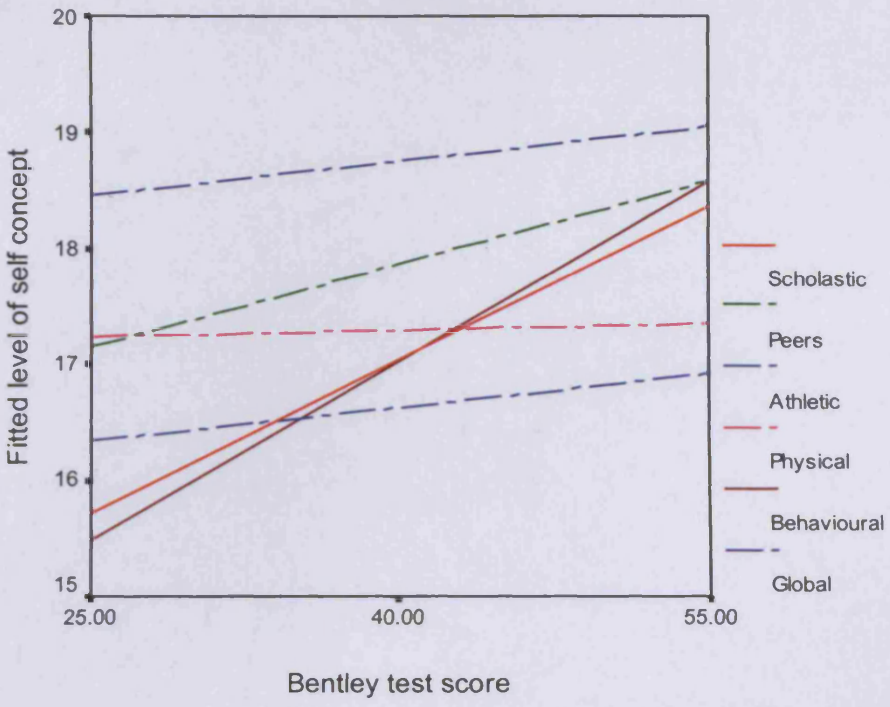


Figure 5.3 Best-fit lines for simultaneous multivariate regression of levels of self-concept on the Bentley test score.

The lines for domains where change in the level of self-concept is predicted by the Bentley test score to a significant extent are the solid ones in Figure 5. 3. The mean score for global self worth stays between 18 and 19 regardless of Bentley test score level. The lines that change to a significant extent are those for the scholastic ($t(156)= 2.63$, $p= .009$) and behavioural domains ($t(156)= 3.34$, $p= .001$). There is a shallow trend for relations with peers but it is not significant ($t(156)= 1.24$, $p= .217$).

5.8.5 Learning to play an instrument and level of self-concept

The methods explained by Snijders and Bosker (1999) can also be used for testing for the significance of a factor, such as learning to play an instrument, on an array of scores, such as self-concept scores. The SPSS procedures described by Peugh and Enders (2005) were again used to conduct the omnibus test for the effect of kind of school and learning an instrument on all six domains of the self-concept taken together. The results are given in Table 5.19.

Source	df	F ratio	Sig.
Kind of school	6,5921	0.157	0.988
Learning to play an instrument	6.155	3.627	0.002
Interaction – kind of school and learning to play	6.155	1.074	0.380

Table 5.19 Multivariate F Tests of influence of kind of school (school type) and learning to play an instrument on self-concept.

The multivariate test shows that one or more of the domains of the self-concept is influenced strongly by learning to play an instrument ($F(6,155)=3.627$, $p=.002$) but there is no influence of kind of school ($F(6,5921)=0.157$, $p=.988$). From the same statistical procedure, the particular domains that are influenced can be identified (Snijders and Bosker, 1999, pages 204-205). The statistics for identifying the particular domains affected are given as Table 5.20

Effects of learning to play an instrument	Predicted mean for children not learning to play	Std. Error	Difference if playing	Std. Error	T (159)	Sig.
Scholastic self concept	17.78	0.89	2.20	0.61	3.61	<.0001
Relations with peers	17.93	0.93	0.15	0.72	0.21	.830
Athletic self concept	16.53	0.92	-0.31	0.68	-0.45	.653
Physical appearance	17.12	0.96	-0.52	0.76	-0.68	.495
Behavioural self concept	17.79	0.91	2.23	0.56	3.96	<.0001
Global self worth	18.60	0.92	-0.50	0.66	-0.76	.448

Table 5.20 Significance testing for identifying which domains of the self concept were significantly affected by learning to play an instrument

In Table 5.20, the column labelled 'mean for children not playing' (labelled 'the intercept' on SPSS output) shows the mean score for each domain of the self-concept for children who were not learning to play an instrument. The column labelled 'Difference if playing' shows by how much the mean of the scores of children who learn to play will differ from the mean for those who do not. Table 5.19 showed that the omnibus multivariate F test for level of self concept is significant ($F(6,155) = 3.627$, $p=0.002$), so it is reasonable to interpret the significance tests for the individual domains. Table 5.21 shows that the score for scholastic self-concept (sense of academic competence) would be just over two points higher (2.20) if learning to play a musical instrument. This difference is significant ($t(159)=3.61$, $p<.0001$). The mean score for behavioural self-concept

can also be expected to be just over two points higher (2.23) if learning to play an instrument: this is also significant ($t(159)=3.96$, $p<.001$). So the domains of the self-concept affected by learning to play an instrument, whether in a choir or a local authority school, are the scholastic domain and the behavioural domain. There is no significant effect on the sense of global self worth ($t(159)=.76$, $p=.448$).

Figure 5.4 plots these results for the scholastic, behavioural and global domains, with means surrounded by bars indicating the 95% confidence limits on either side of the point depicting the mean level. It can be seen that the level of self-concept differs by just over two points, as a function of learning to play an instrument, for the scholastic and behavioural domains. The absence of effect on the sense of global self worth can be appreciated from the complete overlap of the distance between the bars. At the same time, the bars around the means for the scholastic and behavioural domains can be seen to stay apart.

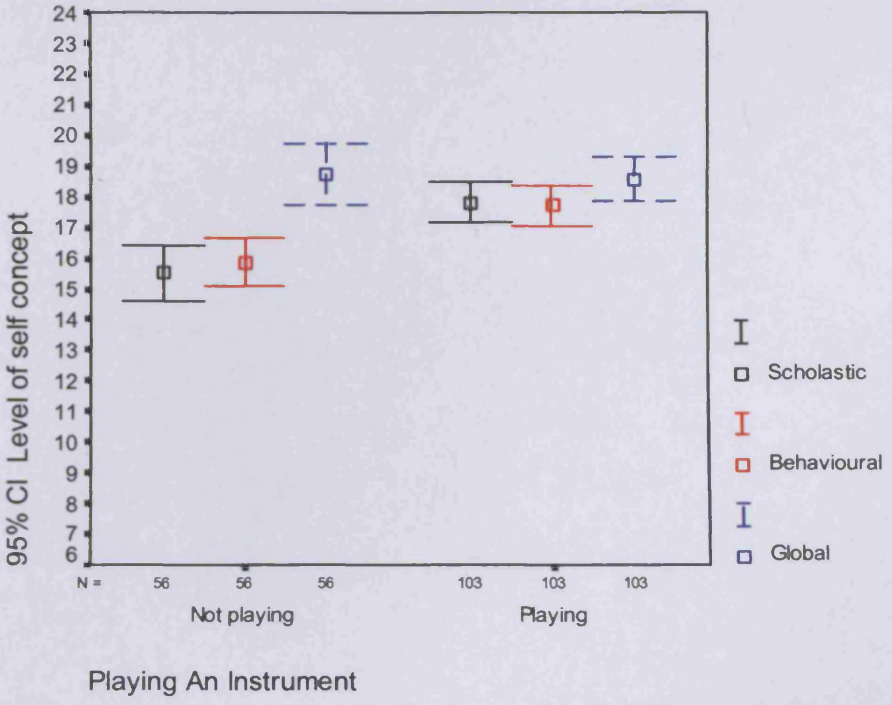


Figure 5.4 Levels of self-concept as a function of learning to play an instrument, or not.

5.9 Conclusions

The evidence from both inspection reports and children's answers to questions about their experience indicated that performing, composing and listening or appraising were taking place, in some measure, even in schools without extensive, specialised facilities, though attainments differed extensively according to their availability and that of specialised teachers. Even in choir schools, not all children participated to the same extent. However, it tended to be the case that they had either entered the schools with elevated musical abilities or their scores reflected vicarious benefits of being educated with more musical peers.

The evidence from children's conceptions of themselves confirms the embeddedness of music in the curriculum. It relates to the sense of academic competence but not to global self worth, as we might anticipate would have been the case if Music were just something provided to raise self-esteem. In local authority schools where peripatetic teachers are relied upon for instrumental tuition, children have to be responsible for their behaviour as they leave classmates to join them. In choir schools, the same level of responsibility might be required for going to the practice rooms. However, this is a *post hoc* explanation and underlines that these self-concept results need qualification if we are to repose full confidence in them.

What these results from the data in Phase Two show most convincingly is the importance of learning to play an instrument for core musical abilities as assessed with the Bentley Test. The very high scores among boys in local authority schools were clearly to do with their extra years of experience of learning to play an instrument, compared to girls.

From the point of view of the general research question as to the effects of the historical change of bringing in National Curriculum Music, these results concerning learning an instrument are very important, for it is not part of the curriculum specification. Yet, if there is to be overall raising of the level of

musical abilities, requiring instrumental lessons would be a change that might have the most potent effect.

The evidence in this chapter may be interpreted as support for an extended model of the development of musical abilities. From a family perspective, this might indicate relevant differences in parental input, as assessed in the musical experience questionnaire. Both individual and family environment selections, as well as community social selection processes, are at work. Some will be conscious; though environment selection in the case of young child will be similar to that described by Dickens and Flynn (2001) (see Section 2.6). When making music or gaining musical experience with peers in other ways children have an immediate circle of contacts. If one basis of selection of contacts is to do with music, with a consequent increase in enjoyment, there will be scope for a group contextual effect or 'social multiplier', as predicted by Dickens and Flynn (2001) for intelligence.

The generalisations made on the basis of these results need to be qualified by the caution that not all of the achievements of specialist choir schools were brought into assessment, given the reliance on pitch perception, rhythm, memory for tunes and chord recognition tasks in the Bentley test. However, it *is* intended as an ability rather than attainment test. Given the influence of learning an instrument, a reciprocal influence between environment selection and ability is likely. Whether or not a pupil was in a state school or independent

specialist school, playing an instrument would be partly the result of environment selection. When self-enhancement of musical abilities enters the picture, its influence is two-way and cumulative. By the time children in the study were tested, even within higher ability ranges, further self-enhancement of their abilities was well underway. It was decided that this called for investigation of what would happen with successive waves of testing in the same school where the National Curriculum was being implemented. In taking this way of thinking further temporal contexts need to be investigated. One-off testing has characterised the evidence collected in Phase Two of the investigation reported in this chapter. It was now considered necessary to retest as many pupils as possible, using the Bentley test, to see whether changes had occurred over one- and two-year periods. Chapter Six describes this testing.

Chapter Six

Changes in Musical Abilities over Time.

6.1 Introduction

Chapter Five showed the power of the influence of learning to play an instrument, as an individual performer, on scores on the Bentley Test of Musical abilities. Even in contrasting schools, those without facilities or specialised teachers still had children at the same level of core musical skills (Bentley test) as in choir schools, as a result of learning an instrument.

Learning to play an instrument as an individual is not part of the specification of the National Curriculum. The question for Chapter Six becomes 'what would be the outcome if successive waves of testing were conducted in a single school which followed the National Curriculum, and what had happened if a second wave of testing was conducted in a school already visited?'

The following hypotheses are examined: if there is a social multiplier at work then, over three years, (i) the gap between those learning an instrument and others would widen at successive waves of testing.

If the benefit does not involve a social multiplier (ii) the gap would be sustained, but not widened.

This chapter looks at changes in musical ability over time in a non-specialist independent school and a specialist choir school to see whether educational setting and playing an instrument influenced pupils' scores on the Bentley test of musical ability.

6.2 Objectives

The aim of the research described in this chapter was to see if initial advantages in musical ability were 'multiplied' as a result of experience of the National Curriculum, implementation of whose requirements could be checked by reference to Inspection reports. Three waves of testing were conducted in an independent school from 2002 to 2004. Children's musical abilities were assessed using the Bentley test of musical abilities, while Choir School 3 (Chapter 5) was revisited after two years to see if the advantages of learning an instrument were maintained over time, or had even 'multiplied'. Dickens and Flynn's (2001) theory (see Section 2.6) was the basis of the research question. Early individual differences are assumed to influence a child's socialisation patterns and shared interests to lead to interest in music. Children will then seek out social contact and experience that will raise their level of musical abilities. In turn, they contribute to raising the level of abilities in their immediate circle of contacts. Dickens and Flynn (2001) refer to this reciprocal influence as a 'social multiplier', or more informally, 'snowballing'. They assume a within-generation or age-graded effect on abilities as well as a between generation or history-graded effect. Looking for indications that

snowballing can happen with musical abilities is the objective of Chapter Six.

6.3 Research method: testing and retesting individuals within schools

The intended method of investigation in this third phase of the research was to retest as many children as possible from the five school samples using the Bentley test. For a variety of practical reasons, particularly very variable teacher cooperation induced, not least, by staff changes, re-organisations and pupil movement between schools, it was possible to revisit only one of them. This meant that only in Choir School 3 was it possible to run the Bentley tests on the same pupils still in the school two years later.

For this reason, a further school, which might be described as having 'a broad agenda in a competitive market for independent schools' was approached and agreed to cooperate. This independent, non-specialist school, which had not been used in the previous phases, made instrumental playing available, with a more individualist emphasis, as one among many advantages on offer to parents choosing it, in contrast to Choir School 3, where instrument playing was in addition to an existing, strong, musical tradition.

6.3.1 The research sites

A change of my teaching post to Head of Music and a move to a different kind of school, which will be referred to as the independent school, made possible a study of a group of children in this non-specialist institution over three years.

The head teacher of Choir School 3 was contacted and asked for permission to retest pupils who had been participants in the original study, with which he and staff readily concurred. Of the 71 pupils originally tested two years earlier, 40 were available for retest, while 31 pupils had moved on to other secondary schools and it was not possible to trace them for the third phase of this research. The 40 pupils were tested with the Bentley Music Test response sheet and with three additional items from the Musical Experience questionnaire that I had devised, as described in Chapter Five. Pupils were asked which instrument they played, what grade they had achieved on their instrument and how much they practised per week.

The Independent School used in this research, where I worked as the music specialist when testing took place, was coeducational, having 350 pupils at the time of the research, aged three to eleven. 129 pupils from Years 3, 4, 5 and 6, with ages between 7 and 11, participated in this investigation. The pupils were chosen for this research because they were all in middle childhood at the time of the testing and they all had the same music specialist and the same musical opportunities at the school.

Although this was a co-educational school, the year groups concerned were actually all girls, as the boys school was only up to 8 years. Permission was sought for the research from the head teacher at the school. The head teacher was aware of my purposes, and no ethical dilemmas were apparent and administering the Bentley test was considered unproblematic, given that listening and appraising were curriculum activities.

The criteria for using this school for the research were that although the school did not specialise it had a very strong emphasis on music, with many extra-curricular activities taking place weekly, over 250 pupils having individual instrumental lessons per week on instruments such as piano, recorder, voice, percussion, woodwind, strings and brass. Three waves of testing in three consecutive years when musical experience at the school was provided in a very similar way, conforming to the National Curriculum was possible. Pupils in all years received an hour of music specialist class tuition per week, which took place in a very well resourced, spacious, dedicated music room. Extra-curricular musical activities included four choirs, an orchestra, a woodwind group, a recorder group and a theory group for high achievers and opportunities to perform in musical events in school, aimed both at parents and the community, were frequent.

As a check on National Curriculum implementation, the school's inspection report, which was concurrent with the research (Independent

Schools Inspectorate, January 2004, reference withheld), was consulted. According to this report, pupils achieved good standards in Music in Years 1 and 2 and high standards in Years 3 to 6. In both lessons and assembly, attainment was good in Year 2 and, by its end, pupils were using their voices expressively through singing. They followed directions carefully, accompanied their singing with simple rhythmic actions and improved their own work. The inspection report also commented on composing, where pupils' work was advanced, using graphic or traditional notation and including appropriate musical devices such as rhythms, chords and melody.

The Inspection Report did not comment on listening to music as a separate activity, an activity that is part of National Curriculum requirements. Nonetheless, it could be claimed to provide a basis for concluding that, for Music, this aspect was being implemented satisfactorily. It was noted that plans were in place to make use of ICT to further enhance the curriculum. On this basis, it was decided that the school was a suitable research location for deciding whether the implementation of a national curriculum could have a boosting effect on musical abilities within the school and whether experiences beyond those called for in the curriculum might be creating 'snowballing' or multiplying effects.

6.3.2 Research measures and procedures

In administering the Bentley Test, the same set of tapes that had been used in the original testing was used in retesting. A response sheet was constructed, and, at the bottom, pupils reported if they were learning to play an instrument, and what grade they had achieved. Retesting was more readily arranged in Music lessons in the school where I was a member of staff where, in the first year of testing, 129 pupils took part, with ages ranging from 7 to 10, declining to 79 a year later as the oldest pupils left the school and 44 in the third year of testing.

In the first year of testing at Choir School 3 (previously used in Phase Two) 71 Year 5 and 6 (age range 10-11) pupils participated. For practical reasons there was only a second time of testing which was two years later, when 40 pupils were re-tested who had moved up to the Senior part of the school which took, children aged 3 -18 on the same site. By then 31 pupils had moved to a different school. Testing for phase three took place between September 2002 and November 2004

In terms of Bentley norms, pupils from Choir School 3 had a raw average of Grade B at both times of testing. The non-specialist Independent School pupils were predominantly in Bentley's Grade C (middle 40%) at the first time of testing, rising to the bottom of the Grade B range by the third time of testing. While it should be noted that they were mainly younger than those from Choir School 3, Bentley norms take age into account.

On the bottom of the response sheet for the Bentley test pupils reported if they were learning to play an instrument and what grade they had achieved.

6.4 Analysis of Data

6.4.1 Independent School

There were three waves of testing in the Independent school involving four cohorts of pupils, whose distribution by age groups is given in Table 6.1.

Cohort by age in 2002	Wave1	Wave 2	Wave 3
7yrs	33	19	20
8yrs	36	16	24
9yrs	29	29	0
10yrs	31	15	0
Total	129	79	44

Table 6.1 Independent School distribution of pupils by age groups and time of testing

In this kind of study, there is inevitable attrition, since nine and ten year olds had left by the time of the third test. Moreover, all would have had many musical experiences before entering the school that might predispose them to music.

6.4.2 Choir School

In the choir school, 40 of the original 71 children had moved up into year 8 – the secondary section of the same school. The numbers are shown in Table 6.2.

Age of children in 2001	Wave1 (2001)	Wave 2 (2003)
10yrs	71	40

Table 6.2 Age of children in Choir School 3 in 2001

6.4.3 Independent School results

The analysis strategy in the non-specialist independent school was to take advantage of the Bentley norms, in order to group members of cohorts into those whose 2002 scores were higher than might be expected on the basis of their age and those whose scores were as expected or lower than expected for their age. This was a principled way of lowering the number of groups for comparison. It also allowed for the possibility that the starting level of those children playing a musical instrument might be higher by age 7 than the level of other children.

Even though the 1966 Bentley test norms were very old, this method of dividing into cohorts was more meaningful than simple reliance on chronological age. It also retained numbers in comparison groups, as can be seen from Table 6.3.

Grouping according to Bentley norms in 2002	Wave1	Wave 2	Wave 3
Above expected (AB)	83	53	20
At or below expected (CDE)	46	26	24
Total	129	79	44

Table 6.3 Grouping children for waves of testing in the Independent non-specialist school

Table 6.4 then further divides the children into four categories for each wave of testing, on the basis of whether they played an instrument or not, and whether their Bentley scores were higher than expected for their age in 2002 or not.

Bentley norm in 2002		Wave 1	Wave 2	Wave 3
	Learning to play	Number	Number	Number
Above expected (AB)	No	29	16	9
	Yes	54	37	11
As expected or below (CDE)	No	21	12	14
	Yes	25	14	10

Table 6.4 Numbers tested at each wave of testing according to starting level Bentley norms and whether they learned an instrument or not in the Independent non-specialist school

Although children were expected to gravitate towards musical experience on the basis of already established interests, those in the Independent School were encouraged to learn an instrument. However, encouragement did not seem to offset a tendency for those higher on Bentley norms to be more likely to take up an instrument. The first column in Table 6.4 shows that just over two thirds (54 out of 83) in the AB

category were learning to play an instrument in 2002, while a half (25 out of 46) in the CDE category were learning an instrument.

An indication of change based on Bentley norms was to compare their status in 2002 with what would be expected for their age group in 2004. The rate or likelihood of moving from one category to another by the third wave of testing is shown in Table 6.5.

Pupils	Learning an instrument (81)	Not learning an instrument (48)
Changing to better than expected between 2002 and 2004	45%	38%
Changing down to expected or lower than expected between 2002 and 2004	2%	17%
Probability (Fisher exact test)	P=.014	P=.768

Table 6.5 Rates of changing status according to Bentley Norms as a function of learning to play an instrument in the Independent non-specialist school

A Fisher's Exact test analysis was carried out to examine the significance of change in category between the first and last time of testing, both for children learning and instrument and those not. This showed the importance of learning an instrument affecting change. If not learning an instrument, less than half (38%) had moved category between the first and last time of testing from the expected level or below to above. However 17% had gone to the expected level or lower for the age group. The significance of change could readily have occurred by chance,

p=.768. For those playing an instrument, only two out of 81 had receded, while two thirds (66.1%) of those starting below the A/B level had higher Bentley test scores by the third time of testing. This tendency was highly significant, with p=.014 on the Fisher exact test.

A less crude analysis can be conducted using the children's scores on the Bentley test but still using the division according to the scoring category at the first time of testing. Table 6.6 shows the mean scores of pupils on the Bentley test in the categories of Table 6.5 (above and below expectations in relation to the norms, and according to whether or not they were learning an instrument.

		Wave 1			Wave 2			Wave 3		
2002 status	**Playing**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
Above Bentley norm	**No**	31.14	7.07	21	30.00	9.63	12	37.50	8.54	14
	Yes	37.32	5.16	25	39.07	7.55	14	43.10	5.32	10
As expected or below	**No**	28.38	5.97	29	30.75	10.79	16	38.89	6.09	9
	Yes	28.61	6.22	54	34.43	7.87	37	38.36	7.51	11

Table 6.6 Bentley test scores, by whether an instrument was being learned for those at or below and higher than original Bentley norms in the Independent non-specialist school

The results in Table 6.6 show a simple time effect, with each group of pupils ending up with a higher score than at the first time of testing. Authors such as Singer and Willett (2003) insisted that provided that all

children's scores are kept for use in analysis, significance of effects of change over time can be tested. Peugh and Enders (2005) explain how to perform the recommended calculations with well-known statistical packages. The same methods apply to this analysis where, instead of keeping four groups for comparison according to chronological age, they were divided according to their Bentley norm categories (Bentley categories A and B and categories C, D or E)

Figure 6.1 is a graph showing what happened over time at the three waves of testing in the Independent School.

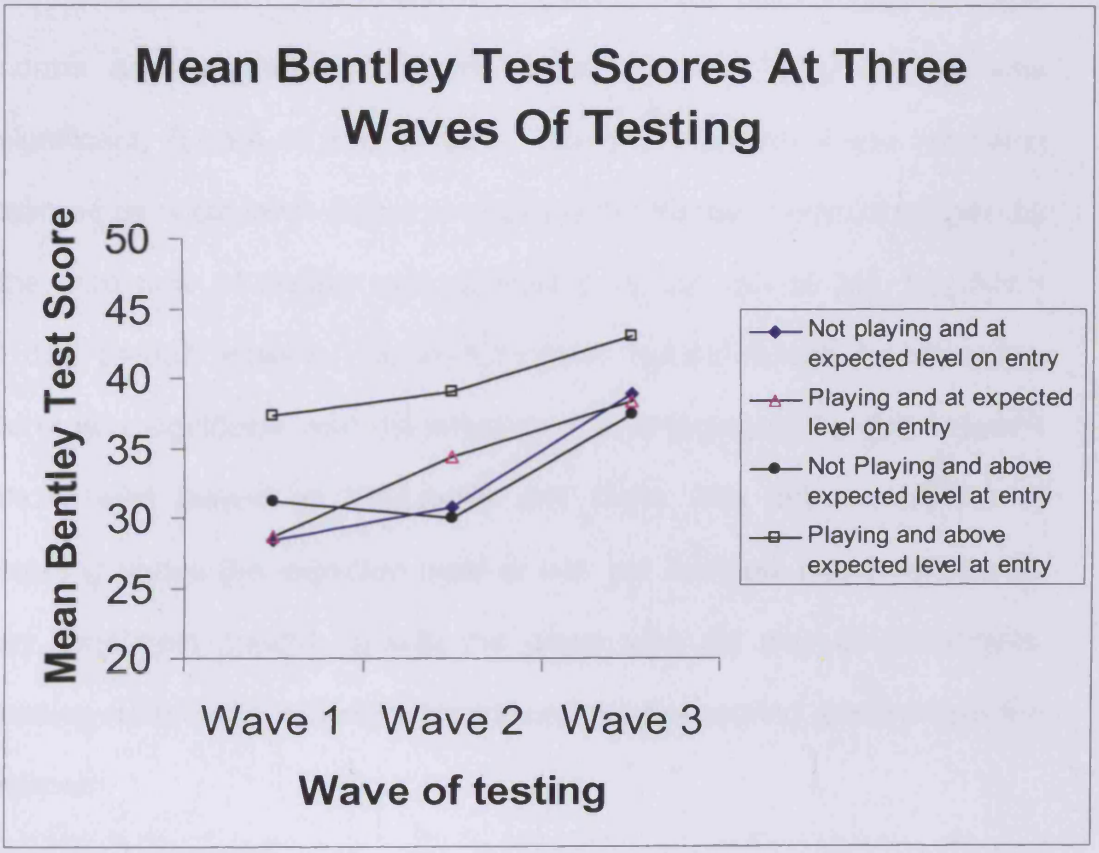


Figure 6.1 Mean Bentley Test scores at three waves of testing in the Independent School

For the four categories of pupil, the mean test score was improved by 2004 (the final wave of testing). The appropriate significance test for a simple time effect was significant, $F(1,87)=51.766$, $p<.0001$.

There was a significant overall superiority in pupils who were higher than the Bentley norm for their age group, averaging across different times of testing at $F(1,39) = 19.483$, $p<.001$. There was also an overall superiority for pupils learning to play an instrument: $F(1,40)=16.140$, $p<.0001$. Simple effects were not the whole story, the superiority of those learning to play an instrument being conditional on their entry level in terms of the old Bentley norms. The interaction between expectation based on these norms and whether or not an instrument was being learned was significant, $F(1,40) =7.964$, $p=.007$. When an instrument was not being learned by pupils who started at or below the Bentley norms, their gain by the third time of testing was significant, though not so big, $t(1,40) = 2.822$, $p=.007$. However, Figure 6.1 shows that the reason the interaction term was significant was not because of a widening of the gap between those who played an instrument and those who did, irrespective of starting above the expected level or not, but because those not playing an instrument caught up with the group who did play an instrument, having started at or below their expected level of scoring, according to the norms.

6.4.4 Choir School 3 Results

Choir School 3 was revisited after two years in the third phase of testing. The aim was again to see if a pattern of change in older pupils with considerable musical experience indicated a possible multiplier effect. The results from the Bentley test for the first and second wave of testing are given in Table 6.7.

Playing involvement	Wave 1 of testing			Wave 2 of testing		
	Mean	SD	Count	Mean	SD	Count
Not playing	38.83	6.91	18	42.00	6.52	18
One instrument	41.23	5.90	48	46.00	4.50	48
More than one	49.40	2.07	5	50.40	4.88	5

Table 6.7 Choir School 3 Bentley test scores, first and second wave of testing, by playing one or more instruments.

Pupils learning one instrument scored on average just above 40 (M= 41.23, SD = 5.90) at the first time of testing and an average five points higher (M=46.00, SD=4.50) at the second, a gain of five points. Those not learning an instrument started and ended with averages below others but there did not seem to be a widening gap. The five pupils playing more than one instrument seemed to be peaking at around 50 points. Figure 6.2 gives a graph of the results.

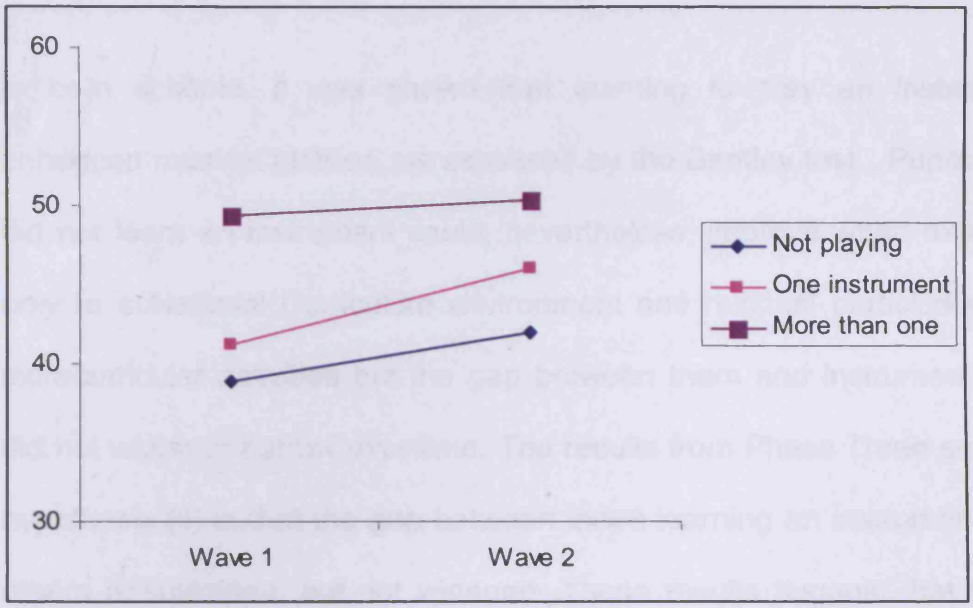


Figure 6.2 Mean Bentley scores at two waves of testing according to whether children played more than one instrument, one instrument or did not learn an instrument in Choir School 3.

The appropriate significance tests confirmed that playing instruments kept pupils ahead of those who did not, with the main effect of playing an instrument attaining significance, $F(1,28) = 8.128$, $p=.008$ but the interaction term, which would have to be significant if there was a widening gap, did not attain significance, $F(2,28) =.991$, $p=.384$.

6.5 Discussion of results

In section 6.1 the following hypotheses were presented:

If there is a social multiplier at work, then over three years, (i) the gap between those learning an instrument and others would widen. If the benefit does not involve a social multiplier, (ii) the gap would be sustained, but not widened.

In both schools, it was shown that learning to play an instrument enhanced musical abilities, as assessed by the Bentley test. Pupils who did not learn an instrument could, nevertheless, improve when exposed only to a National Curriculum environment and residual participation in extracurricular activities but the gap between them and instrumentalists did not widen or narrow over time. The results from Phase Three support hypothesis (ii) in that the gap between those learning an instrument and others is sustained, but not widened. These results suggest that those pupils playing instruments in Choir School 3 were still snowballing at the final time of testing. However, any further conclusions from these results have to be drawn with care, given the use of just two institutions and sample attrition. Improvement from first time of testing was large enough in those learning an instrument in a non-specialist environment to be taken as evidence of continuing self-enhancement of musical abilities. The results of retesting indicated that continuing self-enhancement of musical abilities was possible even where entry levels were high, as with older children in specialist schools.

In middle childhood, those who join music groups will have increased exposure to music, with wider gaps being created between them and their peers who have other interests apart from music. Being part of musical groups, such as an orchestra or choir, will bring benefits to musical abilities, given 'social multiplier' effects within them. Boosting will continue and, as musical enjoyment increases, may be 'snowballed' by even more

exposure to music and highly trained musicians and teachers. In the temporal context, by middle childhood, it can be assumed that within-generation effects have been at work. Time between testing occasions in the data in this chapter can be assumed to be sufficient for showing that within-generation effects have taken place.

We considered in Chapter Five how the social context of developing musical abilities is influenced by immediate circles of associates and wider societal forces, which need to be analytically distinguished in taking our model of them in new and original directions. Moreover, we argued that the temporal context in musical ability needs to be further and more carefully investigated. Dickens and Flynn (2001) separated the temporal context into within-generation changes, where social multiplier effects may operate to make abilities self-enhancing, and between-generation, society-wide changes. They believed that changes in work practices and increasing cognitive and symbolic demands over decades can explain why national average intelligence scores are being driven up. An extended model would make environment selection responsible for that boosting. Specialist institutions in this study predominantly pick up those who have benefited most from earlier 'boosting' and who are disproportionately from Bentley's top 20%. Multipliers attributable to enculturation at the individual level would have taken advantage of possible influences of 'social multipliers' from immediate circles of peers.

Dickens and Flynn (2001) formalised their model in a way that makes precise quantitative predictions about mental test scores. This has not been done with Bentley test scores, hence the use of the metaphorical terms 'boosting' for proposed between–generation changes and 'snowballing' for within-generation changes. Enculturation differences would give differences in 'hardness' and suitability *qua* aptitude or capability, rather like selecting something small and hard in a snowy environment as the core of a ball. Instruction, practice and institutional influences act on musical ability like the accretion of materials to form snowballs, from insignificant beginnings.

If there can be effects of what Dickens and Flynn (2001) would label as multipliers, then benefits over time should be attributable both to the kind of institution attended and individual effort of learning to play an instrument. Learning to play an instrument would be more than an extra cognitive task: it would be a self-conscious move in environment selection. It should work as a multiplier, even in non-specialist schools. The likelihood of immediate circles of contacts being of similar musical ability and motivation would be higher and change over time would favour a choir over a non-specialist, independent school.

6.6 Conclusion

Having examined the social and temporal context of children's musical abilities over a limited time scale the danger is that conclusions may be drawn that go beyond the data. If there is a basis for applying concepts,

such as those employed in intelligence development to musical ability, it is backed up here by the data presented over the three phases of this research where the kind of model that Dickens and Flynn (2001) present for the development of intelligence is extended to musical abilities. In particular, one would claim to have clarified aspects of what is important in the social context, where group contextual effects can be assumed to be at work, as when people with cognitive skills of a certain level somehow gravitate towards others with a similar level. Moreover, in metaphorical terms, the evidence presented in Chapter Five and the retesting data in this chapter indicate that a way of boosting overall musical abilities would be to widen participation in learning a musical instrument much further than is catered for in the National Curriculum of England and Wales.

It would be going beyond the evidence to insist on changing the National Curriculum because the precedent of boosting intelligence scores suggests that wider cultural changes than changes in schooling can produce the boosting effect. It would remain to be seen if developments in electronic music could work on musical abilities in the way that the prevalence of symbols in contemporary everyday environments is connected with rising average intelligence test scores.

Chapter 7

Conclusions: Musical Abilities and Exercising Abilities

7.1 Introduction

In this concluding chapter the empirical findings presented in Chapters Four to Six are reviewed in the light of the theoretically contextualised research questions framed in Chapter Two, their limitations are discussed, implications for educational policy are outlined and directions for future research are proposed. The original research questions were pursued over three successive phases, reviewed below:

1. Should musical intelligence be regarded as separate from other kinds of intelligence, and what makes up musical abilities? (Chapter Four)

2. How embedded in school experience is music education and could it have a 'boosting' effect on overall levels of musical ability? (Chapter Five)

3. Can influences from the social environment contribute to cumulative changes in musical abilities over time, possibly inducing self-enhancement of abilities? (Chapter Six)

7.2 Phase One. Musical abilities and general intellectual abilities

The first phase of the research, reported in Chapter Four, was to evaluate whether musical abilities should be regarded as separate from other kinds of intellectual abilities and to what extent core abilities could be identified and inter-related. The importance of investigating the organisation of individuals' abilities in middle childhood derived from a way of handling the tension between popular belief in musical abilities as 'special gifts' and the enterprise of teaching Music to all pupils. One way of handling the tension was to follow Howard Gardner's (1983, 1993) ideas, which contended that individual abilities were organised as 'separate intelligences'. Were this shown to be the case, an education neglecting 'musical intelligence' would fail to match children's developmental needs.

In Chapter Three, it was proposed that a long-standing test of musical abilities devised by Bentley in 1966, though currently in less active use in education than it was in the past, was appropriately sensitive to abilities in perceiving pitch, remembering tunes and responding to rhythms and would allow for valid inferences about individuals across differing educational contexts. Moreover, the presence and levels of these abilities appeared to be integral to judgements in the Inspections regularly made of our schools since the introduction of the National Curriculum after

1988. Following Gardner, it was predicted that inter-correlations between subtests for the same 'intelligence' would be high, while those between tests of different intelligences would be lower. However, if researchers such as Carroll (1993) were followed, high inter-correlations across different 'intelligences' would be predicted: that is to say, although at one 'stratum' sets of abilities could be regarded as separate, there are broad categorisations, such as abilities that depend on processing sound, where musical abilities, linguistic abilities and auditory processing come together. Moreover, in contradiction of Gardner, Carroll and others posited a third 'stratum' where all 'abilities' came together as general intellectual processing. With specific regard to music, then, Carroll placed elements, such as: perceiving contrasts in pitch between tones in the first stratum; auditory abilities, including perceiving contrasts in speech sounds and musical abilities, in the second; and general intelligence, the general factor, in the top stratum.

Subtests from a general intelligence test, the Heim, Watt, & Simmons, (1974) AH2/AH3 Group Tests of General Reasoning were selected as representative of both verbal and 'logico-mathematical' intelligence. Inter-correlations were found to be high across subtests of musical abilities and general intelligence. This view was found to hold for inter-correlations between tests results obtained from Year 6 pupils in three contrasting local authority primary schools (Primary Schools 1, 2 and 3).

7.3 Phase Two. Musical abilities, relations with other children, kind of school, curriculum reform and social position

The second phase of the research was concerned with how musical abilities developed in a changing social context where influences were conceptualised as proximal (other children in pupils' immediate network of contacts), more distal (kinds of teachers and schools), and 'macro' (kind of institution and social position). A temporal dimension cut across such sets of influences. The implementation of a National Curriculum in Music was regarded as a more distal influence on the course of development for musical abilities. Phase One factor analysis of scores on Bentley subtests with scores on subtests of a general intelligence test indicated that all could be grouped together in a very general category, regardless of content. What was now sought was a range of further school sites that would provide maximal variation in terms of the various dimensions of social and musical contexts, provided by Primary Schools 4 and 5 and Choir Schools 1, 2 and 3. In selecting these, the most straightforward way of conceptualising the differences in social context that they exemplified would have been in terms of unidirectional influences, where being good at music was conceived of as raising sense of global self worth and higher musical ability was regarded as being associated directly with access to parental social capital, in the case of those attending specialist choir schools and with respect to those attending relatively disadvantaged primaries.

The Bentley test of musical abilities was again used for investigating these possibilities, along with an assessment of children's self-concept, which included a measure of global sense of self worth. If direct, unidirectional influences were the case, then it was predicted that, in contrasting kinds of schools (from the point of view of social position), higher musical ability scores would correlate positively with scores for global self worth, even though in schools regarded as disadvantaged, average musical ability scores would be lower. However, it was found that influences other than social position affected musical development. In both specialist choir schools and disadvantaged schools, where teachers were not specialists, learning an instrument was associated with significantly higher Bentley test scores. Indeed, musical ability test scores for pupils learning an instrument in disadvantaged schools could be as high as those of pupils selected for specialist choir schools who were not learning an instrument.

An important perspective on development, which has informed theorising in this area since the 1990s, shares the assumption that influences will be indirect rather than direct and are highly likely to be reciprocal; musical abilities can be both a product and a producer of social contexts which foster their development. This happens in an indirect way because pupils are more likely to socialise with peers with whom they have things in common than with others with whom they have less in common. Social comparisons will lead to differentiation in self-concepts as a result of making judgements and being judged in one's immediate network of

contacts. By middle childhood, the self-concept can be regarded as having become differentiated into academic or scholastic, athletic, physical appearance and peer domains. Having a positive view of the self in these different domains may or may not lead to a positive or negative sense of global self worth.

Cutting across such interactions between the self and elements of the social context are history-graded changes. It matters that this investigation into musical abilities has taken place after the introduction of a National Curriculum in England and Wales. It was important in investigating these possibilities to use a self-concept instrument that assessed global self worth alongside more differentiated domains. It was also important to be sure that in contrasting kinds of school, Music as required by the National Curriculum was being implemented: this was checked by means of Inspection reports.

In schools that met this criterion but were socially disadvantaged Bentley test scores correlated significantly with scholastic and behavioural self-concept but not with global self worth. In music specialist schools, where average Bentley scores were relatively higher, it was music examination grades that correlated significantly with scholastic and behavioural self-concept, not Bentley scores. Regardless of kind of school, being above average on the Bentley test of musical abilities or learning to play an instrument led to a more positive sense of academic competence (score on the scholastic domain) and a more positive feeling about behaviour

(score on the behavioural domain). However, there was no effect on positive sense of global self worth. At the same time, collective music making can be a vehicle for pursuing goals that are wider than attainment within the curriculum

7.4 Phase Three. Musical abilities and the temporal context

Phase Three of the research investigated changes in musical ability in children over time. The effect of playing an instrument on individual musical ability could be tracked to see if cumulative changes led to a widening of the gap between those doing so and others who were merely following the National Curriculum and in receipt of whatever aspects of their schools' extracurricular activities they chose to participate in. Pupil performance in Choir School 3, used in Phase Two of the investigation, was now contrasted with the performance of pupils in an Independent School in which I currently ran the Music department. In this new position, I controlled the implementation of the music curriculum and was in direct receipt of inspection reports. Three successive, yearly waves of testing were possible in this school, which did not specialise in music, while two, (one in phase two and one in phase three), were achieved in Choir School 3.

The importance of investigating the temporal context was twofold. First, it was important to collect longitudinal data to support the claim that a 'macro' change, such as implementing the National Curriculum, including Music, could have a boosting effect on group averages for scores on

tests of musical ability. Second, it was important to find out whether a particular assumption, derived from a model of change in general intelligence over time, could apply to musical abilities. Common to theorising from a developmental contextual perspective (Lerner, 1991) is the assumption of reciprocal influences. Being at any level with respect of a set of abilities will lead individuals to have a circle of immediate contacts with similar interests and a similar level of abilities. However, in explaining rises in overall levels of general intelligence across generations (a history-graded change), Dickens and Flynn (2001) made a particular, further assumption about changes within a single generation. They assumed that mixing with people at a similar level of ability had a 'social multiplier' effect, a given level of ability causing a particular socialisation pattern. This pattern tends to raise the average level of ability of the immediate circle. In turn, circle members experience gains in their individual levels of ability. Such history-graded change comes about because persistent influences in the environment, such as cognitive demands of the workplace, keep social multipliers at work in more and more networks of social contact as generations go by. Dickens and Flynn refer to this within-generation change informally as 'snowballing'.

It is important that 'snowballing' can take place with general intelligence, since musical abilities scores can be shown to belong, at a very general level, with general intelligence scores (see Section 4. 5). The question becomes whether, over time, an influence such as learning a musical instrument and the socialisation patterns that such activity induces create

a widening gap between those who do and do not learn an instrument. Corroborating evidence for boosting musical abilities was offered in Chapter Six. Children merely following the National Curriculum showed gains in scores on Bentley tests over time in the non-specialist Independent School, where the gap between those also learning an instrument and others was maintained but did not get wider. The gap was sustained in specialist Choir School 3 but did not appear to widen by the second wave of testing. There were gains in scores for children who were not learning an instrument. One interpretation of these gains is that music in the National Curriculum is a positive influence on musical abilities. However, if an instrument was being learned, starting levels were higher and gains continued to be made. In the National Curriculum, the orders do not require learning an instrument. Learning an instrument is clearly a very powerful positive influence on musical abilities.

The question then became whether learning a musical instrument involved the kind of social multiplier that Dickens and Flynn (2001) assume to be at work with general intelligence. Dickens and Flynn assume that there have been history-graded positive influences on the overall level of intelligence within Western countries. These come from the wider social environment - greater use of symbols in the culture and higher cognitive demands of work. They then lead to age-graded (within generation) multiplying effects of mixing with an immediate circle of contacts with similar intellectual ability. So it could be that learning an instrument would lead to mixing more with others having similar interests

and levels of musical ability. This kind of social contact could have a multiplying effect on levels of musical ability.

If a social multiplier was at work with levels of musical ability, then not only would learning an instrument give people higher levels of musical ability, but the gap between them and others might widen over time. In the results of Chapter Six, widening of the gap did not occur, either in the non-specialist school or the choir school. Learning an instrument can be regarded as probably the most powerful positive influence on musical abilities. However, there is no basis for claiming that learning an instrument leads to the multiplying effects of the more immediate social environment that are considered responsible for raised levels of general intelligence.

The evidence gathered over Phases Two and Three and reported in Chapters Five and Six, therefore, offers strong support for adopting a contextual developmental perspective assuming reciprocal influences across contexts but not a model including 'social multipliers' on the lines delineated by Dickens and Flynn (2001), as depicted in Section 2.6.

7.5 Understanding the limitations of the research: point and counterpoint

All dissertations are works in progress, representing the strengths and limitations of the conceptual grasp and the research training of their authors. In this case, I have been trying to hit not so much a clearly

defined target as a very broad canvas so that, in some senses, it has been difficult to miss, while in others, palpable hits may be hard to identify. Moreover, I came to this project initially very much in teacherly mode, and the final product shows all the signs of the perilous journey from classroom to scholarly discovery and critique.

The *first phase* of my work represented, in one way, the recurrent need of teachers who wish to transcend merely 'doing it over' decently and arrive at a clearer understanding of the basis of their pedagogic practice. In this case, it concerned the 'debate' concerning the attractiveness of Gardnerian claims to musical ability being one of several separate intelligences. Gardner's way of opposing the belief that possession of 'special gifts' is prerequisite to more than mundane performance falls short of surrounding notions of improvable and trainable competence in a psycho-social approach to curriculum planning. My decision was to locate three state primary schools, which afforded a perfectly ordinary range of post-National Curriculum Music and extracurricular experience. Here I administered the Bentley and Heim tests to pupils in the hope of teasing out how far tests of 'musical' and 'general' ability measured the 'same thing'. There were 'limitations' attendant on every decision I made. The school contexts were purposefully different: Primary Schools 1 and 3 were predominantly middle class, while Primary School 2 was more mixed, with more pupils from working class backgrounds. In Primary School 1, music had always played an important part in the life of the school and instrumental lessons were provided by the local education

authority, while Primary School 3 had no full time member of staff specialising in music but employed a peripatetic music teacher from the local education authority for two and a half hours per week. All pupils in Primary School 2 had one hour of music a week, where recorders seemed to take priority. The school did not have an orchestra or choir at the time when the research took place, although it had two recorder groups.

This act of opportunity sampling to highlight key institutional contrasts involved several rough-hewn assumptions. First, using Inspection reports as indicators that the National Curriculum was being delivered, while an original feature of the investigation that can be counted as a strength, did not contest any challenge to assumptions about their reliability and validity as measures of its 'presence'. Neither OFSTED nor OHMCI (nor its successor Estyn) have permitted independent verification of their evaluatory categories or attempted their own exercises in these respects. Their claim to authority, notwithstanding the expertise of their employees and contractors, rests on official rather than research authority. Lack of clarity about their metric must remain a weakness of using inspection reports in such a way; without more precise data from other sources observations, statements such as 'some reach very high standards' might be regarded as relatively meaningless judgements. The Inspection system is officially justified as providing objective and dispassionate reports that include judgements and recommendations which should be used to improve schools' provision and pupil achievement. We should not

forget that this, rather than any *bona fide* claim to purveying good empirical data, is the system's rationale.

Yet, without inspection reports, it would have been difficult to establish the extent to which a school, or its curriculum, matched the needs of its pupils or the impact of schools' music provision on pupils' performance. Where inspection reports were used in this study, they have been used mainly to describe the characteristics of schools' music curricula as offered to their pupils. Although the only measure of musical ability used was the Bentley (1966a) test, the Bentley components of the test and Inspectors' comments on attainment agreed very well in the case of these state schools, while in the choir schools used in phase two of the investigation their reports additionally described and discussed the existence of composition as a curricular element.

My rationale for using inspection reports was to enable comparison of performances across schools on the basis of knowledge about their curricular offerings. This involved two schools from middle-class areas, serving very similar socio-economic sectors, and one from a predominantly working class area, all from the same region, in a pupil sample of 70 in Phase One. While all pupils completed all of the tests required in lesson time, without any attrition, the sample size was small and contained a limited number of pupils in quite a high musical ability range. Moreover, using free school dinners as a proxy for more direct measures of social class and 'deprivation', while hallowed in recent

research practice, is to compound what is already very rough categorisation into only two groups, 'middle' and 'working class', whose boundaries are far from clear and within which we might expect almost as much intra- as inter-class variation.

The tests used in Phase One were the Bentley Measures of Musical Ability (1966a) and the Heim, Watt and Simmons AH3 Group Tests of General Reasoning (1974). Both tests measure components of ability, making it possible to identify whether children have strengths and weaknesses in particular areas. The strength of both tests was that they were appropriate for the age groups used in this research and could be completed within the lesson time, thus not imposing on any of the respondents' extra-curricular time. More pupils could be tested within a limited time than by an individual test method. A further strength of the Bentley test was that it might have revealed high musical abilities in pupils who had previously shown no musical ability and this may have acted as a motivator and encouraged pupils to take up a musical instrument. However, reliance on it as the only measure of musical ability in Phase One, without any other musical assessment of musical ability or attainment, must be regarded a weakness of this part of the research. The limitations of using the Bentley and Heim tests are that they cannot be applied to pupils who are not old enough and who do not have understanding of relevant terminology and knowledge. All pupils had to understand from a recorded tape what they had to do on the Bentley (1966a) test. One of the main objectives of designing musical ability tests

is to be able to measure equally well the abilities of trained musicians and those who have developed musical activities naturally. A weakness of the Bentley test is that it relies on respondents' understanding of musical terms, such as knowledge of musical chord descriptions, intervals and crotchets.

The statistical techniques used in Phase One to test hypotheses were correlational. Factor analysis was used as a data reduction technique to reduce the large number of variables to a small set of factors that explained the most variability in the research. The strengths of using factor analysis were that it showed how closely musical ability went with intelligence without making claims that one caused the other, while recognising certain properties of correlations, which other analyses fail to do. Using factor analysis as a statistical analysis was a strength in looking at more than one variable at a time when analysing data, for example, pitch, tunes, rhythm, chords, number, perceptual and verbal elements, and in considering the combined effects of variables. Principal components analysis afforded evidence that one factor of ability was satisfactory. However, limited sample size was a weakness of using factor analysis: if the number of factors had increased, it would have become increasingly difficult to interpret the results. ANOVA was used in Phase One to check that differences between schools would not be so great as to invalidate inferences about individual respondents. The inferences legitimately drawn from the results supported the interpretation of musical abilities, as assessed by the Bentley test, as belonging to a

general set of intellectual abilities. Both the musical abilities test and the intelligence test assessed a stratum of abilities having a general factor in common. It appeared that there might be good evidence against Gardner's (1995) view that there is a separable musical intelligence.

The *second phase*, where I sought evidence of the presence of boosting and snowballing by comparing musical ability progress in two further state Primary Schools (4 and 5), which might fairly be described as disadvantaged, with that measured in three specialist Choir Schools (1, 2 and 3), was an attempt to highlight and contrast the possible effect of social position in schools, all of which would be expected to be implementing the National Curriculum, while offering access to quite differential instrumental tuition and extracurricular experiences. Inspection reports for participating schools were again used to check implementation of the National Curriculum and also highlighted ways in which schools made musical experience meaningful for their pupils.

Confining the research to hypotheses about quantitative data passed by the prospect of exploring how the choir schools were faithful to stewardship of the tradition of choral singing marked, not least, by participation in an annual choir schools' music festival. At the same time each choir school seemed to be just as strongly engaged in new cultural forms extending facilities as, from a multi-purpose studio, a keyboard studio, orchestral and choral practice rooms and a recording studio in Choir School 1, to a keyboard studio, and a recording studio, as well as

orchestral and choral practice rooms in Choir School 2, while Choir School 3 had not only a teaching area and sixteen practice rooms but also the prospect of creating a music technology and recording facility. It was also true that Primary Schools 4 and 5, regarded as disadvantaged, also belonged to a wider space of experience. Both had strong links to the annual youth festival in Wales known as the Urdd Eisteddfod and were praised for events held in their own schools, such as an Indo-Cymry percussion band in Primary school 4. This was very much concerned with new identity construction rather than stewardship of a tradition, suggesting that music in the curriculum was a vehicle for constructing a new, hybrid identity with elements from different cultures. In the choir schools, concern was not solely with choral tradition in religious music; new cultural possibilities were also explored, for example, through electronic music making. Primary School 4's inspection report commended the way in which it was using the National Curriculum as a vehicle for promoting multicultural education in the school generally, with praise for the 'Indo Cymry' percussion band and Indian drumming as valuable cultural assets offered to pupils.

Though it was beyond the scope of this research to explore the salience of such cultural items for participants, such extension of musical experience would not be possible without developing the core musical abilities which *could* be investigated using the methods employed in this thesis. For the purpose of highlighting the importance of learning an instrument, the questionnaire concerning pupils' musical experience was

functional, providing information to account for similarities and differences between pupils at different types of schools relatively economically. This questionnaire information was collected from a large portion of the sample and return rates were high, not least because it was delivered and responded to in class time. A large number of issues which were touched upon, such as pupils own listening preferences would have benefited from piloting and maybe focus group methods. In such a modality, there is always the risk that some pupils may have misinterpreted some questions and others did not complete them, so that even the descriptions afforded have gaps. In particular, the 1990 classification of social class employed (OPCS, 1991), while having the advantages of widespread use and recognisability, is only as good as the responses fed into it: pupils may not have understood what their parents' occupations were and they may have written down the wrong jobs on the questionnaire or not understood the term 'occupation'. Moreover, while we may agree that '(T)here is complete unanimity across central and local government, academics and the private sector that OPCS social classifications are necessary' (Social Research Update, 1995: 1) and to the qualified advantages of OPCS producing a standard government classification, it leaves government in control of definition and, hence, the information that must be collected in order to produce classifications, which are not free of conceptual or population coverage limitations. Social classifications have to be considered within the framework of current intellectual debates surrounding class analysis, principal among them being the relationship between gender and class, the definition and

measurement of 'paid employment' and problems of the very relevance of class analysis to contemporary society and social scientific explanation. Nevertheless, for both pragmatic and theoretical reasons, occupationally–based classification will continue to remain a vital tool for scientific and academic researchers for the foreseeable future and I was remarkably fortunate to be able to access data that enabled them to be used in this research.

As to the standardised tests used in Phase Two, firstly, the modified Harter self-concept instrument by Bellin and Rees (2004) can be regarded as particularly apt, making it easier for respondents to understand questions and give answers than previous versions. Self-report is one of the most common techniques in this area, where 'self-concept' as a construct is often ill defined. Given that it becomes differentiated by the time of middle childhood, doubts are often expressed about the value of any assessment of general self esteem (Harter, 1999). Pupils' responses to a self-concept instrument may be influenced by a number of factors, for example, willingness to cooperate, lack of understanding of questions asked, or inability to express or describe themselves. The meaning and interpretation of some of the questions in the modified version of Harter's test used here may have caused some problems for pupils, although return rates were high and not many questions were left unanswered. Standards of self-concept measurement have improved and many of the problems precluding to adequacy of measures have largely been resolved (Wylie, 1989: 3).

Secondly, the measures of attainment provided by the schools were National Foundation for Educational Research (NFER) tests in English and Mathematics in the Choir Schools and Key Stage 2 levels of attainment in English, Mathematics and Science in local authority schools. It was beyond the scope of the research to question their usefulness concerning the effectiveness of schools and the education system. There were weaknesses in using NFER tests for some schools and SAT (Standard Assessment Tasks) scores for others in terms of their incommensurability. Though both may be taken to reflect National Curriculum outcomes, they are, simply, different. Moreover, one of the primary schools was unexpectedly very reluctant to give out Key Stage levels at the time when fieldwork took place, lowering the numbers when calculating correlations. The NFER sounds a caution in its *Administration Manual for Cognitive Abilities Test* (Hagues and Courtenay, 1994b: 4) in urging researchers to remember 'that tests do not make decisions. People make decisions; tests simply give information that may help in making those decisions', which we might all heed.

The music exam grades asked for in the musical experience questionnaire were those of the Associated Board of the Royal Schools of Music, probably the most widely recognised measure of musical attainment. Basic components of musical perception, such as rhythm, pitch, melody and listening skills, similar to the Bentley Measures of Musical Ability (1966a) seem to be prerequisites for higher grades.

However, though correlations between Bentley test and Associated Board exam results might be reassuring, they will not account for high scores by untrained musicians who have never entered Associated Board exams.

Finally, the form of Phase Two analysis chosen, embedded in a contextually aware, developmentalist, conceptual framework, was a complex one, attempting to hold together notions of age-graded change in persons' internal environment with contextualist beliefs that what changes with age is not level of ability alone but an interaction between level of ability and what is in the external environment. The form of analysis contrived here was able to handle the notion, for example, of high levels of musical ability in children at a particular age being accountable in terms of changes over time in how they had responded to their external environments. Contextualists are more ready to accept that there can be losses as well as gains arising from such processes. For example, decline in the scores of children changing school or giving up learning an instrument does not have to be taken as evidence of 'something within', a lack of a gift or anything else but, rather, may be because key interactions between the external environment and previously attained level of ability have been taken away. For those not taking a contextualist perspective, musical abilities tend to be thought of as reaching a certain level by a particular age, some faster than others. It may have been simplistic to apply the reasoning of Dickens and Flynn (2001) to musical abilities, with its emphasis upon history-graded changes as crucial for the persistent increase in overall levels of

intelligence test scores. There does seem to be more use of symbols in more and more environments and a persistent increase in cognitive demands in the workplace. At the same time, there have been widespread changes in sound reproduction, such as developments in analogue recording technology since 1945, and in digital music reproduction since the 1980s. Do such changes add up to the kind of persistent influence that can be expected from changes in cognitive demands in the workplace? Recent analysts of pedagogic discourse in school music, such as Wright (2006), have argued that musical experience is increasingly open to and influenced by a hugely transformed platform of listening availability *qua* technologies, sources and genres and that these have real impact on children's reading of and response to school and other music. Whatever the balance of probabilities in such arguments, among other things, there was no way of adding in a value for the way in which they might have affected our pupil scores in this already complex phase and the next.

A limitation of the longitudinal approach which formed the basis of *Phase Three* was that while three annual waves of testing took place in one musically non-specialist Independent School only two were possible in the socially similar, specialist school Choir School 3. Clearly more schools and five waves of testing would have been preferable. However the data obtained was sufficient to test whether a widening gap between those learning and not learning an instrument was opening up. That it was not unreasonable to investigate whether either boosting or

snowballing was taking place was mildly attested by OFSTED findings on musical achievement, set against those for all foundation subjects, for 1996/7 and 2002/2003, given in Figure 2.1. However, even such a large-scale change as the introduction of the National Curriculum does not amount to a big enough history graded change to guarantee a change in overall average abilities.

7.6 A contextual developmental perspective and teaching

Intelligence and musical abilities may be related closely enough to allow debates about intelligence to influence debates about musical ability. Music teachers, like those of other subjects, have been tempted to think that the way out of the debate on intelligence was to go with Gardner's (1993) view of separate intelligences. However, Gardner's views did not resolve the tension between belief in 'special gifts' and teaching music to all, and here, as elsewhere, they appear to offer only false promises of professional 'liberation'. Taking a contextual developmental perspective there would be a basis for expecting implementation of a national curriculum to boost musical abilities, even in schools regarded as disadvantaged. The results of this investigation showed that boosting can take place in non-specialist schools and that in both specialist and non-specialist schools, learning an instrument has a strong influence.

Detailed predictions assuming that musical abilities are undergoing boosting through education and becoming self-enhancing (snowballing) were not confirmed in every case in this research. However, the general

perspective according to which musical abilities can be held to have causal influence on socialisation patterns and, in turn, be influenced by them was supported overall. Accordingly, teaching musical activities, such as having live music and musicians in the classroom, bringing composers into school to work alongside pupils on composing projects and having links with professional orchestras which go beyond the classroom, are vehicles for musical experience and have to be regarded as potentially powerful influences. In some measure, implementation of the National Curriculum in Music can be regarded as having been a vehicle for bringing together teachers and musicians in developing new skills and new approaches to the curriculum, such that even inexperienced staff could take up more effective opportunities to engage in music making, as well as group learning.

Using the National Curriculum to boost musical abilities can be viewed as a goal for all music teachers, rather than a process simply to be awaited. Socialisation patterns which influence musical abilities can be produced through promoting ensemble work, including sharing and refining creative ideas and concern for performance matters, such as balance, tempi and cues. In making boosting a goal, there would be a need for piloting new working practices, as well as building on existing work in training and leadership for specialist and non-specialist teachers. Moreover, instrumental and vocal music lessons in the context of a national curriculum ought no longer to be referred to as 'extracurricular'. Music lessons have become part of what pupils see of themselves as scholastic

or academic and how they regard their own behaviour; music in the contemporary context has become integral to identity. By middle childhood, becoming part of a musical group can become an activity of everyday life and enhance musical ability. Widening the availability of lessons in performing as a individual and in a group on musical instruments would seem to be a between-generation influence for raising musical ability.

Given that schools are arenas for influence from more proximal network of social contacts, in their attempts to develop musical abilities they might usefully set out to include outside agencies to address specific needs. For example, it was noteworthy that schools where Inspection reports either said nothing about composition or commented on its absence had less musically experienced teachers. In such contexts, both local and non-local contacts could have a direct influence on what might happen in the curriculum if professional musicians could be persuaded to visit schools to give demonstrations of solo and ensemble playing. Partnerships might be made between schools and local music groups, allowing the curriculum to be enhanced by their performance skills. Attempts might be made to liase through the community, to arrange for some of the professional orchestras and music ensembles that play all around us, often very close to where schools are situated, to give demonstrations. Collaboration with composers and performers and participation in musical ensembles could encourage pupils to take part in more musical activities in and out of school. Relating classroom music to the world of

professional performers, stimulating in its own right, could boost further performance. More peripatetic instrumental teachers are needed to increase the number of pupils having lessons.

There was also an absence of comment and gradings in some Inspection reports concerning listening and appraising as classroom activities, even though, like composing, it is an element of the Music National Curriculum. However, there are practical steps that can increase the amount of direction and purposefulness of such activities. Pupils can keep diaries or logbooks, which provide a cumulative overview of their listening experiences, as well as their own development with instrument learning and playing in an ensemble, as, indeed, they can of their own musical compositions, even carrying them through from primary to secondary school. Observing a performance can provide opportunities for pupils to record and explain their impressions. They can be taught techniques for evaluating their own work and include reviews of their own performances.

From the research in this study, it seems that the hardest musical activity to get implemented from the curriculum activities is composing. We need to have more specialists or more specialist composition training in teachers. Without much composing in their schools, those children learning instruments in local authority schools had Bentley test scores nearly as high as the highest in the specialist schools. So if musical abilities are to be raised overall, ways of having many more people learn instruments at any age would be the kind of change that would match the

reliance on symbols and cognitive demands of the workplace as far as general intellectual abilities go.

7.7 Policy Implementations of the Research

The research conducted in this context reinforces calls for the school curriculum to deliver more than a minimal music education to pupils. The primary purpose of including Music in the school curriculum is to raise the abilities of all pupils as they gain access to the rich and wordless dimensions of their own and other cultural heritages. Although the focus of my particular research questions has been on core abilities, there has been no intention of losing sight of the purpose of their exercise in enhancing children's emotional development, giving them opportunities to experience and express feelings and the power to control that expression. The benefits of wider access to learning to play instruments have been shown in this research. Where there is doubt about the value of peripatetic teachers in non specialist contexts, this research shown here is evidence for further provision.

7.8 Directions for future research

This study moved from a narrow focus on the intra-individual context of music development to consideration of social and temporal contexts. It may be that a more sophisticated research design using quantitative and qualitative research methods with a larger battery of measures than were employed in these investigations would be needed to more thoroughly research a 'boosting and snowballing' model. My suggestion for future

research is that it should start with a wide focus on how institutions at the school level and beyond can structure musical experience so that self enhancement of musical abilities can take place through a linkage of musical opportunities at school, within the community and through parental involvement. Although a mainly quantitative methodology has been followed here, given the need to track progression from intra-individual to immediate and more distal social contexts, it would be appropriate when doing so to combine methodologies, rather than choosing between them. This would especially be an advantage if the intention was to investigate manipulation of social contexts. In this sense, within the limitations of an individual's investigation, the importance of taking contextualist views into music education research and practice has been demonstrated.

Bibliography

Ackerman, P. L (1988) Determinants of individual differences during skill acquisition: cognitive abilities and information processing. Journal of Experimental Psychology: General, 117: 299-318.

Bellin, W. & Rees, V. (2004) Reassessing the self-concept in middle childhood Psychology of Education Review, 28: 224-31

Bentley, A. (1966a) Measure of musical abilities. London: George Harrap

Bentley, A. (1966b) Musical Ability in children and its measurement. London: George Harrap

Bentley, A. (1968) Monotones: a comparison with "normal" singers in terms of Incidence and musical abilities. Music Education Research Papers, no. 1 London: Novello.

British Educational Research Association (BERA) (2004) Revised Ethical Guidelines for Educational Research. Southwell. British Educational Research Association.

Bergin, D. A. & Cizek, G. J. (2001). Alfred Binet. In J. A. Palmer (Ed.), Fifty major thinkers on education: From Confucius to Dewey (pp. 160-164). London: Routledge.

Bernstein, B. (1996) Pedagogy, Symbolic Control and Identity: Theory, Research, Critique London: Taylor & Francis.

Bever, T.G. & Chiarello, R.J (1974) Cerebral dominance in musicians and non musicians Science 185 (150): 537-9

Binet, A. & Simon, T., (1983) The Development of Intelligence in Children, Reprint New Hampshire.

Bourdieu, P. (1984) Distinction: A Social Critique Of The Judgment Of Taste, Cambridge: Harvard University Press.

British Psychological Society (2006) Code of conduct, Ethical Principles and Guidelines.

Bragg, W. (1980) An analysis of the effect of a program of creative enrichment on the self-esteem and self-concept of elementary school age children. Dissertation Abstracts Int. 41, 4279A

Brandt, K.S. (1980) Music, Art and Physical Education (ERIC Document Reproduction Service no. ED 188 964)

Bynner, J. M. & Romney, D. M. (1986). Intelligence, fact or artefact: alternative structures for cognitive abilities. British Journal of Educational Psychology, 56: 13-23.

Callahan, C. M., Tomlinson, C. A., Moon, T., Tomchin, E. M., & Plucker, J. A. (1995). Project *START*: Using a Multiple Intelligences Model in Identifying and Promoting Talent in High-Risk Students (Research Monograph 95136). Storrs, CT: The National Research Centre on the Gifted and Talented, University of Connecticut.

Campbell, L. (1997) Variations on a Theme, 'How teachers interpret MI Theory' Educational Leadership 55 (1): 14-19.

Carroll, J. B. (1982). 'The measurement of intelligence' in R.J. Sternberg, Ed. Handbook of Human Intelligence, pp.29-120. Cambridge: Cambridge University Press.

Carroll, J.B. (1993). Human cognitive abilities: A survey of factor-analytical studies. New York: Cambridge University Press.

Carroll, J. B (1995) On Methodology in the study of cognitive abilities. Multivariate Behavioral Research, 30(3): 429-452

Casey, B. (1996) Understanding individual differences in spatial ability within females Developmental Review, 16: 241-260

Casey, M.B. (1996) Understanding individual differences in spatial ability within females: A nature / nurture interactionalist framework. Developmental Review, 16, 241-260

Cattell, R.B. (1963). 'Theory of fluid and crystallized intelligence: A critical experiment.' Journal of Educational Psychology, 54: 1-22.

Cattell, R. B. (1968). Spearman, C. E. In International Encyclopedia of the Social Sciences, 15, D. E. Sills, Ed., pp. 108-111, New York: Macmillan.

Cattell, R. B. (1978) The scientific use of factor analysis in behavioral and life sciences. New York: Plenum.

Cattell, R.B. (1987). Intelligence: Its structure, growth, and action. New York: Elsevier.

Cole, D. A. Maxwell, E., Martin, J. M., Peeke, L. G., Seroczynski, A. D., Tram, J. M., Hoffman, K. B., Ruiz, M. D., Jacquez, F . & Maschman, T. (2001). The Development of Multiple Domains of Child and Adolescent Self-Concept: A Cohort Sequential Longitudinal Design. Child Development, 72(6):1723-1746

Ceci. S. J. & Liker, J. (1986) A day at the races: a study of IQ, expertise, and cognitive complexity. Journal of Experimental Psychology: General, 115: 255-266.

Ceci, S. J. (1990) On intelligence - more or less: A bio-ecological treatise on intellectual development. Englewood Cliffs, NJ: Prentice Hall.

Central Advisory Council for Education (1967) Children And Their Primary Schools [Plowden Report] London: HMSO

Chang M. & Trehub S.E. (1977a) Auditory processing of relational information by young infants, J. Exp. Child Psychology., 24: 324- 331.

Choate, R.A (1968) Document report of the Tanglewood Symposium. Music Educators' National Conference

Clarkson M.G. & Clifton, R.K. (1985) Infant pitch perception: evidence for responding to pitch categories and the missing fundamental Accoust Soc. Am 77:1521-8

Coopersmith, S. (1967) The antecedents of self-concept. Palo Alto, CA: Consulting Psychologists Press.

Coon, H. & Carey, G. (1989) Genetic and environmental determinants of musical ability in twins. Behaviour Genetics, 19: 183-193.

Curwen, J. (1858) Standard Course of Tonic-Sol-fa

Davidson, J. W., Howe, M. J. A., Moore, D. G. & Sloboda, J. A. (1996) The role of parental influences in the development of musical performance. British Journal of Developmental Psychology, 14: 399-412

Davidson, J.W., Howe, M.J.A. & Sloboda, J. (1997). 'Environmental factors in the development of musical performance skill over the lifespan.' In D. J. Hargreaves and A.C. North (Eds). The social psychology of music. Oxford

Davis, M. (1994) Folk Music Psychology The Psychologist, 7: 537

DeCaspar A.J. & Fifer W.P. (1980) Of human bonding: newborns prefer their mothers' voices Science 1 208:1174-6

Delige, I. & Sloboda, J.A. (EOS 1996) Musical beginnings: Origins and developments of musical competence. Oxford: OUP

Department For Education and Skills (1985) Music from 5-16 Curriculum Matters London: HMSO

Department For Education and Skills (1991) Music for ages 7 to 14 years. London: HMSO

Department for Education (1995) Music in the National Curriculum

Department For Education and Skills (DFEE/QCA) (1999) Music: The National Curriculum for England London: HMSO

Department of Education and Science (1991) National Curriculum Music Working Group Interim Report

Department for Education and Skills (2002) Disapplying National Curriculum subjects to facilitate extended work-related learning at key stage 2. An Evaluation DFES Report 293

Detterman, D. K. (1992) The Origins and Development of High Ability, Ciba Foundation Symposium 178, ed. G. R. Bock & K. Ackrill, Wiley.

Dickens, W. T & Flynn, J. R. (2001) Heritability estimates versus large environmental effects: The IQ Paradox Resolved, Psychological Review, 108 (2): 246-369

Dowling W.J. (1982). Melodic information processing and its development in the psychology of music (ed. D. Deutsch). Academic Press, New York.

Dowling, W. J. (1994). Melodic contour in hearing and remembering melodies. In R. Aiello & J. Sloboda (Eds.), Musical perceptions (pp. 173-190). Oxford: Oxford University Press.

Dowling W.J. & Harwood D.L. (1986) Music cognition. New York: Academic Press.

Dowling, W.J. Kwak, S. & Andrews, M.W. (1995) The time course of recognition of novel melodies. Perception & Psychophysics, 57: 136-149.

Douglas, S. & Willats P. (1994) Music relating to literacy skills. Journal of Research into Reading 17: 99-107

Draper, T.W. & Gayle, C. (1987) 'An Analysis of historical reasons for teaching music to young children: Is it the same old song?' In: J.C. Peery & T.W. Draper (Eds.) Music and Child Development, New York: Springer-Verlag, pp. 194-205.

Edmunds, H.T. (1968) Psychism and the Unconscious Mind, Wheaton, Ill: Theosophical Publishing House.

Entwistle N. (1988) Styles of learning and teaching. An integrated outline of educational psychology, London: David Fulton

Farnsworth, P. (1958) The Social Psychology of Music. The Dryden Press.

Flynn J.R. (1987) Massive IQ gains in 14 nations. What IQ tests really measure. Psychological Bulletin 101: 171-191

Flynn, J.R. (1999) Evidence against Rushton: the genetic loading of WISCR subtests and the causes of between-group IQ differences. Personality and Individual Differences 26: 373-379.

Gagne, R.M (1985) The conditions of learning and theory of instruction (4th.ed.) New York: Holt, Rhinehart and Winston.

Gagne, R,M (1991) Toward a differentiated model of giftedness and talent. N. Colangelo & G. Davis (Eds.), Handbook of gifted education. Boston: Allyn & Bacon.

Gardner, H. (1982) Art, Mind and Brain. New York: Basic Books.

Gardner, H. (1983) Frames of Mind: The Theory of Multiple Intelligences New York : Basic Books.

Gardner H. (1984) The Arts and Human Development: A Psychological Study of the Artistic Process. New York: Basic Books.

Gardner H. (1991) The unschooled mind: How children think; how schools should teach. New York: Basic Books.

Gardner, H. (1993) Multiple Intelligences: 'The theory in practice.' New York: Basic Books.

Gardner, H. (1993b) Creating Minds. New York: Basic Books.

Gardner, H. (1994) Intelligences in theory and practice: A response to Elliot. W. Eisner, Robert J. Sternberg and Henry M. Levin. Teachers College record, 95(4): 576-583

Gardner, H. (1995) Why would anyone become an expert? American Psychologist 50: 202

Gardner, H. (1999a). Disciplined Minds: What all students should understand. New York: Simon and Schuster.

Gardner, H. (1999b) Intelligence reframed: multiple intelligence for the 21st century. New York: Basic Books

George, D., and Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. Boston: Allyn & Bacon.

Gordon, E. (1965) Musical Aptitude Profile manual. Boston: Houghton Mifflin

Gordon, E. (1972) Research in the field of music psychology, VIII, University of Iowa Press, Iowa

Gordon, E. (1976) Tonal and rhythm patterns, an objective analysis. A taxonomy of tonal patterns, rhythm patterns and seminal experimental evidence of their difficulty and growth rate. Albans: State University of New York press

Gordon, E. (1980) Developmental music aptitudes among inner city primary children, Council for Research in Music Education. 63: 25-30

Gottfredson L.S. (1997) Mainstream science on intelligence: An editorial with 52 signatories, history and bibliography. Intelligence 24: 13-23

Guilford, J. (1959) Creativity. American Psychologist. 5: 444 - 454.

Guilford, J. P. (1967). The Nature of Human Intelligence. New York: McGraw-Hill

Gutloff, K. (ed). Multiple Intelligences West Haven, CT: NEA Professional Library

Hagues N., Courtenay, D. & Patilla, P. (1994) Mathematics 6-14, Windsor, UK: National Foundation for Educational Research - Nelson

Hagues N, & Courtenay, D. (1994a) Mathematics 9 (age 7-11) Manual National Foundation for Educational Research. Oxford: NFER

Hagues N. & Courtenay, D. (1994b) Progress in English (age 8-13) Manual National Foundation for Educational Research. Oxford: NFER

Hallam, S. (1997) The development of memorisation strategies in musicians: implications for education. British Journal of Music Education, 14.1,

Hargreaves, D.J. (1986) The Developmental Psychology of Music, Cambridge University Press.

Hargreaves, D. J. (1994) Musical education for all. The Psychologist, 7: 357-358.

Hargreaves, D.J. & Marshall, N.A. (2003). Developing identities in music education. Music Education Research, 5(3): 263-273.

Hargreaves, D.J., Marshall, N. & North, A.C. (2003). Music education in the 21st century: a psychological perspective. British Journal of Music Education, 20(2): 147-163.

Harter, S. (1982). The Perceived Competence Scale for Children. Child Development, 53: 87-97

Harter, S. (1985) Manual for the Social Support Scale of Children. University of Denver, Co.

Harter, S. (1988) Manual for the Self-Perception Profile for Children. University of Denver, Co.

Harter, S. (1990) Causes, correlates and the functional role of global self-worth: A life-span perspective in J. Kolligan and R. Sternberg (eds) Perceptions of Competence and Incompetence across the life span. (pp.67-90) New House, CT: Yale University Press

Harter, S. (1996). Historical Roots of Contemporary Issues Involving Self-Concept, in B. A. Bracken, Handbook of self-concept (pp. 1-37). New York: Wiley.

Harter, S. (1999) The Construction of Self: A Developmental Perspective. New York: The Guilford Press.

Harter, S., Whitesell, N.R., & Kowalski, P. (1992). Individual differences in the effects of educational transitions on young adolescents' perceptions of competence and motivational orientation. American Educational Research Journal, 29: 777-807.

Heim, A.H., Watt, K.P & Simmons, V. (1974) AH2/AH3 Group tests of General Reasoning: Manual. Windsor: NFER Nelson.

Heim, A. W. (1977) AH2/AH3 Parallel tests of Reasoning, British Journal of Psychology vol. 65

Hernstein R & Murray C. (1994) The Bell Curve: Intelligence and class structure in American life. New York: The Free Press

Hickey, M (2004) 'Can I pick more than one project? Case studies of five teachers who used Multiple Intelligence Based Instructional Planning. Teachers College record, 106(1): 77-86

Hobbs, C. (1985) A comparison of the Music Aptitude, Scholastic Approach and Academic Achievement, British Journal Of Psychology 13(2): 93-98

Hope, K. & Goldthorpe J. H. (1974) The Social Grading of Occupations. Oxford: Clarendon Press.

Horn, J.L. (1986) Intellectual ability concepts. In: Advances in the Psychology of Human Intelligence, volume 3, ed. R. J. Sternberg, Erlbaum

Howe, M.J.A. (1990) The Origins of Exceptional Abilities, Oxford: Blackwell.

Howe, M.J.A. (1990a) Gifts, talents, and natural abilities: an explanatory mythology? Educational and Child Psychology, 7: 52-54.

Howe, M.J.A. & Sloboda, J.A. (1991a) Young Musicians' accounts of significant influences in their early lives: The family and the musical background. British Journal of Music Education, 8: 39-52.

Howe, M.J.A. & Sloboda, J.A. (1991b) Early signs of talents and special interests in the lives of young musicians. European Journal of High Ability, 2: 102-111.

Howe, M.J.A. (1993) The early lives of child prodigies. In: Ciba Foundation Symposium 178: the origins and development of high ability, ed. G. R. Bock & K. Ackrill, Wiley.

Howe, M.J.A., Davidson, J.W., Moore, D.G. & Sloboda, J.A. (1995) Are there early childhood signs of musical ability? Psychology of Music, 23: 162-176.

Howe, M.J.A., Davidson, J.W. & Sloboda, J.A. (1998). Innate Talents: Reality or Myth? Brain and Behavioural Sciences, 21, 299-442.

Hullah, J. (1843) Royal College of Music: Grove, Sir George Mendelssohm, Spontini Grove Letters

Jenson C. (1970) Rising IQ without increasing G? Developmental Review 9: 234-258

Karma, K. (1982) Musical, Spatial and Verbal Abilities. A Progress Report. Psychology Of Music 9: 66-69.

Kaufman A.S, (1990) Assessing adolescent and adult intelligence. Boston: Allyn and Bacon.

Keating, D. P. (1984) 'The Emperor's New Clothes: the "new look" in intelligence research.' In: Advances in Human Intelligence, vol. 2, ed. R. J. Sternberg, Erlbaum.

Kelly, L & Sutton Smith, B (1987) A study of infant musical productivity in music and child development. Edited by J.C. Perry, I.W. Perry and J.W. Draper. New York: Springer-Veilag,

Kirk, R. E. (1995), Experimental Design: Procedures for the Behavioural Sciences (3rd ed.), Pacific Grove, CA: Brooks/Cole.

Klinedinst R.E. (1989) Assessing adolescent and adult intelligence. Boston: Allyn and Bacon.

Kodaly, Z (1982) A Developmental Music Program. (revised English edition) Boosey and Hawkes

Kornhaber, M. L. (2001) 'Howard Gardner' in J. A. Palmer (ed.) Fifty Modern Thinkers on Education. From Piaget to the present, London: Routledge

Kornhaber, M. L. (2004). Multiple Intelligences: From the Ivory Tower to the Dusty Classroom -- But Why? Teachers College Record, 106 (1): 67-76.

Kornhaber, M.L., & Krechevsky, M. (1995). Expanding definitions of teaching and learning: Notes from the MI underground. In P. Cookson & B. Schneider (Eds.), Transforming Schools. New York: Garland Publishers.

Lazear, D. G. (1992) Teaching for Multiple Intelligences Bloomington, IN: Phi Delta Kappa Educational Foundation

Lecanuet, J.P. (1995) Prenatal auditory experience. In: Perception and Cognition of Music, ed. I. Deliege & J. A. Sloboda, Hove: Erlbaum.

Lerner, R.M. (1986). Concepts And Theories Of Human Development (2nd edn.). New York: Random House.

Lerner, R.M. (1991). Changing organism-context relations as the basic process of development: a developmental contextual perspective. Developmental Psychology, 27(1): 27-32.

Lerner, R. M (1996). Relative Plasticity, Integration, Temporality, and Diversity in Human Development: A Developmental Contextual Perspective About Theory, Process, and Method Developmental Psychology 32(4): 781-786

Loehlin J. C. (2002) The IQ paradox: Resolved? Still an open question. Psychological Review 109: 754 - 758

Lundin, R. (1953) An Objective Psychology of Music New York: The Ronald Press Co.

MANA (1995) - Instrumental Teaching & Learning in Context : London: Music Advisers' National Association in Mills, J. (1994) 'Music in the National Curriculum: the first year', British Journal of Music Education11, 3:191-6

Martin M. (1983) Success teaching spelling with music. Academic Therapy 18: 505-507

McLeish, J. (1968) The Factor of Musical Cognition in Wing and Seashore's Tests. Music Education Research Papers 11: 3-9

McPhee, A. D. & Skelton, F. (2002) Gaining Entry, Gaining Confidence: A Study of the Glasgow Access to Primary Teacher Education Project. Journal of Widening Participation and Lifelong Learning, 4(1): 22-32.

McPhee, A.D. & Stollery, P. (2001). Perspectives on Musical Intelligence Scottish Network for Able Pupils Conference.

McPhee, A. D. & Stollery, P. (2002) Some Perspectives on Musical Gift and Musical Intelligence. British Journal of Music Education. 19(1):89-102.

Messick, S. (1992) Multiple intelligences or multi-level intelligence? Psychological Inquiry 3: 365–384

Mills, J. (1985) 'Gifted instrumentalists: how can we recognise them?' British Journal of Music Education, 2(1): 39-49

Mills, J. (1993) Music in the Primary school. (revised edition) Cambridge: University Press

Mingroni, M.A. (2004) The secular rise in IQ: Giving heterosis a closer look. Intelligence 32: 65–83

Montgomery, D.C (1997) Design and analysis of experiments, New York. Wiley

Murphy, R. & Torrance, H. (1988) Evaluating Education. London: Chapman

Mursell, J.L. (1937) The Psychology of Music. New York: W.W.Norton

National Curriculum Council Arts in Schools Project (1990) The Arts 5-16: A Curriculum Framework. London: Oliver & Boyd

Neisser, U., Boodoo, G. Bouchard, T.J. & Boykin, A.W. (1996) Intelligence: Knowns and unknowns. American Psychologist 51: 77-101

Nettelbeck, T. & Wilson, C. (2003) The Flynn Effect. Smarter not faster. Intelligence 32: 85-93

Nolin, W.H & Vanderark, S. D (1977) A Pilot Study of Patterns of Attitudes Towards School Musical Experiences, Self Esteem and Socioeconomic Status in Elementary and Junior High Students. Contributions to Music Education 5: 31 - 46

Nunnally, J.C (1975) Introduction to Statistics for Psychology and Education. New York:McGraw-Hill

OFSTED (2004) Standards of Music in Primary Schools. Ofsted Report : Department for Education and Skills

Orff C-Schuilwerk (1950) Music for Children. Gunild Keetman

Orff C-Schulwerk (1982) Music for children. (revised edition) Boosey and Hawkes

OPCS (1980) Classification of Occupations 1980. London: HMSO.

OPCS (1991) Standard Occupational Classification Volume 3. London: HMSO

Papousek, M. & Papousek, H. (1981). Musical elements in the infant's vocalization: their significance for communication, cognition and creativity. Advances in Infancy Research, Vol. 1. L.P. Lipsitt and C.K. Rovee-Collier (Eds.), (pp. 163-224) Norwood, New Jersey: Ablex.

Papousek, H. (1995) 'Musicality and infancy research' Perception and Cognition of Music. In Deliege, I &. Sloboda, J.A (Eds), Perception and Cognition of Music. Mahwah NJ, Lawrence Erlbaum Associates..

Papousek, M. (1996). 'Intuitive parenting: A hidden source of musical stimulation in infancy.' In I. Deliege and J. Sloboda (Eds.), Musical Beginnings: Origins and Development of Musical Competence, (pp. 88-112). Oxford: Oxford University Press.

Paynter, J. & Aston, P. (1970) Sound and Silence: Classroom Projects in Creative Music. London: Cambridge University Press

Paynter, J. (1992) Sound and Structure. Cambridge: Cambridge University Press.

Peugh, J. L. & Enders, C. K. (2005) Using the SPSS Mixed Procedure to fit linear and growth trajectory models. Educational and Psychological Measurement, 64: 419-436.

Phillips, D. (1976) An investigation of the relationship between musicality and intelligence, British Journal of Psychology 4: 16-31

Pollard, A. (1987) 'Studying children's perspectives: a collaborative approach'. In Walford, G. (ed.) Doing Sociology of Education Lewes: Falmer

Posner, M.I. (2004). Neural systems and individual differences. Teachers College Record, 106:24-30

Piechowski, M.M (1993) Developmental Potential New Voices: in counselling the gifted. Kendall/ Hunt

Pitts, S (2000b) Reasons to Teach Music: establishing a place in the contemporary curriculum. British Journal of Music Education, 17.1, Cambridge University Press

Plucker, J. A., Callahan, C. M., & Tomchin, E. M. (1996). Wherefore art thou, multiple intelligences? Alternative assessments for identifying talent in ethnically diverse and low income students. Gifted Child Quarterly, 40(2): 81-90

Pratt, G & Stephens, J. (Eds.). (1995). Teaching Music in the National Curriculum. Oxford: Heinemann Educational.

Rauscher, F.H., Shaw, G.L & KY, KN (1995) Listening to Mozart enhances spatial–temporal reasoning: Towards a neurophysiological basis. Neuroscience Letters, 185: 44-47

Rauscher, F.H., Levine, L.J. Wright, E. L., Dennis. W.R. & Newcomb, R.L (1997) Music training causes long term enhancement of pre-school children's spatial – temporal reasoning. Neurological Research. 19: 2-8

Rauscher, F.H. (2000) Classroom keyboard instruction improves kindergarten children's spatial – temporal performance. Early Childhood Research Quarterly 15: 215-228

Révész, G. (1925) The Psychology of a Musical Prodigy, Kegan Paul, Trench & Trubner

Révész, G. (1946) Introduction to the Psychology of Music. Translated by G.I.C. de Courcy. Norman, University of Oklahoma Press

Ridley, M, (2001) Nature via Nurture: Genes, Experience, & What Makes Us Human. Cambridge University Press

Rosenberg, M. (1979) Conceiving the Self. New York, Basic Books

Rowe, D.C. & Rogers, J.L. (2002) Expanding variance and the case of historical changes in IQ means: A critique of Dickens and Flynn (2001). Psychological Review 109: 759 - 763

Schoen, M. (1940) The Psychology of Music: A survey for teacher & musician. New York: Ronald Press.

School Inspections Act (1996) Elizabeth II. Chapter 57

Seashore, C.E. (1919) The Psychology of Musical Talent. Boston: Silver Burdett.

Seashore, C.E. (1938) Psychology of Music. New York: McGraw-Hill Book Company.

Seashore, C. E., Lewis, L & Saetveit. J.G (1960) Seashore Measures of Musical Talents. New York McGraw-Hill Book Company

Seashore, C. E. (1967) Psychology of Music New York: Silver Burdett

Self, G. (1967) New Sounds in Class. A Contemporary approach to Music Heinemann

Self, G. (1967) Revolution, Music in Education 29(313): 126-127. Heinemann

Sergeant, D. & Thatcher, G. (1974). Intelligence, social status and musical abilities. Psychology of Music. 2: 32-57. Heinemann

Shearer, B. (2004) 'Using a multiple Intelligences assessment to promote teacher development and student achievement'. Teachers College Record, 106: 147-162.

Sherman, S.W (1978) Ability Testing of People Washington: National Academy Press

Shuter-Dyson, R. (1968) The Psychology of Musical Ability. London: Methuen & Co., 1968.

Shuter-Dyson, R. & Gabriel, C. (1981) The Psychology of Musical Ability, 2nd edition, London: Methuen

Shuter-Dyson, R. (1985) 'Musical Giftedness,' in The Psychology of Gifted Children, ed. by Joan Freeman. New York :John Wiley & Sons.

Singer, J. D. & Willet, J. B. (2003). Applied longitudinal Data analysis. New York: Oxford University Press.

Sloboda, J. A. (1985) The Musical Mind: The Cognitive Psychology of Music. Oxford: Clarendon Press

Sloboda, J. A. (1988) Generative Processes in Music: the Psychology of Performance, Improvisation and Composition. London: Oxford University Press.

Sloboda, J. A. (1991) 'Musical expertise' in 'Toward a general theory of expertise, edited by Ericsson, K.A and Smith, J. Cambridge University Press.

Sloboda, J. A. & J.A. Howe (1992). Transition in the early musical careers of able young musicians: Choosing instrument and teachers. Journal of Research in Music Education, 40(4): 283-294.

Sloboda, J. A., Davidson, J. W. & Howe, M. J. A. (1994a) Is everyone musical? The Psychologist, 7: 349-354.

Sloboda, J. A., Davidson, J. W. & Howe, M. J. A. (1994b) Musicians: experts, not geniuses. The Psychologist, 7: 363-364.

Sloboda, J. A., Davidson, J. W., Howe, M. J. A. & Moore, D. G. (1996) The role of practice in the development of performing musicians. British Journal of Psychology, 87:287-309

Smith, P. & Hagues, N (1993) National Foundation for Educational Research. Non- Verbal reasoning 10 &11 Manual. NFER- Nelson.

Snijders, T.A.B, & Basker, R.J (1999). Multilevel analysis: An introduction to basic and advanced multilevel modeling. Thousand Oaks, CA: Sage.

Social Research Update (1995) Official Social Classification in the UK. Issue 9

Spearman, C.E (1904). "General intelligence", objectively determined and measured. American Journal of Psychology, 15: 201-293.

Spearman, C. E. (1927). The abilities of man: their nature and measurement. New York: Macmillan and Company LTD. (Reprinted: New York: AMS Publishers, 1981)

Spearman, C. E., & Jones, L. W. (1951). Human abilities. London: Macmillan.

Sternberg, R. J. (1985) Beyond IQ: A triarchic theory of human intelligence. New York: Cambridge University Press.

Sternberg, R. J. (1993) Procedures for identifying intellectual potential in the gifted: a perspective on alternative 'metaphors of mind' in International Handbook of Research and Development of Giftedness and Talent, ed. K. A. Heller, F. J. Mönks & A. H. Passow, Pergamon

Sternberg, R. J. (Ed.) (1994) Encyclopedia of human intelligence. New York: Macmillan Publishing Company.

Sternberg, R. J. (1996) Successful intelligence. New York: Simon & Schuster

Swanwick, K. (1968) Popular Music and the Teacher. Oxford: Pergamon

Swanwick, K. (1979) A Basis for Music Education Windsor: NFER, Nelson

Swanwick, K. (1988) Music, Mind, and Education. London: Routledge,

Swanwick, K., & Tillman, J. (1989). Towards a model of development of children's musical creativity. Canadian Music Educator, 30 (2): 169-74.

Swanwick, K. (1994) Musical Knowledge London: Routledge

Swanwick, K (1997) Assessing Musical Quality in the National Curriculum. British Journal of Music Education, 14.3, Cambridge: Cambridge University Press

Sunyak, P. & Kaufman M. (1983) One Principal's Fight for the Arts. Principal. 62 (5): 6-13

Svengalis J. (1978) Music attitudes and the pre-adolescent male. Dissertation Abstracts, International. 39: 4800A

Takeuchi, A.H. & Hulse, S. H. (1991) Absolute pitch judgments of black- and white-key pitches. Music Perception, 9, 27-46.

Takeuchi, A.H., & Hulse, S. H. (1993) Absolute pitch. Psychological Bulletin, 113(2): 235-361.

Taylor, D. (1979) Music Now. Oxford University Press

Thackaray, W (1971) Rhythmic Abilities in Children Music Education Research Papers, 5 London.

Thurstone, L.L. (1924) The Nature of Intelligence Chicago: University of Chicago Press.

Thurstone, L.L. (1931). Measurement of social attitudes. Journal of Abnormal and Social Psychology, 26: 249-269.

Thursone L.L. (1938) Primary Mental Abilities. Chicago, University of Chicago Press

Torff, B. & Winne, E (1994) Don't throw out the baby with the bath water. The Psychologist, 7: 361-362

Trehub, S. E. (1990). The perception of musical patterns by human infants: The provision of similar patterns by their parents. In M.A. Berkley and W. C. Stebbins , Comparative Perception; Vol. 1, Mechanisms, (pp. 429-459). New York: Wiley.

Trehub S. E. & Henderson J.L. (1994). Children's songs to infant siblings: parallels with speech. Junior Child Language 21(3): 735-44

Trehub, S. E (2003) The developmental origins of musicality. Nature Neuroscience 6: 669-673.

Tuckman, B. W. (1978). Conducting educational research (2nd ed.) San Diego: Harcourt Brace Jovanovich

Uttl, B. & Van-Alstine, C.L. (2003) Rising verbal intelligence scores: Implications for research and clinical practice. Psychology and Aging. 18: 616 - 621

Usher, J. A & Neisser, U. (1993) Childhood amnesia and the beginnings of memory for four early life events. Journal Of Experimental Psychology: General 122:155-165

Walford, G. (ed) 1991, Doing Educational Research, Routledge, London

Wampole, B.E & Serlin, R.C (2000) The consequences of ignoring a nested factor on measures of effect size in analysis of variance. Psychological Methods, 5(4):425-433

Warburton, E. (2002) From talent identification to multidimensional assessment: toward new models of evaluation in dance education. Research in Dance Education, Vol 3. No.2 Taylor and Francis Ltd.

Welch, G (2004) Mapping music education research in the UK . BERA Music Education Review Group Psychology of Music 32:239-290

Williams, W.M & Ceci, S.J. (1997) Are Americans becoming more or less alike? Trends in race, class and ability differences in intelligence. American Psychologist. 52: 1226-1235

Wing, H.D (1948) Standardised Tests of Musical Intelligence. Sheffield, England: City of Sheffield Training College.

Wing, H.D. (1968) Standardised Tests of Musical Intelligence. (1957 Revision) National Foundation for Educational Research.

Wing, H.D (1961) Standardised Tests of Musical Intelligence. The Mere, England: National Foundation for Educational Research.

Winne, P.H. & Marx, R.W. (1981) Convergent and discriminate validity in self-concept measurement. Paper presented at the annual meeting of the American Educational Research Association. Los Angeles, CA.

Wright, R (2006) Music as pedagogic discourse: an ethnographic case study of one Year 9 class of pupils and their music teacher in a South Wales secondary school. Unpublished PhD, University of Wales Institute Cardiff.

Wylie, R (1989) Measurement of Self-Concept. London: University of Nebraska Press

Zenatti, A. (1969) 'Le development genetique de la perception musicale. Monographies Francaises de Psychologie, 17: 1-110

Appendix 1.

MEASURES OF MUSICAL ABILITIES – Arnold Bentley (1966a)

Name..... **School.....**
Age.....

I
PITCH

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

II
TUNES

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

III
CHORDS

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

IV
RHYTHM

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Appendix 2

Musical Experience Questionnaire

Please answer the following questions by placing a tick in the appropriate box. All answers are confidential.

Section 1 : Introduction.

Name : _____ Gender :
Age : _____ Male
Female

School Name: : _____

School Year : 3 4 5 6 7 8 other

Parents Occupation : Mother : _____

Father : _____

Section 2 : In School.

1. Do you play a musical instrument? Please tick as many as apply.

No, None. – Please go to section 3.

Yes In school Out of school

Piano Brass Strings Percussion Woodwind

2. How long have you played an instrument?

Less than 6 months 6 months to 1 year

1 to 2 years More than 2 years

3. What standard have you reached on your instrument?

Pre-prep Grade1 Grade2 Grade 3 Grade 4
Grade 5

4. How often do you practice?

Every day At least twice per week Once a week or less

5. Do your parents remind you to practice?

Never Sometimes Always

6. How often do you have lessons on your instrument?

Once per week More

7. For what reason did you start playing an instrument?

Fun
You liked the sound of it
Your parents wanted you to play this instrument

Section 3.

1. In school, how often do you have music lessons?

Never
Once per week
Twice per week
More than twice per week

2. Who teaches you for music lessons?

Class teacher Music teacher Other teacher

3. What activities do you do in music lessons? Please tick as many as apply

Singing Composing (writing music)
Music theory Listening to music
Playing instrument Computer music
Other. Please specify : _____

4. Do you take part in school performance?

No. Go to question 6.

Never Once a term Once a year More often

School concert
School play
Other

5. Do you sing in a.

School choir	Cathedral choir	No choir
Community choir	Theatre group	Church choir
Other. Please specify :		

6. Does your school offer any of the below?

Orchestra	Recorder club	Keyboard club
Theory club	Other. Please specify :	

7. Do you take part in musical activities outside of the classroom, but still in school?

None. Go to section 4.

	Never	Once a week	More than once a week	Every day
Orchestra				
Recorder club				
Keyboard club				
Theory club				
Other. Please specifiy :				

Section 4: Outside School

1. Do you listen to music at home?

No
Yeas. If so, what type?

	Rarely	Sometimes	Often	Always
Classical				
Jazz/Blues				
Pop				
Country				

2. Do your parents play a musical instrument?

No

Yes, if so, what?

Piano	Woodwind	Strings	Brass
Percussion			

Thank you for completing this questionnaire. All answers will be confidential.

Appendix 3
What I am like

Are you

☐ Male

Please tick one alternative.

☐ Female

When were you born? _____ (date of birth)

Please read each statement carefully.

If that is really like you, please tick the first box. If it is a bit like you tick the second box.

If it is not like you at all tick the furthest box.

Sample Statement	Describes me very well	Describes me quite well	Describes me quite poorly	Describes me very poorly
Some children like to play outdoors in their spare time	☐	☐	☐	☐

	Describes me very well	Describes me quite well	Describes me quite poorly	Describes me very poorly
Some children feel that they are very good at their school work	☐	☐	☐	☐
Some children find it hard to make friends	☐	☐	☐	☐
Some children do very well at all kinds of sports	☐	☐	☐	☐
Some children are happy with they way they look	☐	☐	☐	☐
Some children often do not like the way they behave	☐	☐	☐	☐

Appendix 3
What I am like

Some children are often unhappy with themselves	☐	☐	☐	☐
Some children feel like they are just as clever as other children of their age				
Some children have a lot of friends	☐	☐	☐	☐
Some children wish they could be a lot better at sports	☐	☐	☐	☐
Some children are happy with their height and weight	☐	☐	☐	☐
Some children usually do the right thing	☐	☐	☐	☐
Some children don't like the way they are leading their lives	☐	☐	☐	☐
Some children are pretty slow in finishing their school work	☐	☐	☐	☐
Some children would like to have a lot more friends	☐	☐	☐	☐
Some children think they could do well at just about any new sports activity they haven't tried before	☐	☐	☐	☐
Some children wish their body was different	☐	☐	☐	☐
Some children usually act the way they know they are supposed to	☐	☐	☐	☐
Some children are happy with themselves as a person	☐	☐	☐	☐
Some children often forget what they learn	☐	☐	☐	☐
Some children are always doing things with a lot of children	☐	☐	☐	☐
Some children feel that they are better than others their age at sports	☐	☐	☐	☐
Some children wish their physical appearance (how they look) was different	☐	☐	☐	☐
Some children usually get in trouble because of the things they do	☐	☐	☐	☐

Appendix 3
What I am like

Some children like the kind of person they are	☐	☐	☐	☐
Some children do very well at their classwork	☐	☐	☐	☐
Some children wish that more people their age liked them	☐	☐	☐	☐
In games and sports some children usually watch instead of play	☐	☐	☐	☐
Some children wish something about their face or hair looked different	☐	☐	☐	☐
Some children do things they know they shouldn't do	☐	☐	☐	☐
Some children are very happy being the way they are	☐	☐	☐	☐
Some children have trouble figuring out the answers in school	☐	☐	☐	☐
Some children are popular with others their age	☐	☐	☐	☐
Some children don't do very well at new outdoor games	☐	☐	☐	☐
Some children think that they are good looking	☐	☐	☐	☐
Some children behave themselves very well	☐	☐	☐	☐
Some children are not very happy with the way they do a lot of things	☐	☐	☐	☐