FIGURENOTES AND CHILDREN WITH AUTISM: USING REFLECTIVE PRACTICE IN A MUSIC INTERVENTION

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DEDICATION

This thesis is dedicated to the late Robin Howat. Robin was a skilled and influential music therapist, both in the U.K. and in his adopted country of Australia. He was my mentor and guide during the formative years of my career as a music therapist. Robin also gave me encouragement in taking seriously questions which were important to me, and in pursuing new directions in my work and research.

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Lastly, I thank the participants and their families who participated in this study, as well as the teachers involved. It was a privilege to work with all of you.

STATEMENT OF AUTHENTICATION

The work presented in this thesis is, to the best of my knowledge and belief, original except as acknowledged in the text. I hereby declare that I have not submitted this material, either in full or in part, for a degree at this or any other institution.

Signed: 

PRESENTATIONS

Research from this thesis has been presented by the author in the following seminars and conferences:

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FIGURENOTES

Figurenotes, the music notation used in this study, was invented by Kaarlo Uusitalo in 1996. Kaarlo Uusitalo and Markku Kaikkonen have established Figurenotes Global Ltd. as the body owning all copyrights for Figurenotes, as well as intellectual property rights. Permission to use the term “Figurenotes” in this study has been granted by Mr Uusitalo and Mr Kaikkonen, and all references to the term in this thesis imply the use of the term copyrighted by Figurenotes Global Ltd.

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ABSTRACT

Figurenotes is a simplified visual music notation system developed in Finland in the mid-1990s for people challenged by the abstract nature of conventional music notation. The system facilitates music reading and instrument playing, thus allowing active participation in music-making. The use of Figurenotes in both educational and therapeutic settings is now spreading to other countries. This thesis examines specifically the effectiveness and applicability of Figurenotes as a tool to facilitate music-making by children with autism in Australia, through the lens of a journey in reflective practice by the researcher-practitioner.

The study involved three phases: in the first phase, eight individual children aged 6 to 13 years with autism participated in eight weekly sessions; in the second phase, two school groups of children with autism participated in an eight-week phase, and finally the families of the initial eight individuals participated in an additional phase of four weekly sessions each. Sessions involved the use of Figurenotes in rhythmic and creative activities, participating in ensembles, and developing playing technique using digital keyboards and tuned percussion instruments. The action research methodological approach allowed flexibility in study design, incorporating cycles of reflecting, planning, acting, and observing within the three phases of the study. Data were obtained through video observation, interviews, and researcher notes on participants' development. Case studies of selected participants were compared with outcomes for the cohort as a whole. Thematic analysis combined with observer ratings to enable the investigation of four key focus areas: music-making skills, social interaction, self-concept, and reflective practice.

Figurenotes was found to be an effective tool that allows children with autism to engage successfully in music-making independently, with peers, and with family members. The action research approach allowed novel interventions using Figurenotes which facilitated the development of participants' music-making skills and also their creativity. Participation in musical interactions was found to be associated with improved social interactions with peers and family members. Development of music-making skills was also associated with improvements in participants' self-concept through positive changes in participants' self-perception of their competence. Additionally, action research was found in this study to be an effective methodology in facilitating reflective practice when working with children with autism. The multiple beneficial outcomes demonstrated in this research warrant the further use and development of Figurenotes, and point to the value of further research in the development of music-making skills and creativity in children with autism.

CHAPTER 1 - INTRODUCTION

"And how can one assess the contribution of her books to the quality of Cushla's life? It seems clear that access to such a wealth of words and pictures, in a setting of consistent love and support, has contributed enormously ... perhaps, most of all, Cushla's books have surrounded her with friends; with people and warmth and colour during the days when her life was lived in almost constant pain and frustration" (Butler, 1979, p.102).

In *Cushla and Her Books* (Butler, 1979), Cushla, a child with severe developmental disabilities, finds a way to experience and connect with the world around her through reading books. Cushla's impairments mean she is largely unable to engage with others and with the world around her. Within the context of this severely restricted life, she first discovers a love of books through being read to by the adults in her life. Later, as she is helped to learn to read by herself, she becomes able to use her reading of books to learn about and engage with the world around her. Cushla's books become very important for her, a medium through which she can connect with life around her despite the isolation and frustration caused by her disabilities. The story powerfully demonstrates the importance of finding ways of participation in meaningful activities for individuals who are unable to participate normally.

This study is an account of a music therapist/teacher's journey in facilitating music-making by children with autism using Figurenotes, an adapted music notation system. The motivation for me to undertake this study was provided by professional experiences over several years of working as a music therapist and music teacher, underpinned by my own childhood experiences with music. In order to facilitate an understanding of the relationship between the study elements, the following section describes aspects of my personal and professional background which relate to this study.

1.1 Researcher Background

Music was very important to me from an early age. I was a solitary child, despite having a large and happy family, and I was awkward in social situations. Yet the musical interactions I had with others in my musical ensembles were meaningful and successful, much more so than verbal interactions. I played timpani in local orchestras, sang in school and church choirs, and accompanied many instrumentalists and singers. It was often only when playing in these music ensembles that I really felt that I was communicating successfully with others. The music provided a safe space in which interaction and communication could take place, both during the music itself, and in the discussions that occurred around the music., making music taught me how to listen, be aware of, and have sensitivity to others. I was able to apply skills learned in musical ensembles (playing with an awareness of others' parts, and taking turns with others) to other social situations. Playing music also gave my young self a sense of identity, and gave me opportunities to connect with peers with whom I could not otherwise make connections. From my musical activities I gained a sense of my abilities and a sense of who I was. Performing in concerts enabled me to express myself and gain confidence, and playing music on my own gave me a sense of personal satisfaction that I did not experience in any other activity. The skills I gained as a performer made me feel more competent, and because I valued music highly, being competent in music gave me a sense of personal worth.

In both my social interactions and my self-concept, the agent of change was the practical music-making skills I learned. In my professional work as a music teacher and music therapist I have observed similar processes with many of my students and clients. Participating in music-making gives them new skills in relating to others, and opportunities to do so. Music-making also gives them a sense of confidence in their own abilities. However, it is a constant professional challenge for me to find ways of helping those with whom I work to develop the basic skills needed to engage confidently in music-making.

A few years into my career as a music therapist, I began to work with Peter, a young man with a rare genetic condition which had resulted in a lifelong physical and cognitive impairment. Peter loved to listen to songs from musicals and pop songs of the 1970s, but a few months into our sessions he expressed a deep desire to learn to read and play this

music for himself. I began to help him to do this, using a digital piano keyboard. However, Peter's progress was slow and frustrating. Apart from the physical demands of playing the keyboard, he was unable to understand the written musical scores of his songs, despite needing to have visual cues of the songs he was playing. He could not understand the abstract symbols of conventional music notation, and this proved an insurmountable barrier to progress. Peter was not the only client of mine who had this problem, and I felt that I needed to actively seek solutions. I began a search for alternative music notations which may help my ambitious but frustrated clients.

Observations I conducted of various teachers and therapists provided numerous examples of the use of alternative notations to assist clients or students to read and play music. Often these were in the form of coloured stickers placed on piano keys, with the colours used over the notes on a score to be played. However, these methods are usually used only as short-term techniques: either to assist students to learn conventional notation, or in response to a desire of a client to play a particular melody within the course of therapy. These alternative notations are usually applied haphazardly and inconsistently and not used in any systematic or developmental way.

The search for a more systematic solution brought me to the *Resonaari Special Music Centre* in Helsinki, Finland in 2012. *Resonaari* is a music school for people with special needs, with around 300 students taking regular lessons. I was invited to visit Resonaari for two weeks, and it was there that I first experienced *Figurenotes* in action. Figurenotes is a concrete, matching music notation system where a musical note's pitch and duration is represented by a specific colour and shape. These colours and shapes are exactly matched by stickers or colours on the instrument being used, meaning that no translation is needed from reading the score symbols to playing an instrument. Figurenotes was invented in Finland in the mid-1990s originally for use by people with intellectual disabilities. It is used in Finland extensively in music education and music therapy settings, and Figurenotes has recently spread to other countries.

Discovering Figurenotes changed my perspective on the potential of adapted music notations. At Resonaari, Figurenotes is applied systematically and intelligently. The confidence and enthusiasm with which students at Resonaari students approach their

music-making suggest that this approach is highly effective for the students. Figurenotes operates as a kind of common musical language at Resonaari, used by a majority of students and teachers. During my visit there, I observed students of all ages joyously playing and singing music, and also performing in front of an audience at their annual concert, *Resonaari Soi!.* The sense of achievement, pleasure, and meaning that the students and staff displayed at Resonaari was inspiring for me, and when I returned to Australia I began using Figurenotes with my own clients. With Figurenotes, Peter succeeded in his wish to be able to read and play the music he loves. The basic music-making skills that he has developed enable him to play on his own, at home, any time he chooses. Through his playing, Peter's sense of self has changed. Recently he also performed in his first concert, and playing for others has given Peter new opportunities for social interaction.

As mentioned earlier, my social skills were poor as a child. At primary school, I was forever missing cues in social interactions and consequently being left out of most of the jokes and banter that children typically engage in. I liked to spend most of my time alone, and I would walk around the school playground at recess and lunch, taking the same route each time. Other children at school sometimes asked me "are you autistic?", and a piano teacher once told me to "stop that autistic rocking" on the piano stool, which apparently occurred regularly while I played, unnoticed by me. At the time I did not know anything about autism, but in hindsight some of the behaviours I exhibited as a child are those often associated with the condition. I was never diagnosed with autism but the imprint of these childhood behaviours, and the responses they evoked from others, have enabled me to feel a real connection and empathy with people with autism ever since and have led me to devote much of my professional life to working with them.

After the success in using Figurenotes with Peter, I began to speculate about the potential of Figurenotes with the children and adults with autism I was working with. Could this be a way of enabling them to be involved more easily and effectively in music-making? In my work as a music therapist I have always tried to find the most effective tools and techniques for each client. To assist those clients who wanted or needed to develop some music skills, I had used various techniques: playing by ear or imitation, traditional music notation, and spontaneously-invented graphic notations. These had met with varying degrees of success, sometimes hitting the mark and other times proving completely useless. It did seem to me

that for many of the autism population I worked with, that clear, concrete, visual and matching tools did enable more effective musical understanding and playing of instruments. To this population, and to me, Figurenotes offered exciting potential.

1.2 Overview of Study

Conceptual influences

In conducting research into the areas described, personally and professionally significant and which investigate questions which are important to me, I have been influenced by two conceptual frameworks. The first is *dig where you stand*, a term first used by Swedish author, activist, and researcher Sven Lindqvist in 1978 to describe his manifesto on the need for workers to research the histories of their workplaces (Lindqvist, 2014). It relates to the idea of researchers investigating the topics and fields which they encounter in their everyday lives, and the importance of doing so. In my own professional experience, differences in the methods and tools used in a music intervention often makes a very large differences to the success or otherwise of the intervention, both in musical and non-musical outcomes, and it is from this standpoint that this study's focus on the role of Figurenotes in facilitating music-making has arisen. Also, in this study the place where I stand is my professional work as a music therapist and music teacher. For me, these two contrasting but complementary identities are intertwined. This study draws on research, ideas, concepts, and techniques from the fields of both music therapy and special music education.

The second conceptual framework of this study is reflective practice. In reflective practice, professionals engage in conscious, deliberate reflection on their practice while undertaking it and afterwards, in order to gain insights into ways of improving it. Reflection-on-action, the more usual form of professional reflection, is where reflection occurs after a period of practice or is done by a different person. The idea of *reflection-in-action*, reflecting on practice as it is occurring, developed by Donald Schon (1983), is less common, and has guided me in the choice of action research as the main methodological approach for this study. Action research enables the systematic incorporation of both reflection-on-action and reflection-in-action into the aims and the outcomes of a study. Schon (1983) argues that

reflective practice is an increasingly important undertaking for professionals in the context of a rapidly-changing world. Reflective practice has certainly become necessary for me as I seek to find solutions for the challenges faced by my students and clients as we make music together.

The two conceptual influences of *dig where you stand* and *reflective practice* enable the aims, scope, and design of this study to be informed by my personal and professional background. I approach the research process conscious of my own subjective perspective. Having a subjective position need not be downplayed, but I, as a researcher, do need to "understand the role of the self in the creation of knowledge" (Berger, 2013, p. 220). To a large extent, development of critical thinking about the methods of carrying out the study and in analysing and discussing the outcomes reflect a developing awareness of the subjective nature of my role as researcher and practitioner.

Aim of this study

This study takes place within a broad societal and research environment of "burgeoning interest in the use of music to impact a broader health and well-being agenda" (McFerran, Thompson & Bolger, 2016, p. 241). Music-making has attracted attention from researchers for its potential to enhance human flourishing in all its manifestations (Croom, 2012) and has been associated with benefits in the physical, cognitive, social, and emotional domains of human functioning (Rickard & McFerran, 2011). Musical perception, learning, and activity has been found to enhance brain plasticity and connections across multiple brain areas (Wan & Schlaug, 2010). Indeed, the breadth of potential positive effects of music make the field of music and health one in which there are a myriad of research possibilities.

However, more research is needed into the use, applicability, and effectiveness of specific tools and techniques. The wellbeing outcomes studied also need to be specific. The focus needs to be narrow, but deep. This study therefore aims to investigate what extent a specific music notation system, Figurenotes, can facilitate music-making by children with autism, and whether this is associated with changes in their social interaction and self-concept. This study is also the journey of a practitioner, myself, and participants, children with autism, in exploring and learning about Figurenotes.

Thesis structure

In this study I am aiming at "consistency between the aim of the study, research question, chosen methods and personal philosophy of the researcher" (Proctor, 1998, p. 73). In order to elucidate this consistency, the thesis contains seven chapters which follow a logical sequence and are interlinked. *Chapter 1 - Introduction*, this chapter, gives the background to the research. *Chapter 2 - Review of Literature* describes the areas of investigation, critically examines the literature in these areas, and shows why this study is needed. *Chapter 3 - Methodology* describes the research approach, orientation, methods, tools, and analysis techniques, and outlines how action research is used in the study. Three chapters then describe the three main phases of the study: *Chapter 4 - Individual Phase, Chapter 5 - Group Phase,* and *Chapter 6 - Family Phase* form the results chapters. The action research approach taken in this study allows these chapters to connect the processes of the research with the outcomes of these processes. Finally, *Chapter 7 - Conclusions* will bring the three study phases together, discussing and synthesising the outcomes into key findings which respond to the research questions, and drawing implications for future research.

CHAPTER 2 - REVIEW OF LITERATURE

This chapter describes the areas of investigation, critically examines the literature in these areas, and advances an argument for a study which links reflective practice, children with autism, music-making, and Figurenotes. The chapter begins with an examination of reflective practice and researcher subjectivity (2.1). Characteristics of autism and its increasing prevalence necessitating appropriate interventions (2.2) are described next. For children with autism, music-making (2.3) interventions may be highly appropriate. In order to increase the effectiveness of music-making as an intervention for children with autism, there is a need to address the development of their basic music skills (2.4). Two areas of wellbeing which may benefit from music-making interventions for children with autism are social interaction (2.5) and self-concept (2.6), and there is a need for studies which link these areas. The development of music-making skills in children with autism may be facilitated by the use of adapted music notations such as Figurenotes (2.7), the effectiveness of which requires further research. The research questions (2.8) combine the elements of this argument, position the study within the literature, and give the study a clear focus.

2.1 Reflective Practice

In Chapter 1 I described my professional background as both a music therapist and music teacher of people with special needs, and my desire to integrate my experiences as a professional in both fields within a study. Music in special education and music therapy share much in common, and techniques used in music in special education are often similar to those used in group music therapy. This is not to say that they are identical: the goals and approaches of a therapist differ to those of an educator, with the therapist focusing on using music to achieve non-musical goals with a client, and the teacher aiming to develop musical knowledge in the student. Each field has its own codes of practice and develops practice to meet different goals. However, when working with people with special needs, the methods and techniques can be very similar. A special educator teaching music to a class of special-needs students must think about the same issues as a music therapist working with the same group, as described by Clements-Cortés & Chow (2018). In this study I bring my subjective experience as a practitioner of both professions to a study which

incorporates emelments of both fields. Reflective practice offers a powerful tool for elucidating and investigating this.

In reflective practice, professionals engage in conscious, deliberate reflection on their practice (Loughran, 2002). Practitioners examine their practice from an objective viewpoint, seeking to understand it. They question their own assumptions and those of the profession as a whole. Reflective practice involves conscious, deliberate reflection on practice before, during and after a period of practice (Boud, Keogh, & Walker, 1985). Insights are gained into ways of improving learning through questioning, and these insights can be aided by problematizing an aspect of a practice situation in order to gain focus on what may need to change. In reflective practice the practitioner "is not dependent on the categories of established theory and technique, but constructs a new theory of the unique case" (p.84). This can be achieved by writing formally or informally about the practice situation or events in order to reconsider, develop, and articulate a knowledge about the practice and making sense of events, "making the tacit explicit" (Coughlan, 2002, p.38) and allowing links and themes to emerge. However, the time taken and energy taken to engage in thorough reflective practice means that it may not be undertaken by many professionals. I know that there have been several times in my own professional life where I was aware of a need to reflect more deeply, but have not done so.

The importance of a connection between reflection and practice in the work of professionals was influentially articulated by Donald Schon (1983), who argued that there was an urgent need for professionals to undertake reflective practice, individually and collectively. Schon argued for the need for professionals to engage in *reflection-in-action* and *reflection-on-action*, to meet the needs of a changing workplace and world. Reflection-in-action occurs from an internal perspective, examining practice as it is occurring. Reflection-on-action occurs from a perspective external to the practice, which includes looking at it from outside the practice, or at the conclusion of a discrete period of practice. Schon particularly emphasises the importance of acknowledging that "the workaday life of the professional depends on tacit knowing-in-action" (p.63), and gives an example of a baseball pitcher's experientially-gained "feel for the ball" (p.69) to describe "a kind of knowing ... probably not originally represented in words at all" (p.74). It is this type of

knowledge which, Schon argues, needs to be made explicit through the process of reflection-in-action.

Reflective practice benefits the practitioner undertaking the reflection as well as their profession as a whole. For the individual practitioner, professional competence is developed along with an ability to exercise professional judgement in an ever-changing professional environment. For the profession, reflective practice enables the sharing of insights with other professionals, and "the knowledge base of the profession is developed and refined in ways that help the practitioner to be an effective and informed professional" (Loughran, 2002, p.34). Schon (1983) also describes a conflict between rigour and relevance, where a need for professionals to be relevant to the world in which they work conflicts with a need to maintain rigour as professionals. In Schon's view, professionals tend to lose relevance by holding on to a narrowly technical practice based on existing theory, rather than risking losing rigour and status as professionals by questioning their practices. Schon's solution is for practitioners to adopt a new "epistemology of practice" (p.62) which honours knowledge which is intuitive, artistic, and tacit but which is given appropriate rigour through sustained reflective inquiry in order to develop new theories of practice. Placing "technical problem solving within a broader context of reflective inquiry" (p.85) thus enables theory and practice to become integrated in a way which is both rigorous and relevant.

Reflective enquiry necessitates an examination of researcher subjectivity. In a sense, all research is subjective, as “the identities, experiences, and physical presence of the researcher unavoidably influence the research process” (Sutherns, Bourgeault, & James, 2014, p.3). And, when research is reported on, "there is more to be said than can be said” (Stake, 2006, p. 85). However, when the researcher has some personal stake in the topic being researched, the issue assumes a greater importance. Not only must subjectivity be recognised, but it must be transcended (Letherby, 2013). Yet the transcending of subjectivity does not necessarily mean doing all in one’s power to avoid it. Subjectivity can be a strength, rather than a liability, if used wisely. The inherent strengths of incorporating researcher subjectivity in the research itself begin from our choice of topic and research approach, as “who we are circumscribes the kind of research we are best equipped to undertake” (Sutherns, Bourgeault, & James, 2014, p.5). Our life experiences leading up to conducting research enables us to select a research topic and to understand it better.

Additionally, seeing research as a relationship (that of a researcher with participants) opens up the opportunity for a greater depth in data collection. When data are analysed, the researcher's empathy and experience of the participants' situation can enable better explanation. And finally, the experiences of the participants can be enhanced when the researcher is able to relate to them and their situation (Sutherns, Bourgeault, & James, 2014). My personal and professional interest and engagement, the "feel for the ball" I am able to bring to the study, can thus benefit both the participants and the research. Sustained reflective practice brings the required level of rigour to the undertaking.

2.2 Autism

Autism, a lifelong neurodevelopmental condition, is a word derived from the Greek *autos* meaning *self* (Hammel, 2013). The word was first used to describe "a unique and specific condition separate to any other childhood conditions" by Leo Kanner in 1943 (Hanbury, 2012, p. 3). Autism diagnosis in Australia and many other countries uses the Diagnostic and Statistical Manual, Volume V, known as DSM-V (American Psychiatric Association, 2013). The DSM-V criteria focus on observed deficits in two main areas: social communication and patterns of behaviour. In order to be diagnosed with autism, a person needs to exhibit deficits in both areas. Specifically, a person must exhibit impairments in verbal communication and in general social interaction, as well as displaying restricted or repetitive behaviours, preference for strict routines, and interests in narrow areas.

Although widely known and in use for several decades, the term *autism spectrum disorder* has more recently been criticised for being based on a model of deficit (Baron-Cohen et al., 2009). An alternative definition which considers autism from the perspective of difference rather than deficit is the term *autism spectrum condition*. Referring to a condition rather than a disorder may be less stigmatising and "reflects that these individuals have not only disabilities ... but also areas of cognitive strength" (p. 500). In keeping with my professional perspective, as well as with a focus on developing self-concept in the participants, the term autism spectrum disorder will not be used in this study. However, as the alternative of autism spectrum condition has not as yet been widely adopted, the text simply uses the term *autism* when referring to the condition. For the purpose of this study, autism will equate with the term autism spectrum disorder, as defined in the DSM-V.

A key aspect of autism is the high variability of manifestations of the condition; there is a very large variability in functioning and behaviour between people with autism (Grandin, 2013). Autism diagnosis in the DSM-V comes with three broad levels of severity (American Psychiatric Association, 2013):

Level 1 - Requiring Support;

Level 2 - Requiring Substantial Support; and

Level 3 - Requiring Very Substantial Support.

A person diagnosed with Level 1 autism is usually able to function independently with a small amount of support, and their autism may not be immediately obvious. In contrast, a person with Level 3 autism typically has substantial impairments in social communication, and displays significantly restricted and repetitive behaviours (Carpenter, 2013). People with Level 2 autism have moderate impairments in social communication and behaviour, somewhere between Level 1 (mild) and Level 3 (severe). They require substantial support for social communication and interaction, and to enable restricted interests and behaviours to be modulated (American Psychiatric Association, 2013).

Current autism prevalence in Australia is estimated at 1 in 70 people (Autism Spectrum Australia, 2018), and is rising rapidly, matching a worldwide trend (Fombonne, 2009). However, at least some of this increase may be attributable to changes in diagnostic criteria and reporting practices (Hansen, Schendel, & Parner, 2015). Additionally, autism often co-occurs with other conditions, particularly intellectual disability (Matson & Shoemaker, 2009), making accurate measurements of prevalance challenging. However, the general trend towards increasing prevalence means that there is an increasing need for effective interventions to enable people with autism to live productive and healthy lives (Weitlauf, Sathe, McPheeters, & Warren, 2017). In order to be effective, interventions and developmental programmes for children with autism need to take into account the particular issues and challenges they face related to learning differences, sensory sensitivity and sensory integration, and differences in intellectual ability.

There may be significant learning differences between children with autism and typically-developing children (Blair, 2014), and interventions must be informed by potential challenges experienced by children with autism in their learning environment. Much learning by typically-developing children is picked up incidentally, without specific instruction, but children with autism "do not learn in the same way as their non-autistic peers. These children have difficulty learning from their environment via exploration, modelling, and communication" (Bruce, 2010, p. 84). Specific and direct instructions may be needed in order to engage children with autism in communication and interaction (Hanbury, 2012). Additionally, many children with autism do not develop functional speech (Gadberry, 2011) and interventions may need to accommodate this by including non-verbal forms of communication, such as visual communication.

Sensory sensitivity is highly prevalent in the autism population (Lang et al., 2012). Children with autism may process input from their senses differently to typically-developing children (Grandin, 2013). Some children with autism are very sensitive to overstimulation, whereas others actively seek out sensory experiences (Hanbury, 2012). For example, too much sound may be unbearable for a person who has a high level of sensory sensitivity, whereas sensory-seekers may prefer environments with many sounds. The seemingly contradictory attributes of sensory-avoidance and sensory-seeking may both be associated with an inability to adequately modulate sensory inputs (Lang et al., 2012). This inability may be related to a weakness in central coherence (Happe, Briskman, & Frith, 2001) or a reliance on bottom-up processing which may manifest as an inability to filter incoming sensations (Maekawa et al., 2011). The implication for studies using music for children with autism is that care needs to be taken with the aural environment. If a participant is unable to regulate the input of the music used (for example, the volume or timbre), this may cause distress and prevent their participation.

A related issue is that of sensory integration. For some people with autism, incoming sensory perceptions from separate sensory modalities (for example, sight and sound) are sometimes not linked to create coherent experiences. As with sensory modulation problems, this tendency has also been linked to weak central coherence, manifesting as "a tendency to focus on parts of things rather than wholes" (Ockelford, 2013, p. 215). Some studies have suggested that sensory integration can be improved in children with autism

(Lang et al., 2012). In view of this, combining multiple sensory inputs in interventions for children with autism may yield positive results. Integrating the use of aural and visual sensory areas through the use of visual music notation to represent musical sounds may be one such intervention. Additionally, many people with autism live with an intellectual disability. One recent study found a prevalence of intellectual disability in children with autism as high as 47.6% (Postorino et al., 2016), although the prevalence is difficult to measure given the co-morbidity. The likelihood that a significant proportion of children with autism also possess an intellectual impairment also needs to inform the development of interventions, and points to a value in interventions which can be successfully applied to children with autism functioning at a variety of intellectual levels.

In recent years, the focus in interventions for children with autism has been increasingly in two areas: early intervention, and strength-based approaches. Early interventions have the potential to produce positive outcomes for people with autism over their lifespan (Humpal & Kern, 2012), but there is a need for more research in this area, particularly into interventions which are cost-effective (Sharda et al., 2018). Strength-based approaches build on the interests and strengths of children with autism, and may be more effective than those which focus primarily on ameliorating perceived weaknesses in these areas (Hanbury, 2012). The markedly high levels of specific skills in a small percentage of the autism population, sometimes given the label *savant syndrome*, has been a topic of interest in the research literature on autism for several decades and has resulted in an interest in people with these skills (Heaton, 2009). Some aspects of the savant syndrome may be explained by the fact that some children with autism with a low level of overall functioning develop a high level of competence in one or more specific areas of interest (Meilleur, Jelenic & Mottron, 2014). In this case, effective interventions may be those which can target areas of interest for children with autism, while encouraging the skills developed in these areas to generalise into overall functioning. Thus, effective interventions for children with autism are those which can be applied early in life, are based on strengths and interests, allow for learning differences, sensory issues and for variations in intellectual ability, and seek to build on a pre-existing area of interest. Music-making, which is discussed in the next section, has much to offer in this context.

2.3 Music-Making and Music Skills

The potential of music as an intervention for enhancing the wellbeing of children with autism was influentially outlined in Brown (1994) and has received increasing attention in the research literature in recent years (Geretsegger, Elefant, Mössler, & Gold, 2014). Brown posits that music's "paradoxical elements of fixed organisation and creativity" may help people with autism to "develop more coherent and adaptable responses to other world structures" (1994, p.18). The tonal patterns and repetitive nature of music may be particularly suited to people with autism. Moreover, "the self-referencing and highly repetitive nature of music is a perfect match for a number of traits of those on the autism spectrum ... autistic minds latch onto music as a source of predictability, interest and comfort in a generally confusing world" (Ockelford, 2013, p. 21). Music may have common origins with spoken language as a form of human communication (Mithen, Morley, Wray, Tallerman, & Gamble, 2006), and music's nature as a non-verbal form of communication may have particular applicability for those on the autism spectrum who are non-verbal or for whom speech is difficult (Gold, Wigram, & Elefant, 2006). Music can also be a non-threatening medium through which children with autism can express themselves and learn about feelings and emotions, by experiencing "a communicative intent in the way [others] play or sing" (Ockelford, 2013, p. 258).

Several studies have investigated the effects of music interventions for children with autism. Although one recent study which used an improvisational approach (Bieleninik et al., 2017) found only limited benefits to social communication, systematic reviews have identified benefits of music therapy on social interaction (Geretsegger et al., 2014; James et al., 2015), in particular joint attention (Kim, Wigram, & Gold, 2008), for children with autism. Studies have also shown benefits to children with autism in communication (Gattino, 2011); engagement (McFerran et al., 2016); functioning, behaviour, emotions and self-expression (James et al., 2015; Straus, 2014); motor skills (Woodward, 2004); and sensory regulation (Weitlauf, 2017). These benefits in a variety of functional areas point to a potentially broad range of potential benefits of music interventions for children with autism.

The majority of published studies involving music interventions with children with autism are studies of children receiving individualised interventions (Geretsegger et al., 2014).

Individual settings have been preferred for music therapy interventions as a result of music therapists' focus on child-centred interventions, such as improvisation (Reschke-Hernández, 2011). However, there is a paucity of studies involving groups of children with autism, despite group music environments providing "opportunities for learning social skills such as imitation, turn-taking, social reciprocity, joint attention, shared affect, and empathy" (Ghasemtabar et al., 2015, p. 162). The efficacy of small-group music therapy was reported by Bryan (1989) in a pioneering study which found benefits to psychological wellbeing in a study of six children with autism. More recently, Cunha (2017) found beneficial effects of group music therapy for adults, where group music-making gave each participant "a specific role ... and interacting in musical and personal relations that conveyed joy and relief" (Cunha, 2017, p.9). This finding points to an aspect of group music-making that cannot by definition be found in individual settings: the potential of groups to foster musical and social interactions and communication. Another benefit which group interventions can promote is the ability to work together towards a common goal, with recent research suggesting that successful musical ensemble playing can model effective teamwork between individuals (MacRitchie, Herff, Procopio, & Keller, 2018).

Geretsegger et al. (2014) identifies a need for the effects of music therapy to be generalized and extended beyond the therapy context. Research into music interventions for children with autism is giving increasing attention to working with their families in striving to achieve positive outcomes. A recent study has found a positive effect of music therapy on quality of life for families whose child received a music therapy intervention (Sharda et al., 2018). Recent research has investigated not only the effects on family life of music interventions for children with autism, but also the potential of actively involving family members of children with autism in these interventions. This involvement has a theoretical basis in Family Systems Theory, which highlights the importance of healthy relationships between all family members (Cridland, Jones, Magee, & Caputi, 2013). Musical experiences have been found to enable mutually enjoyable interactions between family members, and working with families of children with autism holds the potential to benefit all members of the family, including siblings and parents (Thompson, 2014). In her research into ecological approaches to music therapy, Thompson (2014) emphasises the importance of guiding families of children with autism to embed music in their daily lives, and points out that

inviting parents and siblings into music therapy sessions enables this to happen. In music education, Hammel (2013) has shown that music teachers can collaborate with parents of children with autism to foster more effective outcomes. However, in general the involvement of parents of children with autism in their children's musical activities is not yet widely studied. This is surprising, given the importance of parental involvement for children's outcomes (Bruce, 2010).

Some recent studies have highlighted a need for interventions which address potential problems for the siblings of children with autism. A study which compared aspects of wellbeing for 29 siblings of children with autism with the same number of siblings of normally developing children found that parents of children with autism reported more behavioural problems, particularly in younger siblings (Verté, Roeyers, & Buysse, 2003). Children need positive interactions with their siblings, and the wellbeing of one sibling often affects other siblings (Williams, Barrett, Welch, Abad, & Broughton, 2015). In families where one child has autism, interactions between siblings are often infrequent and of poor quality, and a typically-developing sibling may be negatively affected by receiving less parental support and attention than their sibling with autism (Cridland et al., 2013). Additionally, there may be a stigma associated with having a brother or sister with autism, which may lead to feelings of shame, depression, or avoidance behaviours (Habelrih, Hicks, & Vanstone, 2018). Verté, Roeyers, & Buysse (2003) argue that interventions for children with autism should involve their siblings "so they also feel themselves as an important member of the family" (p.202). Thus, there are potential benefits in involving family members of children with autism in music-making interventions, both for the children with autism themselves, and also for their parents and siblings. This potential informs the inclusion in this study of a participant phase specifically involving family members of children with autism.

Music-making

Techniques used to enable children with autism to engage in musical experiences vary widely. Engagement in musical experiences can broadly be categorised as either active or passive (Bruscia, 2013). Active music engagement involves playing, singing, dancing or other physical involvement (Raglio, Traficante, & Oasi, 2011). Passive, or receptive, music

engagement includes listening or moving to music (Turry, 2018). The goal of active music engagement in music therapy is frequently to develop a client's communicative abilities (Gold et al., 2006). Shared music-making between therapist and client can act as a proxy for verbal communication and provide a way for children with autism to make connections with others and express themselves, thus forming an "effective medium for engaging in non-verbal social exchange" (Geretsegger et al., 2014, p. 6).

Several studies investigating active musical engagement in children with autism have employed an improvisational approach (Bieleninik et al., 2017; Geretsegger et al., 2014; James et al., 2015; McCord, 2009), and improvisation using echoing or call-and-response techniques has been found effective with this population (McCord, 2009). Many music therapists, particularly those trained in the Creative Music Therapy approach (Nordoff, 2007) use improvisation as a way of developing clients' experiences in making music. Improvisation in music therapy involves the client, and frequently the therapist, in spontaneous creation of music using singing, playing, and movement. In this way, improvisation is "a developmental, child-centered approach in which a music therapist follows the child's focus of attention, behaviors, and interests to facilitate development in the child's social communicative skills" (Bieleninik et al., 2017, p. 526).

However, even within a primarily improvisational approach, pre-composed musical materials, games, and songs are frequently used to give structure to clients' experiences within a session by re-creating existing musical structures (Wheeler, Shultis, & Polen, 2005; Nordoff, 2007). The issues involved in re-creating music by children with autism are poorly-understood (James et al., 2015) and this may lead to fewer opportunities for clients to perform pre-composed music in music therapy. Yet the patterns, structure, repetitions, and non-verbal forms of expression inherent in performing pre-composed music may render it particularly effective for some children with autism (Mottron, Dawson & Soulières, 2009; Ockelford, 2013). Additionally, re-creating music requires an ability to firstly assimilate the music by aural or visual means. The approaches conventionally used to enable the development of music skills to do this (learning to read music notation or developing aural memory) are often unsuited to children with autism (Hammel, 2013), and this may explain further the under-representation of research on re-creating music as an intervention for children with autism.

Another relevant aspect of music-making is musical performance. Music, as a performing art, is intrinsically linked with performance. Musical performance by an individual can be seen as a presentation of self (Ansdell, 2005) and can operate as a *zone of proximal development* as formulated by Vygotsky (Shabani, Khatib, & Ebadi, 2010) where a child is invited to act at a level beyond their current development, the performance of which helps them to attain that level. Moreover, performance can be seen as "both a *self and collaborative* effort" (Jampel, 2011, p. 2) in which an individual's sense of self is co-constructed by themselves and others with whom they perform, or perform to. Musical performance thus holds the potential to act as a powerful context for development for children with autism.

Music skills

In order to re-create and perform music, there is a need to draw on specific skills. Music-making by definition requires those making music to possess some skill in this activity, even if only at a very rudimentary level, just as speaking requires the skills of language and formation of words. However, there is a general paucity of research into the mechanisms and potential benefits of the acquisition of music skills, which may relate to the way in which music is regarded in Western societies. The phenomenon of music as an expert performance art has developed in Western societies since the Renaissance (Blacking, 1973), and musical ability in Western societies has traditionally been seen as a gift which only a few people will ever possess, and cannot be gained simply by practice. Moreover, unless a child is particularly adept at music at an early age, they may be advised not to continue learning music, or even being involved in music (Patrick, 2015). In this view, the development of skills in music can be seen as the drawing-out of innate ability in order to develop high-level music skills expected of a world-class professional musician.

However, when music is seen not as an elite art form but as a medium of functional human expression, music skill development can be seen another way, as developing a level of musical literacy for the purpose of enabling a large number of people to use music as a medium of self-expression, interaction and communication with others. As well as the ability to do something well or with expertise or excellence, skill can also have the meaning of a basic ability gained through training (Delbridge & Yallop, 1981). Additionally, there is

evidence that music developed very early in human evolution, may serve an evolutionary purpose, was widespread in early human societies, and has had a functional use through most of human history (Mithen et al., 2006). In particular, group music-making has been shown to be used in both ancient and modern human cultures as a mechanism for social bonding (Weinstein, Launay, Pearce, Dunbar, & Stewart, 2016). From this is is possible to argue for a view which "places our ability to create and appreciate music at the centre of what it means to be human" (Malloch & Trevarthen, 2018, p.2). Another way of considering the place of music skill development specifically with regard to children with additional needs, is by looking beyond “the presumption that impairment and giftedness in the same endeavour must be mutually exclusive” (Lubet, 2017, p.138). Considered in this way, the ability to develop and benefit from musical skills may be more dependent on finding appropriate ways of developing those skills, rather than the particular pre-existing circumstances of the individual.

Of the existing research investigating potential benefits of the development of music skills on various domains of human functioning (cognitive, physical, social, and emotional), beneficial effects of music skill acquisition In the cognitive domain have been demonstrated in several studies (Costa-Giomi, 2004; Croom, 2012; Goopy, 2013; Wan & Schlaug, 2010), and music skills have been specifically associated with improvements in statistical learning, pattern recognition, and auditory processing (Vasuki, Sharma, Ibrahim, & Arciuli, 2017). However, there is a paucity of research on the effects of music skill acquisition on the social and emotional domains, and this may be a reason behind the lack of research into music skills in music therapy, where the goals are commonly in these social and emotional areas, and the role of the musical skills of the client is not well understood (Bruscia, 2013).

Music education research, however, is also lacking in studies exploring links between music skills and social or emotional effects. A review of literature documenting extra-musical benefits from music instruction (Goopy, 2013) which focused on the Kodaly method, identified benefits to a variety of domains, including social-emotional development. This review also pointed to the need for further research into social-emotional benefits of music engagement, despite music education being "often advocated as having ‘extra-musical effects’ contributing to the development of the whole child” (p. 71). A study investigating music perception and cognition found abilities in the population with autism which are

equal to or are enhanced compared with the general population and postulated that many children with autism have "musical potential that can and should be developed" (Heaton, 2009, p. 1443). However, the development of music skills in individual children with autism, and techniques for achieving this, have received scant attention in the literature (Fong & Lee, 2012). Moreover, for the majority of children with autism who are not exceptionally musical but for whom music holds potential to improve their lives, there is still much to be learned about about “their musicality, the role of music in their lives, and what extra-musical benefits music might have for them” (Lubet, 2017, p.140).

Two concepts about music skills identified – that music skills can enable music to be a medium of expression and communication, and that people with additional needs require techniques and tools suited to them by which to develop their music skills – highlight the particular need for further research into the development of music-making skills by people with additional needs. This section has also shown a need for more studies exploring links specifically between the development of music skills and social-emotional functioning, in children with autism. To address this, the next two sections discuss the potential for the development of music-making skills to influence two key areas of functioning and wellbeing for children with autism: social interaction and self-concept.

2.4 Social Interaction

Social interactions lie at the heart of much of human activity. Interacting with others involves awareness and understanding of complex interpersonal issues, as well as the ability to process and respond to verbal and non-verbal cues from multiple sources. For people with autism, challenges in social interaction are common. Indeed, deficits in social interaction are among the primary criteria for diagnosis for autism in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), the currently accepted source of diagnostic criteria for autism (American Psychiatric Association, 2013). As well as limitations in their verbal communication, people with autism may have difficulty initiating or responding to many of the non-verbal forms of communication that many of us take for granted, such as facial expressions, physical gestures and eye contact (Autism Spectrum Australia, 2013). As social behaviours and habits are developed early in life, there is a critical need for effective interventions for improving social behaviours for very young children with autism

(Cunningham, 2012). The role of a range of performing arts activities in enhancing social skills is being increasingly examined (Ennis & Tonkin, 2018). It is thought that music may be "an effective medium for engaging in non-verbal social exchange for children and adults with ASD" (Geretsegger et al., 2014, p. 6). Two ways in which music-making may be an effective tool for promoting social interaction in children with autism will be discussed: through the effects of specific music-making skills on para-musical social competence, and by stimulating motivation to engage in social communication.

Music skills and social skills

The literature offers differing findings in the area of the effects of music skills on social competence. On the one hand, there is some evidence of increases in the social functioning of children with autism through participation in musical activities (Lagasse, 2017). A Cochrane meta-analysis of ten music therapy studies (Geretsegger et al., 2014) found some evidence of improvements in social interaction following music therapy interventions. One recent clinical trial study found improvements in social skills of children aged 7 to 12 years diagnosed with mild to moderate autism (Ghasemtabar et al., 2015). Importantly, in this study improvements were maintained when measured two months after the intervention. An earlier study, conducted at community music centres in England and Portugal, found that "when children make music together, they have to listen to each other, therefore positively influencing emotions and cooperative behaviour" (Blandford & Duarte, 2004, p. 14). This study found improvements in trust and social bonding in participants, including bonding between participants with special needs and those without. It also found that "students' social skills are enhanced by their participation in a musical community" (p. 22). However, the authors caution that these results were based on interview data with participants, not on objective measures. Another study found gains in social interaction through the development of participants' singing ability (Welch, Papageorgi, & Sarazin, 2014).

Other studies have not found improvements. A study involving music instruction (singing and keyboard) given to small groups of children found no measurable improvements in social functioning (Schellenberg, 2004). Similarly, a study into the effect of a group instrumental tuition intervention in two mainstream primary school classrooms also found no observable improvement in social skills in participants (Rickard et al., 2013). This study

used a Kodaly-based program with younger (Year K-1) children, and a strings-based program with the older (Year 3) children. The lack of improvement in social interactions was unexpected, given that “as music requires participation and group collaboration, it is generally thought that music promotes social cohesion” (p.304). However, the authors point out the need for further research to "determine whether music training can benefit social skills" (p. 304).

A major study involving a randomized controlled trial involving 364 participants aimed at evaluating the effect of improvisational music therapy on social communication skills of children with autism, yielded no significant changes following the music therapy intervention (Bieleninik et al., 2017). However, the study was a pragmatic trial conducted in several countries in various clinical settings, and there was a diversity in both the participants' group and in the music therapy intervention used (Broder-Fingert, Feinberg, & Silverstein, 2017). The study's authors acknowledge a potential limitation to their study in that the music therapy intervention was “not as tightly controlled and perhaps not as consistently implemented as in previous single-center trials” (Bieleninik et al., 2017, p. 533).

If there is some benefit to social interactions through music skill development, the possible mechanisms for this are not yet clear. Improvements to social communication in children with autism participating in a music intervention may be related to the capacity of music to offer an alternative to the usual methods of interpersonal interaction and provide a "structured approach to social communication" (Sharda at al., 2018, p.7). This is consistent with the idea that musical interaction is a form of social interaction "that requires multiple individuals to anticipate and adapt to each other’s actions" (D’Ausilio, Novembre, Fadiga, & Keller, 2015, p.112). Turn-taking is regarded as a primary social skill (Duffy & Fuller, 2000) and non-verbal cues play an important part in the organisation of turn-taking (Holck, 2004). Therefore, engaging in musical dialogue may have the capacity to promote the development of social turn-taking. Another mechanism by which music interventions may be effective in addressing social deficits is through synchrony. The potential importance of synchrony for human social bonding has been reported (Launay, Tarr, & Dunbar 2016), although the management of simultaneousness in social interaction is very different in verbal as compared with musical dialogues (Holck, 2004). Nevertheless, synchronisation in music may

"encourage group cohesion by causing the release of neurohormones that influence social bonding" (Launay, Tarr, & Dunbar 2016, p.779).

It is possible that improvements in social interaction associated with music skills development can be more pronounced when there are more pre-existing deficiencies in this area. This is also the idea behind a study using drumming as an intervention with at-risk youth (Wood, Ivery, Donovan, & Lambin, 2013) which found improvements in social relationship skills among participants who had initial deficits in this area. Similarly, the study by Rickard et al. (2013) noted that the lack of observable improvement in social interaction could be explained by the fact that "the social skills of participants were above average at baseline, whereas benefits of music training may be apparent only in children with poorer social skills" (p. 304). Focussing on development of music-making skills with children with autism may thus enable them to use musical experiences as a guide to social discourse.

The influence of musical interactions on social interactions in children with autism may additionally be enhanced when mediated by the use of musical scores. A musical score for an ensemble contains visual representation of the musical interaction, for example by showing where one instrument takes over a musical phrase started by another instrument. In this way, "the musical score is a script-like description of the interaction" (D'Ausilio, Novembre, Fadiga, & Keller, 2015, p.112). Involving participants in reading musical scores as they perform them may therefore reinforce learning about aspects of social interaction. This may be particularly so for the skill of turn-taking, where music scores depicting the structure of turns in singing or playing with others could enhance the non-verbal cues which play an important part in the organisation of turn-taking (Holck, 2004).

Motivation

A second way in which music-making may be an effective tool in promoting social interaction in children with autism is by stimulating general motivation to engage in social communication. The social motivation theory of autism proposes a lack of motivation as leading to the pervasive lack of social skills in people with autism (Chevallier, Kohls, Troiani, Brodkin, & Schultz, 2012). It posits that impairments in social skills and cognition exhibited by individuals with autism are linked to primary deficits in motivation to attend to others, to take pleasure in collaboration, and to maintain social relationships. This theory points to the

potential of interventions which not only stimulate the development of social skills in children with autism, but also stimulate an underlying desire and motivation to engage in social activities (Chevallier et al., 2012), and this can be linked to research which shows that musical activity may effectively stimulate the reward systems in the brain (Kraus et al., 2014). Therefore, music holds the potential to be an effective intervention for children with autism not only as a medium in which to learn social skills, but also to stimulate the intrinsic motivation for social activity which may be a predictor of subsequent social functioning.

Groups

Performances of musical items are intrinsically social activities, which can "create and sustain networks of relationships between and amongst people, institutions and communities" (Ansdell, 2005, p.4). In this way, music interventions involving groups hold the potential to directly address impairments in social interaction. Wood, Ivery, Donovan, & Lambin (2013) looked at the effects of a drumming program on social behaviour and self-esteem in at-risk youth. The study used surveys of self-esteem pre- and post-test, as well as gathering data on student behaviour and teacher feedback. The study found improvements in both the participants' social outcomes as well as their reported self-esteem, from pre-test to post-test. The use of both quantitative and qualitative measures, as well as the use of an intervention (group drumming) which is accessible to a wide variety of ages and ability levels, give this study relevance in terms of positioning and planning the present study. Another study investigated music therapy with groups of children with autism in a school setting, which included approximately 90 children aged from 5-18 years (McFerran, Thompson, & Bolger, 2016). Although this study did not employ any specific music intervention, aiming instead to determine how school staff could appropriate knowledge and techniques used by specialist music therapists, the study did find that "being able to adapt musical strategies to meet the unique learning style of each student is critical" (p. 255). In the context of a school environment, this finding suggests that music interventions for groups of children with autism need to carefully take into account individual differences in order to maximise the potential of the group setting to facilitate gains in social communication.

Music provides the possibility of creating opportunities for social interaction through shared musical experiences, with music providing a "safe and structured stimulus for social engagement and the practice of social skills" (Lagasse, 2017, pp. 24-25). Social skills may be practised in "joint music-making...[which] encourages the participants to maintain a constant audio-visual representation of the collective intention" (Kirschner & Tomasello, 2010, p.362). Additionally, the regular and predictable structure of music may provide an attractive medium for children with autism to develop social skills:

> Because pieces [of music] are generally made up of sequences of identical or similar events, which divide time into manageable chunks and constitute predictable patterns, music provides a secure framework for the risky business of reaching out into the far from predictable world of other people, setting parameters and establishing the boundaries within which socialisation can occur; building confidence through a medium which the great majority of young children find enjoyable and motivating (Ockelford, 2013, p. 205).

Difficulties in measuring changes in social interactions following a music intervention have limited several afore-mentioned studies. A lack of objective evidence (Blandford & Duarte, 2004, the need for durther research (Rickard et al., 2013), a lack of clarity of the techniques used in the music intervention ((Broder-Fingert, Feinberg, & Silverstein, 2017) all point to a general difficulties in measurement. A wide variety of tools are used to attempt to measure social skills (Cunningham, 2012), and measurement tools used are frequently observational, based on the perspective of a parent or clinician (Lagasse, 2017). Therefore, while the literature shows a potential for music interventions to support the development of social interaction in children with autism, there is clearly a need for further research in this area.

2.5 Self-Concept

Self-concept is a term which can be defined as "the overall body of beliefs that an individual holds about himself or herself" (Miller & Moran, 2012, p. 19). This can include a person's sense of who they are, what they are capable of, where they fit in, and how they feel about themselves. The development of self-concept is regarded is particularly important in children, even being considered "the cornerstone of both social and emotional development" (Kagan, Moore, & Bredekamp, 1998, p.18). It has been proposed that self-

concept is multidimensional in nature (Shavelson, Hubner, & Stanton, 1976) and this multidimensionality means that an individual may hold different self-concepts in different domains of their life. Each of these domains contributes to an individual's overall self-concept, which can be seen as the apex of a hierarchical structure (Marsh & Craven, 2006). In this context, changes in self-concept in an area such as music may influence a person's overall self-concept. People with autism may be particularly prone to low levels of self-concept. There is evidence from studies of adolescents with autism that they may "perceive themselves differently, report lower self-esteem and have poorer psychological outcomes" (Williamson, Craig, & Slinger, 2008, p.392). Low self-concept may be related to a lack of positive experiences of success, and may also be related to lower levels of social functioning (McChesney & Toseeb, 2018). This points to a value of interventions targeted at enabling individuals with autism to experience success in specific activities, and to do so within a social environment. Such interventions may have beneficial effects on self-concept related to the specific activity, and thus on overall self-esteem.

Music interventions and self-concept

The potential beneficial effects of music interventions on self-concept have received considerable interest in the literature but little empirical research (Rickard & McFerran, 2011). A possible reason why self-concept is an under-researched area of effect for music interventions may be due to challenges in measuring and reporting, including "a paucity of theoretical models, psychometrically sound instruments, and appropriate statistical analyses" (Marsh, 1994, p.439). One study, in which children taking individual piano lessons were found to show improvements in self-esteem (Costa-Giomi, 2004), is of interest because the children were from relatively underprivileged backgrounds. This fact is claimed to strengthen the argument that wellbeing improvements associated with musical engagement can be more pronounced when there are pre-existing wellbeing deficiencies. This was also the premise of the *Drumbeat* intervention with at-risk youth (Wood, Ivery, Donovan, & Lambin, 2013). Both studies found overall improvements in self-concept associated with the musical interventions used. Another study which used a group instruction-based music intervention for primary-age children (Rickard et al., 2013) found benefits to self-esteem for the children using global measures of self-reported self-esteem.

Links have been identified between development of children's self-concept and their social skills (Verté, Roeyers, & Buysse, 2003), with deficits in one area associated with deficits in another. Some studies have included both social interaction and self-concept in assessing social-emotional wellbeing associated with a music intervention (Rickard et al., 2013; Welch, Papageorgi, & Sarazin, 2014; Wood, Ivery, Donovan, & Lambin, 2013). Another study using group singing for school children found "a positive relationship between increased singing skill and a greater sense of self and of being socially included" (Welch, Papageorgi, & Sarazin, 2014, p.7). The significance of this finding for the present study is that it associates music skill development with the development of social interactions as well as self-concept. This study used a single term, social inclusion, as "one concept that draws on sense of self and of being socially integrated" (p. 1). These studies provide precedents in the inclusion of social interaction and self-concept as dual areas of focus, and point to the value of incorporating both areas within further studies.

Perception and importance of competence

The development of self-concept in a particular domain may involve primarily the perception an individual holds about their abilities in that domain. Psychologist Daryl Bem developed a theory of self-perception that states that attitudes follow behaviour – a process where people "come to 'know' their own attitudes, emotions, and other internal states partially by inferring them from observations of their own … behaviour" (Bem, 1972, p. 2). In other words, people form concepts of themselves and their abilities and interests from what they are already doing. If a person observes themselves participating in an activity where they are exercising the use of a particular skill (such as in playing in a musical ensemble), then this may result in the person gaining a new perspective of themselves as a capable person. Thus, given that a person's self-concept may be strongly influenced by their competence in specific domains, for those at risk of low levels of self-concept it may be important to assist them to attain self-competence through gaining a sense of achievement.

However, Harter (1984) argues that it is not the actual level of an individual's competence that really matters, but an individual's *perception* of their competence. An individual's perception of their level of competence may be close to, or alternatively quite unlike, their actual level. Additionally, the gap between perceived and actual competence may be larger

in children with autism, due to difficulties in perceiving themselves accurately in relation to others (Capps, Sigman, & Yirmiya, 1995). However, merely attempting to increase children's self-concept by praising their efforts in a particular activity is not likely to lead to genuine improvements in self-competence: "it is not helpful to tell children they are good at something when it is evident, both to them and to others, that they are not. Instead, it is necessary to provide the opportunity for them to achieve real success – and then to help them recognise it as such" (Miller & Moran, 2012, p.51). Thus, helping children not only achieve but also recognise their success in a specific domain may be the most effective way to positively influence self-concept in that domain.

A person's perception of their competence may be influenced by additional factors beyond the simple binary concepts of success or failure. A principle articulated by the pioneer in psychology William James is that a person's self-esteem depends on the relationship between a person's success and their level of aspiration (James, 1913). In attempting to examine the possible effects of music-making on self-concept, it is thus important to consider not only the success or failure of a person in their participation in a musical activity, but also how the person thinks and feels about the activity itself. Goopy (2013) argues that positive effects on self-concept of increased skill in music may be more likely to occur if an individual highly values that activity. In other words, the importance an individual places on being competent in music may be a significant factor in the effect of this competence on their self-concept.

Another factor in how an individual perceives their competence may be the reference group with whom they compare themselves. The feelings individuals have about themselves are often developed as a result of feedback from others (Miller & Moran, 2012). Marsh (1994) developed the *internal/external frame of reference model*, arguing that the reference point used by a child when assessing their own level of competence may be internal, comparing themselves with how they used to be, or external, comparing themselves with another person or group (Wei & Marder, 2011). Therefore, one way to improve self-concept in children may be to assist them to develop an internal reference point for their perceived competence. Another way of raising self-competence may be to enable children to compare themselves with other children at a similar level, as in the *big-fish-little-pond effect* proposed by Marsh (1994). The group with which a person identifies, either through

geographic proximity, personal characteristics, or simply personal preferences, may influence that person's concept of who they are. The potential for music interventions to modify or strengthen a child's self-identification with peers, family, or other developmentally-appropriate groupings has been identified as an area worthy of examination (Robinson, 2004).

In summary, the research literature reviewed above suggests that music interventions have the potential to positively influence self-concept in children with autism, but the mechanisms by which this may occur need to be investigated further. Specifically, music interventions may be able to positively influence self-concept through gains in music-making skills and through musical performance. However, the development of music skills by children with autism may not in itself be sufficient to affect their self-concept. Instead, their perception of their competence (whether similar to their actual level, or different) is likely to be more important. This perception may be mediated through the importance to them of possessing those skills, and also through the reference group with which they use to compare their level of competence. In other words, what matters may be not only how good they are, but how good they think they are, which depends on how important being good is to them, and with whom they compare themselves. These factors must be given due consideration, and by doing so may elucidate potential benefits of music-making to self-concept in children with autism. This section and those preceding it have thus identified a need for further research into music-making by children with autism, identified a need for further research into the development of music-making skills in order to facilitate this, and identified a potential for the development of music-making skills by children with autism to benefit their social interaction and self-concept. The following section addresses how these skills may be developed.

2.6 Figurenotes

Universal Design

Geretsegger, Elefant, Mössler, & Gold (2014) argue the need for more studies examining the effectiveness of specific music methods and tools for children with autism, stating that future research "should continue to be conscious of the quality, clinical applicability and link

to usual practice, and type of music therapy examined ... [and] might entail comparisons between types of music therapy" (p.24). A similar argument that benefits to wellbeing may be dependent to an extent on the methods and tools used is given by Goopy (2013), who suggests that “the pedagogy teachers employ to deliver music programs could affect the significance of … extra musical effects and benefits” (p.71). This suggests that the *what* and *how* (and even *where* and *when*) of a music intervention used can be significant factors in its effectiveness. In the specific area of development of music-making skills by children with autism, the approaches used in special music education provide worthwhile perspectives. The area that has become known as special music education has emerged in recent years in response to a recognition of the need to research and develop approaches to enabling music skill development by people with special needs (Kaikkonen, Petraškeviča, & Väinsar, 2011; Ruokonen, Pollari, Kaikkonen, & Ruismäki, 2012). In essence, it is the application of principles and methods in special education to the specific domain of music education (Kaikkonen, Petraškeviča, & Väinsar, 2011). Within special music education, an overarching approach commonly used is that of Universal Design for Learning.

Universal design is a concept originally related to architecture and functional design but has been adapted to other contexts (Metell & Stige, 2016). It refers to “the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (United Nations, 2006, p.4) In the educational context, Universal Design for Learning (UDL) is an application of the concepts of universal design to learning environments (Darrow, 2010). UDL uses methods which are applicable to all learners, regardless of age, ability or learning style, and focuses on using tools, methods, and resources which are applicable to the widest variety of learners and are "accessible to all students without needing to add special adaptations or activities" (McCord, 2013, p.190). UDL involves finding unified solutions which can be used for all individuals. For example, digital technology has been found to be effective in facilitating music skill development (Criswell, 2014).

While UDL provides an overall approach where tools and methods enabling access for all can be built into an intervention, differentiation and scaffolding are strategies which seek for different solutions for specific individuals in response to needs identified as an intervention is taking place. Differentiation highlights the use of multiple methods of

teaching to support the learning differences of individuals (Péter, 2011; Sparkes, 2015). It focuses on flexibility in methods of teaching and assessment according to the situation and needs of the students, both in groups and as individuals. The influence of underlying assumptions, attitudes, personality, and teaching style, on the individual process of learning music is important (O'Connor, 2007), as is the physical learning environment, as well as how the lessons are conducted (Proietto, 2012). The primary need is to find the method most effective with each individual, in order to allow the necessary development to take place. Similarly, scaffolding involves providing "an appropriate support that enables students to move beyond their current skill or knowledge, in small and attainable steps" (Creech, A., Varvarigou, M., Hallam, S., McQueen, H., & Gaunt, H., 2014, p.432). Scaffolding is closely aligned with differentiation, and both have been found to be effective in music learning (Küpers, van Dijk, & van Geert, 2014). In both differentiation and scaffolding, the focus is very much on careful reflection and adaption of practitioner approaches.

Music notation

When considering the development of music-making skills by children with autism, the specific characteristics of autism need to be carefully incorporated in order for an approach to be successful, along with a consideration of the methods to be used to facilitate this (Heaton, 2009). In many non-Western musics and cultural traditions, as well as in jazz and much popular music, the primary method of re-creating music is by listening and reproducing what is heard. Additionally, re-creating music through the reading of notated musical scores has occupied a pre-eminent position in Western music since the Middle Ages (Broude, 2012), and continues in the present day. Developing music skills by learning to read conventional music notation and by developing aural memory are both methods conventionally used, but these are both often unsuited to children with autism (Hammel, 2013). The case of music notation presents somewhat of a paradox: whilst difficulties interpreting conventional notation may a barrier to musical development, music notation may assist with the development of music-making skills by children with autism by utilising a preference for visual communication (Gadberry, 2011).

Conventional western music notation may be a barrier to music-making for certain individuals (McCord, Gruben, & Rathgeber, 2014). This may be because conventional music

notation is abstract, requiring the user to mentally translate figurative symbols into musical elements (Kuo & Chuang, 2013). This translation requires prior learning and memorisation of the meanings of symbols used in musical scores, with associated "difficulties in identifying accidentals, key signatures, and symbols of the staff at the early learning stage" (p.399). Additionally, a user must integrate sensorimotor areas of the brain in order transform abstract musical notes written as visual symbols, into a mental schema to coordinate physical movements to reproduce the notes on an instrument or by singing (Noppeney & Lee, 2018). For many people “the understanding and translation of notation … can seem like an unachievable goal” (Sparkes, 2015, p. 15). The complexity of traditional notation can thus be a barrier to music-making. Alternative music notations are often used in popular music, where intensional structures (providing parameters of the musical elements) are more often represented rather than the extensional structures (setting out the precise music to be performed) as in classical music (Kivijärvi, 2019). The flexibility of music notations used in popular music thus provides a model of how music notations can be seen as “pedagogical tools that can be adapted flexibly” (p.5) based on situational needs.

Some forms of music notation other than conventional notation may support music-making specifically for children with autism. Many children with autism are visual learners, using visual information to sequence and interpret the world around them (Maekawa et al., 2011). Visual supports have been found to assist learning and communication for children with autism. Visual schedules have been found useful in enabling understanding while reducing anxiety in children with autism (Harris, 2012), and pictorial communication systems such as the Picture Exchange Communication System build on a preference shown by many children with autism for visual communication (Flippin, Reszka, & Watson, 2010).

Alternative notations can exist as completely new systems of notation, or they can be augmentations added to clarify or modify conventional notation (Dennis, 1970). Graphic notations, first used systematically by composers in the 1950s (Pryer, 2011), were developed by composers seeking for alternative means to transmit their musical ideas. Another type of notation is *aural scores*, which have been used in music therapy since the 1960s (Bergstrøm-Nielsen, 2010). Aural scores are notations not designed to be used to reproduce music, but to represent transcriptions of musical improvisations or performances, used as a "map of the musical landscape" (p. 162). Barrett (2004) explored

the use of invented music notations by kindergarten-age children, providing an example of the ability of children to creatively explore alternative ways to represent music visually. This study found that children can also use invented notations as a "problem-solving space ... [to explore] musical and notational intentions" (p. 25). That is, children can use invented notation to explore ideas about the representation of music, as well as simply to represent it. Providing opportunities for children to explore alternative notations may thus encourage creative and novel ways of connecting the aural sounds with visual symbols.

Alternative notations have also been designed specifically designed for special-needs users. McCord, Gruben, & Rathgeber (2014) give examples of music in conventional notation with additions such as numbers, note names, and fingering. These labels can be added by students themselves, enabling “the notation to be functional for themselves” (p.7). Braille music notation, where musical notes as well as other musical information (such as tempo, and dynamics) is another example of an alternative notation to meet the needs of special-needs users. Music can be represented in Braille format, enabling people with visual impairments to read music scores (Rush, 2015). Other notation systems have been designed to be used as more accessible alternatives by very young children or people with cognitive impairments. A colour-based notation system was developed by Kuo & Chuang (2013), where colours are used to represent musical pitch and information on pitch, duration, range, and intensity of music. The objective of the notation is to allow people to "read and to play music quickly, accurately, and confidently” (p.394). Notation systems which use coloured symbols hold potential, but there are potential risks for people with synaesthesia, who may identify certain musical pitches with particular colours. If the colours are the same as those used in a notation, the notation will be useful for them, but if the colours used are different to those already internally represented, the notation may be very uncomfortable for them. Nevertheless, music notations based on colour as a way of representing musical elements has gained popularity in recent times, partly due to advances in colour reproduction and printing technology (p.399).

Another notation system based on colour is Figurenotes. Figurenotes was invented in Finland in 1996 by Kaarlo Uusitalo (Ruokonen, Pollari, Kaikkonen, & Ruismäki, 2012), and is now used in several countries worldwide in both education and therapy settings (Drake Music Scotland, 2016). Figurenotes was designed to enable people who would otherwise

not be able to deal with the abstract nature of conventional music notation, to read music, and play a musical instrument at a basic level. Whilst designed to be simple, Figurenotes is also systematic, giving "the same musical information as conventional notation" (Hakomäki, 2013, p.43).

There are several differences between Figurenotes and traditional Western notation. Firstly, in Figurenotes, the lengths of notes and rests are depicted by the actual horizontal length of the notes or rests. Secondly, colours and shapes are used to depict the pitches and octaves of notes. There are seven colours, corresponding to the seven basic tones of the C major scale. Notes are defined in a range of four octaves, corresponding to the most frequently-used range of pitches in music (which in turn corresponds with the normal range of pitches able to be sung by humans): Figure 1, below, shows pitches represented in conventional notation with Figurenotes colours, and placement of Figurenotes symbols on a keyboard.

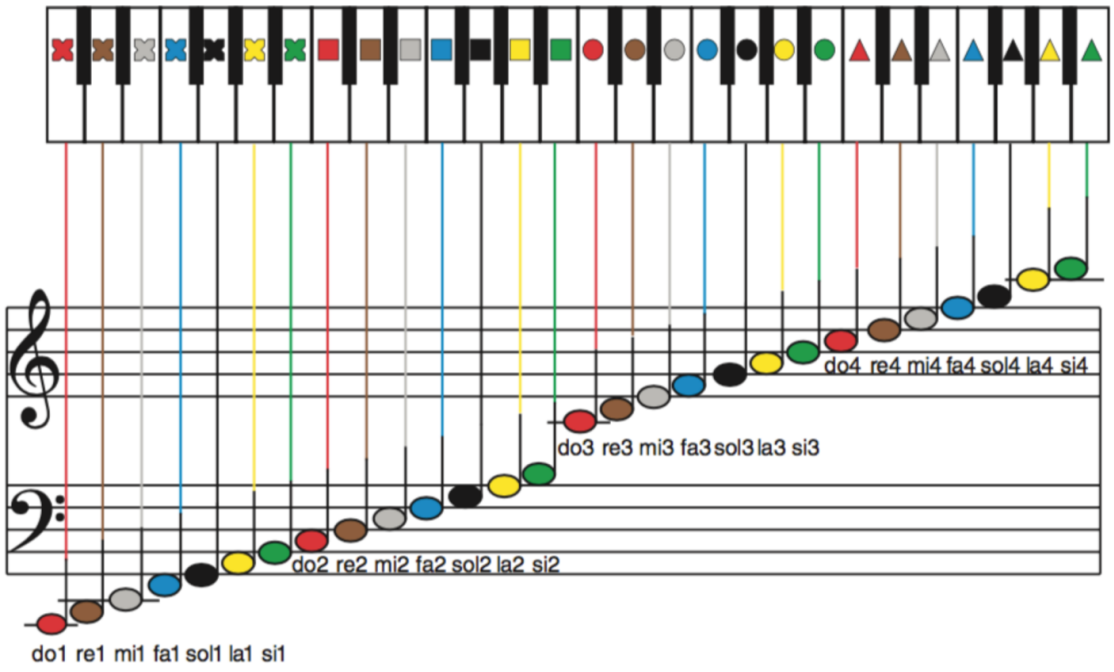


Figure 1 - Figurenotes pitches shown in conventional notation and solfège (Russano, 2018).

Scores written in Figurenotes show durations of notes in a proportional way: longer notes are longer on the horizontal. This is in contrast to the discrete representation of notes in conventional Western notation. A comparison is shown in Figure 2, on the following page.

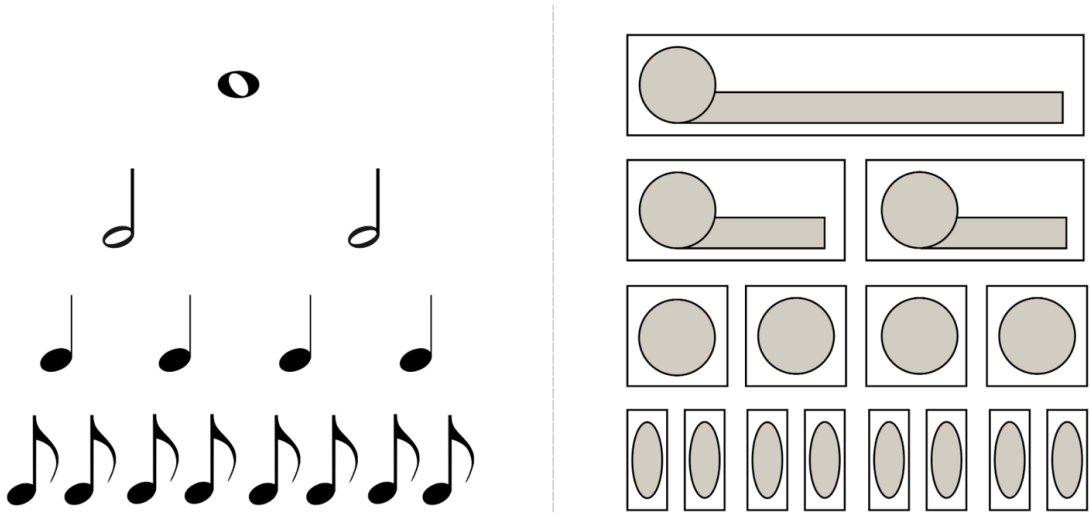


Figure 2 - Note durations in conventional notation (left) and in Figurenotes (right) (Drake, 2018).

An additional element of Figurenotes is that can operate as a note-matching system. Stickers in Figurenotes colours and shapes can be placed on the keys of any instrument where different pitches are spatially organised and played in different areas of the instrument. Instruments most typically played using Figurenotes are keyboard or piano, guitar, bass, and drums. By using Figurenotes as both a notation and a matching tool, players can utilise concrete depiction of the music, and also receive clear guidance for producing the notes indicated; a player can "play what they see" (Kaikkonen, 2008, p.1). Thus, Figurenotes has the potential to be a useful tool to facilitate the development of music skills and to enable musical engagement, in individuals for whom conventional notation is difficult or impossible. Figurenotes was developed specifically for use with people with intellectual disabilities (Kaikkonen, 2008). However, it can, and is, also used more generally. Drake Music Scotland, an organisation providing assistance to people with disabilities to participate in music-making, has developed Figurenotes software "allowing musicians and music teachers to produce parts and encourage participants to be creative and to compose their own music" (Sanderson, Sparkes, & Murray, 2013, p.97).

Figurenotes shares features in common with the colour system described earlier (Kuo & Chuang, 2013), being similarly a colour-based notation, containing information on pitch, duration, and range. However, the range of colours used in Figurenotes is more limited than in the system of Kuo and Chuang. In that system, each of the twelve semitones in the

musical octave is represented by a different colour. Figurenotes instead uses seven colours, one for each white key on a piano keyboard. Notes of the five black keys are represented by arrows placed at the top of the symbol, as shown in Figure 3 below.

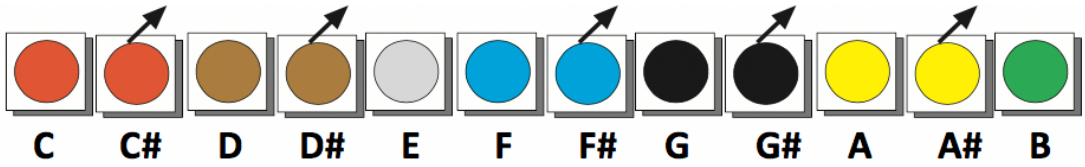


Figure 3 - Figurenotes symbols with corresponding letter names.

The forward arrows are used for notes which are sharps. As in conventional notation, these notes can also be written as flats, using reverse arrows, as shown in Figure 4 below.

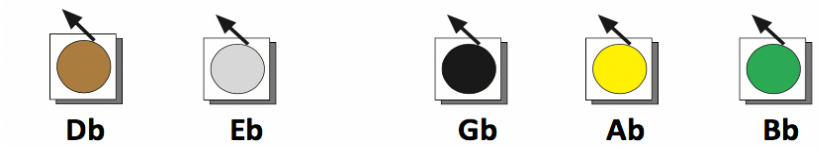


Figure 4 - Figurenotes symbols for flats.

Research investigating the effectiveness of Figurenotes as a music notation is currently limited to three studies. The first study examined the use of Figurenotes in piano teaching in Finland (Vikman, 2001). Participants were individuals and groups of children of differing ages and abilities, from pre-school, primary school, and special-needs primary school. The study was designed as action research, with the researcher being the teacher, and data was obtained though video analysis, questionnaires, and interviews. Figurenotes was used in the teaching of basic musical and piano-playing skills. Results showed that Figurenotes was an effective tool for teaching basic skills in music and in piano playing. Regarding the applicability of Figurenotes to children with special needs, the study found that Figurenotes "make[s] possible the realization of individual musicality for almost all players. For example, the special class students with their new concrete notation system can take part in goal-directed piano-teaching and express themselves musically as well" (Vikman, 2001, p.9). Thus, this study points to the applicability of Figurenotes to people for whom traditional notation is a barrier to engagement.

The second study, also undertaken in Finland, investigates the role of Figurenotes in a novel, researcher-created method of music therapy entitled *Storycomposing* (Hakomäki, 2013). Storycomposing involves the creation and performance of musical artefacts to represent ideas, feelings, or events. Storycomposing addresses therapeutic goals in that it "increases self-confidence, helps clients to compose their thoughts, and encourages patience" (Hakomäki, 2013, p. 51). Figurenotes is used in Storycomposing, allowing the clients to participate actively in both the composition of the musical stories, and in the notation and visual representation of them. The study found that that Figurenotes "enables students with learning difficulties and disabilities to make music much more easily" (Hakomäki, 2013, p. 43). A third study examined the use of Figurenotes in a program designed for young people with autism to learn music from a teacher who comes to their home (Sanderson, Sparkes, & Murray, 2013). This study, conducted in Scotland, reported on a program of individual music instrument lessons to children in their own homes, using Figurenotes. The program aimed to facilitate "the means of creative expression and enjoyment and support progressive learning for participants of all ages and levels, enabling them to realise their aspirations and follow pathways into music education" (p.97).

Each of the studies described above focusses on the use of Figurenotes with individuals. There is a lack of research into the use of Figurenotes with groups, despite the potential for Figurenotes to facilitate musical ensembles. I have personally observed groups of mixed ability and age playing together successfully using Figurenotes, in Finland, Scotland, and Italy, and this points to a need for further research in this area. One of the hallmarks of a useful tool is its applicability across a wide variety of situations, and Figurenotes holds the potential to be useful as a tool for both of the two earlier-discussed approaches of differentiated learning and Universal Design for Learning. Figurenotes is applicable to all learners in a particular situation, but can be flexibly adapted to individual needs.

The colour-based notation system developed by Kuo & Chuang (2013) represents a genuine attempt at formulating an alternative music notation system. However, it is only a theoretical proposal, and is designed for music beginners generally. In contrast, Figurenotes was specifically designed to address the needs of people with special needs. Moreover, in order to be a notation used and understood by those apart from its originators, any alternative notation needs to be used by a sufficiently large community of users to enable

sharing of musical resources. Figurenotes is being increasingly implemented in several countries (Drake Music Scotland, 2016), and thus has the potential to become a genuine alternative to conventional notation. In this context, the lack of published research on Figurenotes means that there is a need for more studies investigating its effectiveness. Therefore, in investigating music-making by children with autism, a study focussing on Figurenotes as a tool is clearly needed. Additionally, given the relative novelty and lack of established methods of using Figurenotes, and its inherent flexibility as a notation tool and note-matching system, using Figurenotes may be particularly applicable in a study which employs the use of reflective practice for investigating music-making.

2.7 Research Questions

This literature review has demonstrated the need for a study investigating the use of reflective practice in music-making as an intervention for children with autism. Furthermore, it has shown a specific need for research into the use of Figurenotes as a tool to facilitate music-making for children with autism. Finally, the review has shown a need for further research into the development of music skills to both enable this music-making by children with autism and to benefit their social interaction and self-concept. The research questions used in this study respond to these areas of research need. The main research question asked is:

To what extent can reflective practice facilitate music-making using Figurenotes by children with autism?

Two sub-questions ask:

1. **In what ways can reflective practice enable more effective practitioner and participant outcomes?**
2. **Can music-making using Figurenotes by children with autism be associated with changes in music skills, social interaction, and/or self-concept?**

The following chapter describes the methods used to answer these questions.

CHAPTER 3 - METHODOLOGY

This chapter describes the methods used to address the research questions defined in the previous chapter. The first section, *research orientation and approach* (3.1) describes the orientation of the study and also how the elements of action research are used. The next section, *study design* (3.2), defines the participants, the study phases, and the methods of data collection. Three key focus areas of the study are then described (3.3): *music skills, social interaction*, *self-concept*, along with the use of ratings and themes in these focus areas. The study's use of *case studies* is then described (3.4), and finally, *ethical issues* are discussed (3.5).

3.1 Research Orientation and Approach

Research orientation

As described in 2.1, this study has a primary focus on reflective practice. In aiming to be reflection-led (as opposed to merely reflection-illustrated), critical reflection needed to be built-in to all aspects of the study. A study investigating the use of a tool such as Figurenotes could have potentially be designed as an evaluative study. However, evaluation research is carried out to assess whether a solution works (de Vaus, 2011, p. 106), and there is "no assumption that what is being studied feeds back in any systematic way to the activity" (Thomas, 2013, p. 160). Moreover, evaluation research is used to "assess the impact, effectiveness, or other consequences of some newly introduced programme" (p. 161). Figurenotes, however, is not a program, but rather a tool, capable of a variety of applications. Therefore, this study does not aim to evaluate Figurenotes except in the context of its specific uses within the study.

This study is more closely aligned to applied research, "the discovery of solutions to current problems" (de Vaus, 2011, p. 106). However, as discussed in 2.2, the children with autism participating in this study are considered from the perspective of *difference* rather than *deficit*. Therefore, problematising their condition as something to be 'fixed' is not what this study is about. It is about the journey of a practitioner, myself, and participants, children with autism, in exploring the use of a specific music notation system, Figurenotes. This

reflexive process of researcher and participant discovery required a methodological approach which was flexible and yet could enable the enquiry to be both rigorous and sustained.

Action research approach

Action research, considered "not so much a methodology as an orientation to inquiry" (Reason & Bradbury, 2008, p. 1), enables practitioners to "systematically reflect on their practice" (Mills, 2014, p. 24). As a research methodology used primarily in educational and social research (Coghlan & Brydon-Miller, 2014; Noffke, 2009), action research enables the systematic incorporation of reflective practice into research and the connecting of theory with practice. Practitioners "generate detailed description of [their] process which can in turn be rigorously and systematically analysed" (Rickson, 2009, p.4) and this involves a process of professional development. The action research approach incorporates *cyclical*, *iterative*, *reflexive*, and *formative evaluation* elements (Coghlan & Brydon-Miller, 2014). One way in which action research is used by practitioners to sustain reflective practice is to allow them to examine underlying values. Conscious and focussed reflection on practice "teases out the attitudes and motives held by professionals towards their roles and responsibilities, and encourages them to recognize why they work as they do, [and] understand their actions and values" (Noffke, 2009, p. 94). In a practical sense, action research enables a flexibility to be built into research design reflecting the reality of research where "there may be many routes to a destination, and ... destinations may change" (Stringer, 2007, p. 9). Yet action research is also "a systematic approach to investigation" (p.1).

Action research aims to bring about change, not just answer a question (Kemmis, 2009). The change brought about can be in a practitioner's practice, but it can also be in outcomes for research participants. The degree to which participants are involved in an action research can vary. Participants may be involved in the research without having any sense of ownership over or in the project (McTaggart, 1997). On the other hand, participants may "share in the way research is conceptualized, practiced, and brought to bear on the life-world" (McTaggart, 1997, p.28). Kemmis (2009) identified three types of action research: *technical, practical,* and *critical.* In technical action research, the practitioner is concerned purely with the outcomes of practice, or to explore new techniques and resources in order

to enhance their practice. In this way action research is used as a form of professional development (Mills, 2014). In order to be considered effective, it must involve a change in practice (Loughran, 2002). In *practical* action research, a practitioner also reflects on his or her practice for professional development purposes, but is also concerned with "the consequences that [participants] experience as a result of the practice" (Kemmis, 2009, p. 470), and the approach takes greater account of these consequences than in technical action research (Mills, 2014). Practical action research includes research participants as active agents in the research process (Kemmis, 2009). This contrasts with a traditional research paradigm of participants as objects to be studied, and instead gives them a place in designing and influencing the course of the research, and an ownership of the process.

A third category of action research is *critical action research*, where the primary goal is "to cause positive social change" (Bruce, 2010, p. 17). Critical action research takes place as a joint venture between researcher and participants, even to the extent of allowing a breakdown of the distinction between the two roles. Participants gain knowledge and are empowered take control of their situation with the researcher acting as a facilitator, and in this way "a just, fair and inclusive culture can be demonstrated" (Noffke, 2009, p.121). Critical action research is often used within an agenda for social change (Kemmis, 2009) and is concerned with broader principles of democracy, liberation, and changing existing paradigms in a form of social action. It can be an approach where participants actively participate in the process of research and are not merely objects of research. Action research "undertaken collectively" (Kemmis, 2009, p. 470) in this way involves "an imaginative leap from a world of 'as it is' to a glimpse of the world 'as it could be'" (McIntyre, 2008, p.13).

Action research has at its core a "simple, yet powerful framework" of a cyclical process (Stringer, 2007, p. 8) combining looking, thinking, and acting (Stringer, Christensen, & Baldwin, 2009). Planning, action, and reflection form a continuous cycle embedded in the research process. Kurt Lewin first proposed action research as a methodological approach involving a cycle of steps (Lewin, 1946), and the essentially cyclical nature of action research has been acknowledged ever since (Coghlan & Brydon-Miller, 2014). The steps of "planning a change, putting the plan into action, observing what happened, and re-formulating the plan in the light of what had happened" (Kemmis, McTaggart, & Nixon, 2013, p. 18) have

also been described in terms of a spiral (Stringer, 2007), with each successive spiral building on the previous one (see Figure 5 on p.46). The upwards direction of a spiral model reflects the broad aim of action research to improve practice as the cycles continue (Kemmis, McTaggart, & Nixon, 2013).

Action research is well-established as a research paradigm in music education research (McFerran, Thompson, & Bolger, 2016), but is still an emerging approach in music therapy research (Stige & McFerran, 2016) where the use of practitioner-led action research is as yet not widespread. Rickson (2009) describes the challenges of playing multiple roles while engaged in an action research project as a music therapist but nevertheless concludes that "action research can be effectively applied to music therapy" (p.4). Stige and McFerran (2016) argue that action research is an appropriate methodology for music therapy as "practical work is part of what defines the discipline [of music therapy], and practice can always be improved and developed" (p. 862). They also point out that the social change agenda which exists in participatory action research can be highly relevant for the marginalized people with whom music therapists frequently work.

There are particular challenges in conducting action research with children as participants. Children's' level of maturity and motivation need to be carefully considered (Groundwater-Smith, 2015). These challenges may be magnified when conducting action research with children with autism, because of the potential limitations in the maturity and communicative ability of the participants. Action research with children with autism as participants may therefore take a purely technical approach. In a study by Fong and Jelas (2010), action research was used in investigating music teaching for groups of children with autism, however the research approach used did not involve any participant input into the research process. Additionally, the generalisability of research with children with autism can be even more problematic than with typically-developing children. Each child has very specific and individual needs, and what works for one is unlikely to work for all. The need to differentiate the techniques used raises "the ethical issue of selecting and acting differently, by possibly planning different teaching methods and techniques for just one student" (Noffke, 2009, p. 120). These may be factors leading to a general paucity of action research studies involving children with autism.

Notwithstanding the challenges, conducting action research with children with autism can offer distinct advantages over other approaches. Action research "offers participants who are 'hard to reach' and 'hard to teach' equality as participants….[which] poses a real challenge to the existing traditional and established educational institutions [and] confronts the dilemmas and contradictions of the system detrimental for the education of students with SEN [special educational needs]" (Noffke, 2009, p. 120). Additionally, action research can produce "detailed, richly described accounts that reveal the problematic, lived experience of stakeholders and their interpretations of the issue investigated" (Stringer, 2007, p. 171). Action research can thus be an effective methodological approach to enable rigorous and sustained reflective practice in exploring uses of Figurenotes with children with autism and it may be able to offer solutions and new approaches for involving children with autism in activities which are often denied them. Although challenges exist in conducting action research involving children with autism, action research has the potential to provide opportunities to develop and sustain reflective practices which can significantly benefit this population.

In determining the most appropriate use of action research in this study, there were three main considerations. Firstly, it was necessary to allow the exploration of uses of Figurenotes in order to achieve the best outcomes for participants. Figurenotes is a tool for music-making, rather than a method. Its inherent flexibility, combined with the fact that research on Figurenotes to date is limited, warranted and a process of feedback where each step of the research process could inform the next. Secondly, I wanted the children with autism who participated in this study (and their siblings and parents) to have a voice in the study, not just to be the objects of investigation. Thirdly, the approach chosen needed to enable a process of self-scrutiny and learning to develop along with the practice, and where the practice could be driven by the learning. It was important that the outcomes from each stage of the study were able to influence the following stages. The following sections describe how the elements of action research were used in the study to address these considerations.

Cycles

Cycles are at the core of action research. The framework of reflection, planning, action, and observation enables a process of continuous refinement of practice. Action research can be seen as a way of conducting research where the participants and researchers are actively involved in a process of ongoing appraisal, learning, and redesign. The process, as much as the product, is of importance as the research sessions proceed. A problem is identified, an intervention is planned to address this problem, and ongoing evaluation of the processes and outcomes of the intervention leads to new iterations of the problem, and new interventions being planned. As the cycles continue, the continual improvement in practice forms a spiral, as illustrated in Figure 5 below.

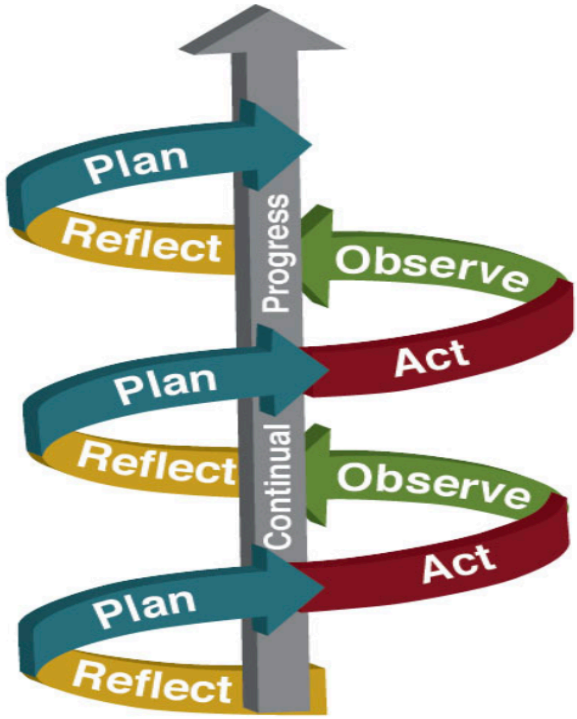


Figure 5 - Spiral model of action research. From: https://valenciacollege.edu/faculty/development/tla/actionResearch/ARP_softchalk/ARP_softchalk_print.html

Another model of the cycles in action research is allows individual stages of the research process to interact with each other in a dynamic and responsive way (Figure 6, below).

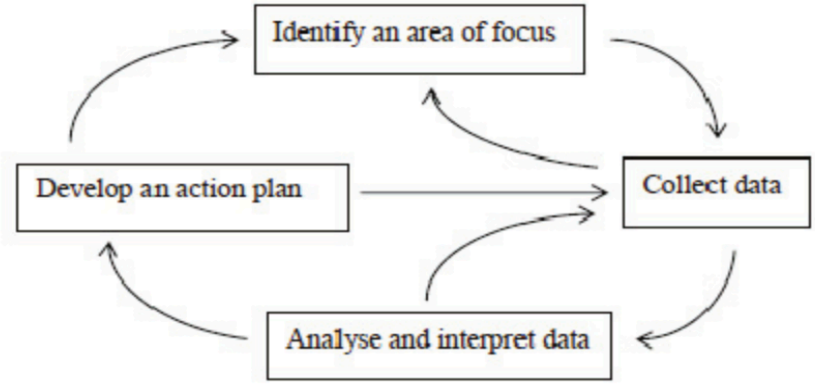


Figure 6 - Dialectic Action research Spiral (Mills, 2014, p.19).

In this model, the recursive nature of action research may even extend to a re-examination of earlier steps in the research journey, including the research questions, which "may change and be refined as new data and issues surface in the research study" (Bruce, 2010, p. 36). The research focus is constantly refined, and "the iterative and recursive nature of the research affects the literature review, and the changing literature review affects the conduct and direction of the research" (p. 37).

The models of the action research process shown in Figures 5 and 6 was used as a heuristic to guide the design of the study's participant sessions and phases. This enabled a consistent and thorough method of exploring and developing uses of Figurenotes from session to session and also from phase to phase. In the sessions Figurenotes could be used flexibly and responsively with each participant or group, in order to facilitate development of participants' music-making skills, self-concept and social interaction. Additionally, the spiral model (Figure 5) was also used in the larger-scale progression of the three study phases. Each study phase built on the cycle of reflect-plan-act-observe undertaken in the previous phase.

Iterations

The multiple cycles of reflecting, planning, acting and observing in this study are iterative: activities were repeated in order to apply new knowledge to the situation, with the goal of

improvement. Repeated iterations of the cycle of planning, acting, observing, and thinking generated a development in both the process of research and in its application. The fundamentally practical, applied nature of action research means that insights generated could be fed back into the situation in which it was formed, and every iteration "adds to the theory ... so it is more likely to be appropriate for a variety of situations" (Avison, Lau, Myers, & Nielsen, 1999, p. 95).

The use of iteration was a powerful tool for allowing Figurenotes to be explored with individual participants and groups. This study was designed so that each participant and group was involved in a series of sessions. The sessions were structured to include Figurenotes activities in categories in order to develop specific aspects of music-making. Each session built on the previous one but was also a repetition of the basic structure of the previous one. The participant and practitioner learning from one session could be applied to subsequent sessions and in this way, skills and knowledge were developed through these iterations. Also, the fact that sessions were conducted with multiple participants or groups within each phase meant that insights from sessions with one participant were able to be applied to those being conducted with other participants or groups in the same phase. The iterative process in this case occurred in the repetition of a particular session with a number of different participants within a short period of time. The iterative processes, both with each participant and between participants, thus enabled ample opportunity for repetition, refinement, and comparison as the study progressed.

Formative and summative evaluation

The concepts of *formative* and *summative* evaluation (Scriven, 1996) refer to two different ways of conducting an evaluation of a program, method, tool, or approach. Formative evaluation is evaluation conducted whilst undertaking a process or method, whereas summative evaluation occurs at the conclusion. Formative evaluation is linked with Schon's (1983) reflection-in-action, and summative evaluation with reflection-on-action. In this study, both formative and summative forms of evaluation were used, but formative evaluation was designed to facilitate the development of knowledge through the iterations and cycles of the research phases and thus was a key element of how the action research approach was used to facilitate reflective practice.

Reflexion

A final key element of action research used in this study is reflexion. The terms reflection and reflexion are sometimes used interchangeably, but they do not mean the same thing (Alvesson & Sköldberg, 2017): in reflexive action one puts into practice what one has become aware of in reflection, and thus reflexion is reflection with consequent action. In this way, reflexion can become the driver for the cyclical process of action research. Additionally, reflexivity may result in significant changes to the course of research, and "the outcome of the investigation may not be its original focus" (Coghlan & Brydon-Miller, 2014, p. 234). In this way, reflexivity enabled the conduct of this study's phases to maintain a process of continual development.

Reflexion can also be used in thinking about the meaning of data obtained. Not only the analysis of study data, but also the choices about which data to actually include in the results, can be the subject of critical reflexivity. In this aspect of reflexion, the analytic perspective of Atkinson (2015) is useful. Atkinson advocates for researchers to always ask "what is this a case of?" (p.65). Making explicit the process by which observed events lead to the formulation of findings can make the research process more transparent and elucidate the "multiple answers, [and] many possible patterns that can be invoked or constructed to make sense of observed events" (p.65). Reflexion is the element of action research which enables this to occur.

3.2 Study Design

The study design formed the way in which the research questions were addressed, and was informed by the cyclical, iterative, formative, and reflexive elements of action research described in the previous section. These elements enabled continuous refinement of the way in which Figurenotes was used as a tool to facilitate music-making for the participants. The following sections describe the key aspects of the study design: participants, phases, sessions, and data collection.

Participants

In action research, the relationships formed between researcher and participants in the course of the research can potentially "support and enrich the data generated" (Groundwater-Smith, 2015, p. 128). As described in the previous section, it was determined that this study could be most effectively undertaken using *practical* action research. Despite limitations in the maturity and communicative ability of the participating children with autism, it was felt that the participants (and their parents and teachers) could and should play an active role in the development of the research sessions and the way in which Figurenotes was used to facilitate music-making, through the feedback enabled by the action research approach. Maintaining respect was crucial to the successful involvement of participants in the action research process: "it is important at the early stages of the research process for us ... to create a mutually respectful and collaborative relationship" (Creswell, Hanson, Plano Clark, & Morales, 2007, p. 258). However, developing a respectful and collaborative relationship with children with autism can be a more difficult and lengthy process than with typically-developing children (Markworth, 2014). This means that this study needed to allow for as many opportunities as possible for establishing an atmosphere of trust and acceptance in early participant sessions.

In this study, participants were able to contribute to the process of research during the research sessions by indicating their preferences and choices in both verbal and non-verbal ways. The use of video observation was a vital tool in capturing participants' non-verbal responses. In order to work actively with the research participants in developing and refining the Figurenotes sessions, I employed a process of learning "how to listen to the participants so as to learn from them" (McIntyre, 2008, p.9). Participants' preferences were sought, for example being given a choice of specific activities or resources to choose from. Their choices influenced the progression of the sessions and also the planning of future sessions. Also, participants were encouraged to offer feedback spontaneously at any time. This sometimes resulting in a change to the planned sequence of activities within a session, and sometimes the feedback was incorporated into the planning for subsequent sessions.

Age

Most music therapy research studies conducted with children with autism involve children of between two and nine years of age (Geretsegger et al., 2014). However, some studies have involved older children, up to age 12 (Gattino, Riesgo, Longo, Leite, & Faccini, 2011), age 14 (Thompson et al., 2014) and age 18 (McFerran et al., 2016). In the present study, the age of potential participants needed to be carefully considered. The potential benefits of carrying out an intervention for children with autism while they are still young was discussed in 2.2. However, participants in this study needed sufficient fine-motor skills to play keyboard, tuned, and untuned percussion instruments, as well as the visual and cognitive ability to read the Figurenotes scores. The age range for participants was thus determined to be between 6 and 12 years old which equates to primary (elementary) school age.

Criteria for participation

The criteria for participation in this study considered the motor, cognitive, and visual demands of the planned use of Figurenotes and musical instruments, as well as the need for the behaviour of participants to allow sufficient focus on the tasks at hand. Children diagnosed at Level 3 autism have severe impairments in functioning and severe deficits in social communication (Carpenter, 2013) and thus they were unlikely to be able to successfully undertake the activities in this study. It was felt that a participant cohort at autism Level 1 would be not differentiated enough from a cohort of typically-developing children, and would not enable a clear enough picture to emerge of specific issues involved in musical engagement using Figurenotes by children with autism. Children at Level 2 have significant impairments in both communication and behaviour, but not to an extent that would prevent their participation in a study such as this. Any barriers to participation in children at this level of autism were more likely to be due to resistive behaviours. Therefore, it was determined that the participants in this study would be children formally diagnosed with Level 2 autism.

To be considered for participation in this study, sighting of a child's formal letter of diagnosis was required. In the state of New South Wales in Australia, where this study was carried out, formal diagnosis of can only be made by a qualified paediatrician, child psychiatrist, or

a multidisciplinary team consisting of at least a psychologist and a speech pathologist (Autism Awareness Australia, 2018). The Information Sheets given to parents of potential participants (Appendix 2) enabled the parents to make a judgement about their child's suitability to participate. Additionally, any sensory sensitivities which may prevent or disrupt participation, such as sensitivity to sound, were discussed with parents at the time of assessment.

Potential participants who had received individual music lessons were specifically excluded, as it would be difficult to ascertain which music skills these children developed as a result of the Figurenotes sessions, and which were pre-existing skills. Prior music therapy was not an exclusion criterion, as music therapy sessions generally do not aim specifically at development of skills in music-making; also, the fact of having taken music therapy previously may indicate an interest in music on the part of the child (or the child's parents), which was a desirable situation for participation the present study.

Inclusion criteria consisted of the following behavioural and motor-cognitive abilities:

- the ability to retain a focus on short activities;
- an ability to understand and carry out instructions;
- fine-motor skills to play a piano keyboard at a basic level (ability to press individual keys using at least one finger on each hand);
- the ability to visually scan left-to-right and top-to-bottom;
- hand-eye coordination to allow a visual signal to be processed into a motor movement; and
- a willingness and enthusiasm to participate.

In the Individual Phase, each potential participant was tested for these abilities separately. A sequence of printed pages with visual representations using Figurenotes of music pitches and rhythms was put on the music rest of a digital keyboard. A potential participant was invited to sit at the keyboard, look at the printed page, and play on the keyboard what they saw. Once they had played the first page, it was replaced by the next, and so on for a total of 15 sheets. Figure 7 on the following page shows the first and last pages given, demonstrating the increasing numbers of pitches, notes, and note durations.

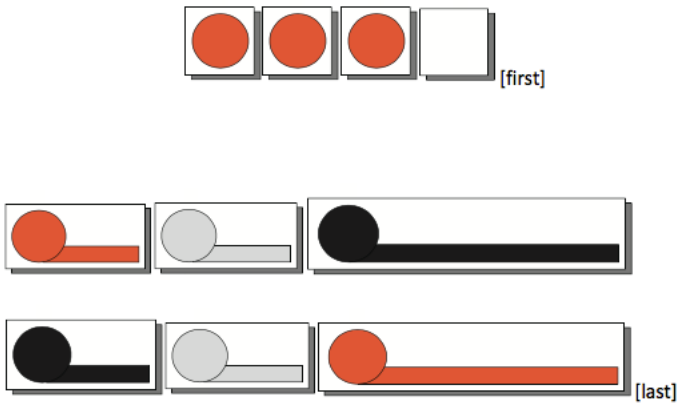


Figure 7 - Figurenotes scores used for assessment of potential participants.

A brief description of each individual's characteristics in the following areas was also written at the conclusion of the assessment, in the following categories:

- behaviour (the child's observed patterns of activity);
- communication (verbal and gestural communication with the researcher);
- relationship (how open the child was to instructions and guidance from the researcher);
- skills (an overall assessment of the child's strengths and weaknesses in carrying out the assessment activities); and
- potential for successful participation in the study.

This description was used to determine whether or not an assessed individual was able to participate in the research, and also, should they be accepted, to inform the approach taken in conducting research sessions with the specific individual.

For the Group Phase, one month prior to the phase starting I observed two music lessons for each group conducted by their regular school music teacher. These observations, along with discussions with the school teacher and school autism unit coordinator, enabled me to ensure that all potential participants fitted the criteria for participation. Participants with autism in the Family Phase were the same as those used in the Individual Phase and thus no additional assessment was required prior to this phase.

Number of participants

The action research approach of this study necessitated a participant cohort size small enough to enable sufficient individual contributions and interactions, but large enough to

enable the cycles to be re-iterated and allow sufficient opportunity for formative evaluation and reflexivity. The resources available for the study also had a limiting effect on the number of participants. Previous studies involving music interventions for children with autism have generally involved between 4 and 10 individual participants, with a few studies including larger sample sizes, up to 50 (Broder-Fingert et al., 2017). A reasonably diverse cohort of participants was preferred, as when there is a diversity, individual differences can be compared and contrasted, and patterns may emerge (Kemmis, 2009). Additionally, if groups of participants were involved, "there is an opportunity to understand wider student learning and behaviour ... and to compare one or more students' development within the group" (Noffke, 2009, p. 120). Therefore, the use of multiple individual participants as well as groups in the study enabled the identification of patterns of response pointing to more general characteristics of the participant cohort.

It was hypothesised that working with participants individually would enable greater flexibility and closer observation, especially when looking at the development of music skills and self-concept. The target number of participants determined for the Individual Phase was between five and eight. A cohort of this size was seen as allowing some differentiation to be developed in the Figurenotes activities, and also some comparison with the effects of similar techniques across participants. However, a greater number of participants than eight was not desirable, due to time and resource limitations. It was also important to allow sufficient time for the processes of reflecting, planning, acting, and observing to be carried out carefully and comprehensively for all sessions. Eight participants were assessed for the Individual Phase, and all of these children were deemed suitable and invited to participate.

The participant cohort for the Group Phase was planned to be between four and twelve participants per group. it was felt that fewer than four participants in a group would make it difficult to carry out activities which divide the group into parts for playing ensembles. On the other hand, it was felt that a group larger than twelve participants could become unwieldy, with more difficulty in focussing on individual participant responses. The final numbers of participants in the Group Phase were:

- K-1 group (age 5-7) – 14 participants, named Group 1
- 2-6 group (age 8-12) – 7 participants, named Group 2

The large size of the younger group (Group 1) did cause some issues initially as the group was hard to manage. However, there were always at least two teacher aides present during the sessions who assisted with management of the group. Additionally, as the sessions proceeded, the group settled and became manageable, notwithstanding occasional complaints from participants who missed out on a turn in an activity because there was not time for everyone!

At the conclusion of the Individual Phase, the parents of each participant (apart from Tony, whose family was moving overseas) asked if there was any possibility of further sessions, and also enquired as to whether parents and siblings could be involved. The desirability of conducting a Family Phase coincided with the availability of willing participants, and so it was decided to seek the involvement of the same cohort of Individual Phase participants, this time with the added involvement of their siblings and parents. As two of these Individual Phase participants were siblings (twins), and one (Tony) had moved overseas, a total of six families were available to participate in the Family Phase.

Phases

This study contained three distinct participant phases: an Individual Phase, a Group Phase, and a Family Phase. Each participant phase in this study necessarily had unique elements to its design, execution, and analysis, but the phases are linked by the use of Figurenotes as the tool used to facilitate musical engagement. Working with individuals enabled close observation of each participant and the flexibility to modify the approach to suit the individual's needs and preferences.. However, there are factors which pointed to the advantages of including some of the participant cohort as groups. Firstly, social interaction is best examined in a group setting. Secondly, the music skills needed to participate successfully in group music-making are different from those needed for individual performing. Thirdly, as discussed in 2.5, self-concept may include aspects relating to an individual's self-perception within a group of peers. Finally, group work also enables a variety of musical participation, as "simple, repetitive patterns on percussion may have little aesthetic appeal [but] their combined effect can indeed be musically pleasing and motivating" (Ockelford, 2013, p. 205). Therefore, including both individual participants and group participants in the study enabled a broader inquiry into the uses and applicability of

Figurenotes in facilitating music-making by children with autism. A variety of techniques could be employed and enabled a comparison between results for the individual cohort and the group cohort.

However, there were significant potential challenges anticipated in conducting a Group Phase in this study. Working with groups necessitates a less tailored approach than with one individual; all participants need to be accommodated and there may be significant differences between individuals within a group. A compromise is often required in order to maintain a realistic pace. For example, if one individual is needing more time to carry out an activity than the others, only a limited amount of extra time is able to be given to allow that individual to catch up before moving on to the next activity. The differences between individuals in a group can be even more pronounced in a group of children with autism. Autism incorporates individuals within a wide spectrum of symptoms and functioning levels and there are large differences in the behavioural manifestations of each individual's autism. There is a need for teaching and learning to be more personalised for individual children, but this is often problematic in a school environment where "from a teacher's perspective, classroom behaviours may be the most challenging problems they confront" (Blair, 2014, p. 368). It is necessary also for allowance to be made of the learning behaviour of children with autism, as they may be "imperfectly socialised, extend outside conventional pedagogical practice and therefore require methods which are exclusively formed around that individual's learning style" (Hanbury, 2012, p. 99).

In order to enable these potential challenges to be adequately addressed, it was decided to begin the study with the Individual Phase. The Individual Phase could enable various uses of Figurenotes to be trialled, revealing initial findings on the use of Figurenotes by participants, as well as dealing with logistical issues in relation to the running of sessions and gathering data. It was anticipated that the outcomes of this phase could then inform the Group Phase. Working with individuals prior to working with groups also enabled me to develop skills in taking a more individualised focus which could then be applied in the Group Phase. Furthermore, using both individuals and groups of participants enabled the research questions to be addressed in different ways, as the approaches used in group work are often quite distinct from those used in individual work.

This study did not commence with an intention to conduct any further participant phases after the Individual and Group Phases. However, during the Individual Phase, family members of the participants expressed an active interest in the music sessions, as described in 4.3. Including families can be an effective means of extending and deepening participant involvement in action research with children with additional needs (Bruce, 2010), and it was felt that the involvement of family members of participants held the potential to offer additional insights into the uses of Figurenotes for children with autism. Therefore, an additional Family Phase was added after obtaining ethics approval. Importantly, the action research approach used allowed the addition of the Family Phase without the need for major changes to the research methodology. The Family Phase occurred after the Individual and Group Phases, enabling insights gained in using Figurenotes with individuals, as well as groups of participants, to be applied. As the third and final phase of the study, the Family Phase is linked to the two earlier phases, the Individual Phase and the Group Phase, as shown in Figure 8 below.

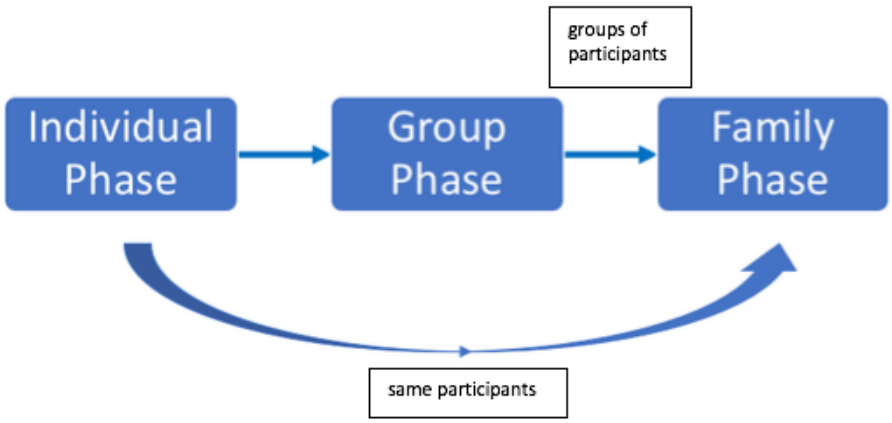


Figure 8 - Diagram showing links in participant groupings between study phases

Sessions

Each phase of the study included a series of music sessions conducted by myself. I also conducted the group phase sessions. These were supported by school staff, but these staff played no role in the leadership of the sessions. The number of sessions for each phase needed to be sufficient to allow exploration of the participants' musical engagement, and to allow development in participants' music skills, self-concept and social interaction.

However, the number of sessions also was limited by the resources of the study. A maximum of eight sessions per phase was deemed efficient and practicable.

The ideal length of a session was closely related to the optimal (and possible) length of time in which a child with autism could realistically be engaged. Attention time varies naturally between all children and between age groups; individual differences can be even more pronounced for children with autism, and individuals with autism are often co-diagnosed with attention deficit disorders, ADD or ADHD (Volkmar et al., 2014, p. 20). Additionally, allowance needed to be made for processing time due to differences in the way children with autism process information. People with autism "do not tend to see the 'big picture' and may need time in order to piece the bits of information they have into a coherent whole" (Hanbury, 2012, p. 61). Therefore, time also needed to be built into the sessions to allow the children to absorb the information and to respond. Individual Phase sessions were allocated 30 minutes each, and Group and Family Phase sessions were allocated 45 minutes.

Musical instruments used

For this study, the means of music-making needed to be appropriate not only for the physical and cognitive capabilities of the participants, but also appropriate for use with Figurenotes. Singing is a mode of expression often used in music-making with children with autism (Reschke-Hernández, 2011). However, in order to utilise in this study the *matching* property of Figurenotes (as described in 2.6), use of singing was ruled out as a primary medium of music-making. Figurenotes is suited for use on instruments where the pitches are physically laid out in in a sequence, from lowest to highest, such as tuned percussion and piano keyboards, or with different sounds which can each be labelled with Figurenotes, such as untuned percussion. Music-making by children with autism using these instruments has been studied, with successful outcomes reported in the use of piano or digital keyboard (Costa-Giomi, 2004; Ockelford, 2013; Sanderson et al., 2013), tuned percussion (Richmond, McLachlan, Ainley, & Osborne, 2015), and untuned percussion (Nordoff, 2007).

As a practitioner and musician, I primarily use pianos (acoustic and electronic) and am more experienced in using these than other instruments. Pianos use keyboards laid out in pitch order and depressed by the fingers, enabling instant and simple production of musical tones. Figurenotes can be used very effectively on a piano keyboard, with each key allowing

space for the placement of a Figurenotes sticker but still sufficient space for fingers to press the key, as shown in Figure 9 below.

Figure 9 - layout of Figurenotes on piano keyboard.

Electronic piano keyboards have the additional advantage of only requiring the application of a relatively light amount of force with the fingers in order to play a note, which was a consideration given the age and physical capabilities of the participants. Therefore, electronic pianos were the primary musical instruments used by participants in this study.

Data collection

Within the music therapy literature, some studies involving children with autism have focussed primarily on experimental research based on a positivist orientation (Broder-Fingert et al., 2017; Geretsegger et al., 2014; James et al., 2015). Other studies have used qualitative research within an interpretative orientation, particularly when involving the use of Creative Music Therapy (Aigen, 2008; Markworth, 2014). Qualitative research can reveal more of the *how* and *why* about a situation in addition to the *what*, *when*, and *where* of quantitative research. In studies involving participants with disabilities, it has been argued that qualitative approaches may be particularly effective in gaining useful insights into a wide spectrum of participant responses and behaviours (Thomas, 2013). Taking a primarily qualitative, interpretative orientation thus allowed this study to effectively explore the effects of Figurenotes with children with autism, in the key focus areas of music skills, social interaction, self-concept, and reflective practice.

However, within qualitative research, there are many possible approaches to conducting, organising, and reporting the research (Blor & Wood, 2006). In some cases "the phenomena under study can be understood best when approached with a variety or a combination of research methods" (Given, 2008, p. 892). In this way, the dichotomy between positivist and interpretivist approaches (Denzin & Lincoln, 2003) need not disallow the inclusion of some

quantitative data in essentially qualitative research, as the research approach "should be the servant of your research question, not its master" (Thomas, 2013, p. 116). The use of mixed methods is becoming increasingly popular in education research. This type of research allows for triangulation of data from qualitative as well as quantitative sources (Plano Clark & Ivankova, 2016). Additionally, a sequential design of session phases can be used in mixed methods research design with the purpose of using follow-up qualitative data to elaborate, explain, or confirm initial quantitative results, and vice versa. However, the present study was limited by a sample size insufficiently large to enable a true mixed methods approach. Nevertheless, some numerical measures were used to triangulate the qualitative data, in order to "aim for depth of analysis of a narrower topic" (Bloor & Wood, 2006, p. 117) and allowing a more comprehensive picture to emerge. It also facilitated the process of comparing responses across participants and over time.

A strength of behavioural observation is that "because measured behaviours are selected based on their importance for particular child participants and the treatment being tested, they are often directly related to the experimental treatment" (Cunningham, 2012, p. 595). However, in gathering behavioural data, one consideration is the potential effect on participants of merely the attention given to them, known as the Hawthorne Effect, "a change in people's behaviour which happens because an interest is being taken in them" (Thomas, 2013, p. 141). Whilst the potential for this effect to occur in this study could not be eliminated, it was addressed by the use of multiple observational tools which enabled a clearer understanding of the particular effects of the use of Figurenotes in the sessions. The primary sources of data in this study were the participant sessions, which formed the foci of the key elements of the action research cycle (reflection, planning, acting, and observing). The data collection tools used were chosen to maximise the opportunities for observation of, and reflection on, the sessions. For this reason, data-gathering utilised three primary tools: video observation, session notes, and interviews. These tools were used to gather data to be gathered in the focus areas of music skills, social interaction, self-concept, and reflective practice.

Video observation

Video recordings enabled behavioural observations to be made of participants during their participation in the sessions, enabling fine-grained observations of participant responses and behaviour. All sessions in each phase were video-recorded and later analysed. Video recording sessions can reveal details of the interactions, communication, and behaviours of participants and researcher which may not have been noticed in the course of conducting the session (Thorne & Qiang, 1996). In this study, video footage of each session was usually reviewed directly following the session, and detailed notes were taken in each of the key focus areas (music skills, social interaction, self-concept, and reflective practice). The footage was also used to assign participant ratings (described in 3.3). Video observation was particularly useful in identifying any changes in participants' self-concept, which were not as immediately obvious as changes in music skills or social interaction.

Session notes

The keeping of research journals or diaries can be an effective technique in action research (Kemmis et al., 2013; Thorne & Qiang, 1996). Session notes can be a tool for not only recording objective observations, but also interpreting them. Thick description, a term first used by the anthropologist Clifford Geertz in 1975 (Geertz, 2002), refers to interpreting behaviour at the same time as describing it, in context. In making thick descriptions, the results and the analysis of these results become one and the same thing: “when you are watching and taking notes and then making a ‘thick description’ you *are* analysing" (Thomas, 2013, p. 272). Field notes can be observations about other people or things but they can also be used to document how one's thinking may change over time. Thus, they can be used to facilitate the cycles of reflection and action undertaken from session to session. The act of writing down one's thoughts and impressions addresses the need to "feed and nurture self-reflection" (Kemmis et al., 2013, p. 176). Keeping session notes "imposes a discipline" (p. 175) and facilitates the process of formative evaluation. In this study, I wrote thick description in the form of session notes immediately after the conclusion of each participant session. The use of session notes allowed a session-by-session tracking of key issues, ideas, and impressions, which added to and triangulated evidence provided by the video footage.

Interviews

The children with autism in this study were unlikely to be able to communicate all that they were experiencing, feeling, or thinking about the music sessions. Therefore, in order to gain a more comprehensive picture of the effect of the music sessions on the participants, a number of the participants' parents and teachers were asked for feedback. In the Individual Phase, parents of participants were interviewed at the conclusion of each session (Appendix 8). In the Group Phase, the school music teacher was interviewed at the conclusion of the phase (Appendix 9). In the Family Phase, parents involved in the sessions were given a questionnaire to fill out at the conclusion of their participation (Appendix 10). Although time and resource limitations meant that these interviews and questionnaires were short and needed to be conducted in informal settings, it was felt that they were still worthwhile to carry out.

Triangulation

Triangulation is a process of using multiple perceptions to clarify meaning (Stake, 2006, p. 38). In attempting to elucidate meaning from a situation, “viewing from several points is better than viewing from one” (Thomas, 2013, p. 146). Triangulation can enable analysis of data to "inform and reveal complexity and difference and bring about new understanding to inform future change and action” (Noffke, 2009, p. 121). In this study, triangulation occurred through the multiple viewpoints enabled by the data-collection tools used - session notes, video observation, and interviews. Session notes were able to be compared with the video footage in order to clarify the context of observations made in the notes, watching the video footage provided extra opportunities to identify events or participant behaviours which may have been missed in the notes, and perspectives from parent and teacher interviews were compared with the perspectives I had gained on the participants. The numerical participant ratings used in music skills, social interaction, and self-concept were compared with interpretations gained from session notes and interviews. Additionally, the cyclical, iterative, formative, and reflexive action research approach enabled the use of multiple time-point perspectives when analysing the data.

3.3 Key Focus Areas

Music skills

Developing the music skills of participants was one of the key aims of the study sessions. Allowance was needed for participants' varying needs and learning styles. Also, the observations of music skills needed to be able to capture the different ways in which these skills may be manifested by participants. For example, when the performance of a specific piece was chosen to be used for an assessment of a participants' music skills in a particular session, flexibility was needed as to the point within the session when this piece was performed, and in the settings used on the keyboard for the performance (e.g. loud-soft, voice type). The aim was for the measurement of a participant's music skills to be at no time seen by the participant as a test. Putting pressure on the participants to achieve something ran the risk of negatively affecting participants' self-concept and social interaction.

There was a need for the music skills to be basic ones, able to be developed in participants within a short time, but also skills intrinsic to the activity of playing music and participating in musical interaction with others. The following skills were identified as suitable for these purposes:

1. accuracy of performance of the notes of a melody or part (*accuracy*);
2. fluency of performance, maintaining a steady beat (*fluency*);
3. technical skill in playing an instrument (*technique);*
4. turn-taking with a partner in musical ensemble (*music turn-taking*); and
5. ability to play together with a partner in musical ensemble (*playing together*).

A system of ratings of participants' music skills was devised in order to capture observed changes in participants' skills. These ratings were compared and combined with thick description in order to identify themes in Chapters 4, 5, and 6. The system of ratings consists of researcher-given ratings of participants on their performance in music skills using Likert scales. Likert scales are a widely-used psychometric scale which typically use between 2 and 11 categories (Wakita, Ueshima, & Noguchi, 2012). The ratings used in this study use a 10-point scale with 1 being the lowest and 10 the highest. The ratings are norm-referenced, not criterion-referenced, comparing participants with each other and not an external standard. It is primarily the relationship between the ratings given that is of interest. However, it is

important to bear in mind that “when we look for relationships between variables we have to be very wary about imputing reasons for any relationships we discover” (Thomas, 2013, p. 258). The ratings were used to deepen and triangulate the other data collected, not as objective measures designed to stand alone. A precedent for developing a system of ratings specifically for one study is McIntosh & Vaughan (1993), a study in education that developed an observation measure using a Likert scale for teachers to rate student interactions and behaviour of a total of 60 students. It was noted that after searching for existing measures to use, no appropriate instrument was found, but those instruments examined “provided models useful in constructing an appropriate instrument” (McIntosh & Vaughan, 1993, p.253).

The criteria on which numerical scores were allocated was in practice adjusted somewhat as the sessions proceeded. This was possible because all sessions were video-recorded and thus were subject to re-examination using changed criteria. A re-appraisal of the criteria used after the completion of a phase could result in small changes to the exact criteria deemed most important; the videos could be re-analysed and the new criteria applied, with new scores given. In this way it was possible to “organize the data based on what is being learned from the data” (Bruce, 2010, p. 40). The following Tables 1, 2, 3, 4 and 5 describe the criteria for giving ratings of 1, 4, 7, and 10 for each of the measured music skills. Other scores (2, 3, 5, 6, 8, or 9) follow the same patterns.

Accuracy

Participants were rated on their ability to perform music using the correct notes. This skill rated participants on the accuracy of the pitch played on the keyboard when matched with the visual representation of the note on the *Figurenotes* score, i.e. whether the note played matched the note depicted.

Table 1 - Accuracy ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	10% or less of the notes played matched the pitch of the notes depicted.	40% of the notes played matched the pitch of the notes depicted.	70% of the notes played matched the pitch of the notes depicted.	All notes played matched the pitch of the notes depicted.

Fluency

Fluency can relate to the way in which one musical note is connected to another. In this rating, participants are scored on their ability to maintain a steady tempo. This includes the durations of the individual notes played, the transitions from one line of the score to another and also the overall flow of the music. The ability to maintain an internal awareness of a beat, maintained at an unchanging rate, has been termed *basic beat* (Nordoff, 2007) and is regarded as a fundamental musical ability, one which all humans in fact share, as we all have a heartbeat. This fundamental sense of beat may be latent in some people, and is a skill which can be developed.

Table 2 - Fluency ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	10% or less of the notes played matched the duration of the notes depicted.	40% of the notes played matched the duration of the notes depicted.	70% of the notes played matched the duration of the notes depicted.	All notes played matched the duration of the notes depicted.

Technique

Participants were rated on their technical proficiency. The rating was given on participants' finger dexterity, independence of fingers, and hand posture when playing the piano keyboard. Whilst the sessions did not aim to enable participants to develop piano-playing technique in any abstract sense, it was useful to track development of participants' basic technical abilities to perform the musical activities given, independent of the musical effect, in order to learn more about changes in their overall music skills.

Table 3 - Technique ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	No independence of fingers; dexterity and posture unable to support playing of keys	Some independence of fingers and dexterity; movements laboured	Fingers able to play keys independently; dexterity adequate to maintain tempo	Fingers fully independent; posture effectively supporting playing; very high level of dexterity

Playing together

The final two music skill areas specifically relate to participants' music-making with other people. It was important to allow any links to be elucidated between the development of music skills and changes in social interaction in the participants. Therefore, two of the music skills measured were *turn-taking* and *playing together*, both of which are skills in listening and responding to others. The ability of a player to play simultaneously with another player (for example, one person playing a melody and the other playing a bass line) is an important and measurable skill, and like turn-taking can be related directly to social interaction, as it requires a player to communicate non-verbally with their playing partner(s) in order to match tempo and rhythm.

Table 4 -Playing Together ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	Not matching tempo or rhythm of partner	Matching tempo but not rhythm of partner	Matching both tempo and rhythm of partner, inconsistently	Matching tempo and rhythm of partner throughout

In the Individual Phase, the focus was on development of basic music skills using Figurenotes to enable performance of simple melodies, so the music skills measured were fluency, accuracy, technique, and playing together. In the Group and Family Phases, the focus was on facilitating the use of these performance skills in ensemble work, and so for

the Group Phase an additional measure of music turn-taking was included. For the Family Phase, it was decided to measure only playing together and turn-taking. As the primary musical activities in the family sessions were the playing of ensembles, it was felt that a focus on these two skills would enable elucidation of whether social and musical interaction would be different in family groupings when compared with peer groupings. Ratings of playing together and turn-taking were made for the participating child with autism in interactions with both their parent and their sibling. Separating the data into interactions with either the parent or the sibling enabled a clearer picture to emerge of the interactions during sessions.

Music turn-taking

As with playing together, turn-taking is a skill involving an ability to reciprocate in musical interaction. This reciprocation occurs when playing music with a partner that consists of a melodic line that is passed from one player to the other. It requires a person to respond in a timely (i.e. without too long a pause) and appropriate (i.e. related to the previous phrase) way. The skill of turn-taking in this study was measured by arranging particular melodies in Figurenotes in such a way as to clearly delineate the turn-taking, and then the participants were rated on the way they carried this out.

Table 5 -Music Turn-Taking ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	No reciprocation in playing with partner	Playing after partner but not or in regular beat or in partner's tempo	Playing after partner in regular beat, but not in partner's tempo	Playing after partner in regular beat and in tempo of partner's playing

Table 6, on the following page, shows a summary of the music skills rated across all three study phases.

Table 6 - Music skills included in ratings, by phase, indicated by green fill.

Skill	Individual Phase	Group Phase	Family Phase
Accuracy			
Fluency			
Technique			
Turn-Taking		with peers	with parent/sibling
Playing Together		with peers	with parent/sibling

Social interaction

In order to determine specific aspects of social interaction to observe in this study, the following diagnostic category was used:

> A1. Deficits in social-emotional reciprocity; ranging from abnormal social approach and failure of normal back and forth conversation through reduced sharing of interests, emotions, and affect and response to total lack of initiation of social interaction. (American Psychiatric Association, 2013)

Reciprocity in social communication achieved through back and forth conversation can occur in any situation where two or more people are interacting; therefore, turn-taking and communication (verbal and gestural) were included as social interaction ratings.

For social interaction ratings, both the *frequency* and the *quality* of social interaction were rated. It was important to consider not only how many times a child was socially interactive within a session, but in what way (Hernández et al., 2015). For example, if a child interacts with a peer by grabbing his chime bar beater and hitting him with it, this is of a very different quality from the same child taking the beater and demonstrating to their peer how to play the chime bar so as to get a better sound. While both of these behaviours are interactions, the first behaviour is a negative interaction whereas the second indicates a real engagement with a group and musical process. When rating the frequency of a behaviour or communication, the fact that sessions were not all of the same length means that a simple count of the number of interactions would not yield comparable results. Therefore,

measurements of the frequency of interactions in individual sessions were done by counting the total number of interactions and then dividing that by the length of the session, to obtain an average number of interactions per session, which was then compared with other sessions and participants.

The applicability of ratings of social interaction to the Group and Family phases is self-evident. However, they were also used in the Individual Phase, which involved interactions during sessions between researcher-practitioner and the participant. These constitute social interaction, albeit on a smaller scale than when a group of participants was involved. In the Family Phase, two of the social interaction measures used in the Family Phase were the same as in the earlier phases (turn-taking and communication), whilst two ratings used in earlier phases were not included (following directions and transitioning). This was because (as for some of the music skills rated) the participants had already been rated in these aspects in their individual sessions, and also because the emphasis in the family sessions was on promoting musical and social interactions between participants. In the Group Phase, ratings were made of communication of participants with their peers as well as with adults (teachers and researcher-practitioner). In the Family Phase, ratings were made of communication of participants with both their parents and their siblings. Table 7 below shows the aspects of social interaction rated in each of the study phases.

Table 7 - Social Interaction ratings in each phase. Green shading indicates use of rating.

Rating	**Individual Phase**	**Group Phase**	**Family Phase**
Following Directions			
Transitioning			
Turn-Taking	with researcher	with peers and adults	with parent and sibling
Communication	with researcher	with peers and adults	with parent and sibling

The tables in the following paragraphs (Tables 8, 9, 10 and 11) describe the criteria for ratings of 1, 4, 7, and 10 for each of the measured social interactions.

Communication

Verbal and gestural communication are key ways in which social interaction occurs, and deficits in these areas commonly occur in children with autism (Carpenter, 2013). Music may be able to facilitate and encourage verbal and gestural communication by children with autism (Geretsegger et al., 2014). In the present study, participants' verbal communication as well as their gestural communication (any non-verbal or body language elements of their expression) was rated. The communication rating in the Group Phase was separated into two domains: communication with adults, and communication with peers. It was felt that looking at participants' communication in this way may elucidate any differences between their communication with other participants and their communication with the researcher, class teacher, other school staff actively observing or assisting in the sessions.

Table 8 - Communication ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	No verbal or gestural communication	Occasional verbal and/or gestural communication	Frequent verbal and/or gestural communication	Communication with partner highly responsive, using a variety of facial, body, and verbal language

Social turn-taking

This rating is directly related to music turn-taking, described earlier. Measures were taken of a participant's turn-taking in all interaction which occurred outside the musical activities (the beginnings and endings of sessions and the times where activities were being set up, discussed, explained, or in transitions). Turn-taking in social situations is not as easily measurable as turn-taking in musical activities, due to the wide range of possible parameters to the interactions. Nevertheless, turn-taking is a fundamental aspect of social interaction and thus was important to include in the ratings. Including turn-taking as both a music skill and as an aspect of social interactions allowed a comparison to be made between participants' ratings in each.

Table 9 - Social Turn-Taking ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	No evidence of turn-taking	Occasional turn-taking; prompting needed	Occasional turn-taking with no prompting	Frequent turn-taking with no prompting

Following directions

The ability to follow directions requires an understanding that the person giving the directions knows what needs to be done to achieve a certain task, and also that the person carries an authority in this situation – in other words, an understanding is required of the situation and the interpersonal relationships within the situation. Following directions can be problematic for children with autism, and they can be "reserved, aloof, seemingly uninterested and dismissive" (Hanbury, 2012, p. 25). Children with Level 2 autism, although often showing impairments in joint attention (Carpenter, 2013), were in my prior experience generally able to follow directions to some degree, and therefore it was felt that measuring changes in the frequency and quality of participants' following of directions could be indicative of changes in social behaviour, when combined with the other rated aspects of social interaction.

Table 10 - Following Directions ratings - criteria

Rating	**1**	**4**	**7**	**10**
Criteria	Directions never followed	Directions occasionally followed; prompting needed	Directions usually followed; some prompting needed	Directions always followed without prompting

Transitioning

Transitions, moving from one activity to the next, "are invariably a stressful time for children with autism" (Hanbury, 2012, p. 58). Yet in order to function in the world where people and events are unpredictable, the ability to transition is vital. Music therapy has been used to help children with autism to adapt and operate in social environments (McFerran et al., 2016) and it is thought that the temporal structure of music may assist in developing the

ability to transition from one activity to the next (Kern, Wolery, & Aldridge, 2007). In the present study, the use of musical activities using Figurenotes was not specifically planned to reinforce and develop participants' abilities to transition; however, it was hypothesised that the clear structure of each musical activity could enable participants to develop their ability to move from one activity to the next, and thus this ability could be used as another measure of social interaction.

Table 11 - Transitioning ratings - criteria

Rating	1	4	7	10
Criteria	Assistance always needed to transition.	Able to transition with assistance.	Able to transition, sometimes without assistance.	Always able to transition without assistance.

The Family Phase enabled the social interactions of participants to be compared with the earlier phases. Family groupings were smaller than those in the group sessions: a maximum of three players would be playing together at any one time (parent, child with autism, and sibling). Family groups are also self-evidently different from school peer groups in both the environment in which interaction occurs (typically the family home for families, typically a school classroom for school groups), and the type of interactions which may occur. In the Family Phase, ratings were made of the participating children with autism, not of their siblings or parents. However, the behaviours and communication of parents and siblings were closely observed and informed the development of themes. Additionally, the study design allowed for an examination of whether the development of participants' music skills could be associated with changes in their social interaction. In order to elucidate any possible links, the music skills and social interaction ratings were designed to have aspects of comparability. Participant ratings in social turn-taking could directly compared to ratings in music turn-taking, and playing together could be compared with verbal and gestural communication.

Self-concept

As described in 2.5, perception of skill level (whether similar to their actual level, or different) may be a key factor in a person's overall self-concept. Moreover, this perception of competence may be mediated by the importance of possessing these skills, and by the reference group with which level of competence is determined. Therefore, this study examined participants' perceptions of their competence in the music sessions, the value they placed on being competent, and the reference group they used to determine their perception of competence. Self-concept is an inner psychological construct and is not easily measured. Moreover, observing and measuring phenomena which are primarily concerned with participants' internal states can be particularly problematic in children with autism (Capps, Sigman, & Yirmiya, 1995). A combination of observations of participants and participant self-ratings (Verté, Roeyers, & Buysse, 2003), was thus used in this study.

Observations of participants

Participants' emotional and affective responses during the music sessions were observed for manifestations of how the participants thought and felt about their experiences. Specifically, using written session notes and video footage of sessions, observations of participants were made in the following areas:

- behaviour;
- verbal and gestural communication; and
- changes in overall demeanour during the sessions.

Additionally, in the Individual Phase parents were interviewed at the conclusion of each session (Appendix 8) for their assessment of any changes in their child in the above areas within the session as well as since the previous session. In the Group Phase, the school music teacher was interviewed about the participating children's' responses during the sessions (Appendix 9). In the Family Phase, participating parents were given a questionnaire to fill in at the conclusion of each session, again asking for observations of their children's responses (Appendix 10).

The Perceived Competence and Social Acceptance Scale for Children

In the Group Phase, *The Perceived Competence and Social Acceptance Scale for Children* was used to obtain participant self-ratings. *The Perceived Competence and Social Acceptance Scale for Children* (Harter & Pike, 1984) is a psychometric measurement tool used to measure changes in aspects of children's' self-concept from the point of view of their perception of themselves and their abilities. Before deciding on this measure, alternatives were considered: The *Personal Wellbeing Index - Intellectual Disability (English) - 3rd Edition* (Cummins, 2005), the *Self-description Questionnaire I* (Marsh, 1994), and the *Perceived Competence and Social Acceptance Scale for Learning Disabled Children* (Harter & Renick, 2012).

The *Personal Wellbeing Index* and the *Self-description Questionnaire I* address several areas of wellbeing and self-perception and were felt to be too broad-based for the present study. Moreover, they are based on participants either reading and writing their answers or being asked and responding verbally. It was felt that the risk was too great that some participants in this study would have difficulties with the written or verbal methods of scale administration, which especially if combined with attentional difficulties, would compromise the reliability and validity of the measure. The other alternative examined was The *Perceived Competence and Social Acceptance Scale for Learning Disabled Children*, which is a multidimensional scale measuring perceived competence in a limited number of academic and physical domains. However, as for the other scales considered, the method of scale administration (verbal) was considered to be unsuitable for the participants with autism in this study. Therefore, *The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children* was deemed most suitable for the participants in this study, as it contained domain-specific evaluations of self-competence, but used a visual, pictorial basis for administration.

For the sake of conciseness, *The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children* will be referred to as *Perceived Competence and Social Acceptance Scale,* or abbreviated further to *Harter scale*. The scale assesses self-concept across four domains: cognitive competence, physical competence, peer acceptance, and maternal acceptance. These are divided into two areas, general competence and social

acceptance. The scale is not designed to be a singular measure of global self-esteem or self-concept, due to the fact that "not … all of these seeming self-judgements are based on characteristics that reside in the self" (Harter & Pike, 1984, p. 1971). A pictorial format is used for the questions. Each question contains two pictures, each of a child engaging in an activity. In one of them the child is portrayed as not doing it well, whereas the other one depicts the child carrying out the task well. Once the participant has chosen which of the pictures is most like them, they are then asked if they are a lot like that girl or boy, or just a little bit like them. Thus, each question contains four possible answers. This is in contrast to the more typical two choice (true/false) format and reduces the tendency for children to give a "socially desirable" response (p. 1970).

The scale was not specifically designed to be used with children with autism. However, using the scale with children with autism who are slightly older than the age groups for which the scale was designed, is consistent with an understanding that a child's self-structure "appears to be more highly related to mental age than chronological age" (p. 1980). The format of this scale was felt to be well suited to the abilities of the participants in this study. Therefore, the Preschool-Kindergarten version was used for the Years K-1 group (Group 1), and the First-Second Grades used for the Years 2-6 group (Group 2). There are different versions for boys and for girls, using gender-appropriate images and descriptions. Appendix 11 shows, as an example, the plates used for girls in Group 1. As well as gender differences, there are slight differences in the comparisons used between the grade level versions of the scale, as shown in Figure 10 on the following page.

Subscale and Item No.	Preschool-Kindergarten	First-Second Grades
Cognitive competence:		
1	Good at puzzles	Good at numbers
5	Gets stars on paper	Knows a lot in school
9	Knows names of colors	Can read alone
13	Good at counting	Can write words
17	Knows alphabet	Good at spelling
21	Knows first letter of name	Good at adding
Physical competence:		
3	Good at swinging	Good at swinging
7*	Good at climbing	Good at climbing
11	Can tie shoes	Good at bouncing ball
15*	Good at skipping	Good at skipping
19*	Good at running	Good at running
23	Good at hopping	Good at jump-roping
Peer acceptance:		
2*	Has lots of friends	Has lots of friends
6	Stays overnight at friends'	Others share their toys
10*	Has friends to play with	Has friends to play with
14*	Has friends on playground	Has friends on playground
18*	Gets asked to play with others	Gets asked to play with others
22	Eats dinner at friends' house	Others sit next to you
Maternal acceptance:		
4	Mom smiles	Mom lets you eat at friends'
8*	Mom takes you places you like	Mom takes you places you like
12*	Mom cooks favorite foods	Mom cooks favorite foods
16*	Mom reads to you	Mom reads to you
20	Mom plays with you	Mom plays with you
24*	Mom talks to you	Mom talks to you

Figure 10 - The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children: list of questions and domains (Harter & Pike, 1984, p. 1972).

Initial research on the use of the scale revealed that children can give plausible reasons for the answers that they provide (Harter & Pike, 1984). The responses when using the scale from the participants in this study sometimes went further than merely selecting a picture. Some participants actively demonstrated a skill to reinforce their selection in a particular question. For example, Susan, when presented with question 15 ("This girl is good at skipping. Is she a lot like you or only a little bit like you?") stood up and started skipping around the desk. In some situations this was done by the child to illustrate a high level of competence, and in rarer cases to illustrate that they were not good at an activity. This tends to reinforce the scale authors' assertion that "children's self-perceptions of their competencies appear to be based on specific behavioural referents" (Harter & Pike, 1984, p. 1979).

The *Perceived Competence and Social Acceptance Scale* was used only in the Group Phase. This is because the Group Phase was the only phase which allowed sufficient time to complete administration of the scale. Lesson time, supervision of other participants, and appropriate physical settings were provided by the school for administration of the scale at

the beginning and the end of the Group Phase. The time taken for scale administration was too long to allow it to be used in the Individual and Group phases, where home-based sessions were time- and resource- limited.

Reflective practice

My role in this study was as researcher-practitioner, researching my own practice. The action research approach allows practitioners to "systematically reflect on their practice" (Mills, 2014, p. 24), and in this study this systematic reflection is documented in the *reflective practice outcomes* sections of the results chapters (Chapters 4, 5 and 6). The practitioner outcomes of the study phases fall into two broad categories. Firstly, the development of Figurenotes activities and techniques during the sessions; secondly, the development of my own skills as a practitioner. These two aspects are closely related, in the sense that the Figurenotes techniques were the modus operandi and it was through these that I, as well as the participants, were given the opportunity to develop our skills: for the participants, their music skills, and for myself, my skills as a practitioner.

Observation and reflection on each participant's session enabled their session in the following week to be planned responsively. Additionally, reflection on one participant's session enabled me to adapt sessions conducted with other participants in the same week. Figure 11, below, illustrates an example of this process.

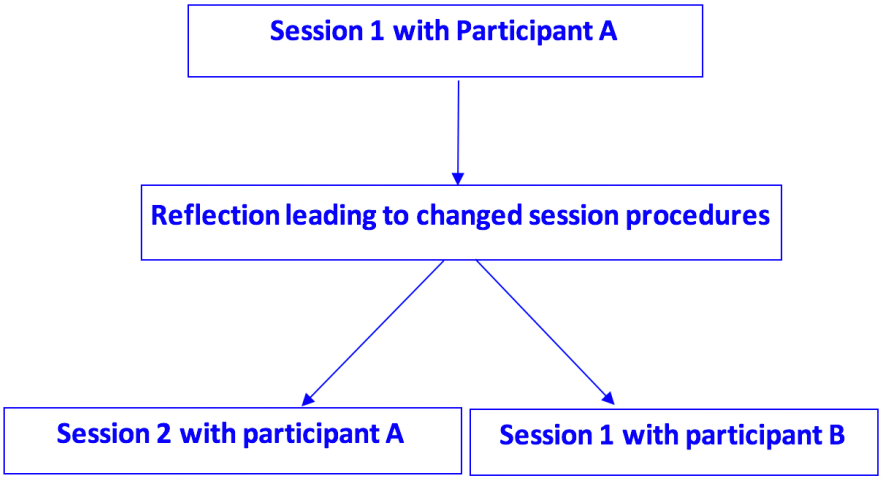


Figure 7 - diagram of two uses of session reflection.

I observed and listened to participants closely for their reactions to the Figurenotes activities used in the sessions. Both the positive and the negative responses of participants during their sessions were incorporated into my planning for subsequent sessions. I aimed to forge a respectful relationship with each participant where they could feel comfortable to express their feelings and preferences. Early on, participants did not offer much apart from occasionally showing reluctance or eagerness to do an activity. It took until the later stages of the phase before the participants offered verbal comments on what they were doing. This may be because it took time for participants to feel comfortable with the situation and with me. The reflective practice outcomes for each phase are described prior to the music skills, social interaction, and self-concept outcomes.

Themes

Themes are used in this study to identify specific outcomes from the study phases in each of the four key focus areas described in the preceding sections (music skills, social interaction, self-concept, and reflective practice). The term *themes* has a specific meaning within psychology and applied sciences, referring to identifying patterns within datasets (Braun & Clarke, 2006). Thematic analysis is "an accessible and theoretically-flexible approach to analysing qualitative data" (Braun & Clarke, 2006, p.77). In this study, themes were identified using thick description from video observation, session notes, and parent and teacher interviews.

A *constant comparative* method was used in order to analyse the data. Constant comparison was first described by Glaser and Strauss in 1967 as a way of developing grounded theory (Glaser & Strauss, 2004). It can be used in interpretative research generally as a means of analysing written data to distil the underlying constructs and themes. When analysing the session and video notes and interview transcripts, the following sequence was used (Thomas, 2013, pp. 235-236):

1. Highlight words and phrases which appear significant, forming codes.
2. Examine these coded words and phrases, looking for recurrences or particularly significant points. Compile these in a list of temporary constructs.

3. Read through the data again, finding specific examples of each construct in the text. Reference each of these against the constructs.
4. Eliminate any constructs which are not supported by enough, or significant enough, examples.
5. Create a table of second-order constructs from the remaining constructs. Add the examples for each construct.
6. Go through the data looking for counter-examples (instances which contradict a construct) and add them to the construct table.
7. Go through the data once more, asking whether these constructs truly capture the essence of the data. Revise constructs again if needed.
8. Examine the constructs for connections or contradictions. Collapse related constructs into themes.
9. Select good examples for each theme (including counter-examples if found).
10. Map the themes, showing the relationships between them.

In action research, analysis can take place at the same time as data is being collected, and reflection on each step in the research process is vital in planning for the subsequent step (McNiff, 2016). In this way, *descriptions* of the data (events, people, actions) and *interpretations* of the data are closely linked, although still separate. Thus, the processes of conducting the research is inextricably intertwined with the outcomes of the research. In this study, the *formative evaluation* conducted during each phase and the *summative evaluation* conducted at the conclusion of each phase were both used in identifying themes. Each session phase was subjected separately to a thematic analysis in each of the four key focus areas (music skills, social interaction, self-concept, and reflective practice). The identification of themes in music skills and social interaction was facilitated by the ratings used in these areas, and themes in self-concept were informed in the Group Phase by data from the *Perceived Competence and Acceptance Scale*.

3.4 Case Studies

The case study was first employed as a methodological approach in formal research around 1920 by researchers in sociology at the University of Chicago, and its developing popularity with researchers there resulted in what is known as the *Chicago School* of case study-led research (Mills, 2010). Since that time, the case study approach has been widely used in research in the social sciences and humanities, and in practice-led disciplines such as education, human services, management, and public administration. It has also been used in research in medicine and the sciences where a need exists to study a phenomenon outside the confines of the laboratory (Woodside, 2016). Essentially, a case study is a description and analysis of one or multiple people, situations, and environments in an attempt to understand an issue or generate (or test) a theory. A case study is concerned with interrelationships between an individual and their environment, focusing on "the link between a specific entity and its supposed contextual interrelationships" (Mills, 2010, p.i).

In this study, case studies have been used to report the processes and outcomes which occurred in specific research phases and with specific participants. Case studies form "a basic methodology for action research" (Bruce, 2010, p. 13), used in order to gain "richly detailed, thickly described accounts" (Stringer, 2007, p. 180) of an aspect or aspects of a research focus (Mills, 2010). Action research requires the capacity for the organising principles to change during a study, and in this context case studies can be "progressively focused" (Stake, 2006, p. vi). Moreover, case studies are "in complete harmony with the three key words that characterize any qualitative method: describing, understanding, and explaining" (Ericsson, Krampe, & Tesch-Römer, 1993, p. 39). However, case studies are limited in their ability to provide evidence of causation and generalization. They "describe but do not explain" (Gottschlich, 2000, p. 1294), because they can consider an outcome relating to only one person or situation.

In the case studies it was important to maintain a focus on participants' use of Figurenotes, rather than on all the possible events and aspects which could be observed and described in each case. Thus, the case study type used in this study was *instrumental* rather than *intrinsic*. In intrinsic case studies, the focus is purely on the case itself, whereas the focus in an instrumental case study is on an object (Thomas, 2013) or *quintain* (Stake, 2006).

However, the object or quintain may be “a target, not a bull’s eye” (Stake, 2006, p. 6); in other words, the analytical frame has some flexibility in what it encompasses. In this study, the target of the case reports was the participants' responses in music-making using Figurenotes, but some additional details were occasionally included when these provided new insight, for example into their self-concept. These details also have value because they "can spark interest in a new facet of investigation" (Gottschlich, 2000, p. 1293).

Using multiple cases

Children with autism, even those diagnosed with the same criteria, display significant individual differences in personality, behaviour, and functioning (Grandin, 2013). The differences between the participating children with autism in this study meant that it was important to investigate whether similar uses of Figurenotes amongst participants would result in similar outcomes, or whether the uniqueness of each individual participant meant that a different use of Figurenotes was required for each individual. In order to enable the use of Figurenotes to be more fully explored, case studies are used in each of the results chapters (Chapter 4-6). Each case was chosen in order to elucidate aspects of the key focus areas and enable contrasts to be drawn with the remainder of the cohort. Using multiple case studies enabled a comparison to be made between them, because “the complex meanings of the quintain are understood differently and better because of the particular activity and contexts of each case” (Stake, 2006, p. 40). The analysis of a case in one phase influenced the observations and conclusions drawn from subsequent cases. By looking in detail at how Figurenotes can facilitate musical engagement in a few specific individuals, considering various aspects of these individuals’ experiences and responses, a deeper understanding of the relevant factors in musical engagement by children with autism using Figurenotes is gained.

The total number of participants in all the research sessions was too many to allow a case report to be made of each participant, so a process of selection occurred. The number of cases chosen needed to show enough "interactivity between programs and their situations" (Stake, 2006, p. 22) but not "provide more uniqueness of interactivity than the research team and readers can come to understand” (p.22). In this study, cases were selected on the basis of their ability to increase understanding of the key themes of the study. They were

not selected for gender balance, as the proportion of males to females amongst participants in this study was close to the worldwide autism average of just over four males to every one female (Fombonne, 2009, p. 592). One case report is used for each study phase, although the Group Phase includes two cases, one for each group involved.

Uniqueness and generalisability of cases

An important consideration was whether to choose cases which represented typical examples (cases that were representative of the cohort), or ones which were atypical. The value of atypical cases is that they can give points of comparison and contrast with the typical cases, enhancing our understanding of both, as "it is often better to pick the cases that most enhance our understanding than to pick the most typical cases. In fact, highly atypical cases can sometimes give the best insights" (Stake, 2006, p. vii). Individual case studies may not have any explanatory or general value in themselves (Hamel, 1993), but when both the differences and the similarities of an individual case vis-à-vis the majority are appreciated as contributing to an understanding of the issues, they can be useful. Therefore, this study uses a combination of typical and atypical cases.

A situation which can arise in the use of case study as an analysis technique is known as the *case-quintain dilemma* (Stake, 2006). A case study may describe a unique instance, but simultaneously be representative of a more general phenomenon; elements of both uniqueness and generalizability may be present within a single case. The dilemma is that if a case can reveal both a case's uniqueness (its difference to other cases), or its similarity (and thus generalizability) to other individuals or situations, it is not easy to determine which of these is more valuable. However, the value of the case study for understanding both uniqueness and generalizability may be regarded as an advantage, particularly in cases involving people with disabilities:

> "It is important to study these outlier situations as they are a reality....for example, although some disabilities are rare, they do occur, and in order to effectively accommodate children with these disabilities, appropriate teaching policy must be created and implemented. Without the flexibility of the case study approach, which allows for targeted sampling, it would otherwise be difficult to appropriately and effectively capture these

> phenomena along with other situations in a holistic way" (Mills, 2010, p. 99).

It was not possible in this study to generalise or form theories of the response that all children with autism would make to music-making with Figurenotes. Yet, "all theories are initially based on a particular case or object. The in-depth study of this case or study will elicit one or more theories that could be validated by other objects or cases" (Ericsson et al., 1993, pp. 29,30). Furthermore, generalization itself is not a simple matter of a single phenomenon repeating itself in many instances. Yin (1989a) introduces a distinction between analytical generality and statistical generality, and proposes that the case study, unlike the experiment, "does not represent a 'sample,' and the investigator's goal is to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization)" (Yin, 2014, p. 21). In considering generalization in this way, it becomes clear that obtaining a certain frequency of occurrence of a particular phenomenon is not the main issue, and "no sociological investigation can be defined on the basis of that issue alone" (p. 36). Instead, when sufficient detail and context is given through thick description in a case study, it may be possible to determine the degree of generalisability: "the degree of detail in the description of the case study thus serves to ensure that the representativeness of the case under investigation has been defined in a manner that is clearly apparent" (Hamel, 1993, p. 37). Put another way, "singularity is thus characterized as a concentration of the global in the local. Singularity is not perceived as a particular feature of a fact, a species, or a thing. It is seen, rather, as characterizing a fact, a species, or a thing" (Ericsson et al., 1993, p. 38). In this study, the use of case studies of selected participants enabled the elucidation of responses to the Figurenotes sessions which were both unique to particular participants, and general to the cohort. A comparison of these characteristics of response enhanced the value of the outcomes.

3.5 Ethics

Ethics in research methods

Relationship between researcher and participants

Action research methodology presents particular ethical challenges. These challenges may go beyond simply "what actions will be taken, and how information will be disseminated to outsiders" (McIntyre, 2008, p.11). A particular issue anticipated in this study was the relationships established between researcher and participants during the course of the research sessions. Forming a good working relationship with a participant in the course of conducting action research enables both parties to become comfortable with each other, facilitating the process of interactive development desired in the course of the research (Creswell et al., 2007). However, the establishment of a relationship poses a potential challenge when the research sessions have been completed, as these relationships come to an end and it can be difficult for children to cope with this abrupt ending. The end of sessions may be an emotionally difficult time for some participants: action research is "linked closely with everyday experiences, so it can be difficult to withdraw" (Groundwater-Smith, 2015, p. 130). In this study, I always approached the final sessions sensitively and allowed participants to say goodbye if they felt they needed to, in their own way.

A participant cohort of children, particularly children with additional needs, presents particular ethical issues. Focussing on a small cohort of participants and observing them carefully, means that care needs to be taken to obscure the identity of the children. Also, there exists a risk that research using participants with additional needs may result in negative outcomes. It is an essential consideration that "action research with students and adults with ... disabilities is concerned with understanding that the research participants are vulnerable and susceptible to harm, because of their minority status or other stigmatizing factors" (Noffke, 2009, p. 126). Not only did the activities in participant sessions in this study need to be carefully planned, my own responses to participant behaviour needed to be considered. I had to draw on my experience as a music therapist to maintain a desirable

level of attention to their moment-by-moment needs, as well as my status as the researcher to ensure the sessions were addressing the study's research questions.

Observer bias

As much as possible in this study, I attempted to reflect on sessions objectively, meaning that when reflecting on my observations I needed to ask myself "what is this a case of?" (Atkinson, 2015, p.65) . Yet observations were made from my personal point of view, and "the ideas, thoughts, representations, and values of the ... researcher stand in the way of an exact reconstruction of elements that could define the phenomenon, the object of study" (Ericsson et al., 1993, p. 26). Similarly, the case studies are subject to bias in the collection, construction, and analysis of the data because choices had to be made as to what was included. However, subjectivity is not necessarily to be avoided in action research, as described in 2.1. In action research, a personal viewpoint can serve to deepen the exploration of the issues by enabling a first-hand description of the situations. Acknowledging a degree of subjectivity also allows for the inclusion of the kind of understanding of a situation akin to a "feel for the ball" (Schon, 1983, p.63).

The system of observer ratings used for the key focus areas of music skills and social interaction likewise contained an element of subjectivity. Ratings were given by me as the researcher who was also the practitioner, conducting action research with the participants. While observer bias may tend to produce scores which are either too high or too low (McIntosh & Vaughn, 1993), the clear criteria developed for the numerical ratings served to control for this possibility as much as was practicable.

Generalisability

It was important not to generalise or draw conclusions for all participants from the behaviour of one participant or one group. There is a tension in action research between the need to not generalise or to make assumptions, and the action research imperative to draw out implications of individual sessions and apply what was learned in one session or phase, to the next session or phase. Balancing these considerations always required a careful and critical examination of participant responses as well as my own reactions.

Using a small cohort of participants meant that there was a need to avoid drawing conclusions or making assumptions about the representativeness and generalizability of any of the observations or results. This included conducting the sessions, where it was not always preferable to assume that a certain technique used with one participant would be effective with another participant. This study aimed to reveal where Figurenotes worked well for specific individuals and why, and also what uses of Figurenotes were generally more successful. However, in research with children with autism it is particularly difficult to generalize due to the broad spectrum of the condition. One child's response or way of behaving to a specific stimulus may be very different from another's, therefore individual cases may be useful for providing insights, but "not as offering a single global and comprehensive understanding" (Hanbury, 2012, p. 8). In attempting to tease out common themes and generalisations in this study, this uniqueness was respected.

Ethics in research sessions

There were some ethical issues specifically in relation to the conduct of the sessions in this study. Firstly, there was a risk that participants may experience a level of frustration during sessions, as the session activities were designed to extend and develop their current level of musical skill to a higher level. Secondly, the group and family sessions involved participants in close proximity. There was a risk that participants may cause some physical or emotional injury to each other. These potential risks were addressed by constant monitoring during sessions by myself, as well as by attending parents (in the Individual and Family Phases) and teachers (in the Group Phase). If a participant showed any symptoms of frustration, or was the recipient or perpetrator of any physical or emotional aggression towards another, I (assisted by the parent or teacher present) immediately acted to rectify the situation by offering advice, giving instruction to remedy the situation, or if needed, removing the participant from the session room.

In effect, these measures were only ever needed during the Group Phase. On three occasions during the group sessions, a participant was unable to control their behaviour and began to physically push (or hit with an instrument or beater) another participant sitting next to them. No participant received any physical injury during these incidents, as the participant exhibiting the behaviour was quickly and efficiently removed from the room by

the school teacher, who was familiar with such procedures. Other than this, participants always behaved in a way which caused no harm to others, and any signs of frustration with an activity was addressed and alleviated immediately by the use of assistive prompts or substitution of one activity with another.

Another issue was balancing the demands and expectations of the participants with the needs of the research process, such as occurred when participants sometimes become interested in a particular activity and wanted to continue it even though there was another activity scheduled. This required a careful approach often involving a compromise, for example offering a five-minute extension to the current activity and shortening the following activity.

There was some potential risk to myself as the researcher when conducting the individual and family sessions at participants' homes. Not only would I conduct these home visits without physical support, but in the home environment there was a small risk that if a participant became distressed there could be a negative reaction from the participant's family. In all instances, however, I was made to feel comfortable in the participants' homes and a great deal of goodwill and understanding was shown by other members of the participants' families before, during, and after the sessions. The sessions were seen as special and I was respected accordingly.

Another consideration is the longer-term effect for participants. Potential exists for the participants to continue engaging in musical activities, with or without Figurenotes, even after the researcher "leaves the system" (Rickson, 2009, p. 2). It is hoped that these activities will be beneficial and rewarding to the participants, but this will be dependent to some extent on participants' own desires and motivations, as well as later opportunities they are given.

Required ethics approvals for carrying out all phases of the study were sought and received from the Western Sydney University Human Research Ethics Committee. Approval was gained initially for the Individual and Group Phases (Appendix 1). Information sheets for these phases were prepared and distributed to interested parents (Appendix 2). Parents who volunteered their child to participate in the study were given consent forms to be

signed and collected (Appendix 3). The Group Phase used separate information sheets and consent forms given to parents (Appendices 4 and 5). Ethics approval for the Family Phase involved an application for amendment of the original ethics approval. After this was obtained from the university Human Research Ethics Committee (Appendix 6), parents signed consent forms for their own participation (Appendix 7) as well as that of their children (Appendix 3).

CHAPTER 4 - INDIVIDUAL PHASE

The action research approach of this study allowed for development of ideas and changes in research foci and tools. The way in which the study phases actually progressed is as important as what was originally planned, because "in action research, the emphasis is more on what practitioners do than on what they say they do" (Avison, Lau, Myers, & Nielsen, 1999, p.96). Moreover, doing action research made it necessary to analyse what actually happened in one phase and arrive at outcomes prior to undertaking the next phase, in accordance with the spiral model depicted in Figure 5 (p.46). Thus, in order to show my continually developing understanding, and the development of the participants, the next three chapters describe the processes of the research alongside the outcomes.

4.1 Phase Planning

All eight participants who were assessed were accepted to participate. The cohort of participants in the Individual Phase is listed in Table 12 below, along with age, gender, and school year. Pseudonyms are used for each participant.

Table 12 - Individual Phase participants

Name	**Age**	**Gender**	**School Year**
Neal	12	Male	6
Alexander	11	Male	5
Steven	12	Male	6
Sebastian	12	Male	6
Tony	7	Male	2
Sean	8	Male	2
Charlotte	8	Female	2
Anna	9	Female	3

The median age of the cohort was 10. There were six males and two females, forming a ratio of 3:1 which is a little lower than the worldwide average of just over 4:1 (Fombonne,

2009). Participants were between Years 2 and 6 at school. Sessions were planned to be 30 minutes in duration, with an additional 15 minutes for set up and pack up. All sessions were conducted at participants' homes. Activities in the Individual Phase sessions were designed to enable development of the specific music skills to be rated in this phase (accuracy, fluency, technique, and playing together). There were three activity types, described below.

Exercises

Each session began with approximately five minutes of exercises, which consisted of simple musical patterns arranged in Figurenotes (see Figure 12, below, as an example). The purpose of these exercises was to enable participants to develop their finger and hand fine-motor skills, to develop their ability to play notes of different duration and pitch, and to become more familiar with Figurenotes. The exercises prepared participants for the playing of melodies. Exercises that had been used in the initial assessment were always used first in each session, ensuring that participant had familiar activities to start with before moving on to new activities. Additional exercises were added as the sessions proceeded.

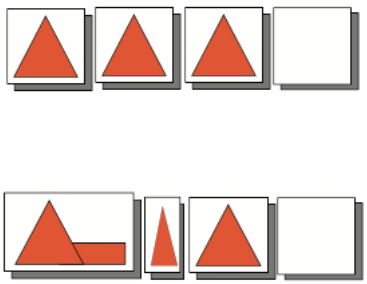


Figure 12 - Rhythm exercise.

Melodies

Playing melodies from scores written in Figurenotes formed the bulk of the session activities. Many of the melodies were sourced from nursery rhymes and other children's music. At first, I had some hesitation about using nursery rhymes with the older children (Neal, Alexander, Steven, and Sebastian) as I felt they may be perceived by these participants as inappropriate. In the first sessions, I asked the participants if they wanted to play *Mary Had a Little Lamb* and *Twinkle Twinkle Little Star*. All of them told me they knew

these songs and that they wanted to play them, and in subsequent sessions they all played these songs with eagerness, perhaps simply because of their familiarity. Figure 13, below, shows *Mary Had a Little Lamb*.

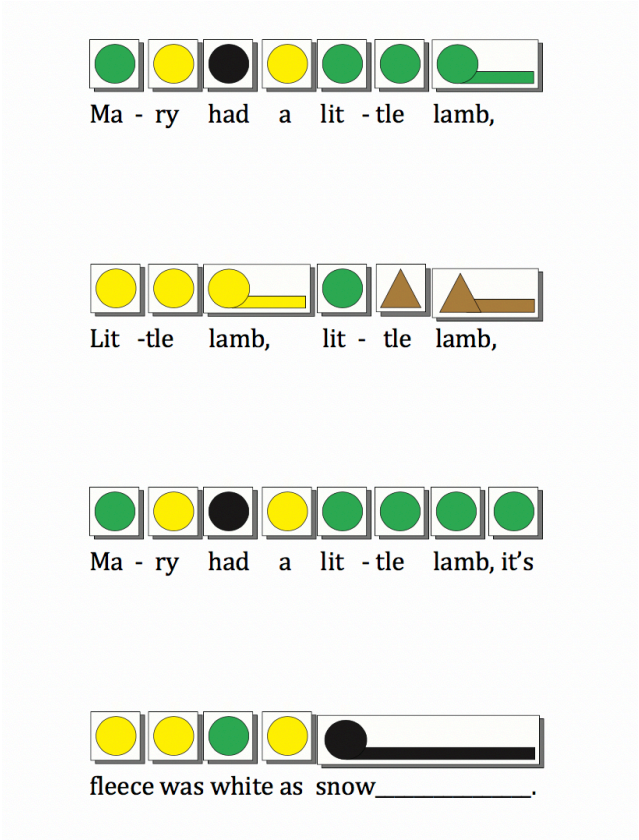


Figure 13 - Mary Had a Little Lamb, Figurenotes arrangement.

As well as well-known children's music, additional melodies, less likely to be known to participants, were used for contrast and extra challenge. These songs were not known by participants and in addition to the extra technical challenges, they also enabled participants to develop their reading skills, as they had no pre-existing aural schema of the music. An example is shown in Figure 14 on the following page.

Figure 14- Section of Desperado, Figurenotes arrangement.

The melodies were arranged in Figurenotes in up to three different ways: as a solo for the participant to play alone, as a duet to be played by the participant with me, and as hands together for the participant to play with their right and left hands. Each melody was used in only one different version in each session, in order not to confuse participants. The solo and duet versions were used to enable development of the specific music skills to be rated. The solo version was always introduced first and was used to develop the skills of accuracy, fluency, and technique. The duet version enabled participants to develop skill in playing together. Hands together versions were provided for extra challenge and stimulation. The melodies used are listed in Table 13 below.

Table 13 - Individual Phase melodies. Green shading indicates usage.

	Solo (playing alone, one hand)	**Duet** (playing with researcher)	**Hands Together** (playing solo, two hands)
Twinkle Twinkle Little Star			
Mary Had a Little Lamb			
Stairway to Heaven			
Muffin Man			
Desperado			
Hot Cross Buns			
Happy Birthday			
My Way			
Do Your Thing			
Old McDonald			

Musical stories

The third activity type was musical stories. The purpose of these was to enable the participants to further familiarise themselves with reading Figurenotes, to provide a contrast to the exercises and melody activities, and to encourage interaction between participant and researcher. The stories used were entitled *Twist* and *Mr Red*, and involved picture-book style illustrations, with some printed words, depicting scenes in a simple short story. The story was initially introduced verbally by me, and after a few sessions of use the participants were able to remember the simple sequence of events and were able to play the Figurenotes depicted without verbal support. A variety of Figurenotes shapes and colours were incorporated into the pictures, always being integral to the picture. When a character or object drawn in Figurenotes was featured in the story, participants were able to play it on the keyboard; characters and objects thus had musical motifs which were repeated each time the character appeared in the story. Figure 15, below, shows *Mr Red*.

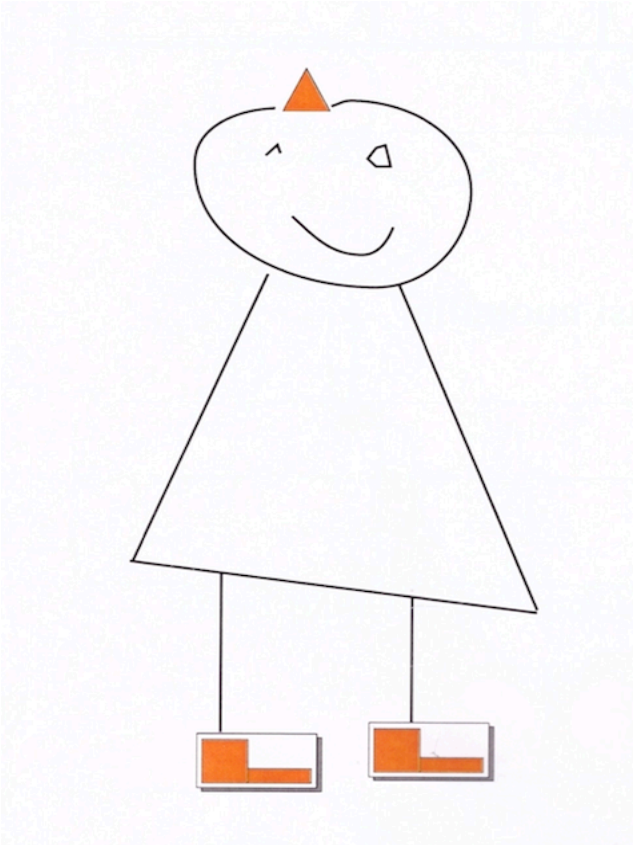


Figure 15 - Mr Red - musical story (Kaikkonen, 2004, p.22).

4.2 Participants and Sessions

Case Study - Tony

The case study of Tony is an atypical, outlier case within the Individual Phase, an instance of a participant who did not respond in the way expected, or in a way representative of other participants. Aged seven, Tony was the youngest participant in the Individual Phase cohort. His case has been selected because it represented my first real challenge in conducting the research sessions. Most participants responded positively to what I brought to them and most sessions proceeded smoothly. Tony's sessions were always unpredictable and it was through them that I first became aware of issues which became important in the later study phases.

At assessment, and although fulfilling the criteria for participation (see pp .52-54) Tony already exhibited some behaviours different from other participants. All the other participants could produce short phrases at least, whereas Tony only had single words and was primarily echolalic. His parents were enthusiastic about having Tony participate in the study, and told me that Tony listened to classical music at home. They had obviously tried to create a musical environment for Tony, and were supportive of anything which might assist him develop his interest in music. However, they did advise me prior to the sessions starting that Tony had "tried several therapies" and he had become somewhat resistant to being asked to try new activities. The key to working with Tony, his parents told me, was to offer a clear and desirable reward for any activity. In working with Tony, I was prepared to use reward as a general motivator, but was not prepared for the extent to which this would be needed as the sessions progressed.

At the start of Session 1, Tony sat at the keyboard and started playing random notes with fingers in both hands, demonstrating dexterity in his fingers and a clear indication that he possessed some fine motor skills, and also that he was interested in the keyboard. When we began the planned activities, I noticed that Tony was reluctant to look at the Figurenotes score in front of him. He would look up then quickly look away while playing, enough to know what notes to play, but only a few at a time. After the first six short exercises Tony stopped playing. His mother (who was in the room watching) spoke up and reminded Tony

about his reward for participating today – a game on his iPad. Tony, however, did not immediately start playing but instead turned around and tried to give his mum a hug. After a minute he turned around again and continued playing, seeming more interested when the exercises had a greater variety of colours (the first nine exercises contain only red and yellow Figurenotes).

When I introduced the first melody*, Mary Had a Little Lamb*, by playing it myself on the keyboard, Tony spontaneously sang the lyrics, singing with mostly accurate pitch. When his turn to play the melody came, Tony did not seem to know what to do so I lifted his hand and guided his fingers to the keys. This also occurred when we turned to *Twinkle Twinkle Little Star*. Several times Tony had to be refocussed on looking at the Figurenotes score and playing on the keyboard. The way in which Tony responded in the first session was typical of his responses throughout the sessions. He tended to resist when any demands were placed on him. He also showed an unwillingness to follow the written score when playing the keyboard, but a definite preference to sing and an obvious ability and interest in music generally. After the first session it remained to be seen how much effect Figurenotes could have on the development of his music skills.

In Session 2, Tony brought a favourite book to the keyboard and was humming quietly to himself, although the melody was unclear. He sang *Mary Had a Little Lamb* and *Twinkle Twinkle Little Star* as he had in the first session, and this time he was able to look at the Figurenotes scores a little more. I tried to help him with this by pointing at certain Figurenotes and asking him what colours or shapes he could see, and he showed an interest in what I was doing (and correctly answered my questions). His right hand had to be guided in playing, but he was able to play a few notes completely unaided.

Tony's mother then told me that she had been teaching him how to play *Hot Cross Buns*. I asked Tony to show me and he played the first two lines then seemed to become confused so his mother guided his hand to finish the song. However, I observed that Tony was actually singing another tune while playing this one! After this Tony slouched in his chair and was unable to be persuaded to try anything else, so I sat at the keyboard and demonstrated *Muffin Man*, which was the next song I had planned to introduce. Tony sat on my chair and showed interest in my playing, and then his mother asked me if I could play

the theme music of *Twentieth-Century Fox* (the fanfare used before movies made by the motion-picture company). I played it and Tony showed delight, jumping up and down. When I asked Tony to come and play something after that, he refused and seemed suddenly very tired. His mother said that Tony pretends to be tired for his therapists so he can avoid doing the activities he is asked to do. I felt it was better not to push Tony at this time, so we ended the session early.

When I arrived for Session 3, Tony's mother said that he was expecting me. While playing *Twinkle Twinkle Little Star*, he was looking at the score almost continuously. After this, Tony put his hands over his ears and began humming an unidentifiable tune – perhaps the experience of concentrating and achievement in an activity had been overwhelming for him. He then walked away, walked back to the keyboard, and gave me a hug. This was his first demonstration of real acknowledgement of my presence, and despite being (from my perspective) an unexpected response, it was a sign of his developing trust in our relationship. However, when I brought out *Twinkle Twinkle Little Star*, Tony turned away again. His mother said that Tony was "over" this, and also *Mary Had a Little Lamb*, and needed other songs. I brought out *Muffin Man* and Tony listened attentively to my performance. Then Tony played the melody while I played chords – the first time he had played with me in a duet. Tony showed a high level of awareness of my part and responsiveness in this activity, which gave another example of his musical potential.

Tony also spent some time spontaneously exploring the notes of the keyboard in this session, enjoying the sound of low and high pitches and using different fingers of his right hand. When I showed him how to change the instrumental voices on the keyboard, he was also interested; the clarinet sound especially interested him, and he called out excitedly "horn!". In this session Tony interacted more, and more positively, with me than before. This may have been because he was less tired than in previous sessions, but also may have been because I had allowed him some free exploration, as well as time to listen to me playing. He seemed to be able to relax a little. However, a pattern was emerging: Tony was showing interest in the keyboard and in the musical activities, but as yet his playing was not reflecting this. It seemed that Figurenotes was not necessarily helping Tony much, as he was obviously relying largely on his acute aural memory for playing the melodies.

In Session 4 Tony willingly engaged in some free exploration of the keyboard, and he also listened attentively to my demonstration of *Muffin Man* and *Mary Had a Little Lamb*. However, he needed to be offered rewards in order to be willing to play these songs himself. Tony only played when he was reminded by his mother that he would be allowed his favourite dessert as a reward. I next introduced the duet arrangement of *Twinkle Twinkle Little Star*. Tony showed interest, but wanted to play the original melody first by himself. He then was willing to try the duet version. His performance of this quite complex task (involving listening to the other part, maintaining the tempo, and accurate playing of the notes of his part) was another indication of his musical abilities.

During this session, mid-way through playing the melody of *Mary had a Little* Lamb, Tony asked for a pencil and proceeded to write in fingering above the Figurenotes for each note in the melody, as shown in Figure 16 below. Conventional fingering for this melody would use the 3rd (middle) finger for the first note so that all notes are playable without stretching fingers, so I showed him how starting with the 3rd finger may be simpler. I asked him if he still wanted to start with his 4th finger, and Tony was adamant: "Yes, I want that one!".

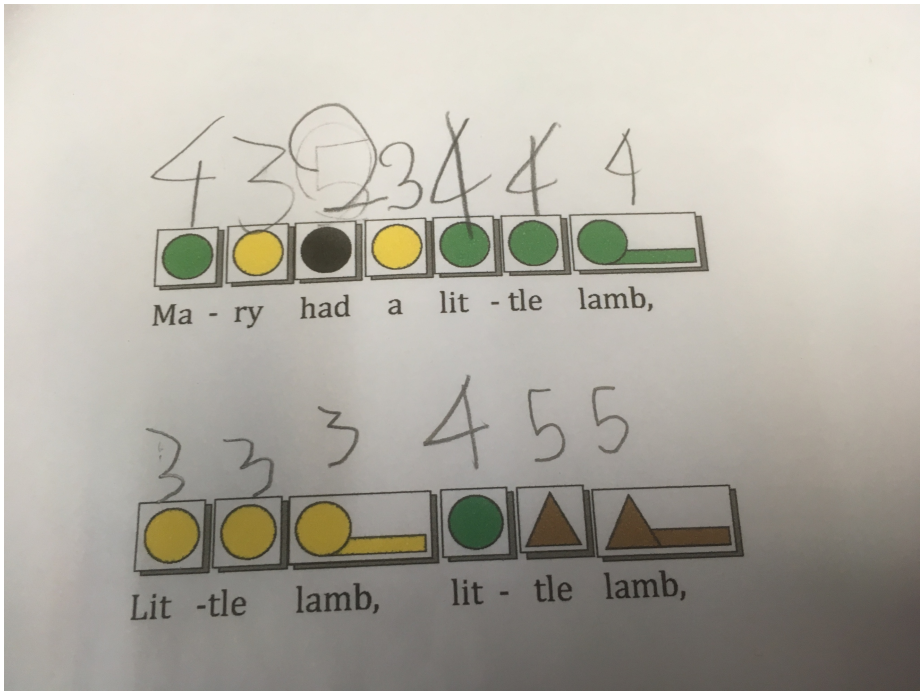


Figure 16 - Tony's fingering for lines 1 & 2 of Mary Had a Little Lamb.

In Session 5 I was interested to see if we could continue to develop Tony's duet playing. He was willing to play when rewards were offered, however he was once again reluctant to

look at the Figurenotes scores, preferring to rely on his aural memory of the melodies, and when I asked him to play the other, bass or harmony part (which he had not yet internalised) he refused to look at the scores, and did not respond even when I tried to interest him in the scores by pointing and asking him the colours and shapes, as before. With ten minutes remaining in the session, and Tony not actually running away, I had to think quickly how to continue. I had brought in some spare Figurenotes stickers brought as replacements for the keyboard stickers in case any were damaged during (or between) the sessions. I got these out, stuck four of them on a piece of paper, and asked Tony to find them on the keyboard. Perhaps because of the novelty of the situation, Tony became interested and found and looked at the Figurenotes and accurately played them on the keyboard. Then I asked him to make up a melody for me to play, which he did, and I played it. This situation turned out to be one of the few in which communication between Tony and I was sustained for any length of time.

When Tony's mother called out from the kitchen to remind him of the dessert reward if he cooperated in my session, I immediately repeated the word "dessert" and added a rising and falling pitch to it. Tony copied my vocalisation and we repeated it several times. At the end of the session Tony ran around the room singing "dessert, dessert!". This activity transformed the offer of reward into a motivating activity within the session, in a similar way to McCord's (2009) description of children improvising rhythms for food words.

Session 6 began with Tony running around the room. When he had tired himself out and was ready to sit at the keyboard, Tony played the melodies given but without looking at the Figurenotes scores. Tony's fine motor skills were continuing to improve – he played positively and used multiple fingers, however his accuracy was lower this time, perhaps because he was relying completely on his aural memory. In this session Tony seemed withdrawn from the activities and from me. He communicated and interacted only reluctantly and infrequently. The only activity in which he became more engaged and communicative was when I produced the Figurenotes stickers and we made up short melodies for each other to play, as we had done in the previous session. It seemed that this activity was manageable for him as it was more open-ended and allowed him to be creative. At the end of the session I played some ragtime music for him on the keyboard as he had

become unwilling to sit at the keyboard any longer. Tony danced to the music spontaneously beside the keyboard.

Unfortunately, the sessions came to an unexpected end at that time, as Tony's family had made a sudden decision to travel overseas. The sessions with Tony were for me the most exhausting and frustrating of any of the individual participants, and required considerable flexibility and inventiveness in the way I used Figurenotes. In time, Figurenotes may have proved a useful visual adjunct to Tony's already strong aural musical sense. He was a child for whom music, as perhaps other activities, was intensely personal. However, while he was able to follow the visual scores, he was generally reluctant to do so, preferring to rely on his more advanced aural memory. During the playing of melodies in the sessions, Figurenotes was mostly a distraction for Tony.

Tony's case suggests that Figurenotes may be most effective as a musical tool for children with autism who readily absorb information visually. Despite indications that visual supports can aid learning and communication for children with autism (Harris, 2012), not all children with autism are visual learners. However, the use of Figurenotes in creative ways, such as the unplanned composition activity in Session 5, gave Tony a new way of interacting with me, and with musical sounds. On reflection, the creative activities were the most significant and meaningful activities of Tony's sessions, and Tony's sessions gave the first indications of the potential of creative uses of Figurenotes in this study.

Tony's music skills showed limited improvements over the course of his sessions. Changes in his music skills ratings are shown in Figure 17 on the following page. The y-axis shows the rating given in each session according to the criteria given on pp.64-67.

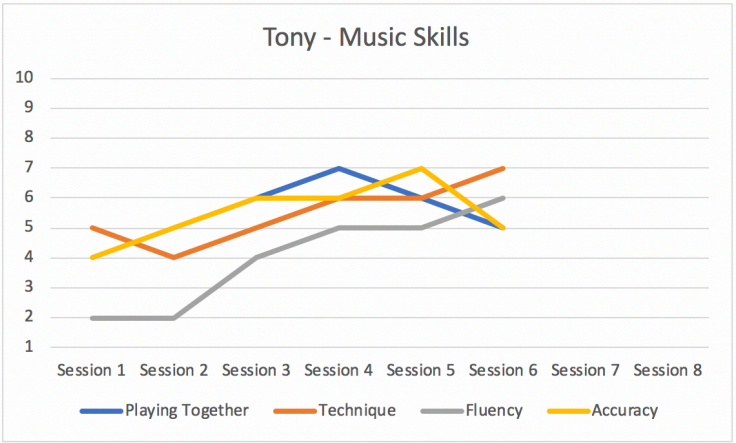


Figure 17 - Tony, ratings of music skills.

This graph shows clearly the inconsistent nature of the development of his music skills. However, a general increase can be seen in all skills except for playing together. However this skill was only rated from Session 3, because in Sessions 1 and 2 Tony did not play any duets. Therefore, Tony did not have the opportunity to develop this skill over many sessions. Tony's social interaction ratings also improved somewhat during the sessions, as shown in Figure 18 below.

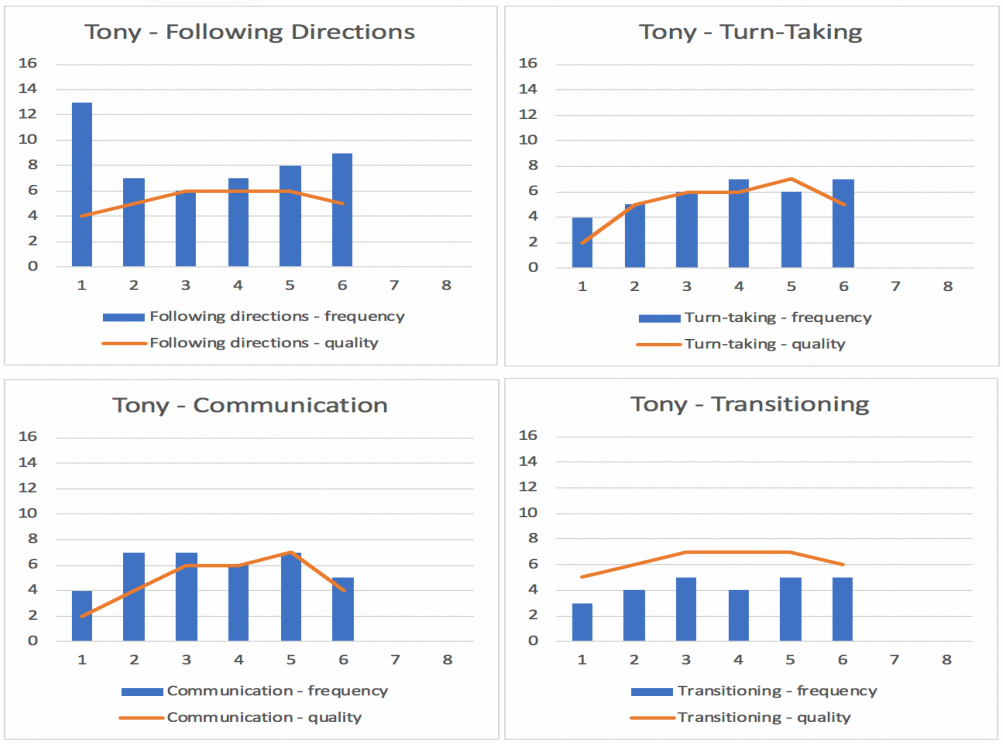


Figure 18 - Tony, ratings of social interactions.

However, a decline occurred in Session 6, wiping out many of the gains shown in the previous sessions, which paralleled the situation with his music skills.

Summaries of Other Participants

Steven

Steven was an older participant (aged 12), a serious boy who had a strong personality, despite being non-verbal in the initial sessions. He responded enthusiastically to Figurenotes, although his perfectionism and anxiety sometimes meant he was resistant to new challenges and had to be encouraged or offered rewards. Steven's sense of steady pulse was quite disorganised at first, but this skill developed as the sessions progressed. The main effect of the sessions for Steven was the change which occurred in his communication. Through playing the music arranged in Figurenotes, he was able to begin to express himself in a meaningful way. This expressive aspect was further developed when he spontaneously began to sing the lyrics of some of his arrangements while playing them on the keyboard. The confidence in pitch and rhythm he was able to obtain from his keyboard work gave Steven a foundation and support to vocalise. His singing became increasingly confident and clear as the sessions progressed. During later sessions he also began to speak, mostly single words such as "again", "more", "finish", and "goodbye".

Sebastian

Sebastian was also a rather serious boy, who seemed initially lacking in self-confidence and was therefore reluctant to participate. However there was a gradual development of his ability to perform the Figurenotes arrangements, and this combined with his obvious enjoyment of the musical stories, resulted in Sebastian responding very positively to the sessions. His frequent expressions of "I can do it!" signalled surprise at his success as well as pleasure. Sebastian seemed to understand that he was improving in his musical skills. Sebastian’s technique did not improve a great deal during the sessions, but his other music skills did show consistent improvement. His surprised reaction during the sessions to his improvements suggests that he may not have had a positive experience of skill development previously.

Neal

Neal was tall and gangly, often sitting slouched over in his sessions. In early sessions I thought this slouching may be due to his being apprehensive about me and what was going to happen in the sessions. When this behaviour continued, I began to suspect a lack of self-confidence similar to Sebastian's. However, the slouching was accompanied by a willingness, even eagerness to participate, and it did not significantly affect Neal's ability to play the instruments or communicate with me. In the assessment session, Neal held his hand and fingers in a rather twisted pose at the keyboard and was initially reluctant to place his hands on the keyboard to play. However, after successfully playing his first Figurenotes arrangement (*Twinkle Twinkle Little Star*) in the first session, he seemed to gain confidence and was motivated for the remainder of his sessions. As the sessions proceeded, Neal began to show a real aptitude for the activities, quickly grasping the pulse, rhythm, and melody of the arrangements. Neal expressed an unwillingness to participate in some activities, expressing strong dislike to particular melodies. Neal's strongly-expressed musical preferences were subsequently taken into consideration when choosing which Figurenotes arrangements to give him. The strong development of Neal's music skills reinforced an impression of him as having significant musical aptitude. In social interaction, Neal's verbal communication varied from no talking at all to quite interactive.

Alexander

Alexander had the highest level of fine-motor functioning and coordination of all the participants. In his sessions he was able to play more arrangements with hands together than any other participant. Of all the participants, only Alexander was able to understand from the beginning the need to work on a section to improve accuracy and fluency. Alexander was even able to self-identify sections which needed extra refining. Despite his abilities, Alexander was often quite anxious, asking "Is it too hard?" when presented with a new arrangement. He was very aware of his own playing and would, of his own volition, repeat passages that were not correct. By the end of the sessions, Alexander had progressed to a level where he was able to comfortably and willingly play hands-together arrangements containing a variety of rhythms and melodic figures. Alexander's readiness to play more complex arrangements pushed me to introduce more arrangements to him than I

had previously planned, and also to make new arrangements of existing ones. These arrangements were then able to be used later with other participants.

Anna

Of all the participants, Anna was the most demonstrative of her feelings and preferences. Even more so than Neal, Anna gave very clear indications, both verbally and in her behaviour, about whether she liked or disliked an activity. However, a majority of the time she expressed a liking for most of the activities, particularly the exercises and musical stories, and demonstrated development in her musical skills. Social interaction occurred and developed within the duets and also outside the musical activities, mainly through her communication of preferences and my negotiations with her around which activities to do. Anna loved the musical stories and it was primarily her interest in these which prompted me to explore further the use of musical stories in Figurenotes when planning the Group Phase.

Sean

From the beginning, Sean seemed extremely motivated by Figurenotes. By the end of the sessions, he had shown a potential to go much further in the development of his music skills. As for Tony, Sean refused to participate in any duet activities in the first two sessions, and consequently there was no rating given for playing together until Session 3. Another aspect of Sean's participation is the relationship of the development of his music skills with his social interaction. Sean has very little spoken language and primarily expresses himself non-verbally. In the session activities Sean exhibited energy, strong emotions, and a keen understanding of the structure and potential expressiveness of musical phrases. At times it seemed that Sean had found an activity which he completely understood and was comfortable with. Whilst some of his attachment to Figurenotes may have been due to a simple interest in colours and shapes, his perfectionism, as well as his interest in listening to his sister (Charlotte) during her sessions, suggests that it was the combination of visual and aural prompts which motivated him.

Charlotte

Charlotte (the twin sister of Sean) showed an interest in singing the lyrics of the songs at the first session, and this interest continued throughout her sessions. The Figurenotes activities enabled Charlotte to develop her vocal ability and match it to a visual realisation of musical

structure. Charlotte is a very energetic girl and would frequently express her energy by rapidly striking all the keys on the keyboard from one end to the other and back again in a glissando. These actions would often be accompanied by verbal outbursts of an echolalic nature. I allowed Charlotte to explore and make sounds on the keyboard at the start of each session, and this helped her to be ready to concentrate. Playing and singing the Figurenotes arrangements encouraged Charlotte to focus her vocal and physical energy and expression into a more coherent form. Charlotte was, as with her brother Sean, unwilling to participate in playing duets until Session 3 so was not rated in turn-taking until then. As the sessions progressed, Charlotte became more and more interested in talking with me. The musical activities were often interrupted while we talked about a topic which interested her, often arising from the theme of the lyrics, or the Figurenotes of the song being used.

Each of the participants in the Individual Phase was thus able to offer a particular pattern of response to the Figurenotes sessions. I found it useful when reflecting to identify a key outcome for each participant (Table 14, below).

Table 14 - Key outcomes for participants

Participant	**Key Outcome**
Steven	use of voice
Sebastian	being good at something
Neal	musical aptitude unlocked
Alexander	using Figurenotes to develop strong skills
Anna	love of musical stories
Sean	Figurenotes a window to engagement
Charlotte	singing and playing provided a focus of expression
Tony	importance of creative work

4.3 Reflective Practice Outcomes

The acting step of the action research cycle often occurred concurrently with observing. In carrying out the sessions I was also observing them, and modifications of the planned sequence (such as that mentioned above) occurred as a result of this constant observation. However, observation was carried out more systematically and carefully by my writing of notes immediately after each session, and later by analysing the video recordings made of each session. These techniques resulted in a clear picture of what had worked and not worked in the session. The cycle then began again with reflection on these observations, leading to a new plan for the following session, followed by the session itself, observation of the session, and more reflection, and so on throughout the phase. A thematic analysis using the constant comparative method (as described on pp.78-79) yielded four themes in reflective practice emerging from the Individual Phase. These themes (as described on p.77) relate both to the development of my own skills as a practitioner as well as to the responses from participants to the activities I designed.

Effectiveness of concrete feedback

One aspect of the behaviour and functioning of Individual Phase participants was the effectiveness of the concrete feedback given to participants on their performance of musical items. When feedback in the form of numerical ratings was given to participants immediately after their performance of musical activities, of their performance, the participants responded positively to this by either showing readiness for the next activity (for high ratings) or by willingly repeating the activity (for low ratings). Numerical feedback seemed highly motivating for them, regardless of whether the rating was high or low. In contrast, participants showed little ability to self-correct without this concrete feedback. This finding corresponds with previous research which proposed that "individuals with ASD may process external, concrete feedback similar to typically developing individuals, but have difficulty with internal, more abstract, regulation of performance" (Larson, South, Krauskopf, Clawson, & Crowley, 2011, p. 198). A consequence of the success of using concrete feedback for some participants is that I began using it for all participants, not for all activities, but for the longer and more complex ones when participants may not have been able to regulate or assess their performances unassisted.

Importance of matching colours

The Figurenotes scores used in the sessions with participants were prepared and printed at multiple locations. Using printers with slightly different colour printing profiles resulted in the colours of some of the printed notes being a little different from the colours of Figurenotes stickers on the keyboards which participants used in the sessions. I did not notice these differences at first; it was only when I reflected on errors made by participants in performing the arrangements in the first two sessions, that I noticed that errors were being made consistently at the same few points in the music, by most participants. These occurred on both grey and brown-coloured notes. When I checked the scores against the stickers on the keyboards, I found that there were small differences between the shading of the brown Figurenotes stickers and the brown Figurenotes on the scores. I found the same situation with the grey stickers and notes. Figure 19, below, illustrates the differences in shading.

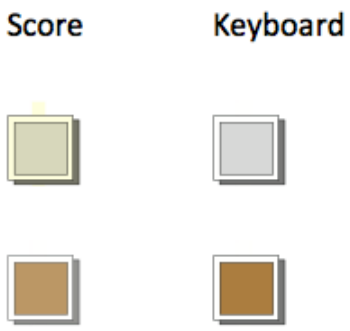


Figure 19 - Difference in colour shading, grey and brown Figurenotes

The participants were not able to easily identify the differently-shaded note on the score. An example of this is when Steven moved his finger over the whole keyboard searching for a matching brown sticker when he came to a brown Figurenotes symbol in the score. It was only after reviewing the video footage of the session, and also noticing the slight difference between the colour of the brown Figurenotes symbol on the score and the keyboard sticker, that I realised that his hesitation was not due to a low level of musical skill: he was simply not making the connection. An inability to see a slight variant as still representative of that colour may be related to sensory processing abnormalities and hyper-sensitivity to colours (Ludlow, Wilkins, & Heaton, 2008) and is regarded as a characteristic of some children with

autism. This experience was for me an important lesson in the need to ensure consistency in the colour shadings used for all the Figurenotes on the scores and the keyboards used. It also encouraged me to be more aware of what the participants were doing and not to jump to conclusions about why they may be responding in a certain way.

Refining of arrangements

My goal was usually to select songs and pieces which were likely to be familiar to participants. I anticipated that using arrangements of familiar music was likely to be more appealing to participants and facilitate their participation. The Individual Phase sessions validated this approach, with participants showing greater interest in performing music for which they indicated they already knew the melodies. However, it was not possible to accurately guess all the music which a particular participant knew or preferred, and I developed new arrangements during the phase in response to participants' requests for music they knew.

An example of the development of an arrangement can be seen in *Stairway to Heaven.* Initially I arranged this as a solo bass line, as this song has a distinctive bass progression, shown in Figure 20 below.

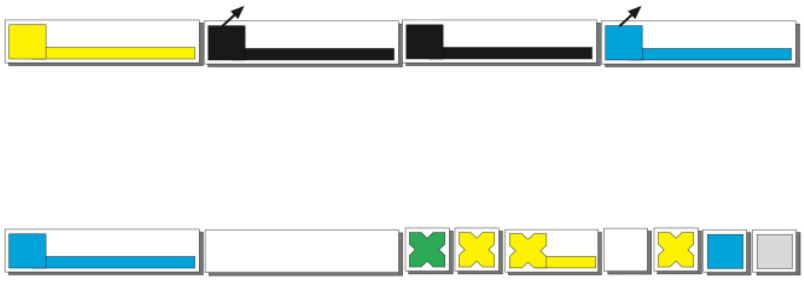


Figure 20 - Stairway to Heaven, initial arrangement of bass.

Participants were able to play the first line. However, none of them managed the second line, even after I gave them an exercise to reinforce their understanding of long and short notes and rests. So, I re-arranged the score, simplifying the second line by replacing the last four beats with a 4-beat rest which had been used previously in the line, shown in Figure 21 on the following page.

Figure 21 - Stairway to Heaven, simplified arrangement of line 2 bass.

This re-arrangement was played successfully by the participants. Neal announced in the next session that he wanted to "play the real melody" of the song. His mother told me she had played him the original version by Led Zeppelin. So, I made an arrangement which included the melody as well as the simplified bass line, shown in Figure 22 below. This figure also shows the fingering I wrote on Neal's score to assist him in playing.

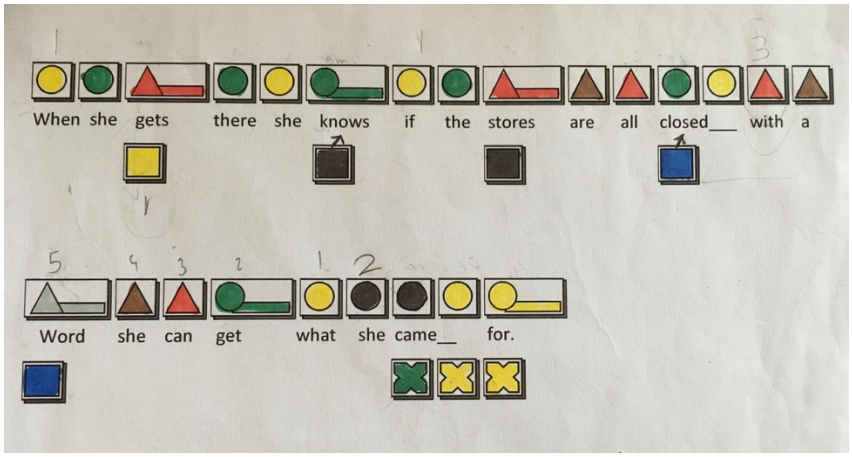


Figure 22 - Stairway to Heaven, arrangement for melody with bass.

I also made arrangements of several of the melodies in more than one way. Unfortunately, this confused some participants. When I introduced a hands together version of *Muffin Man*, Charlotte was interested and able to play it. When in the next session we were playing duets, she turned the page in the book being used and indicated she wanted to play *Muffin Man* as a duet. However, during the first line, Charlotte tried to place her left hand where my hand was playing the bass part. I showed her that this part was for me, but in the next line the same thing happened. It seemed that in Charlotte's mind, *Muffin Man* was now only to be played hands together! This, and other similar experiences, suggested that it would have been better to use specific songs for specific activities: some melodies only for one-line solo playing, some for duets, and some for hands together. This was able to be done later in the phase, as allowed by the action research methodology used in this study.

Potential for family involvement

Figurenotes was attractive to the participants' siblings and parents. When the parents were in the same room as the participants during their sessions, they were able to see the Figurenotes scores, and showed interest in the colours and shapes, often asking about them after the sessions. Both Neal and Steven's mothers asked to be given a turn at playing simple Figurenotes scores after some sessions. I observed that Figurenotes scores were able to be performed by these parents successfully without instruction at the first attempt, and these successful performances of tunes already known to the parents engendered expressions of pleasure. Neal's mother said "I can play too!".

Similarly, participants' siblings expressed genuine interest in their brother or sister's sessions. Steven's brother shyly put his head around the door during Steven's second session. As soon as he was aware I had noticed me, he quickly withdrew. This was repeated in the next session. I perceived a definite interest, and invited him to come into the room before the next session, which he did with encouragement from his mother. He subsequently attended all but one of the remaining sessions, quietly sitting on one side while his brother played and sang.

In Session 5, I arrived a little late for Alexander's session. While I was setting up the video camera, and after Alexander was seated at the keyboard waiting for me to be ready to begin, Alexander's younger sister took a pencil, opened the book of arrangements, pointed at the first page and said "one, two, three, go!". She then moved her pencil over the score as Alexander played, in an exact mimicry of what I typically did while Alexander was playing. Other examples of sibling interest are when Anna's younger sister loudly asked her mother after one of Anna's sessions, "I want a turn, too!", and when Neal's brother greeted me at the front door when I arrived for Neal's session and followed me all the way to the session room. These situations suggested a potential benefit of directly involving parents and siblings in participant sessions. This potential was realised when the Family Phase was added to the study.

4.4 Music Skills

In the area of music skills, the individual sessions provided some significant early findings. Much of the time in the early sessions was taken up with activities which enabled participants to begin playing melodies on the keyboard. Participants showed enthusiasm and engagement when given the opportunity to perform melodies they already knew, such as *Twinkle Twinkle Little Star* and *Mary Had a Little Lamb*. Figure 23, below, shows a clear difference between Tony's music skills and those of other participants.

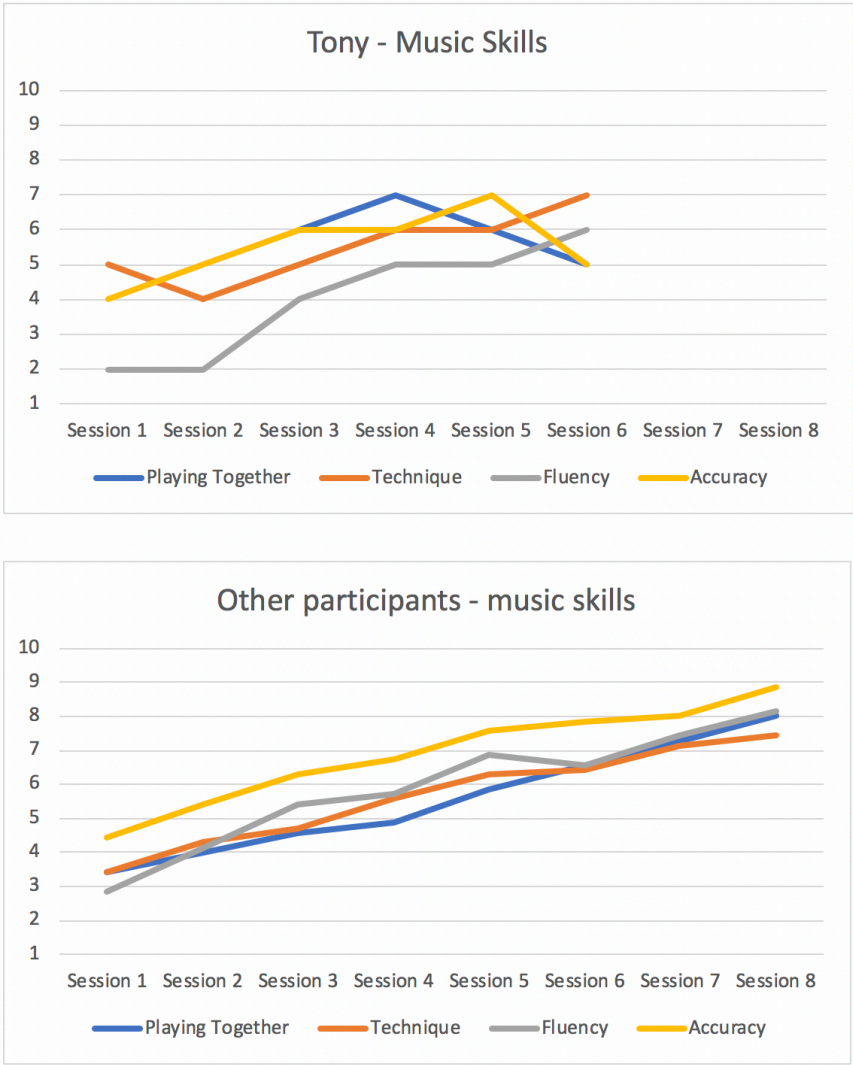


Figure 23 - Comparison of Music Skills ratings, Tony and other participants.

In general, participants' music skills in the areas rated (technique, accuracy, fluency, and playing together) increased steadily during the sessions. There are frequent instances of ratings increasing or decreasing at the same rate from session to session. This may reflect

that the skills were connected, and changes in one skill of a participant affected other skills. Ratings in technique increased throughout the sessions (see Figure 22), although in the final session there was a smaller improvement. The reason for this may be due to the effects of mental fatigue. A link has been demonstrated between mental fatigue and impaired performance in cognitively demanding tasks (Hopstaken, van der Linden, Bakker, & Kompier, 2015, p. 312) and it is possible that mental fatigue was a factor for some participants towards the end of the eight-week session phase.

Accuracy

The accuracy of participants' playing (how well the pitches played on the keyboard matched the visual representation of the notes on the *Figurenotes* score) showed steady increases through the sessions. Tony was the exception, with a drop in his accuracy in his final session, although in the first five sessions his ratings had generally improved. For the remainder of the cohort, accuracy was consistently the highest rated music skill. This may be due to the fact that this skill involved recognition and matching of visual stimuli, which (as described in 2.1) is often a strength in children with autism.

Fluency

Participants' fluency improved when they were given a model beat prior to their performance. For example, when Neal played the first phrase of *Twinkle Twinkle Little Star* in an unsteady combination of long and short notes, I clapped the phrase in steady beats. Then, when Neal played the phrase again he played it with that same steady pulse. The Figurenotes score on this occasion seemed not to assist Neal particularly in playing fluently (and in fact Neal frequently asked me to tap a song's beat before he started to play).

However, there were many other occasions for Neal and other participants, when their imperfect knowledge of the rhythm of a melody was transformed into a fluent performance immediately upon seeing the melody notated in Figurenotes. This occurred, for example, for Charlotte with the melody *Old McDonald*. Charlotte started singing the song when I mentioned we were going to play it next, but her rhythm in the line "E-I-E-I-O" consisted of a shortened E and lengthened I. When she played from the Figurenotes score however, she was immediately able to correct this and played with a steady fluency, as shown in Figure 24 on the following page.

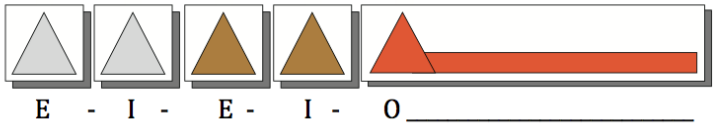


Figure 24 - Old McDonald Had a Farm, 2nd phrase in Figurenotes

It seems that in cases like these, the visual information presented was able to replace previously memorised incorrect rhythms: the next time Charlotte sang the song, she sang with the correct rhythm in this phrase.

Of course, a sense of pulse and fluency are not the same thing. A person may have a sense of where the beats in a song should be, and be able to tap the beats. When performing the song however, the person may not play fluently in that pulse due to technical limitations (for instance, weak fine motor control) or a lack of understanding of the notation, or even a wilful deviation from the beat, which is a common performance technique in improvised music. However, the fact that average participant fluency started at a low level and increased significantly, and also the fact that in the majority of cases in these sessions, participants performed progressively more fluently on new songs presented in Figurenotes, suggests that the example given earlier of Neal playing *Twinkle* with low fluency may be more due to his relying on an incorrect earlier internal memorisation of the tune. Figurenotes seems to have, at the very least, not impeded the fluency of participants' performance, and in general it seems to have greatly facilitated it. The primary reason why this is so may be the geometric accuracy in spatial proportions of the Figurenotes shapes – the length of a note being matched visually by its horizontal length, making rhythms and beats easy to comprehend.

Technique

The sessions always began with some warm-up technical exercises designed to strengthen participants' finger muscles and enable more independent movement of the fingers. Exercises written in Figurenotes were easily understood by participants and they enjoyed playing them. The intention was to reduce the number of exercises used in the sessions once participants were familiar with the melodies. However, the exercises were very popular: Alexander and Neal in particular performed the exercises with a great deal of

enthusiasm and always wanted to play through the entire sequence of exercises at the start of each session. The patterns and repetition of the exercises may have been appealed to these children with autism even more than the technical aspect, as a tendency to repetitive behaviour and interests is one of the diagnostic criteria of autism (American Psychiatric Association, 2013). An example of one exercise popular with participants is given in Figure 25 below.

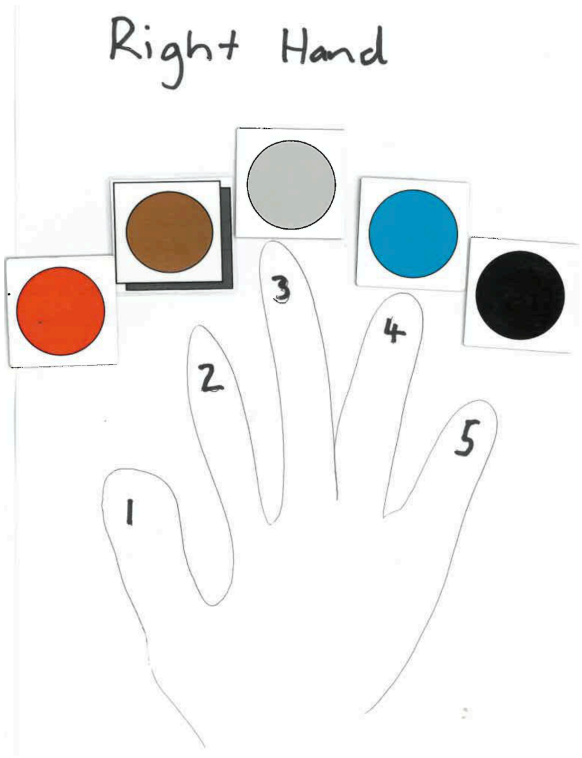


Figure 25 - Right-hand finger exercise.

Technique remained at a low rating in some participants, effectively acting as a barrier to their keyboard performance. In particular, Sebastian had poor fine-motor control in both his hands which necessitated extra work on technical exercises. Sebastian enjoyed these exercises however, and showed some improvement in his playing technique as he repeated the exercises from session to session. In Sebastian's case, the use of melodies and ensembles which allowed performance with one finger generally ameliorated any significant disruption to the development of his other music skills.

A comparison of participants' changes in the four music skills measures (playing together, technique, fluency, and accuracy, shown in Figure 23 on p.110) reveals that the largest

increase occurred in fluency, even though this increase was not as consistent from session to session as increases in the other measures. In the first sessions, participants exhibited a fluctuating and unstable sense of pulse – their performance of exercises and melodies did not maintain a steady beat, even for melodies they showed familiarity with by singing the lyrics. This was probably exacerbated by the poor playing technique of some of the participants, most notably Sebastian. Nevertheless, Sebastian did demonstrate understanding of fingering, as shown by his writing of finger numbers above the Figurenotes for *Do Your Thing* during Session 4 (Figure 26 below). This parallels Tony's writing of fingering above the Figurenotes for *Mary Had a Little Lamb*, described in 4.2, both demonstrating a clear understanding of how to use all five fingers to effectively play the given melodies.

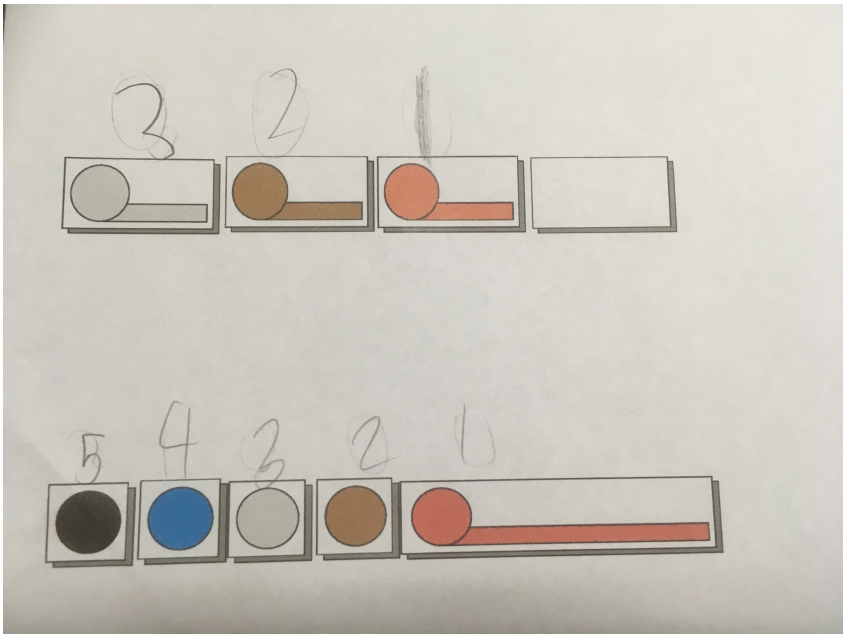


Figure 26 - Sebastian, fingering for Do Your Thing.

Playing together

Playing together was rated in the Individual Phase when participants played specially-arranged scores in Figurenotes with a partner (myself). The scores consisted of music arranged so that two players were performing a melody in octaves as shown in Figure 27 on the following page.

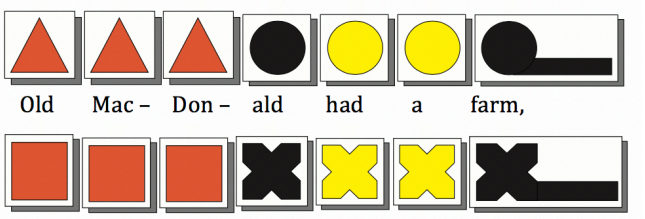


Figure 27 - Old MacDonald, line 1, Figurenotes arrangement.

In later sessions, the parts consisted of notes not in octaves, but still in the same note durations, as shown in Figure 28 below.

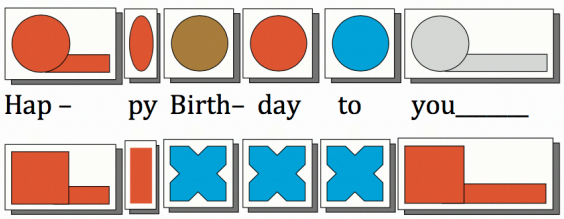


Figure 28 - Happy Birthday, Figurenotes arrangement, line 1.

This skill required participants to communicate non-verbally with their playing partner (myself) in order to match tempo and rhythm. It also required me to be aware of participants' playing in the same way, although I focussed on maintaining accurate rhythm in order to communicate this the participant. In the early sessions, participants generally did not show much awareness of the other part, and continued playing regardless of how closely the parts were matching in tempo or rhythm. In later sessions, however, participants become much more aware of the other part (as well as the basic tempo) and were able to modify their playing by waiting for me or speeding up as required.

Themes

Thematic analysis of videos, session notes, and interviews revealed four emerging themes in participants' music skills development in the Individual Phase. The action research approach used in the study allowed these themes to influence the development of the subsequent Group and Family Phases.

Participants vocalised melodies

Of the individual session phase participants, four (Charlotte, Neal, Alexander, and Sebastian) had spoken language at the time of initial assessment, however for two of these (Charlotte and Neal) the words spoken were not functional, but echolalic. One of the criteria for autism

diagnosis in the DSM-V is stereotyped or repetitive speech (American Psychiatric Association, 2013), of which echolalia is a common behaviour. However, it has been conjectured that echolalia, as a form of imitation, bears a resemblance to musical processing of sound, when words "become musical objects, to be manipulated purely through their sounding qualities" (Ockelford, 2013, p. 239). The echolalia used by Charlotte and Neal occurred primarily when song lyrics were demonstrated by me prior to the participants performing the music on the keyboard. When the song lyrics were printed on a score under the Figurenotes, Charlotte and Neal only sang the lyrics while playing the corresponding notes on the keyboard. This suggests that their vocalising in these cases was connected to their engagement in the musical activity, and to their repetition of a section of music in order to play it correctly (as a practice tool), and was not merely echolalia.

Three participants (Sean, Tony, and Steven) had no spoken language at all. Impairment in spoken communication is one of the most characteristic features of autism (Hanbury, 2012, p. 62) and it is therefore significant that by the end of the sessions, all participants were able to sing the lyrics of many of the songs used. Tony and Steven (both with no spoken language) began to vocalise rhythmically and melodically with the melodies used in the first sessions, in a manner akin to scat singing. As the sessions progressed, this vocalising transformed into a more clearly-distinguishable enunciation of the song lyrics, until by the last session they were singing quite clearly. These vocalisations almost always occurred as the participant performed the melody on the keyboard, using the Figurenotes score. Figure 29 below shows how the lyrics of most songs were printed below the Figurenotes.

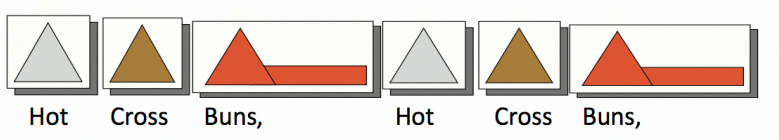


Figure 29 - Hot Cross Buns - melody and lyrics, line 1.

An exception was in *Twinkle Twinkle Little Star,* where only the Figurenotes were given, with no lyrics. It is of interest to note that Steven and Tony's vocalising of this song remained at a scat-singing level (singing sounds with no semantic meaning), even though they had previously demonstrated that they knew the song well by singing it spontaneously when I

told them we were going to play it. This suggests that the primary stimulus to begin to sing the lyrics was the fact that they were printed on the score. The extent to which Figurenotes facilitated the development of an ability to sing lyrics is unclear and would require further research specifically targeting this area. However, what is clear is that the combination of Figurenotes and song lyrics provided an effective pathway for participants to engage in music-making through simultaneously playing the keyboard and singing. A further aspect of participant's vocalisation is that when they had been vocalising during their sessions, they were more likely to speak to me or members of their family after the session. It would seem that the vocalising they attempted during the session motivated them to do this.

Session durations increased

Sessions early in the phase were short. Participants tired quickly and it was felt best not to push them in these early sessions. However, almost all participants were able (and willing) to focus and remain engaged for much longer periods in later sessions. There were several instances of a participant asking to continue beyond the allotted time; where possible, this was allowed, and the session was continued for another five minutes. The length of sessions varied between participants and between sessions. The main criteria for how long a session lasted was the attention span and engagement of the participants, although a maximum time of 30 minutes was allocated for each session. Table 15, on the following page, shows how session length for all participants (apart from Tony) increased from the first to the last session, in most cases by significant margins. The timings listed are the amount of time actually engaged in the planned musical activities and captured on video. In most cases, additional time involving participants spontaneously singing, or playing, occurred at the beginning and end of sessions while the camera equipment was being set up or packed up. The lengthening trend in session length reflects both participants' increasing ability to remain focused and engaged for longer periods, and also their willingness to do so. Of note is the fact that Charlotte's final session was twice the length of her first session.

Table 15 - Length of first and last session of each participant

Participant	Session 1	Session 8
Steven	13’17”	22’39”
Alexander	16’24”	22’32”
Neal	16’01”	21’05”
Sebastian	19’56”	25’ approx. (camera error)
Charlotte	8’04”	17’26”
Sean	14’23”	21’19”
Tony	17’26”	17’11” (Session 6)

Sessions were designed to be flexible enough to allow for repetition of activities, depending on the interests and patience of participants. As it turned out, participants were observed to be willing to repeat some, but not all, of the activities during the sessions. Songs were repeated to deliberately improve participants' performance, or merely because participants had enjoyed them. The increasing length of session for most participants may reflect their increasing interest in repeating activities.

Some participants exhibited an unwillingness or inability to sit calmly in early sessions. In the early sessions, participants may only be seated at the keyboard for the time taken to play one line of a song – 20 seconds or less – before they got up and walked or ran around the room. This behaviour may have been caused by a need for sensory regulation, in particular the sounds created when making music resulting triggering sensory sensitivity in participants, as described in 2.2. By the last sessions, all participants except Tony were focussed for almost the entire sessions, and they were able to sit and remain at their keyboard during the sessions. Participants’ parents reported being surprised by this ability of their children to remain focussed. Sean's mother reported that Sean would even go to the keyboard outside the sessions and sit for extended periods, which was in contrast to his usual agitated state. His mother stated that “he’s calmer at the keyboard".

Figurenotes assisted memorisation of new melodies

In Session 7, Alexander's mother described how Alexander had played on the piano at his grandmother's home when they had visited her a few days previously: "He just went to her piano and started playing. He didn't need the ... shapes and colours, you know, on the keys, he just knew what to do". Alexander, who was present during the conversation, added "I just used the sounds, and I could work it out". The piano had no Figurenotes on the keys, and there was no score to play from, so it was clear that Alexander had memorised the music used in our previous session.

Other participants also memorised melodies after initially playing them on the keyboard from Figurenotes scores. Two participants in particular, Alexander and Neal, were able to play *Twinkle Twinkle Little Star* and *Mary Had a Little Lamb* fluently and accurately without any visual or other prompts, by the end of the phase. The process of memorizing music is thought to be achieved by a combination of analytic (understanding the structure of the music), aural (memorizing by gaining an aural 'image' of the music), visual (remembering the visual layout of the printed score), and kinaesthetic (muscle memory gained by repeated performance of the music) elements (Herrera & Cremades, 2014, p. 216). Participants were not expected to memorise the music they performed and there were no specific activities designed to help them memorise. Instead, memorization was a spontaneous skill demonstrated by some of the participants.

The fact that memorization occurred prompts the question of how it occurs, and specifically if Figurenotes may have facilitated this. Many of the melodies used in the sessions were well-known tunes and participants already knew the melodies from previously hearing them. Therefore, aural memorization (and possibly analytic memorization also) probably had already occurred in these cases. Therefore, the process of learning these known melodies may have occurred in a sequence of hearing-singing-reading-playing. Their memorisation of playing the melodies may have involved aural, analytical, visual, and kinaesthetic elements to varying degrees, and it is not possible to identify exactly which elements were most dominant.

However, in the case of previously *unknown* melodies, participants would not have been able to call on any element of prior memory when first presented with the Figurenotes

score. Their first experience of the melody was when they first played it on the keyboard, and at that time they had to rely completely on looking at the score to learn the melody. Participants may thus have learned these melodies in the sequence of reading-playing-hearing-singing. Visual memory was the earliest activated element in the eventual memorisation of the melody. Participants read the Figurenotes scores for these melodies while learning to play them, so their kinaesthetic memory would have been developed at the same time as their aural and visual memory. Therefore, it is likely that participants would have used their visual memory from the Figurenotes scores as a significant part of the process of memorization. Thus, Figurenotes played an important role in assisting participants to memorise the melodies used in the sessions, particularly for those melodies which were new to participants.

Importance of patterns

The musical patterns represented visually in the Figurenotes arrangements were attractive to the participants. On several occasions, participants pointed at a Figurenotes score and told me they saw a pattern, which seemed to interest them greatly. The non-verbal participants (Sean, Alexander, and Tony) indicated their interest in particular patterns by repeated playing of the musical phrases in which the pattern occurred. Participants were also very eager to point out to me any variations to the patterns given. Figure 30, below, gives an example.

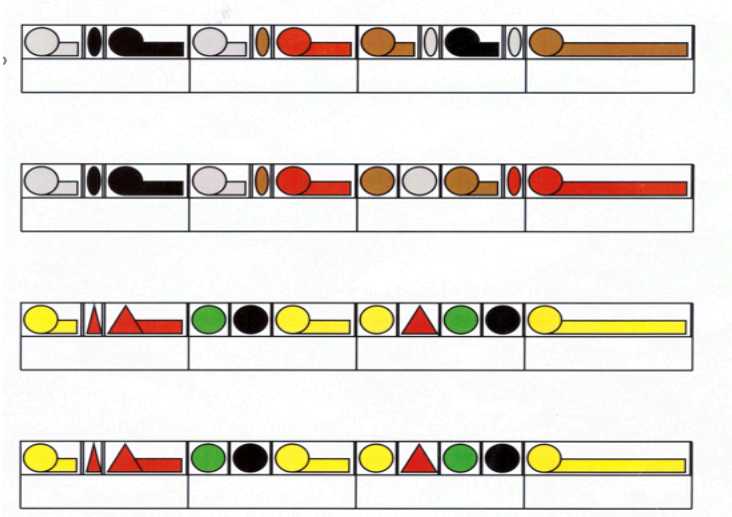


Figure 30 - Segment of Figurenotes score showing patterns and variations.

In the above example, lines 1 and 2 are identical until the mid-point of each line. Thereafter, the notes are of differing pitches and durations, although there are still some similarities. Participants seemed to take pleasure in recognising and pointing out similarities and differences such as these in patterns within the music. The coherence of music is based on an ability to perceive the patterns which constitute the building blocks of musical structure. Repetition, variation, and embellishment of repeated musical phrases are all ways in which patterns can be manipulated within the music. For children with autism, the patterns inherent and fundamental to music may be particularly meaningful and attractive, and "it is as though music, with its reliance on repetition, could have been especially devised for those on the autism spectrum" (Ockelford, 2013, p. 99). In this way, participants' existing interest in patterns may have been facilitated by their representation in colours and shapes in the Figurenotes scores.

4.5 Social Interaction

The outlier nature of Tony's case is shown clearly in a comparison of social interaction ratings. There was a much more consistent rise in the quality of social interactions of the averaged participant cohort than for Tony individually, as shown in Figure 31 below. As described in the case study, Tony is not typical of the other participants, and the remainder of the cohort showed steady increases from session to session.

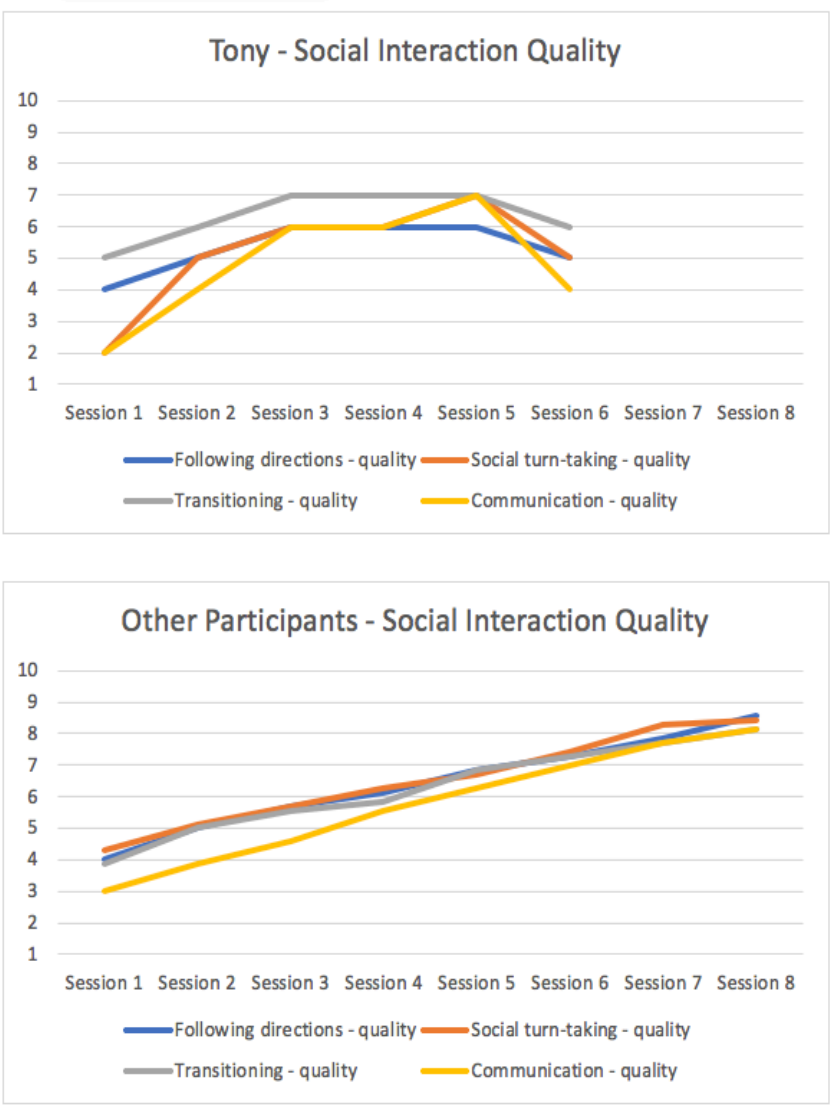


Figure 31 - comparison of Tony and other participants, social interaction quality.

As with music skills, increases in one area of social interaction were paralleled by similar increases in other areas, suggesting close correlation between the different areas rated. Four emerging themes were identified in social interaction, and are described in the following sections.

Quality of social interactions increased

Social interaction ratings included measurements of the frequency of particular interactions as well as the quality of those interactions. As described in the methodology chapter, it was decided to include both frequency as well as quality because these may give different perspectives on the interactions observed and both together may provide a more useful picture of changes in a participant's state (Hernández et al., 2015). The contrasting results which were obtained in this study from frequency and quality measures give weight to this argument. In general, quality of interactions increased from session to session for most participants. However, the frequency of these interactions was much more variable. In the individual sessions, the frequency of directions given decreased steadily in direct contrast to the increasing quality of the following of these directions by participants, as shown in Figure 32 below.

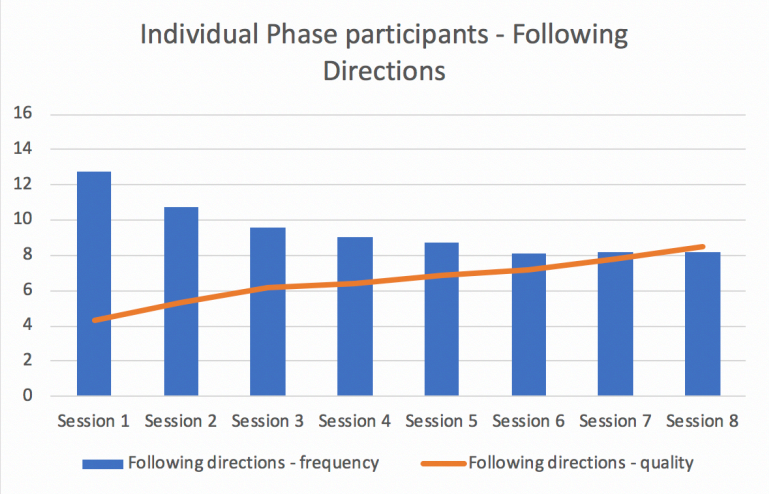


Figure 32 - Individual Phase participants, following directions.

Yet in the same Individual Phase, both frequency and quality of communication increased as more choices were given to participants during the sessions, as shown in Figure 33 on the following page.

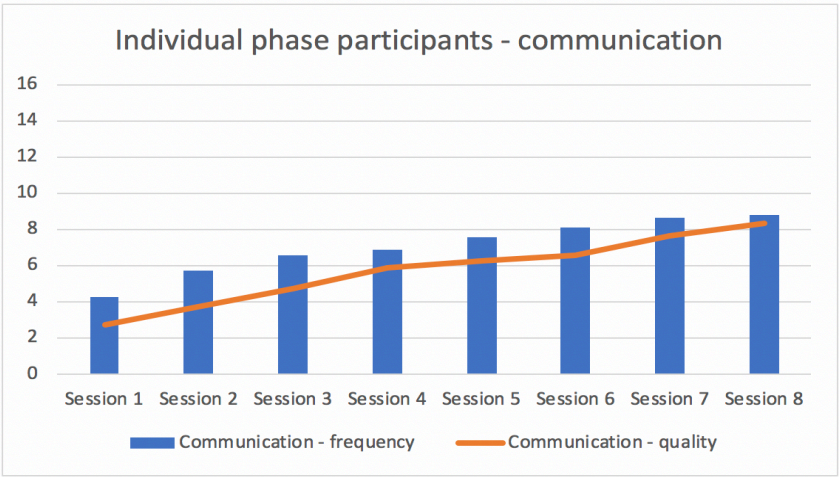


Figure 33 - Individual Phase, participant averages in communication quality and frequency.

Increases in the frequency of interaction may indicate that social interaction is improving. However, a decrease in frequency does not necessarily mean a decline; when accompanied by an increase in interaction *quality* it may suggest the opposite - as seen in Figure 30 above. This result can be explained by considering the purpose of directions given as part of the sessions. The aim during the sessions was to give as few verbal instructions as possible, partly due to the focus on music-making generally, and also due to the tendency of children with autism to have difficulties processing and comprehending verbal instructions (Blair, 2014, p. 368). Nevertheless, in the first session, participants needed to learn the procedural "rules" of the sessions, as well as details regarding how Figurenotes was to be used and technical aspects of instrumental playing. This resulted in a high count of verbal instructions in the first session. In the second session, a number of these directions needed to be repeated, ensuring the count was still quite high. In subsequent sessions, new directions were still needed for newly-introduced activities, but the need for directions in repeated activities reduced markedly as the participants became more familiar with the sessions structure and the Figurenotes activities. Thus, the results for frequency over the sessions show a steady decrease from the first to the last session.

A contrasting story emerges for the quality. The quality of following directions was assessed on how well the participants carried out the directions. In general, at first the participants needed to be given instructions multiple times or using different words. As the sessions progressed, participants demonstrated increasing ability to comprehend and act on directions correctly immediately they were given, and thus their ratings for quality improved

steadily. A participant's following directions has a different nature to a participant's communicating with another person. Following directions relates mostly to instruction, whereas communication relates to interaction. Thus the increase in frequency as well as quality in the communication ratings gives weight to a conclusion of overall improvement in social interaction by participants.

Choice prompted communication

One participant, Sean, showed no interest in participating at the start of Session 3. He was unengaged, turning away from me and sitting on the side of the keyboard stool, and even running away at one point. Rather than force him to do the planned musical activity, I instead placed two Figurenotes sheets in front of him – *Twinkle Twinkle Little Star* and *Mary Had a Little Lamb*, and asked him to choose which one he wanted to use. Sean looked carefully at each sheet (we had used both in the previous session), looking back and forth and inspecting various details of the scores. He eventually opted for *Mary Had a Little Lamb* and placed it on the music rest, willing now to sit and read the Figurenotes and perform the song. In subsequent sessions whenever Sean seemed unengaged, he was given a choice of activities, and he always responded positively to this. The quality of Sean's communication continued to increase in most subsequent sessions. Thus, being given a choice of music to play may have motivated Sean to communicate more during the sessions.

Other participants were also given a choice of activities, either as a response to a lack of engagement, or in order to stimulate communication and interaction. In most cases, when presented with a choice of two activities, participants eagerly engaged in a selection process involving careful examination of the resources; rarely was a choice made superficially or quickly, except when a participant had a strong preference for one activity over another. Participants were occasionally given a choice between their favourite activity (previously identified) and an alternative activity, for the purpose of stimulating interaction, even though they could be relied on to always choose their favourite!

Social Interaction occurred during music-making

Interactions between participant and researcher during sessions were expected to occur between the musical activities, for example when instructions were given for playing a new song. However, as the sessions progressed I observed that there were many interpersonal

interactions occurring within the music activities. These typically occurred in three ways: vocalising, movements, and in duets.

Vocalising

Much of the music chosen for Figurenotes arrangements was songs with lyrics, and in many cases the lyrics were printed on the scores used. Some participants spontaneously sang the lyrics while playing the songs, while others were encouraged to do so and started singing as the sessions proceeded. Steven initially vocalised using vowel sounds in a kind of scat singing, and later was able to pronounce the words more clearly. Charlotte increasingly sang along whilst playing during the sessions, to the point where her singing became loud and dominated the activity. Sean actually read through lyrics of songs before playing them – his playing was done without accompanying vocalising, as if doing one thing at a time was all he could do or wanted to do. When there were no lyrics printed, participants would often vocalise along with their playing by singing or saying the Figurenotes colours as they played, such as "red, green, blue!".

Movements

Sean liked to use his arms in gross-motor movements on the keyboard, bringing his hands down forcefully on the keyboard in an improvised way. Sean did not have spoken language, but these movements (and the resulting loud, dissonant sounds on the keyboard) were clear communications from him – more so as he would look at me as he was doing it, seeming to expect a response. It seemed to be Sean's way of expressing himself. On the other hand, Tony liked to move his body and dance while I played some of the songs at the end of his sessions. All participants used body language frequently to communicate with me, sometimes pushing my hand away when I was guiding them during their playing, or taking my hand and indicating for me to guide their fingers.

Duets

The ensemble arrangements in Figurenotes were the structured tool for interaction during the sessions. Each was designed to require careful listening and watching by the participants so that the parts could be played together. During the performance of these duet activities, participants were actively listening, watching, and responding to my cues when playing the bass part to my melody. When participants were playing the melody (usually immediately

after playing the bass), they gave me the cues. Some participants even counted in ("1-2-3-4") before starting the arrangement, copying my model given in earlier sessions. Figure 34, below, shows a Figurenotes arrangement where this occurred.

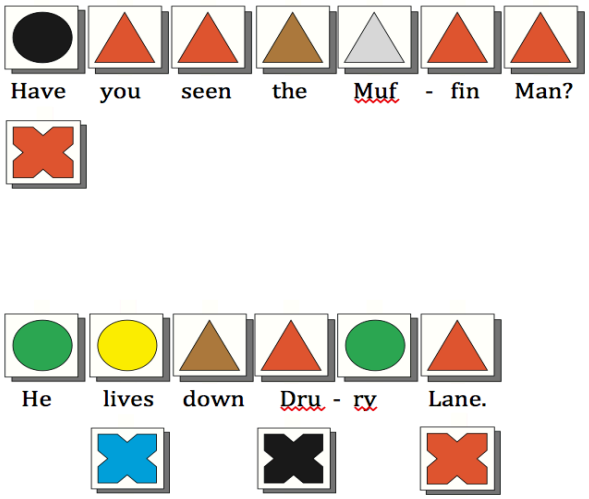


Figure 34 - Muffin Man, melody and bass.

These three aspects – vocalising, movements, and playing duets, were interactions which occurred during the musical activities, and required the ability to listen and watch, matching responses with stimulus, and shared attention. They can thus be considered types of social interaction, in some cases substituting for verbal exchanges. Children with autism often need alternatives to using spoken language when interacting, and the interactions which occurred through the musical activities demonstrate how music-making may facilitate this.

Family members became involved

A final emerging theme in social interaction from the Individual Phase was the unexpected interest shown by family members during the sessions. The communication between participants and their siblings and parents resulted in some of the most significant instances of social interaction that occurred during the sessions. The involvement of parents and siblings in sessions in the Individual Phase was not planned. However, holding the sessions at participants' homes meant that it was not possible to exclude the presence of parents and siblings, and although it was made clear that the sessions were only for the participant, hearing the music-making attracted the attention of their parents and siblings such that the sessions were at times closely observed by family members of participants.

Initially, parents occasionally came into the session room check that that their child was participating and was comfortable in the situation. When a participant showed disengagement, for example when they refused to undertake an activity or got up to leave the room, the parent would try to encourage their child to resume participation. Sean's mum in particular paid close attention to what we were doing in the session, and when Sean was reluctant to continue at one point she told him "if you want to do your favourite song then you have to play *Old MacDonald* first". Another example of parent involvement is provided in the case of Tony, who was the participant most resistant to engagement and interaction. Tony's mother at times came and sat on Tony's keyboard stool and placed Tony on her lap – a tactic she advised me she had used in other therapy contexts - which had the effect of helping Tony focus on the activities in the session.

Siblings also became interested in the sessions. All participants except Tony had a sibling who was home during the sessions, and our sessions increasingly attracted the attention of the siblings; initially they were observed standing at the door to the room where sessions were held, watching and listening, and later came into the room and asked what we were doing. The participants showed varying degrees of acknowledgement of the sibling's presence. Sean and Charlotte are siblings, and each was usually very interested in the other's session and would come into the room where sessions were being held, listening and watching. The relationship between Sean and Charlotte is different to the other participants' sibling relationships, not only because Sean and Charlotte are twins, but because they both have autism.

The involvement of family members in the Individual Phase was unexpected, but positive for the participants. It is possible that the presence of siblings may have helped the participants to relax. Participants seemed to enjoy the opportunity to perform for an audience, and parents and siblings frequently commented on their surprise that the participants were able to play so well. The action research approach taken in the study enabled this ad-hoc involvement of family members in the Individual Phase to inform the addition of a Family Phase to the study where the involvement of family members in Figurenotes activities could be studied more closely.

4.6 Self-Concept

Observations of participants' emotional and affective responses to their experiences in the Individual Phase sessions provided evidence of various manifestations of participants' self-concept, from which the following themes emerged.

Self-expression

Self-expression by participants occurred through the participation in songs which had meaning for them. An example is Neal's use of the song *Wake Up Jeff!* by The Wiggles. This song was requested by Neal's mother for use in the sessions, as she had noticed Neal singing and listening to it with enjoyment previously. A simple arrangement in Figurenotes of the song was prepared for use, shown in Figure 35 below.

Figure 35 - Wake Up, Jeff!, Figurenotes arrangement, lines 1 and 2.

Neal sang and played his part with a loud voice, adding emphasis to the words by singing each word as a command, "WAKE! UP! JEFF!", and laughing afterwards. His mother mentioned that Neal does not like to get up in the morning and that she often has to repeatedly try to wake him up, and so for Neal and his mother this song has particular significance. Using a song in this way shows how music can be a "safe and structured stimulus" for children with autism (Lagasse, 2017, p. 24), enabling emotions to be expressed in a way which is contained and can be understood by the children themselves and by others.

Other opportunities for self-expression came when participants were allowed to play a Figurenotes arrangement using their own choice of fingering, as shown in the examples of Tony's fingering of *Mary Had a Little* Lamb (Figure 17) and Sebastian's fingering of *Do Your Thing* (Figure 27). Also, participants sometimes chose their activities when given a choice between two Figurenotes arrangements. I observed that participants were more likely to play through an arrangement without stopping if they had specifically chosen it themselves. This supports a previous research finding that opportunities to choose the order of items in a schedule may increase the engagement of people with autism (Watanabe & Sturmey, 2003).

Initiative and independence

Participants at times took the initiative in sessions. It was anticipated that I would need to lead activities and give both the structure of the sessions and the cues needed to begin each activity. However, there were several instances of participants taking over these roles and showing a considerable degree of initiative. This manifested in two areas. Firstly, by beginning an activity unprompted. Steven began to perform Figurenotes arrangements as soon as the scores had been set on the music rest at the keyboard, and while I was still organising other resources, not having yet indicated by words or another prompt that the participant was to begin. Secondly, by spontaneously taking a book of Figurenotes arrangements and looking through it to find activities which had not been introduced yet. Alexander did this, and indicating by pointing (or even by starting to play or sing it) that he would like to do an activity he found in the book.

A related finding was of participants' independence in music making. Once participants had been guided (by having the notes on the score pointed to as they played) through the Figurenotes scores in the exercises and simple melodies given in the assessment and initial sessions, they were in many cases able to read and perform the scores without assistance during the majority of the remaining sessions. In particular, Alexander, Sean, and Neal indicated verbally or by gesture that they did not wish to be assisted, even when they hesitated in their performance and it seemed appropriate to assist them by pointing at the correct note in the score.

Another way in which participants showed independence was in their spontaneous counting-in before playing. In the early sessions, I counted in the tempo of each music activity, for example counting "one, two, three, four" for a melody using four beats to a bar. Some participants began to spontaneously do this themselves in later sessions. Sean, who preferred not to use his voice, counted in by silently tracing the numbers (1, 2, 3 etc.) with his finger on the top of the keyboard before playing.

Increasing confidence

All participants showed increasing confidence in attempting particular Figurenotes arrangements. Sebastian had some difficulty with the arrangement of *Stairway to Heaven* introduced in Session 5; he achieved it but with low fluency. In Session 6, I approached this arrangement with caution, asking if he would like to try another one. Sebastian replied “No, of course it’s not difficult”. Notwithstanding the possibility that he may not have been fully aware of how challenging it would be, this response clearly shows a belief in his own ability to perform this arrangement. Another instance occurred with Sean when I was tracking (with my finger on the score) the notes to be performed in *Happy Birthday*. Sean reached out to move my arm away, clearly indicating he did not need my guidance and was able to perform it unaided. In Session 3, Neal said at one point “I don’t like reading” - yet this was said while he was actually reading and playing the Figurenotes score accurately. Alexander, in Session 4, asked me if he could play both the melody and bass of the arrangement of *Lean on Me* which had been intended as a duet. Asked why he wanted to play my part too, he replied "Because it's easy!".

Perhaps the most significant indication of a growth in self-confidence was provided by Neal, when after Session 6 his mother told me that Neal had asked to resume his tennis coaching, an activity he had given up a few months previously due to comparing himself unfavourably with the other children. His mother stated that in her view, the increased sense of achievement Neal had gained specifically during these sessions had allowed him to feel ready to resume his tennis. Neal's confidence may also have been positively affected due to the importance he attached to his competence in the music activities.

Sensitivity to perceived difficulty

All Figurenotes arrangements used in a session were designed to be achievable by the particular participant in that session, based on the initial assessment or their performance in previous sessions. Nevertheless, there was often some degree of challenge and participants sometimes had to move outside their comfort zone to successfully perform an arrangement. This enabled some of the positive self-competence results described earlier, however there were instances when participants reacted negatively to challenge. Alexander, Steven, Tony, and Charlotte all refused to do some activities, either by telling me directly that the activity was too hard, or by their body language in refusing to begin or continue the activity. When asked to perform *Twinkle Twinkle Little Star* hands together (melody and bass) in Session 7, Alexander responded by asking me, “Is it too hard?”. I answered his question in the negative and he consented to doing the activity. Although he performed with a high level of accuracy, Alexander seemed to need my reassurance in order to have the confidence to attempt it.

Extrinsic rewards replaced by internal motivation

As described in Tony's case study, Tony's parents used rewards in order to get him to participate in scheduled therapy sessions. Initially I was uncomfortable with this. I would have preferred Tony to willingly participate on his own terms. However, the use of rewards was obviously effective in motivating Tony, and I began to see the potential value of a well-considered reward system in enabling Tony to begin the process of engagement, which would hopefully move from an exclusively extrinsic motivation to a more intrinsic basis. Similarly, after Neal had shown some hesitation, his mother offered him time playing his Nintendo video game if he participated in his first session. Also, Sean and Charlotte's mother promised them they could watch TV after their first session, which had the effect of focusing their attention on the session.

The reward systems used by these participants' parents continued for subsequent sessions, however they became less important for the participants as they became more intrinsically motivated to complete their sessions. There were even several instances of participants wanting to continue their session for longer after I indicated to them it was finished. From this it can be surmised that the use of extrinsic rewards was a useful mechanism to assist

participants to engage early on, but that the sessions proved rewarding for the participants , and this increased their motivation to participate.

Summary

The Individual Phase enabled me to develop many musical activities using Figurenotes with participants, and there were generally successful outcomes for the participants. Not all exercises, melodies, and musical stories worked for all participants, in particular with Tony (as described in his case study, 4.2) and this prompted me to continue to develop new arrangements during the phase. I was then able to use the lessons I had learned, as well as specific activities developed during the Individual Phase, in the subsequent Group and Family Phases. The skills I developed in using Figurenotes as a tool to facilitate music-making by the Individual Phase participants enabled me to approach the Group Phase with confidence, whilst being aware that the next phase would present new challenges.

CHAPTER 5 - GROUP PHASE

The Group Phase was the second large-scale iteration of the action research cycle, and drew on the outcomes of the first, Individual Phase. Participants in the Group Phase were members of two separate classes in an autism unit within a public school. Having two separate participant groups enabled comparisons to be made between the groups, and the differing age range of the groups also enabled a wider variety of Figurenotes activities to be employed. As Groups 1 and 2 were quite different in participant age, session structure, and participant response, sections in this chapter contain separate descriptions for each group.

5.1 Phase Planning

Information sheets and consent forms for the two classes in the school autism unit were prepared and distributed to all parents via the school staff one month prior to the commencement of the sessions. Any parents who did not return their consent form to the school were contacted by the staff to confirm whether they wanted to participate or not. Group 1, the younger group, consisted of 14 students who were all in a class in the autism unit which combined Kindergarten & Year 1. Students were all aged either 6 or 7, as shown in Table 16 below.

Table 16 - Group 1 participants and ages

Name	Age
Xavier	7
Ben	6
Chris	6
Colin	6
Ernie	6
Lonny	7
Vincent	6
Barnaby	6
Harry	7
Liam	6
Henry	6
Ellen	7
Anne	6
Susan	6

In order to allow for the observations of individual children to be detailed enough to allow a clear picture to emerge of each, five participants were identified at random prior to the start of the sessions to be closely observed for changes in their music skills, social interaction, and self-concept. The participants chosen were Barnaby, Vincent, Susan, Colin, and Ellen.

Group 2 contained seven participants from a class which combined Years 2-6. Participants' ages in this group were more widely spread than in Group 1 (see Table 17 below).

Table 17 - Group 2 participant names and ages

Name	**Age**
Christopher	12
Andrew	10
Hugo	11
Julian	8
Katherine	11
Jeremy	12
Aran	9

Two parents in the Year 2-6 group did not return the consent forms by the date of the first session. This meant that two participants, Hugo and Julian, could not participate in the first session. When contacted by the school the parents returned the forms, saying they had merely forgotten to do so earlier, and so Hugo and Julian were able to participate from Session 2 onwards. The smaller size of Group 2 made possible the close observation of all group participants for changes in their music skills, social interaction, and self-concept. Observing all group participants was also desirable given the wide variation in age of the participants.

The *Perceived Competence and Social Acceptance Scale* was administered in the week prior to the commencement of the Group Phase participant sessions for both groups, and again at the conclusion of these sessions. Administration of the scale was quite problematic in practice. In total, twelve participants (seven of the fourteen participants in Group 1, and five of the seven participants in Group 2) fully completed both pre-test and post-test profiles. The remaining participants missed either pre-test or post-test, or both. This was due to participant absence from school on the testing days, or not having received signed consent forms from participants' parents before the pre-test day. The school regulations stipulated that any surveys with individual students and a researcher needed to be conducted in a location with full view of the school classroom. The only locations available at the times set for the testing were outside the classroom in the play area (for Group 1) or at the back of the school classroom (for Group 2). On the pre-test day for Group 2 there was a video playing on the classroom projector screen, while the surveys were administered at a desk at the back of the room. Each of the students came and sat with me in turn. The video proved distracting to the children, and I had to frequently direct their attention back to the task at hand, and sometimes wait until they were ready to pay attention again. Some participants were reluctant to undertake the pre-test survey and had to be encouraged by the school staff, although in the post-test, most participants came willingly.

Participants' scores in the *Perceived Competence and Social Acceptance Scale* may have been affected by factors outside of the questions themselves. The scores may have been affected by participants' moods and emotions on the testing days, as well as (for Group 2) the distraction of the classroom video. Also, the scores given by participants may have varied according to how comfortable they were with me as the researcher-practitioner. It is additionally possible that not all participants may have taken the surveys equally seriously. For these reasons, there are limitations to the validity of some of the scores obtained in the *Perceived Competence and Social Acceptance Scale* in this study. However, all the participants discussed in this chapter with regard to their results are regarded as having given accurate scores based on their demeanour during the testing.

In contrast with the more flexible session durations in the Individual Phase, sessions in the Group Phase were always the same duration. The music period at school was 50 minutes and five minutes of this was allowed for transitions, so the sessions lasted 45 minutes. The

school music teacher expressed concern prior to the sessions that the children may not be able to focus for 45 minutes without a break. Generally, music lessons at the school consisted of one activity, then a break, then a second activity. Based on the teacher's advice, I was ready to allow a break during my sessions. There were some differences in individual engagement during the sessions. Some children lost focus or became unsettled during some sessions, and one of the teacher aides would remove the child from the group circle for a time-out of a few minutes. Also, some participants preferred to watch and listen for short periods rather than participate actively. However, these incidents became more infrequent by the later sessions, and in no sessions did I or the teachers feel that the whole group needed a break.

The group sessions required a more carefully-planned structure than the individual sessions. The planning process took place based on observations of the groups in their regular music lessons which I had observed over the previous weeks, as well as the responses I had observed during administration of the *Perceived Competence and Social Acceptance Scale* in the week prior to the first sessions. In later sessions I was able to draw on the direct outcomes of the previous sessions to inform the plan for the next session.

It was originally planned to conduct eight sessions with each group over eight weeks, but in fact on a few occasions the regular class music period was replaced with a sporting or whole-school activity and it was not possible to reschedule the session on those occasions, nor was it possible to extend the sessions beyond the allocated term time. The final number of sessions was seven for Group 1 and six for Group 2. Activities in the Group Phase sessions were designed to enable development of the music skills to be rated in this phase, which included those rated in the Individual Phase (accuracy, fluency, technique, and playing together) with the addition of music turn-taking.

Because of the difference in ages of participants between the two participant groups, the activities needed to be different for each group. The primary age-related considerations when designing activities were:

- using age-appropriate music and songs;
- fine motor skills of the participants; and
- cognitive abilities of the participants.

I had the opportunity to interview the school music teacher both prior to the first session and at the conclusion of the final session. Additionally, I attended two music lessons in the term prior to conducting the participant sessions, enabling me to observe the participants and to design activities. Using different, age-appropriate activities for each group was justified by the outcome of the sessions. Participants in each group showed enthusiasm for and engagement in the activities used.

Group 1 Session Activities

First Figurenotes

Many activities prepared for the Year K-1 group were based on activities in *First Figurenotes*, a collection of picture and activity cards and simple songs published by Drake Music Scotland (Wilkie, 2012). This collection was designed for use with early years (aged 2-5 years) music groups. Earlier personal observation of the use of First Figurenotes at Drake Music Scotland, including with children with autism aged 6-7 years, had convinced me that the activities were appropriate for use in the present study. In each session, a specific activity was used to assess the music skills of every participant. The activities used were:

- *Rain is Falling Down*
- *Walking on the Moon*
- *Butterfly Jump Jump*
- *Mr Whale*
- *Golden Bells*
- *Watch my Kite Fly High*

Occasionally, adaptions to *First Figurenotes* activities were needed to make them more appropriate for the group. Figure 36 on the following page shows the flashcard used for *Walking on the Moon*.

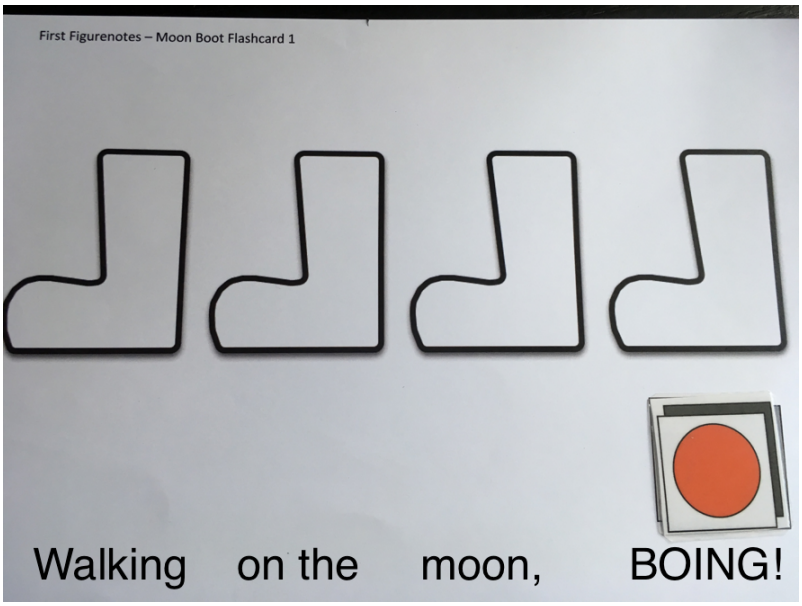


Figure 36 - Walking on the Moon, from First Figurenotes (Wilkie, 2012).

The participants quickly exhausted the possibilities of the song in its simple version, even with the numerous variations suggested in the notes accompanying the song. Therefore, I added a new section which altered the rhythm to include shorter notes to match the syllables of the lyric "Walk-ing-on-the...", which allowed extra challenge in playing and moving to the song.

Rhythm Games

Each session also consisted of some rhythm games, using a whiteboard and Figurenotes magnets. The activities involved reading a short rhythm written in Figurenotes (often also incorporating different pitches) and playing it on a xylophone or glockenspiel. These activities were designed to develop participants' music skills and enable participants to demonstrate these skills. An example is given in Figure 37 below.

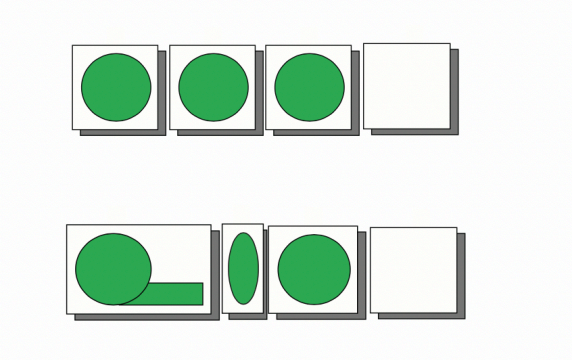


Figure 37 - Group 1 rhythm game.

Group 2 Session Activities

Fairy-Tale Hip-Hop

A series of slides of images from two well-known stories, the movie *Shrek* and the fairy tale *Red Riding Hood*, were created, along with accompanying music and lyrics. The lyrics were written in hip-hop style, which was designed to appeal to the Group 2 participants (Figure 38 below).

"Grandma" says I
"Your eyes are huge"
"Good" says she
They're better to use.
"Grandma", says I
"Your mouth's too wide"
"Good", says she
"to put you inside"

I'm the one
The one with the hood
It's poppy red and I'm feeling good
I'm the one
The one with the hood
It's poppy red and I'm feeling good

Figure 38 - Red Riding Hood Rap, example of lyrics and image (Willoughby, 2012).

Each fairy tale hip-hop song had a chorus melody which was played by participants on glockenspiel, bells, or xylophone, either individually in turn or together as ensembles. These activities proved highly motivating for the participants, and they frequently asked for both activities in sessions where I had planned to use only one of the activities.

In the final two sessions, *Jingle Bells* was added to the activities (Figure 39 below).

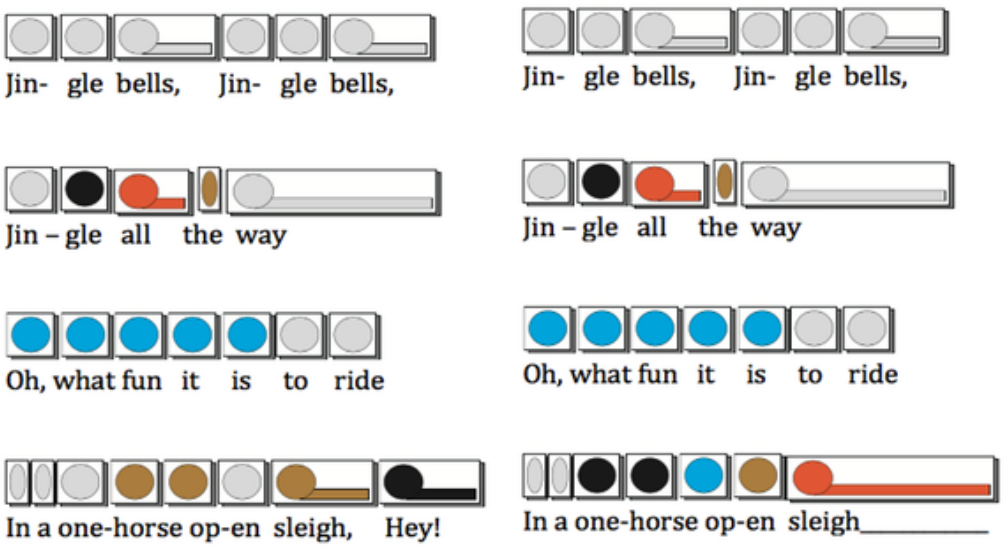


Figure 3 - Jingle Bells, Figurenotes arrangement.

This was chosen for the Christmas season, but also because its melody was an appropriate level of challenge for the group at this stage. The melody of *Jingle Bells* is quite long, but uses only five notes, and has two verses which are almost identical apart from the last line.

Rhythm Games

As for Group 1, rhythm games were incorporated into each session, using Figurenotes magnets and a whiteboard. For Group 2, the rhythm games were also used to develop ensemble skills. Figure 40, below, shows the *Colour Teams* activity.

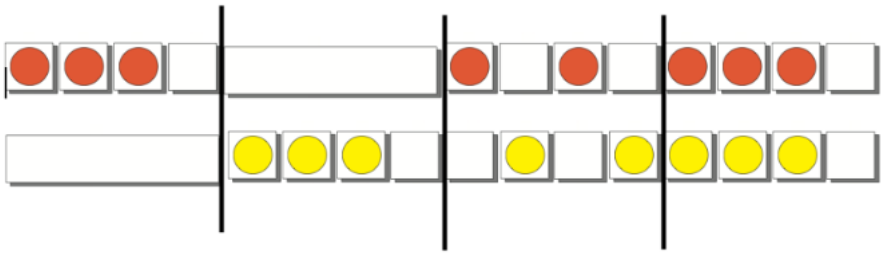


Figure 40 - rhythm game (Colour Teams).

The group was split into a red team and a yellow team, and to be performed successfully, each team needed to maintain accurate rhythm while staying in time with each other and the other team. The rhythm games, along with the other activities designed for the Group Phase, were thus targeted to developing the music skills to be rated.

5.2 Participants and Sessions

Group 1 Case Study: Ellen

As the students entered the classroom for Session 1, one girl walked straight up to me and said “Hello, my name is [Ellen]. What’s yours?” I was surprised by the directness of her communication, as the other children seemed to show no awareness of me, and it is not typical of children with autism to initiate communication in this way with an unknown person. I had met some of the children in previous weeks when I had observed the class and when I administered the pre-test *Perceived Competence and Social Acceptance Scale* with some of the children, including Ellen. However, on those occasions Ellen had not maintained eye contact with me, did not seem particularly interested in me, and had not remembered my name. Nevertheless, on this occasion she seemed to recognise that I was running the session and I saw her advance as a way for her to feel OK with the situation, as well as an expression of her personality. I replied “My name is Matthew. I’m looking forward to our session today”. She seemed satisfied with that, and went and sat down.

Aged 7, Ellen was a lively girl who spoke a lot (I had observed her teachers frequently asking her to stop interrupting) and had a strong presence with the other students. She was physically a larger presence, too, and this seemed to intimidate some of the other participants a little. I noticed that the student who sat beside her at this first session moved his seat a little away from Ellen, as if he knew that Ellen was likely to flail her arms around at some point (which she in fact did) and he had better keep his distance! Ellen’s scores in the pre-test *Perceived Competence and Social Acceptance Scale* had been close to the group average, as shown in Figure 41 on the following page.

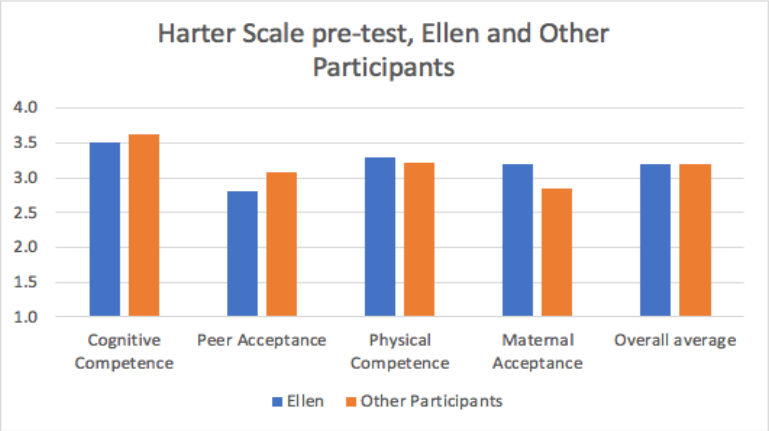


Figure 41 - comparison of pre-test scores, Ellen and other participants.

During the pre-test administration of the scale, Ellen got up from her seat to demonstrate the particular skills mentioned in the physical competence questions – hopping, jumping, running, and tying shoelaces. This tendency to accompany her spoken language with physical demonstration was exhibited many times during the subsequent sessions.

Ellen was one of the lowest-performing children in music turn-taking in Session 1. She played her part on the chime without regard to the other parts, and played very loudly, banging with her beater on the chime as hard as she could. She participated with enthusiasm but without skill. She was also quite unfocussed and was not able to follow directions. Nevertheless, at the end of the sessions she smiled and said "Goodbye!" to me before leaving. She seemed to have enjoyed the experience in her own way, even though I was quite frustrated by what I felt at the time was her under-achievement, given her initial interest.

During Session 1 Ellen had expressed her preference for the colour red. In *Raindrops Falling Down* at the start of Session 2, I placed a red magnet for Ellen to play on the glockenspiel when her turn came. She seemed delighted, and played with such energy that the bar bounced loose from the frame of the glockenspiel and fell out. This enabled me to take the opportunity to demonstrate to the whole group how to hold the beater to achieve optimal sound. This demonstration which had a greater effect on the participants than an earlier one I had given, when participants seemed uninterested. Ellen's music skills during Session 2 improved significantly, and it seemed that she was achieving some of the potential I had

seen in her. At the end of the session Ellen, along with the other girls (Anne and Susan) came up to me and offered to help with packing up my equipment. I invited them to help pick up all the chime bars and put them in the bag, which they did - Susan and Anne with care, while Ellen almost threw them in, but with a smile.

In Session 3 Ellen showed improvement in many areas of her music skills and social interaction - an increasing ability to follow directions, take turns, and transition between activities in particular. However, her playing of chime bars and glockenspiel was still hampered by her heavy-handedness with the beater, and I again demonstrated beater technique (and guided her in her playing) in order to address this. I noticed that many of the children would hold the chime or bell on the vibrating part which effectively deadened the sound. When this was pointed out to them, most (including Ellen) understood that they should hold another part of the instrument. However, in Ellen's case her impulsivity meant that she had to be reminded to do this frequently in all remaining sessions.

At the end of Session 3 I introduced the song *Butterfly Jump Jump*. The lyrics of this song suggest jumping and most participants spontaneously began to jump when singing this song. However, after I had demonstrated the song for the first time, Ellen announced in a loud voice "Butterflies don't jump!". I asked her if she could suggest another action we could replace it with, and she came up with "drink". Another child asked what butterflies drink, I replied that they might drink nectar. "What's nectar?" another child asked. Ellen turned to that child and said "Nectar is in FLOWERS!" as if it should have been obvious. Ellen's communication with her peers was becoming more frequent, although the interactions were still not very positive.

In Session 4, Ellen's playing in *Rain is Falling Down* showed a much-improved technique. She was now able to control her energy and strike the beater to produce a pleasant sound on the chime or glockenspiel. However, neither Ellen's music turn-taking or social turn-taking was as good in this session as in the previous session. She played when it was not her turn in ensemble activities, and also interrupted other participants (and me) in discussions. Yet I sensed a warming in the other participants' attitude towards Ellen, and she seemed to be perceiving the influence she had on the group, as well as allowing the other children to interact with her more.

At the start of Session 5 I noticed there was a different mood in the classroom. The reason for this became clear when the teachers started discussing the issue of the day – one child had lost a set of swap cards from his schoolbag. The teachers had been asking each of the other students if they had seen or taken the cards, and during the music session they continued to pull children from the group to interview them, in order to resolve the issue. The students were quite unsettled by these events, and Ellen was also affected. Her social interactions were of a lower frequency and quality in this session. However, Ellen's music skills did not decrease. Her turn-taking in the musical activities improved significantly from the previous session, but her social turn-taking did not. This suggests that the negative effect of the stolen cards issue was less significant for her during the musical activities, perhaps because the music acted as a distraction for her and enabled her to continue to participate freely despite the general malaise of the situation.

In Session 6 Ellen initially played at a faster tempo than the other participants, and her playing technique was also somewhat unsuccessful. It seemed that she was a little nervous, and it is possible she had remembered the previous session's tense atmosphere. There may be other reasons for the resumption of Ellen's more impulsive behaviour – what she had been doing immediately prior to the music session, for instance. Nevertheless, her social interaction, and particularly her communication with her peers, showed real improvements in this session. During the creative work activity, the children each chose a sequence of four Figurenotes to make a short composition. When one boy performed his four notes, Ellen exclaimed "It's like a rainbow!", and the other children laughed. Ellen interacted more frequently with other children in Session 6, and this continued into the final session.

In Session 7 I extended some of the musical activities we had been working on, encouraging them to be creative and change the set patterns in some of the songs. This would not have been possible in earlier sessions, where Ellen had voiced her complaint several times when I had swapped two notes (principally to test their reactions) or deliberately sung incorrect lyrics to a song they had learned. In this session however, Ellen was willing to be more flexible. When I swapped the order of one-and two-beat Figurenotes in *Golden Bells*, she was willing and able to perform the altered versions (shown in Figure 42 below) accurately.

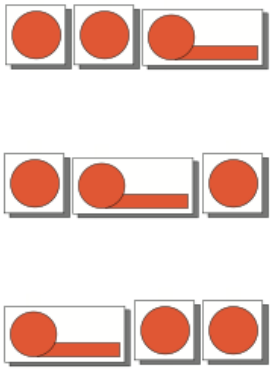


Figure 42 - original line in Golden Bells (line 1), and Ellen's changes (lines 2 & 3).

When I introduced the final activity, the Figurenotes Kite, I demonstrated playing the notes in ascending order in steps on the glockenspiel (as a prelude to singing *Doe, a Deer*). Ellen listened attentively and then said “That’s a pretty song!”. In contrast to Ellen’s rather impulsive outbursts in previous sessions, this was a more mature and aware response. It showed how Ellen’s initial energetic but unfocussed enthusiasm had developed into something more refined and useful. When Ellen’s turn came to play the note sequence, she played with a very controlled and steady tempo. In response to this performance, one participant exclaimed "she's doing it like a grown-up!".

In summary, in these sessions Ellen experienced a journey. At the outset she was energetic but unfocussed in her participation. It seemed that she was used to being left out of group activities, and she was disempowered by this. By the conclusion of the sessions she could direct her energy towards positive music skill development and interactions with others within the Figurenotes activities. This trajectory suggests that it may not have been a lack of

ability causing Ellen's lack of engagement in her class, but a lack of appropriate, available tools to enable her to achieve her real potential.

Summaries of Other Group 1 Participants

Barnaby

Barnaby is a boy small for his age, with a quiet voice and manner. He was very polite to me and to his peers and the school staff, although he did not interact with his peers except when prompted. His music skills did not show a great deal of improvement, apart from his technique which was initially scored at 3 and increased by the final session to 7.Barnaby's *Perceived Competence and Social Acceptance Scale* scores showed a slight drop in cognitive competence, and modest increases in the other domains. His social interaction did show some improvements, particularly in communication with his peers. Initially, Barnaby did not interact with his peers except when prompted and only then for very short periods. During the sessions Barnaby began to interact without being prompted, showing an understanding and acceptance of the need to actively listen and respond. In Session 6, he even volunteered some advice to Xavier during a xylophone playing activity: "No, you're holding the beater upside-down!"

Vincent

Vincent presented as the highest-functioning of all the Group 1 participants. He had clear verbal comprehension and speech, and in some situations showed an awareness of his peers which was unusual for a child at Level 2 autism. Vincent's music skills all showed an increase, and by the final session were all rated at 9 apart from playing together (rated 7).

Vincent's social interactions also showed increases, with (like Ellen) a dip in Session 5. Of interest is his relatively low frequency of communications, particularly to peers. Combined with a relatively high quality of his communications, this paints a picture of a boy who communicated infrequently but when he did communicate, his communications were effective. Scores in Vincent's *Perceived Competence and Social Acceptance Scale* showed an increase in cognitive competence from pre-test to post-test, but a decrease in physical competence; his is the only profile which shows this dichotomy.

Susan

Initially, Susan was very quiet and had poor motor skills. She needed assistance to play an instrument, and even to participate in the actions of the songs. When she was given the opportunity to perform an instrumental solo in Session 5 (the *Butterfly Jump Jump* song, playing a chime bar) she indicated that she wanted to play without assistance for the first time. She was visibly shaking and seemed very nervous, but when asked if she would rather not play, she said, "No, I want to do it". Her performance was very accurate and fluent, and continued to be for subsequent solos. It is likely that the opportunities where she had to demonstrate her increased skill in playing a solo had positive effects on Susan's self-concept, through an increase in her perceived competence. The teacher aides present commented on the difference in Susan's demeanour after her *Butterfly Jump Jump* solo.

Susan's *Perceived Competence and Social Acceptance Scale* scores did not change significantly pre-test to post-test. The reasons for this may relate to the earlier-described limitations in the administration of the *Perceived Competence and Social Acceptance Scale*. Susan's obvious pride in her solo playing came after several sessions where she needed assistance to perform anything, and was hardly willing (or able) to say anything during the sessions. The competent performance she demonstrated in Session 5 was therefore evidence of a big change, more significant for having come after a low achievement level and low level of previous engagement.

Colin

Colin's personality is in contrast to Susan's - he is a loud, self-confident boy who seems to enjoy being the centre of attention. At times he seemed to have an inflated view of his own abilities, although he did show strengths and overall improvements in all his music skills. Colin took particular pleasure in doing what I asked him, evidenced by his smile and the care he took while carrying out directions. Of his social interaction ratings, following directions showed the highest overall frequency and quality. Colin's pre-test and post-test scores in all areas of the *Perceived Competence and Social Acceptance Scale* were generally high, supporting the general view of his having high self-confidence. His scores in maternal acceptance and cognitive and physical competence rose from pre-test to post-test, but his peer acceptance score decreased. This may be due to there being several instances of Colin

eagerly volunteering to perform a solo, but performing at a level lower than that expected from his confidence when volunteering. These instances may have had the effect of reducing the esteem in which his peers held him, thus lowering the level of his perceived peer acceptance.

Colin exhibited lively creativity in some of his responses. After being taught *Walking on the Moon* in Session 2, Colin told me his boots were very heavy and asked me if I had a bigger Figurenotes magnet to show how big his boots were. In *Butterfly Jump Jump,* when I asked them to clap on the designated beats, he told me quite sternly that "Butterflies don't clap!", and at the conclusion of the activity (also the end of the session) Colin continued flying around imitating a butterfly whilst I was packing up.

Group 2 Case Study: Christopher

Christopher is physically the largest child in Group 2, and was also the most dominant personality during the sessions. In discussions prior to Session 1, the music teacher had warned me that I was "unlikely to get anything out of Christopher". I was told to expect a very grumpy and uncooperative boy who only did something if there was a direct reward on offer. In the three regular school music lessons I attended prior to the research sessions commencing, I observed that Christopher was rude to the teacher, did not seem to have any friends, and he seemed uninterested in any positive interactions with his peers. When I walked into the classroom to administer the pre-test *Perceived Competence and Social Acceptance Scale*, Christopher was sitting in a corner, attending only to a laptop on which he was playing a game. It was very difficult to get him to come to the desk I had set up in the centre of the room in order to complete the profile with him. Christopher's relatively high score on Peer Acceptance did not match what I observed in the classroom, and my presence that day seemed merely an annoying distraction for him from his computer game.

In Session 1, Christopher started in a similar vein to what I had observed when administering the *Perceived Competence and Social Acceptance Scale* the previous week. He did not come to the front of the classroom where the other children were seated on beanbags, but preferred to watch from the back of the room. However, when I began to show the video clip which accompanied the *Shrek* song, I began to notice some interest

from Christopher. When I handed out chime bars, one per child, Christopher wandered over and asked for one, which he promptly took back with him to his back-row seat. From that moment on, Christopher was an active participant – even if, for now, from a distance. His Session 1 ratings were low in social interaction, but he scored quite highly on the music skills ratings in all areas, and this made me more interested in attempting to engage him further in future sessions.

Session 2 was conducted two weeks later. *Shrek* was the first musical activity, and I wanted to see if Christopher could engage in this. At the start of the session he was in his usual corner at the back of the room, but as soon as he noticed what we were doing, he walked up to the front. I gave him a chime bar so he could play a part in the ensemble. After the participants had played it once, I suggested a repeat so everyone could try to improve their playing. Christopher immediately said “Yes, and I want to make up an introduction on glockenspiel!”. His use of the word "introduction" in this context demonstrated some pre-existing knowledge about the structure of music. Christopher’s introduction consisted of playing glissandi (up and down the instrument) and saying “We’re going to a magical land!”. His use of glissandi with the associated voiceover showed an interest in perhaps reproducing a movie or TV show he knew, which the *Shrek* theme may have suggested to him. After the music finished, Christopher continued playing on the glockenspiel and said “I am Spider Man!” – again a possible identification with a fictional character, here used as an expression of confidence in himself. When I introduced a new activity, *Red Riding Hood Rap,* Christopher participated throughout. The engagement and enthusiasm Christopher expressed in this session was in stark contrast to his behaviour in the first session, and provided evidence of a strong effect of the Figurenotes activities. It was also obvious now that Christopher was a highly intelligent boy and that if his attention was to be kept in the remaining sessions, he would need to be stimulated and challenged.

With that in mind, I planned to give him more difficult patterns to play in the rhythm games activities for Session 3. This occurred a week after Session 2. When we did the whiteboard activity, Christopher joined the others in suggesting new patterns to try, and nick-naming the red Figurenotes circles “apples”, the yellow ones “bananas” and the rests (circles on white background) “doughnuts”. In *Shrek*, Christopher changed the rhythm of the melody. He did this on purpose, and when I asked him why, he replied that “it’s better that way”. He

interacted with me and the teachers in quite positive ways during this session, but still not with the other children.

In Session 4, during *Red Riding Hood Rap*, I gave each child the opportunity to play a solo in addition to the group playing which had been the mode of performance up to now. Participants seemed ready to play the melody on their own, as they now were showing increasing confidence in their abilities. Christopher's solo was extremely accurate and fluent, and he showed obvious pleasure afterwards. However, he still showed little interest in what the other children were doing apart from showing impatience when other participants made errors in their solos.

There was a two-week gap until the next session due to school activities. The mood in the classroom when I entered Session 5 was subdued – it was now December, the weather was hot, and the end of the school year was approaching. However, when we began with *Red Riding Hood Rap*, the children were back into the engaged state that I had seen in previous sessions. Figurenotes was for them now like a familiar friend. In *Shrek in the Swamp*, the children suggested new places to play in the song – matching the colour of an object or character with the Figurenotes colour of a chime bar, or suggesting a rhythmic or melodic pattern that suggested something in the image or words of a particular slide. Christopher took the lead in this discussion, suggesting a two-note figure for a doorbell to be played indicating Shrek opening his door wide (Figure 43 below).

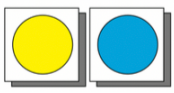


Figure 43 - Christopher's doorbell motif (notes A and F).

He placed the Figurenotes on the whiteboard so the whole group could play it. While still not comfortable with interacting with his peers, Christopher was sufficiently engaged by the activity that he seemed to forget that he did not like to talk to others, and chatted in a lively way with them during the session.

Christopher was absent on the day of Session 6 day so he was unable to participate. In this session there was a sense of withdrawal as the children all knew that it was the last session.

Christopher's absence was noted by the other participants and in all likelihood, this added to the subdued mood of this session. In the sessions he attended, Christopher had offered imaginative suggestions, showed increasing enthusiasm, played his parts with care and took the activities seriously. The leadership qualities Christopher demonstrated established an atmosphere of purposefulness in the sessions and greatly contributed to the positive atmosphere of most of the sessions.

Over the course of these sessions there was a large change in Christopher's engagement. It was also obvious that he already had some useful musical skills, but they were implicit and not being utilised. These sessions helped to make his skills more explicit and offered opportunities to share and use them in positive ways. Christopher's musical skills were noticed, and respected, by his peers. His behaviour and cooperation improved markedly through the sessions. Christopher's *Perceived Competence and Social Acceptance Scale* scores in peer acceptance were the highest of the group, both in pre-test and post-test. This reflects his dominant personality within the group, which may have been reinforced by his high level of music skills. Through his active participation in the activities, Christopher seemed to have been able to experience himself in a new way as an active participant in group activities. Social interaction for him had become a real, and seemingly enjoyable aspect of his class time. During the post-test survey one week after the final session, Christopher looked me in the eye (something I had not previously seen him do) and gave his feedback: “I liked the music sessions, they were fun”.

Summaries of Other Group 2 Participants

Andrew

Andrew was initially quite reluctant to participate. He preferred to sit at his desk focusing on his Lego constructions, saying that he did not like music. However, his imaginative use of his hand-puppet Elmo from Session 3 onwards (described later in 5.9) provided a breakthrough in his participation, with his social interaction increasing in all areas, apart from in the final session. Andrew's peer acceptance scores also increased from pre-test to post-test. This may be associated with his interactions during the sessions, where he was able to participate with his peers using his hand puppet, which enabled him to avoid eye contact.

However, by communicating with them verbally and gesturally, Andrew was able to experience positive interactions with his peers.

Katherine

Katherine was the only girl in Group 2. Her teacher advised me prior to the sessions that Katherine would prefer to sit by herself and not interact with the boys. However, she participated in the sessions willingly from the beginning. Katherine showed a strong will and often refused to undertake particular tasks within the sessions. She was stimulated by associating Figurenotes colours and shapes with objects and characters in the musical stories, and at one time even created her own musical story picture. Katherine's scores in the *Perceived Competence and Social Acceptance Scale* showed a large increase in her peer acceptance from pre-test to post-test. This change may be associated with her increased interaction with the others in the group as the sessions progressed.

Jeremy

Jeremy was absent in Session 2 due to illness. Because of this, his ratings in music skills and social interaction did not rise as early in the phase as for most other participants. However, they did rise overall during the sessions. In the *Perceived Competence and Social Acceptance Scale* results, Jeremy's cognitive competence and peer acceptance rose, but his physical competence and maternal acceptance fell slightly.

Julian

Julian, aged 8, was the youngest of the Group 2 participants. He missed Session 1 due to a delay in receiving signed consent to participate from his parents. Despite Julian's young age, and his missing the first session, his social interaction and music skills showed general improvements over the sessions, although the final session showed a levelling-off. At pre-test, Julian's perceptions of his competence and acceptance in the *Perceived Competence and Social Acceptance Scale* were relatively low. His perceptions of his confidence increased by post-test, although this was not matched in the acceptance domains.

Aran

Aran spent most of the first two sessions watching the activities, but not participating in them. Therefore, his music skills, as well as his social interactions, did not show

improvement until Session 3. In Session 4, Aran was distracted and seemed to be in a bad mood, once again not participating very much. Despite his lack of active participation, his music skills and social interactions did improve somewhat through the sessions.

Hugo

Like Julian, Hugo missed Session 1 due to a late return of his parental consent form. His music skills showed a remarkable improvement between Session 2 and 3, later levelling off. Hugo's social interactions showed a similar pattern to other participants: steady increases until Session 5, with a levelling-off or decline in Session 6.

5.3 Reflective Practice Outcomes

Reflective practice outcomes from the Group Phase reflect the group focus of this phase. Five themes emerged and these are described below. I learned much in the Group Phase about facilitating musical ensembles using Figurenotes. As in the Individual Phase, feedback from participants was very important in informing how the sessions progressed. In Group 2 (the older of the two groups) the children were particularly keen to express their opinions and ideas once they had become comfortable with the sessions and with me. There were several instances of a participant suggesting a novel variation to a Figurenotes activity which I had not previously considered. If it proved successful with the group, this alternative way could then be incorporated in the plan for the following sessions.

Allowing participants to be creative

In the Group Phase, there were several instances of Figurenotes being used directly by participants to creatively express their ideas. The first of these was in Group 1, where Colin wanted a bigger Figurenotes magnet to match the big boots that he was using to stomp around, when performing the rhythm of *Walking on the* Moon. In Group 2, creative uses of Figurenotes were frequent and diverse. Group 2 participants spontaneously began suggesting creative variations to some of the rhythm games. The action research orientation of the study enabled these spontaneous suggestions by participants to be incorporated into the session structure, and participants' novel ideas contributed not only to maintaining the

motivation of the participants, but potentially played a part in the development of their social interactions and self-concept.

When preparing the sessions, I had focused on preparing activities which gave clear structure and sequence to the sessions, as predictability and sequence are regarded as highly important for children with autism. However, as the sessions progressed the participants increasingly found opportunities to be creative and playful in their approach to all activities, even the ones into which I had not designed any creative work. In Group 2, the colours and shapes of Figurenotes provided the stimulus for frequent interactions around association with other objects and images. The way in which participants spontaneously engaged in creative behaviour when presented with Figurenotes activities suggests that Figurenotes may be an ideal tool for creative play and for linking music and sound to visual associations.

The displays of creativity exhibited by participants were often accompanied by excited behaviour, including laughing and running around. In Group 1, the attending teacher aides were obviously uncomfortable whenever participants strayed from following my exact instruction, or called out. Part of the reflexive action research process for the Group 1 sessions consisted of understanding and dealing with the tension that existed between these interesting and potentially valuable excursions into playfulness and creativity, and the prevailing school culture of a need for constant discipline and following instructions. I also experienced a tension sometimes between the need to focus on participants' development of a particular music skill through a disciplined activity, and allowing participants to take an activity in a playful and creative direction.

As the sessions proceeded I began to be able to incorporate these diversions into the overall structure – in other words, to allow and foster participants' creativity while still maintaining an overall focus on the activities of the session. In some cases I was even able to use a creative idea of the participants as a way to develop their music skills. This occurred more frequently once I learned to focus on the particular skill to be developed rather than the particular activity planned to develop it. In this way, it became less of a matter of adhering slavishly to a particular plan for developing the skill, and instead many different possibilities could be utilised. As the participants presented me with their ideas for an activity, I was able

to incorporate their ideas (or chose the most appropriate idea) in the work on the skills needed. This was a significant outcome of my reflective practice in this phase.

Making room for spontaneity

I planned Session 1 with Group 1 as shown in Figure 44 below.

Activities:
1. Whiteboard & Magnets 15'

We're going to play some games
What is this? (magnet, whiteboard, red, circle etc)

Feedback: what was most fun?

2. First Figurenotes 15'
Rain is Falling Down
We're going to make a song
Demo - Sing, point to Raindrops Flashcard 1

"what action shall we do for splash?"
Again, with actions
Again with me playing glock on last beat
[hand out one chime bar per child] -
Again, everyone plays on last blank beat - Put on colour
Again, only the person who has that colour/shape plays
Repeat for a few more colours - Swap chime bars if some haven't had a go -
Loud rain/soft rain

3. Moonboots
"Did you know that on the moon…" (FF3)
Demo - Moon Boot Flashcard 1 – vocal only
"Let's see what the colour is…brown!" put on flashcard
s/o play – bars 1 & 2 only
s/o else
"at the end there's a different colour" – put on red, use Flashcard 2
bar 4 only
use both flashcards – s/o plays red, s/o brown
again with s/o on glock?

Figure 44 - Plan for Session 1, Group 1.

However, instead of the third activity, *Moonboots,* we repeated *Rain is Falling Down*. The children had responded well to that activity, and by that time we there were only 5 minutes remaining in the session, so it was decided to continue with *Rain is Falling Down* rather than introduce something new. It was surprising how willing the children were to prolong and repeat an activity without showing signs of boredom. Children with autism may be more ready for prolonged repetition than typically-developing children, however I had anticipated the simplicity of the initial presentation of *Rain is Falling Down* (singing with actions then playing one note on a particular beat in the song) would cause at least some participants to wonder what was coming next! However, they all seemed comfortable with simply

repeating the activity using different colours. Perhaps this was also a way for them to exploring the available resources, which seemed to reduce any anxieties they had shown when presented with unfamiliar material.

Importance of giving information visually

In early Group Phase sessions, video analysis revealed that I had been giving a large amount of instruction to participants verbally. Participants at times seemed confused, especially when I had given a sequence of instructions or when I had spoken quickly. As a consequence of my observing this tendency, I reduced the amount of verbal instructions I was giving. When verbal instructions were needed I endeavoured to make them as clear and concise as possible. This enabled the participants to focus more on the visual information that was already presented in the Figurenotes scores, as well as the musical information in my demonstrations and in the backing audio tracks. When a sequence of instructions was needed, I wrote a list on the whiteboard for the participants to read.

The Figurenotes shapes and colours proved clear and engaging for the participants. However, the visual attraction of the colours and shapes sometimes caused the participants to get distracted, and reduced the amount of actual musical experiences the participants had. Reflection on this led me to limit the use of the Figurenotes in this way in later sessions to allow for more musical experiences in each activity. It was not easy to do this however, as a participant might mention (or demonstrate) an animal, action, or thing they had associated with the Figurenotes being used, and this had the effect of prompting other participants to do the same.

The depiction of rests in Figurenotes can be represented by a blank (no colour or shape), taking up the same space that a note of the same duration has (see Figure 45 below).

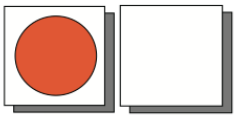


Figure 45 - 1-beat note followed by 1-beat rest in Figurenotes.

All children were able to understand that the rest figure meant that they should not play, clap, or undertake whatever the current action was. However, it was not always clear what

they should do instead. In the playing activities several participants simply played their instrument (or another participant's!) on the rest beat, even when the participant had clearly demonstrated their understanding of the rest while we were doing the song as an action activity. It can be speculated that the incorporation of rests into a musical activity may be the most difficult aspect of participating in that activity, as it is essentially a negative action, or a do-nothing action. Participants were able to use the Figurenotes rests (white circles) to incorporate the rest beats into their performances, but it was still a matter of being clear what action to perform in that beat, as a momentary cessation of activity was not possible for this group. Therefore, a deliberate raising of the beater to indicate rests was modelled in Session 2 and this proved mostly successful.

The way in which the participants were able to quickly and accurately comprehend the Figurenotes with regards to pitch and duration of notes and rests, encouraged me to introduce ensemble activities for Group 2. One of these consisted of the *rhythm teams* activity where participants played a short rhythmic activity involving interplay between two teams. In consideration of the likelihood that participants would prefer to learn the activity as a whole and always play one part, rather than swapping, I split the group into two teams, asked the school teacher to hand out red and yellow chime bars, and proceeded to count the participants in ("1-2-3-go") and then use a drumstick to keep the beat as participants played. The result was somewhat of a mess – the main issue seemed to be that participants were largely unaware of the colour of the chime they were holding and therefore tended to play on every note they saw, regardless of colour. The ease with which ensembles using Figurenotes could be understood and performed by participants suggests that it can be a highly appropriate tool for assisting children with autism to participate in musical ensembles. This may be due mainly to the fact that scores can be expanded horizontally (made longer) or vertically (parts added) while maintaining the simplicity and clarity of presentation.

The age-appropriate and developmentally-appropriate level of the Group Phase activities contributed to their success, as had happened in the Individual Phase. However, perhaps the most influential factor in the success of the Figurenotes activities was that the participants were able to follow and understand them without need for complex verbal explanations and instructions. This suggests that Figurenotes may be particularly

appropriate for children with autism for whom verbal instructions are difficult to comprehend, especially if given in a series.

Keeping the music flowing

While not directly related to the use of Figurenotes, I observed many times during the sessions that activities were performed more successfully when a steady tempo was maintained throughout. Stopping or slowing the tempo to allow slower participants to catch up invariably resulted in the rest of the group getting confused, or simply continuing on at the previously established tempo. From Session 3 I adopted a policy of not slowing down and waiting for a participant who was not keeping up with the group, but instead to continue on, and once the song or song section was completed, to offer assistance to the slow participant or simply repeat the activity, which was often all the participant needed in order to keep up.

The tempo chosen was also a significant factor in the success or otherwise of an activity. Too fast, and a majority could not keep up; too slow, and participant would easily lose focus and have their spare attention drawn by a rotating fan, a teacher aide talking to another, or any one of a myriad of other potential distractions. Also, “Less talk, more music” became a dictum I used in my approach, after video footage revealed that I was spending large amounts of time explaining activities when the participants had seemed ready to do them already.

Value of using humour

Finally, the group sessions taught me about the value of humour and having fun. It is often assumed that children with autism do not have a sense of humour, or find it difficult to appreciate humour. Certainly, in many situations during the group sessions, events or situations that typically-developing children may have laughed at or found funny, were not noticed or commented on by the participants. However, there were several occasions on which participants exhibited a keen sense of humour. When Katherine (in Group 2) started to play her chime bar with her beater the wrong way around, holding the rounded beating end in her hand, three of the boys (Jeremy, Christopher, and Aran) started laughing. Katherine then noticed her mistake and turned the beater around – not laughing, but just quietly fixing her error and getting on with the task. In the next activity when Katherine was

given a beater, Jeremy said “hold it the right way”, and Katherine smiled and laughed, “Yes, this time I will!”.

I was concerned in the first session for both groups to make my presentation of the activities as perfect as possible. Therefore I was somewhat preoccupied with this, and consequently a little tense. Watching the video footage afterwards I noticed a few instances for both groups where something amusing happened but I was not able to be relaxed enough to acknowledge it. An example of this is when a participant got up at one point and turned their chair so they were facing the wrong way. Some other participants laughed at this, but I was preoccupied with giving instructions. At the end of Session 1 for Group 1, one of the boys (Liam) ran up to me and spontaneously gave me a bear hug, an event I was unprepared for and which made the other children laugh. I also laughed, and in later sessions I allowed myself to respond naturally to humorous events.

The colours and shapes in Figurenotes assisted in this area, too. As well as participants associating certain shapes and colours with objects or characters (such as tomatoes for the red circle), some combinations of Figurenotes prompted humorous comparisons such as for a melody consisting of a series of different notes being called a "fruit salad". On a few occasions in the later sessions I deliberately mis-named a colour or shape, for example calling a green circle a blue circle, or a red triangle a red circle. On these occasions, participants immediately corrected me. Participants in Group 1 seemed to assume I had made a genuine mistake but in Group 2 the participants seemed to have a more developed sense of humour and were able to understand that I had made the error on purpose, and they laughed.

5.4 Music Skills

Group 1

Averaged ratings for the Group 1 cohort show that there were mostly steady increases in all music skills. Accuracy which had begun higher than the other skills and was still the highest-rated skill by the final session, although all skills had increased to a similar level by then, as shown in Figure 46 below.

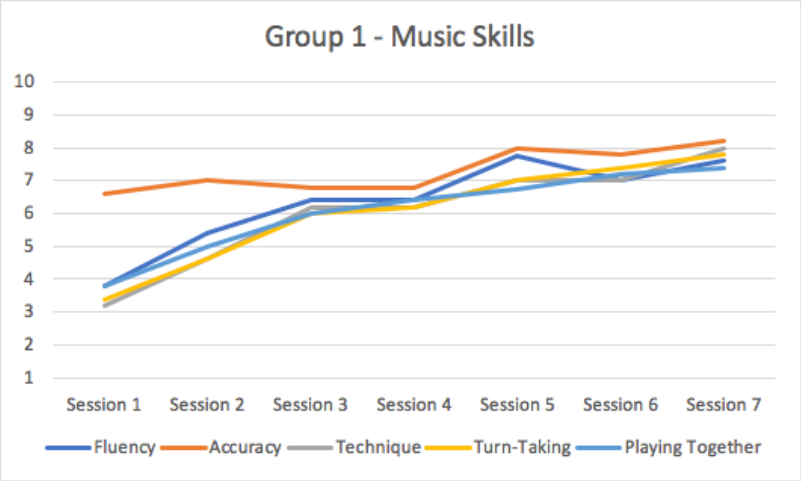


Figure 46 - Group 1 combined average for music skills ratings.

The development of Ellen's music skills showed an inconsistent improvement through the sessions, and varied from session to session. In contrast, music skills for the other participants in Group 1 generally showed a steadier increase. Figure 47 below shows the difference in music turn-taking.

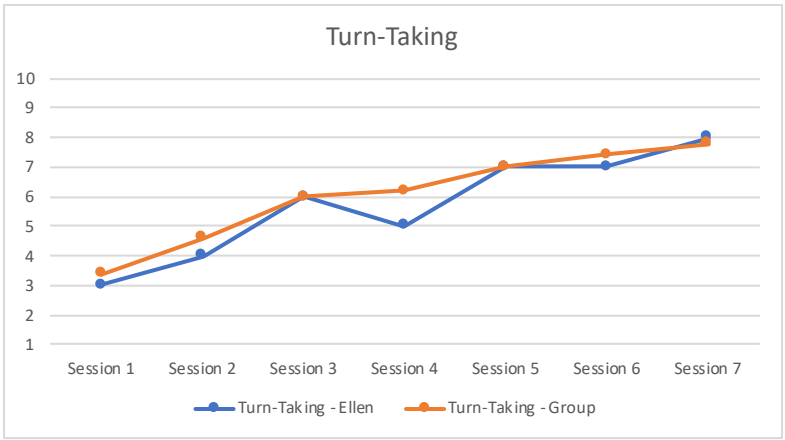


Figure 47 - Comparison of music turn-taking ratings, Ellen and other Group 1 participants.

A possible explanation for this difference may be that Ellen was affected more than other participants by outside events, such as the stolen-cards issue in Session 5, as described in the case study.

The following sections describe three emerging themes identified from the Group 1 sessions.

Technique affected other music skills

The influence of the technical skill with which participants used the instruments had a significant effect on the other skills demonstrated. For example, if a participant was not able to bring their beater down on a chime bar quickly enough when it was their turn to play, the note or notes played were out of time, even if they may have intended and felt their cue correctly. When participants were better able to hold and use their beater, this helped them to play their notes closer to the moment when they had felt the impulse. It would seem that Figurenotes could not necessarily be of any help in achieving this; even without any visual stimulus the participant would still be unable to play correctly if their technique was poor. However, Figurenotes may have assisted the participants to understand the placement of their note in the overall structure more easily. It may be that without Figurenotes, participants may not have had a sense of when their part should be played. It is thus possible that reading Figurenotes enabled participants to gain a sense of when to play a note, even if they were not physically able to play at that point.

As a way of investigating this, in some musical activities, participants were asked to do actions using parts of their bodies instead of playing instruments. For example, in *Walking on the Moon,* participants stood in a circle and on the final beat of each line, where a chime bar should be played, they instead were asked to jump on the spot. All participants were able to do this, which suggests that they had in fact understood the rhythm from the Figurenotes score and it was their poor fine-motor skills that had prevented them from playing the chime bar in time.

Movement as an alternative to playing instruments was also used in other First Figurenotes activities. *Rain is Falling Down* was introduced first by pointing to the flashcard, singing the lyrics, and clapping on the beat marked by the red Figurenotes symbol. Then all children

stood in a circle and walked and jumped on the spot according to the lyrics. All participants were able to do this with a high degree of accuracy. One child was then invited to play a red chime bar on the last beat (where the red Figurenotes symbol was placed) while the other children continued to perform the actions. Other children were subsequently given the opportunity to do this as well. On each occasion it was noted that the child playing the chime bar played their note slightly (or in some cases, a few seconds) after the beat. This difference could not have been due to not sensing where the beat was, for all children had correctly moved their feet or jumped on the correct beat when performing the actions. Therefore, the delay was due to undeveloped beater technique – specifically, the need to prepare the beater stroke before the beat.

Figurenotes enabled participation from the beginning

Within the participant group, there was significant variation in the level of music skills initially presented. For example, participants' music turn-taking scores in Session 1 varied between 2 and 5. Despite this variation, all participants were able to engage in the activities presented in Session 1. The first rhythm games activity consisted of the two-part rhythm shown in Figure 41 on p.140. It was noted that all participants were able to follow the rhythm and perform their allocated part (initially by clapping on their notes). Whilst the actual performance varied from child to child, they were all focussed and attentive, and understood what was required. The rhythms were not demonstrated beforehand so participants only used the Figurenotes score to learn their rhythm. Figurenotes enabled all participants to engage in the music-making activity without the need for any additional scaffolding or adaptions. By employing the inclusive attributes of colour-coding and matching notation to instrument, Figurenotes provided a unified solution to enable all participants to engage in the activity, aligning with principles of *Universal Design for Learning* (Darrow, 2010).

Participants' sense of beat reinforced by Figurenotes

A related theme is that of the participants' sense of steady beat. The use of singing and simple actions with the participants in the *First Figurenotes* activities which had a clear steady beat, enabled all participants to show an intrinsic ability to follow the beat. Put simply, they were all able to keep a beat, by clapping, stamping, or vocalising. During the

sessions, this pre-existing sense of the beat was able to be visually represented by Figurenotes – the predictability and steadiness of the beats could be visually represented for the participants. The size of each Figurenotes symbol (in a pattern of three notes and one rest, repeated, as shown in Figure 48 below) is identical, enabling participants to understand visually the steady tempo.

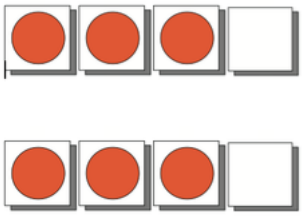


Figure 48 - Figurenotes pattern in equal beats.

This matching then enabled development of this basic beat ability into more complex patterns. Participants could scaffold the newer rhythms with their experience of having the basic beat visually represented. A rhythm given to the participants in Session 7 shows a more complex rhythm (Figure 49 below).

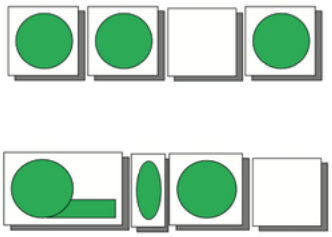


Figure 49 - Figurenotes rhythm using different note durations.

Figurenotes thus enabled participants to visualise the structures in the music, both on a macro- and micro-scale.

Group 2

Each Group 2 activity was designed to develop specific music skills. Table 18, below, shows which music skills were assessed in each activity.

Table 18 - Music skills assessed in each Group 2 activity

	Shrek	Red Riding Hood	Jingle Bells	Rhythm Games
Technique				
Accuracy				
Fluency				
Music turn-taking				
Playing Together				

In comparison with Christopher, the group as a whole began with higher scores in music skills demonstrated in Session 1, except in playing together. This probably reflects Christopher's reluctance to engage with his peers generally at the outset, manifesting as a lack of skill in noticing and responding to others' playing in the Session 1 musical activities. The group as a whole showed steady increase in most music skill areas from session to session, as shown in Figure 50 below.

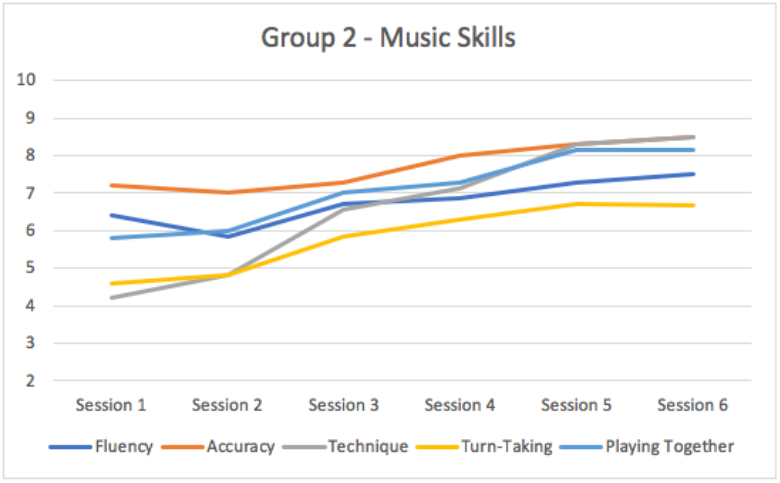


Figure 50 - Group 2 combined average music skills ratings.

A slight dip in fluency from Session 1 to Session 2 may be due to the more challenging parts the participants were given after a reassessment of their musical abilities demonstrated in Session 1. The participants showed that they were capable and the activities were adjusted

to challenge them more. The following sections describe two emerging themes in music skills identified from the Group 2 sessions.

Faster tempo aided focus

During the colour team activity in Session 2 (see Figure 49), the participants were divided into teams (red and yellow) and were given a chime bar and beater each. I tapped the beat with a drumstick and counted in, "1-2-3-4". The first time, participants played with just a little inconsistency in the second half. I told them we would repeat the exercise and counted in again, at a slightly slower tempo, thinking that taking it slower would help them to be more. Instead, the performance was less together than before, and two participants immediately started a mock sword fight using their beaters as weapons. I wondered, why could they not manage to stay focused on this short activity? After the session, when watching the video footage I was struck by how slow the tempo was, even the first time through. It became obvious that for these two participants, the tempo of the activity was simply too slow to keep their attention. The tempo used in Session 3 was faster and participants' attention was held better for this activity (and there was no sword-fight this time!). Subsequent activities also proved that a faster tempo aided focus, as long as the tempo was still achievable.

Latent music skills developed

Participants in Group 2 showed quite strong music skills during the sessions. They were able to successfully perform their given solos in the musical activities with a high level of accuracy and fluency, although not with as much skill in turn-taking, technique, and playing together. It was especially noted that participants (as with Group 1 participants) were able to maintain a steady beat. It was therefore clear that the musical activities designed to develop music skills in the participants should build on these skills they already possessed. Participants firstly needed opportunities to use their skills, and then they needed challenges to enable the skills to be developed further. An example is provided by the *Shrek in the Swamp* activity in Session 5, shown in Figure 51 on the following page.

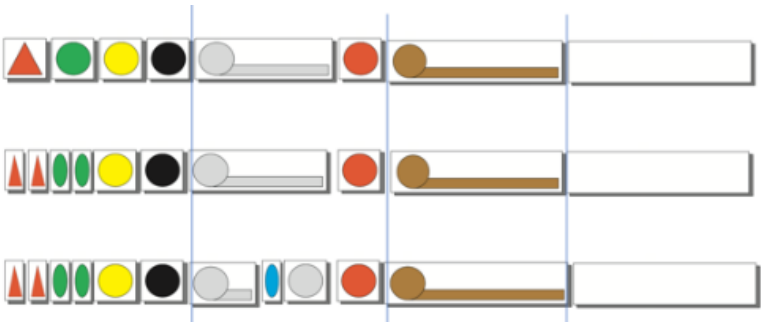


Figure 51 - Shrek in the Swamp, Figurenotes melody (line 1) with two variations (lines 2 & 3).

At the start of the activity, the original four-bar melody was given to participants (each playing individually in turn). After all participants had performed this with a high level of accuracy and fluency, participants were then challenged to try a variation where two of the notes were replaced by shorter notes of the same pitch. All achieved this also, and one participant asked for the "next level", which was provided, being an addition of extra notes in bar 2. Not all participants were able to successfully achieve this, so they were told they could try again in the next session. The participants enjoyed this use of levels so it was used with other activities in later sessions too. Building on participants' pre-existing skills but taking them to the next level provided a motivating framework for them, by allowing them to focus on what they could already do and incrementally increase the level of challenge.

5.5 Social Interaction

Group 1

The Group Phase provided plentiful opportunities for observations to be made of participants' social interactions. Ellen's case study (5.3) described her progression from enthusiasm but with little awareness of those around her, to gaining an experience of genuine interaction through the Figurenotes activities. Other participants in Group 1 also developed in their social interactions through the sessions. However, as with Ellen, outside events affected interactions within the group, most notably in the stolen-cards issue during Session 5. Two themes in social interaction emerged from the Group 1 sessions.

Communication frequency higher with adults

An interesting result was obtained in the ratings of participants' communication. Communication quality changed in a similar pattern with both adults and peers, with a decrease in Session 5 (the stolen-cards session) the only disruption to a steady increase across sessions (Figure 52 below).

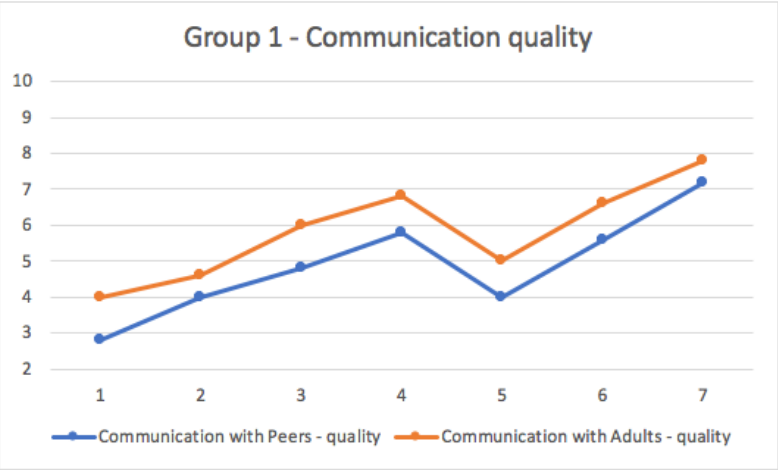


Figure 52 - Group 1 averaged communication quality, peers and adults.

However, communication frequency showed different patterns for adults compared with peers: communication frequency was initially higher with adults but increased with peers to the same level as with adults by the end of the phase, as shown in Figure 53 below.

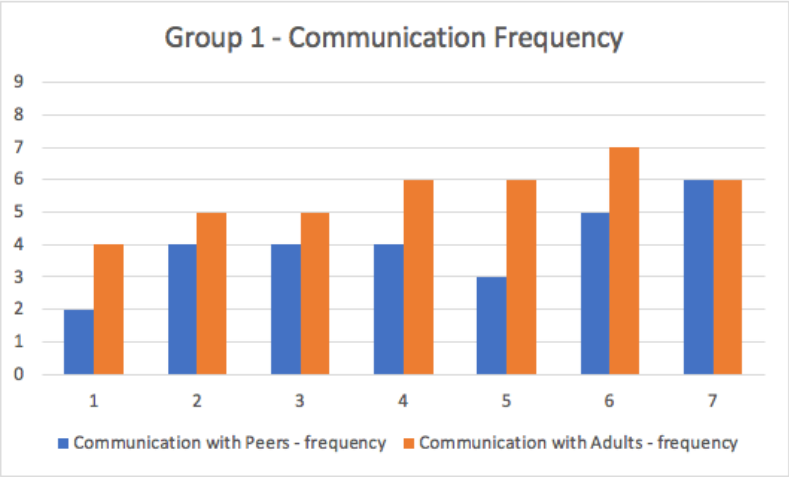


Figure 53 - Group 1 averaged communication frequency, peers and adults.

The difference in communication frequency between peers and adults can be explained by considering the perspective of the participants. As the children participated in the sessions, they became more ready and able to communicate with their peers in the group. The communications with adults were more frequent in the first sessions, when more instructions were needed, consisting largely of procedural matters and discipline. Communications with peers was initially less frequent but ended up equal with the frequency of communications with adults, despite a large drop in Session 5. The frequency of communication with peers is more likely to be an accurate measure of changes in participants' social interactions, as it is peer-to –peer interactions that are often most noticeably lacking in children with autism (Ghasemtabar et al., 2015). This is reinforced by the fact that it was not only the frequency of interactions with peers that increased, but also the quality.

Music and social turn-taking were linked

During the Group 1 sessions, musical turn-taking between participants was generally rated higher than social turn-taking (Figure 54 below).

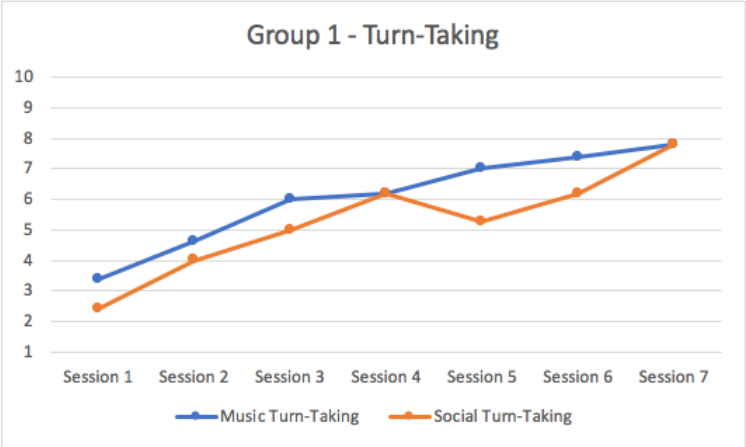


Figure 54 - Group 1, comparison of music and social turn-taking ratings.

A possible explanation for this result is that participants were able to use the temporal structure of the musical activities to structure and encourage their turn-taking. The literature review described a potential for the modelling of social interactions within musical interactions (2.4) with music providing a "safe and structured stimulus for social engagement and the practise of social skills" (Lagasse, 2017, p. 24). In the Group Phase, there was a clear musical structure in all songs, patterns and exercises used during the

sessions, which imposed structure on the proceedings and facilitated participants' turn-taking during music activities.

Whilst there was a practical need for this structure in order to allow musical responses from the participants, the musical structure may have also facilitated social turn-taking during the sessions. As discussed in Ellen's case study (5.2), Session 5 was affected by a student having his swap cards stolen. Music turn-taking improved over the previous session but social turn-taking decreased, as shown in Figure 54 above. This suggests that the negative effect of the stolen-cards issue on turn-taking was less significant during the musical activities than during other activities, perhaps because the participants were more comfortable generally with taking turns within musical activities and were able to maintain a focus and interest in the musical activities despite the distractions of the day.

Another example of the transference of musical structure into social structure is shown in Figure 55 below. Within the predictable progression of *Butterfly Jump Jump* and the associated actions and lyrics, there was opportunity for participants to be interacting in a very real and direct way with each other and with the adults.

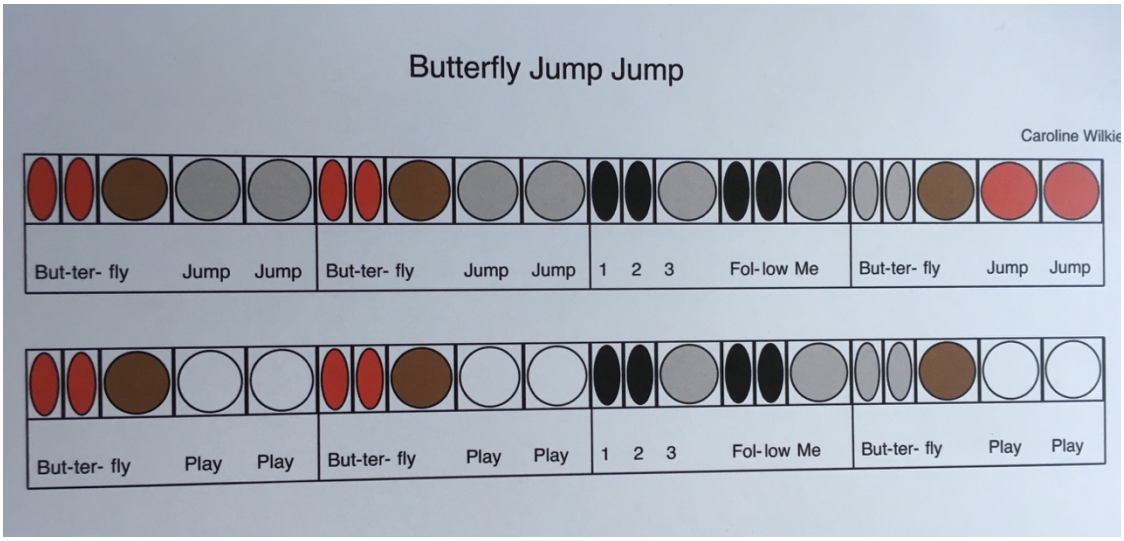


Figure 55 - Butterfly Jump Jump, Figurenotes score (Wilkie, 2012).

The actions ("Jump Jump") and playing cues ("Play Play") were where participants were invited to participate individually, in pairs, or in a whole group, in the activity. I observed that some children were eager to make up alternative activities and words for these beats ("Fly Fly", "Drink Drink"). All children recognised these beats as a cue to contribute or

respond to an ongoing music interaction; the song could not continue until an action and words had been supplied in the correct place.

I observed that many of the children were quite tense in Sessions 1 and 2. There was very little social interaction taking place prior to the session as the children walked in. From Session 3 onwards, when some children entered the room they were already singing the songs that had been used in previous sessions. Not only did this indicate that the songs had been effectively learned, it also enabled the children to have a common theme in their communication; it gave *structure* to the time immediately before the session, which otherwise could have been (and in fact was, for the first two sessions) a rather chaotic transitional period. The fact that the children had self-generated this means of creating structure makes it especially significant. Both these observations would seem to support a conclusion that the structure of musical activities enabled and facilitated interactions amongst the participants. Whilst the interactions occurred within the musical structure, the fact that the children could spontaneously employ that structure themselves at other times, as in the singing of learned songs, indicates an ability to utilise musical structure to support social interactions more generally.

Group 2

Group 2 ratings for social interaction increased from Session 1 to Session 5. In Session 6, the combination of hot weather, the end of the school year, and the absence of Christopher may have all contributed to a decline in communication, as shown below in Figure 56.

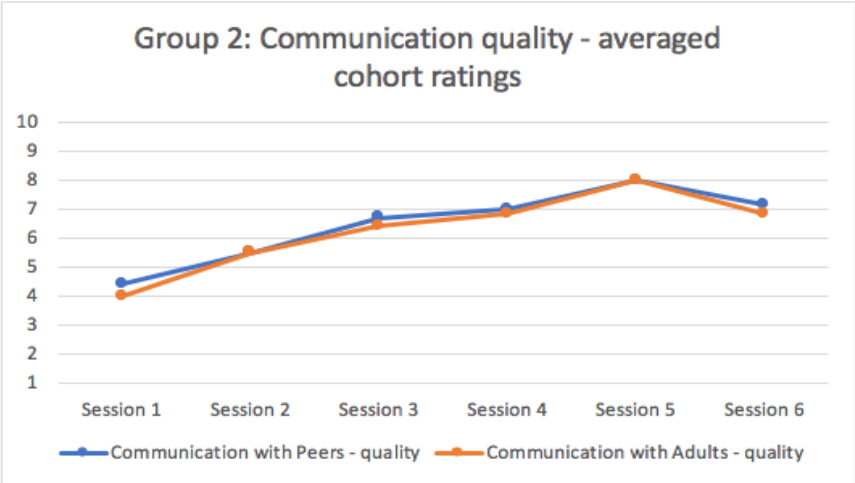


Figure 56 - Group 2 communication ratings.

Participants' creative ideas facilitated interaction

An emerging theme in social interaction from the Group 2 sessions was that the creative ideas of participants was a catalyst for increased social interactions among the participants. The creative ideas were volunteered by participants through discussions and experimentation with participants' own ideas of how to represent events and images contained in the musical stories. I had selected the musical stories partly because of their inherent capacity for participant input in performance: vivid and clear imagery, colourful illustrations, and events and characters which could easily be represented musically. However, I had not anticipated the eagerness with which participants would volunteer ideas for musical accompaniments to the story elements, even those which did not have a clear or immediately obvious musical parallel. Ideas for musical representation of Pinocchio from *Shrek in the Swamp* given by participants included a glissando (running the beater up and down) on the glockenspiel, and a rhythm invented on yellow notes (yellow being the closest colour to Pinocchio's nose) which was later notated using Figurenotes magnets so the whole group could try it.

In addition to engaging with the opportunities provided in the pictures used in the music stories, participants went beyond these pictures and invented extra elements. Christopher's invention of an introduction for *Shrek in the Swamp* has been described in his case study (5.2). Another instance of creativity was seen during work on *Red Riding Hood Rap* when the picture of the wolf was shown. Participants started making up short melodies to depict other animals, and then asked others to guess what the animal was. Also, the backing audio track with *Red Riding Hood Rap* used a hip-hop drum beat which some participants asked to play after hearing it over multiple sessions. I invited them to try to notate it using Figurenotes magnets. As a group they reached a consensus (involving considerable discussion) that the rhythm followed an off-on pattern, which they notated as shown in Figure 57 below.

Figure 57 - group-notated rhythm in Figurenotes.

Once participants had experienced some of the musical stories they were also more ready to offer creative ideas in the rhythm games whiteboard activities. Participants suggested changes to some of the rhythms given in Figurenotes. In Session 2 when I started the rhythm work with a single red Figurenotes circle, Hugo remarked "It's a Japanese flag!". And when the rhythms team's activity was introduced in the same session, the red and yellow colours were given names of fruits: red became tomato and yellow became banana, and the children referred to these in the subsequent sessions as "fruit salad" rhythms. Rests notated in the whiteboard exercises as blank circles became "doughnuts".

Some limits needed to be set on these participant-led interactions, as otherwise they had a tendency to take up large chunks of the sessions, not leaving room for other activities. However, participants were generally encouraged in these acts of creation and playfulness as it was clear that apart from enjoyable experiences, these activities were fuelling a greater level of social interaction, particularly between the participants.

5.6 Self-Concept

Group 1

Results from the *Perceived Competence and Social Acceptance Scale* showed that the improvements in perception of competence shown by Ellen were not matched to the same extent by the other participants in Group 1, as shown in Figure 58 below.

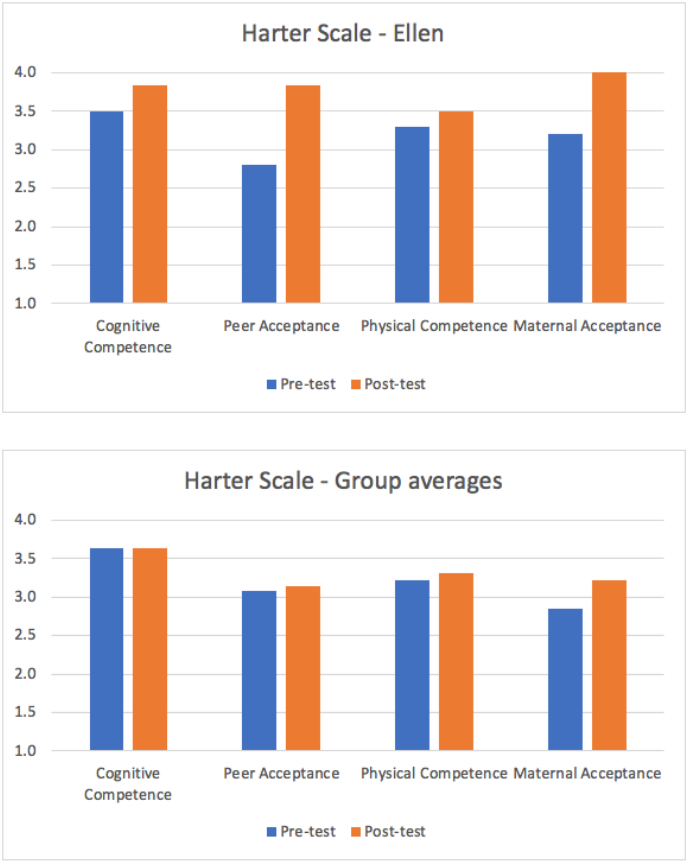


Figure 58 - Perceived Competence and Social Acceptance Scales, Ellen and Group 1.

Whilst there was a small increase shown across all domains as a group average, these increases were relatively small, in contrast to the more significant gains shown by Ellen. Two themes were identified in self-concept for Group 1.

Importance of reference group for perception of competence

The ease with which Group 1 participants were able to perform simple melodies and rhythmic patterns using Figurenotes in the sessions meant that there were ample opportunities for participants to demonstrate their skill from the first session onwards. Each session always included at least one musical activity in which participants played a solo.

These performances were watched and listened to by the whole group as well as by the adults at the session. It seemed that for some participants, these solos were very significant in their social-emotional impact. The impact may have been made greater by the participants being able to compare their performances with their previous lack of competence, rather than with others around them.

An example of this is Susan's performance of *Butterfly Jump Jump*, as described in her participant summary. Through this performance, Susan had an experience of success along with praise from her peers and the adults present. This experience had a strong impact on her as shown by her nervous shaking and grinning. This impact may have been made stronger because Susan placed a high value on the skill she was demonstrating. Even though her actual level of performance was not high, merely playing all the notes in her solo was enough to evince a strong positive reaction. It appears that in Susan's case, the reference group she was using in order to assess her own level of competence may have been changing as a result of her participation. She may have formerly compared herself unfavourably with her peers, but was now able to compare her successful performance favourably with former less-successful performances. This shift in the reference she used for comparison may have enabled Susan to gain a higher perceived competence.

Identifying with particular colours and shapes

An aspect of participants' sense of self demonstrated during the sessions was their identification with particular colours and shapes. Several times during the sessions, participants expressed a liking for certain colours. Charlie's dislike for blue, however, was particularly strong. In Session 1, during *Rain is Falling Down*, participants were taking turns playing the correct note at the time indicated on the score. I placed a blue Figurenotes circle on the score when it was Charlie's turn, and gave him the glockenspiel and a beater. His immediate reaction was "I don't like blue!". When I and the teacher aides encouraged him to "have a go", he protested more violently, "I DON'T LIKE BLUE!" and became visibly agitated. He was asked what colour he preferred, asked for red, and was never offered blue again. I speculated initially that for Charlie, it may not have been a matter of a simple preference for red over blue and that Charlie's strong preference may have been related to the fact that he associated the colour red with the sound of the corresponding note

produced on the glockenspiel. If this was the case, Charlie may have synaesthesia, which may be more common for children on the autism spectrum than for the general population (Ockelford, 2013, p. 201).

If Charlie has synaesthesia, he would already have a matched pitch for different colours and Figurenotes would have been very uncomfortable for him. However, the fact that Charlie was quite happy to use other colours and notes indicates that either he did not have synaesthesia, or his synaesthesia matched all the Figurenotes perfectly except for the blue pitch. If (as is suspected) he did not have synaesthesia, Charlie's strong emotional dislike for blue, and his strong preference for red, indicates simply a sense of identification with the colour red (and disidentification with blue). Several other participants also showed a preference for red, but not as passionately as Charlie, and they were willing to use other colours. This was fortunate, as otherwise a whole session may have been conducted using only one colour and therefore one musical pitch! The emotional reactions some of the participants showed to specific colours can be linked to the difficultly some participants had in matching slightly different shadings from Figurenotes scores to notes, described in 4.4. Both observations suggest a heightened awareness and sensitivity to colour, which points to both the potential usefulness of using colour-based tools such as Figurenotes with children with autism, but also the need to ensure these tools are used carefully.

Group 2

Scores in the *Perceived Competence and Social Acceptance Scale* for Group 2 as a whole showed little variation between pre-test and post-test in most categories with the exception of peer acceptance, as shown in Figure 59 below.

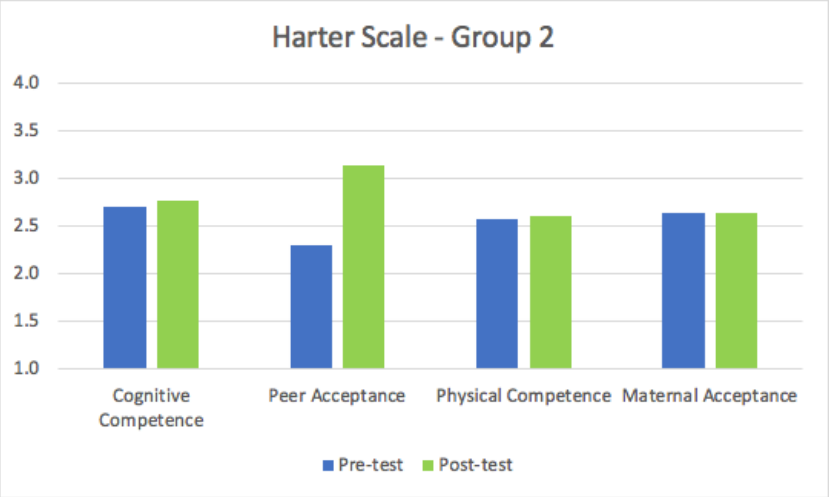


Figure 59 - Group 2, averaged Perceived Competence and Social Acceptance Scale scores.

The increase in peer acceptance is paralleled by increases in the social interaction rating of participants' communication quality with peers, which showed the largest increase of any of the social interaction ratings. Thus, more positive interactions with peers can be associated with more positive self-perception of peer acceptance.

It was expected that the two domains in the Harter scale which could be most impacted by the effect of the Figurenotes sessions would be *cognitive competence* and *peer acceptance*. Peer acceptance did in fact show an increase from pre-test to post-test. However, cognitive competence showed no significant change. The cognitive competence scores for two participants (Andrew and Katherine) even decreased from pre-test to post-test. Of interest is the fact that peer acceptance increased by more than physical competence or cognitive competence. The fact that peer acceptance was the domain which had changed the most from pre-test to post-test suggests the social interactions and musical performances which occurred during the sessions may have been meaningful for the participants. Two themes were identified in self-concept for Group 2, and are described in the following two sections.

Participants experienced competence from the beginning

The school music teacher commented at the conclusion of the sessions that he was surprised how much the participants in Group 2 had engaged in the sessions, and mentioned a possible reason for this as being that with Figurenotes, "initial success comes early, meaning that the students will be keen to keep going with it". The use of Figurenotes in providing a clear visual instruction of what to play (or when to clap) in the very first activities made it possible for all participants to experience success and is likely to have been a contributing factor to their continuing engagement. When given the following rhythm (Figure 60 below) to play for the first time, one participant (Andrew) said "It's gonna be easy!".

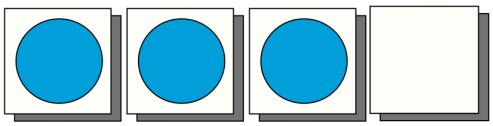


Figure 60 - Figurenotes rhythm used in Session 1.

The school music teacher also commented on the subject matter used in the sessions, noting that it was "great for engagement". The musical stories were chosen for their appropriateness to the participants' age; it was felt that bringing in material which was generally aimed at the age group of the participants but potentially too complex for the participants may have a better chance of being successful than simpler, but perhaps less engaging material. *Red Riding Hood Rap* was of course based on a nursery rhyme, but the use of a rap idiom brought it into an age-appropriate category. In fact, when *Red Riding Hood Rap* appeared for the first time in Session 3, Katherine smiled for the first time in the sessions. Enabling participants to enjoy and achieve success in the musical stories using Figurenotes provided opportunities for them to build their self-competence and self-worth. This finding parallels that in the Group 1 music skills themes that Figurenotes enabled participation from the beginning.

Participants' creativity and perception of competence

The creativity using Figurenotes shown by Group 2 participants has already been discussed in relation to its effect on social interaction. The fact that participants were spontaneously using Figurenotes in this way to create music also points to a likelihood that their perceptions of their music competence were increasing, and that it had importance to them. The various creative uses of Figurenotes within the sessions (creating an introduction, making up and notating a motif based on a story character, notating a heard rhythm on the whiteboard using Figurenotes, the identification of Figurenotes colours with foods or objects, and altering given Figurenotes melodies and rhythms) occurred when participants had gained confidence in using Figurenotes and were able to incorporate it into their ideas and freely make associations to other aspects of their lives.

Participants showed creativity in ways not directly connected with using Figurenotes. Initially, Andrew was very reluctant to participate in the session activities. He preferred to stay seated at his desk at the side of the room, and whilst he would occasionally look up or even make a comment, he was not a very active participant during Sessions 1 and 2. He made it clear that he preferred to sit at his desk and build Lego constructions or work on other school tasks. On the day of Session 3, Andrew brought to school his favourite hand puppet, Elmo (a character from *Sesame Street*). This seemed to be an object which enabled him to feel more secure and participate more easily. Andrew picked up his puppet and pretended to speak like Elmo on one occasion early in the session, although not while participating in the group activity. When it came time for solos in *Red Riding Hood Rap*, I did not expect Andrew to want to participate as he had not been happy about participating in the previous solo sections. However, when it was his turn, Andrew came to the glockenspiel with Elmo, and said "Elmo can do it!". Andrew pickled up the beater while holding the puppet (so that Elmo was holding the beater) and proceeded to play his solo – which he did accurately and fluently, and afterwards when I congratulated Andrew (by shaking Elmo's hand), he said "thank you very much". It was clear that in assuming the character of Elmo, Andrew was able to interact in a way he could not normally.

A significant example of creativity occurred in Session 5. In the early sessions, Katherine had become very interested in the images used in *Shrek* and *Red Riding Hood Rap*. In particular,

she liked to suggest particular Figurenotes colours and shapes which could represent characters or objects in a picture. In Session 3 she asked if she could play the grey Figurenotes triangle whenever the slide showing the three blind mice appeared. While waiting for Session 5 to begin, Katherine took a piece of paper and some coloured markers which were available in the classroom, and drew a picture, which she titled *Ocean* (Figure 61 below).

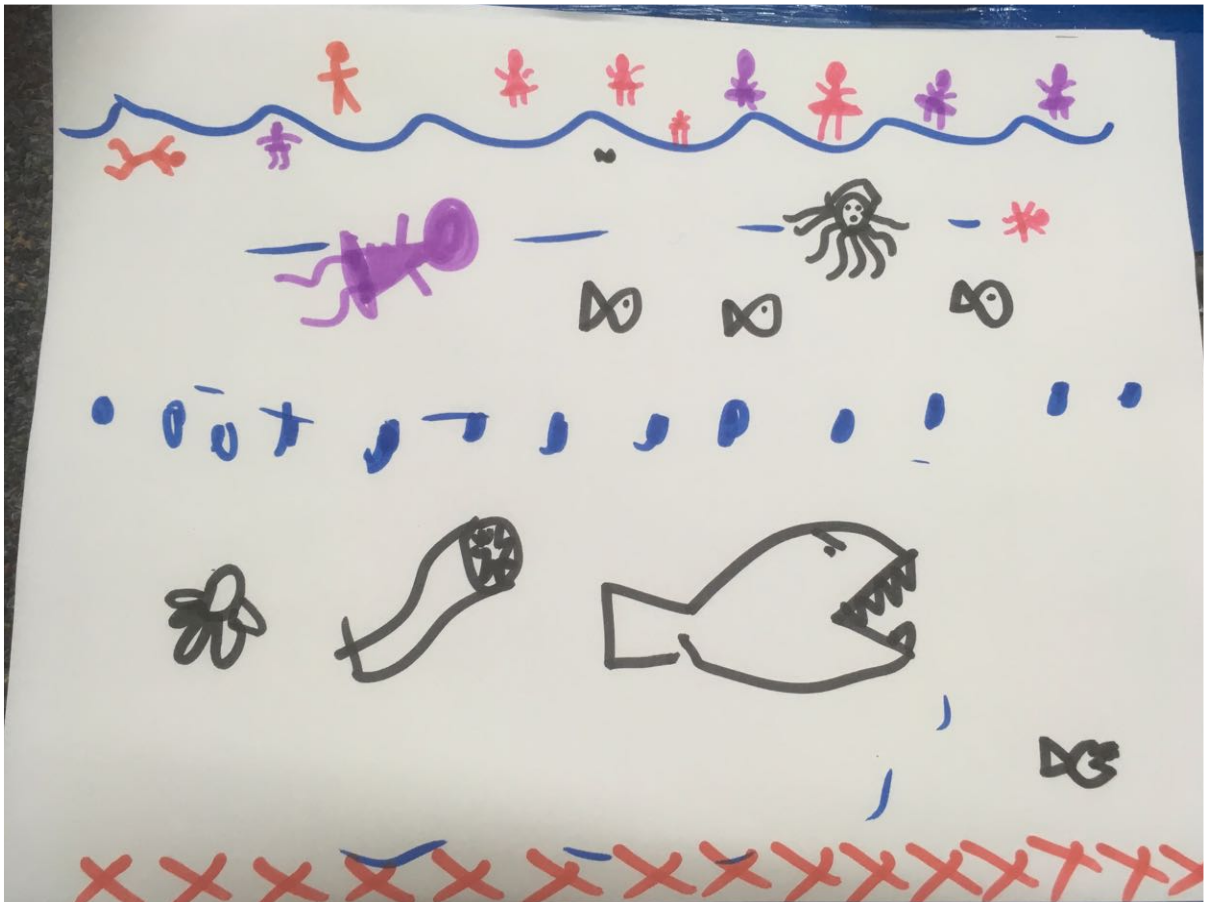


Figure 61 - Ocean, musical story picture using Figurenotes, drawn by Katherine.

This picture was completely Katherine's own idea and creation and used a variety of animate figures. The red crosses across the bottom of the picture and the blue circles at mid-level are Figurenotes. The red crosses represent the lowest note available on the keyboards used, and the blue circles are close to the centre of the keyboard. Katherine was clearly relating the sound of the notes depicted with the relative depth of the water in the picture. When the session began Katherine asked to perform her picture. She explained what all the people, fish, and sea creatures were doing and where they swam. Katherine

had not drawn any Figurenotes to represent the water's surface and instead just played these high notes when explaining the picture. on the glockenspiel and received praise from other participants for her ingenuity, reacting shyly but with a satisfied smile. Katherine had created a genuine piece of visual and sonic art, and she was proud of it.

Summary

In the Group Phase, the two participant groups, one of younger and one of older children, enabled rich data to be obtained on various aspects of the key focus areas of the study. In particular, I learned much about developing and facilitating musical ensembles using Figurenotes. In addition, there were many opportunities to closely observe the social interactions of participants in this phase. The unexpected element of participants' creativity in their responses to the activities I presented to them added an extra dynamic to this phase and propelled the study into the final Family Phase.

CHAPTER 6 - FAMILY PHASE

The Family Phase drew on the processes and outcomes of the Individual and Group Phases. The Family Phase was linked to the Individual Phase through the use of the same participant cohort. As described on p.109, parents and siblings of Individual Phase participants became interested in the activities conducted during the sessions. This led to the eventual addition of the Family Phase, using the same participant cohort but now with the addition of their families. The Family Phase was also linked to the Group Phase in its use of ensemble Figurenotes activities. In the Group Phase, the ensembles consisted of peers in a school class, but in the Family Phase these ensembles consisted of family groupings.

The Family Phase was particularly suited to the examination of aspects of the key focus areas:

- in music skills, participants' development of the music skills of playing together and turn-taking could be studied and compared with the Group Phase;
- in social interaction, social interactions of participants could be studied in the family environment;
- in self-concept, potential changes in self-concept of participants could be observed as they made music with their siblings and parents; and
- the potential influence of participants' creativity on outcomes in each of these key focus areas.

Additionally, in the Family Phase I was able to investigate the effectiveness of Figurenotes in facilitating music-making specifically for families, and could compare this with the results already obtained on the effectiveness of Figurenotes with individuals and peer groups.

6.1 Phase Planning

Table 19, below, lists the Family Phase participants with names and ages for the participating child with autism and details of their sibling and parent.

Table 19 - Family Session phase participants.

Name	Age	Sibling Name	Sibling Age	Parent
Steven	12	John	9	mother
Anna	9	Emma	6	mother
Alexander	11	Elinder	8	mother
Neal	12	Scott	9	mother
Sebastian	12	Dean	10	mother
Charlotte & Sean	8	[twins]		mother

The Family Phase sessions incorporated techniques and activities used in both the Individual and Group phases. However, new activities were also needed which were appropriate for the particular groupings of parent, child with autism, and sibling used in this phase. Four sessions were planned for each family, which was the maximum number of sessions possible within the constraints of study time and resources. Therefore, in the Family Phase the emphasis would be of necessity on musical techniques which would be quickly achievable for participants with autism and their siblings and parents.

Sessions were designed to include a sibling of each participant child with autism. In all cases, the siblings were younger than their brother or sister with autism. This was not the result of any prior decision, but was a coincidence. This situation did, however, allow for a more consistent approach with each family. Also, it was decided to involve one parent in each family. For only two of the families were both parents (father and mother) available to attend sessions at the times offered, and so in order to maintain consistency all participant family groupings consisted of one parent. The parent involved in the sessions was in all cases the mother. This was not by design, but occurred due to the mother being the parent

most often at home with the children. Also, it was participants' mothers, not their fathers, who had expressed interest during the Individual Phase.

At the start of the Family Phase, the children with autism who participated in the Family Phase were more familiar with Figurenotes than were their siblings or parents. This may have affected the early sessions, for example by enabling the children with autism to gain an inflated perception of their competence in comparison with their sibling or parent. However, as had been observed with the Individual and Group Phase participants, Figurenotes was quickly understood by siblings and parents in the Family Phase. This reduced the influence of any superiority in music skills by the children with autism due to their greater familiarity with the Figurenotes notation.

Family sessions presented a new series of challenges to session timing. Sessions were originally planned to be approximately 45 minutes in length. In reality, they lasted anywhere between 30 and 60 minutes. This wide variation was due to a number of factors. There was more flexibility in the groupings and a variety of ensemble combinations (child with autism and sibling, child with autism and parent, and child with autism, parent, and sibling). Also, allowance needed to be made for family members to interact naturally. Thus, in order to experiment with different combinations and uses of Figurenotes, and in order to accommodate the needs and wishes of the family member participants, session duration needed to be flexible. Sessions were conducted either weekly or fortnightly, according to availability. All sessions were conducted in the participating family's home. Conducting sessions in families' homes was preferred, as in the Individual Phase, as it enabled a more naturalistic setting and allowed the child with autism to be in a familiar environment.

The music skills rated in the Family Phase were limited to playing together and turn-taking. The other music skills rated in earlier phases (accuracy, fluency, and technique) were not rated in the Family Phase because findings from the Group Phase had prompted the focus to shift in the Family Phase to investigating those music skills which were most closely related to social interactions. Therefore, activities were prepared which enabled development of these skills. In social interaction, the focus of observation in the Family Phase was on turn-taking and communication. In the Group Phase, participants interacted with other group participants and teachers; in the Family Phase, interactions were with

siblings and parents. In order to elucidate possible similarities and differences, the aspects of communication rated in the Family Phase paralleled those used in the Group Phase. The Group Phase included ratings of communication with peers as well as adults, so the Family Phase included ratings of communication with siblings as well as with parents. In this way, a comparison could be made. Social interactions by participants in both the Individual and Group Phases had increased from the first to the last sessions.

In the Group Phase, an important additional finding was that changes in social interaction were linked to changes in participants' music skills in the specific area of turn-taking. The Family Phase offered further opportunities to explore these findings in a family context. A division of session activities in the Family Phase into performing and creative activities enabled observations to be made and compared between the two areas. In general, music skills (playing together and music turn-taking) were assessed in the performing activities, and the social interactions (communication and social turn-taking) were assessed during the more verbal and freely-structured creative activities. The ensemble activities and creative activities used are described in the next two sections.

Ensemble Activities

In the ensemble activities, participants played together on keyboard and tuned percussion instruments - glockenspiel, xylophone, and tubalophone (an instrument similar to a xylophone but with metal tubes as sounding bars) using arrangements of several songs. Some were children's songs and some were songs for an older age group. Although the same repertoire was used with each family, there was some flexibility in the order of activities within sessions and the length of time spent on each activity, according to the children's age, and the abilities and musical preferences of the children and their parents. Some songs used in the Individual Phase were rearranged for use in the Family Phase. The use of music already familiar to participants was designed to enable them to pay attention to the turn-taking and playing together aspects of the work. The songs used are shown in Table 20 on the following page.

Table 20 - Songs used to develop turn-taking and playing together.

Turn-Taking	Playing Together
Stairway to Heaven	Lean on Me
Desperado	Happy Birthday
Incy-Wincy Spider	Do Your Thing
Bananas	Hallelujah
Heads Shoulders Knees and Toes	
Old MacDonald Twinkle Twinkle Little Star Muffin Man	

Three tunes (in the lower box of the table above) were arranged in such a way as to contain both turn-taking and playing together sections. In the following turn-taking example (Figure 62 below), the first line in a song is given to one player, immediately followed by the second half of the line for the other player.

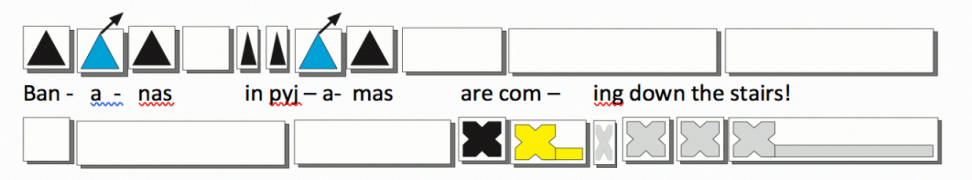


Figure 62 - First line of Figurenotes arrangement of Bananas in Pyjamas.

The next example (Figure 63 below) shows a playing together activity. Both players play their parts simultaneously in different areas on the keyboard, one in the upper register and one in the lower register.

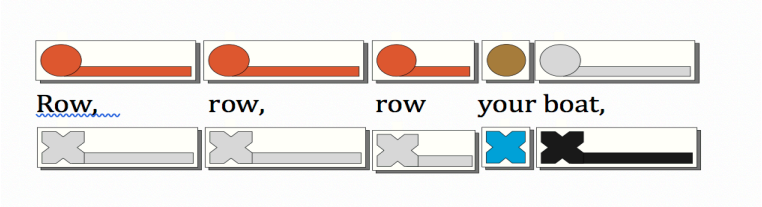


Figure 63 - First line of Figurenotes arrangement of Row Row Row Your Boat.

Creative Activities

An important emerging theme from the Group Phase was the potential role of participants' creative uses of Figurenotes in facilitating development of their social interactions and self-concept. This prompted the incorporation of specific creative activities in the design of the Family Phase sessions. In the group sessions the creative activities occurred initially as a result of participants themselves spontaneously acting to vary or add musical material to what was presented. The action research approach allowed these findings to be used when planning for the Family Phase. In the Family Phase, creative activities were planned and incorporated into each session. Participants were invited to place Figurenotes magnets on a whiteboard to make up short melodies for another participant (sibling or parent) to perform on the keyboard. An example from Session 1 (Figure 64 below) shows Steven's melody, played by his brother John. The melody is a series of notes that are not connected together into a coherent structure.

Figure 64 - Steven, session 1, creative activity.

An example from Session 4 (Figure 65 on the following page) shows Steven creating this time a melodic line using a selection of magnets, but not all of them. His melody has a clear structure, with the second line having a rhythm which is a variation of the first line.

Figure 65 - Steven, Family session 4, creative activity.

It is possible that the creation of patterns of Figurenotes shapes and colours on a whiteboard may not have been done with reference to the resulting sounds. However, these notated melodies were created by participants after several previous sessions experiencing the connection of Figurenotes to sounds, and were also composed while at the keyboard. Regardless of the degree of connection to actual sounds during the creation of the melodies, these creative activities in the Family Phase were primarily designed to facilitate social interaction by the children with autism and development of their self-concept, and allow observations to be made in these two areas.

6.2 Participants and Sessions

Case Study: Anna's Family

Session 1

Anna had already demonstrated her strong personality during the Individual Phase sessions. The Family Phase sessions involved Anna with her younger sister, Emma, and their mother. These sessions held the potential to be challenging for participants as well as researcher, as my observations of Emma when she was present in her sister's Individual Phase sessions had been of an equally strong personality. In the first session with Anna's family, the challenge turned out to be logistical: a suitable area in the family home was needed for the keyboard to be placed in such a way as to allow two participants to be seated at it, as well as space next to the keyboard for a glockenspiel to be played. There also needed to be sufficient space for me to facilitate the activities and the video camera to record the

proceedings. Additionally, a separate area of floor was needed for the participants to sit on while undertaking the creative work activity using the whiteboard, magnets, and glockenspiel. After discussion with Anna's parents, it was decided that their living area was the best location for the session. This meant that family members (and pets) were moving around in the vicinity of the session activities for most of the time, and did cause some distractions for participants at times. However, I felt it was important to follow the wishes of the family and allow the session to run in an environment which was natural for them. During the set-up for this session, Emma followed me around, offering to help. Meanwhile, Anna was fully engaged on the sofa with her iPad. She seemed aware of me but was not interested in paying attention, but when her mother called her, Anna came over to the keyboard and sat down and waited patiently for the session to begin.

Activity 1: turn-taking (Anna and Emma) - Twinkle Twinkle Little Star

Emma played her part on the glockenspiel by striking the keys but not bouncing, creating a rather dull sound. Also, she had low familiarity with Figurenotes so did not move her hand to the correct key immediately she saw it on the score, and the overall time taken to read and play notes was often a few seconds. Anna was reading and playing much quicker than Emma. We repeated the exercise a few times and each time Emma improved her fluency. The arrangement in Figurenotes seemed to work – Anna intuitively understood about the turn-taking from the way I had notated it. Anna waited for Emma to finish her part, but expressed her frustration at being made to wait by sighing on a few occasions.

Activity 2: turn-taking and playing together (Anna and Emma) - Old MacDonald

When I asked the mother to come over to play in this activity, she was reluctant, saying that she would prefer to watch her two children play. As the first activity had taken longer than expected anyway, I decided at this point not to try to encourage her further to participate. Instead, Emma was invited to play with Anna for all ensemble activities in this session. The arrangement of *Old MacDonald* involved playing together (each player having the same part, but on a different octave of the keyboard). Anna was playing faster than Emma at first so the parts were not played together, but with refinement they were able to play almost together. The turn-taking sections worked well from the first attempt.

Activity 3: Creative activity (Anna, Emma and mother)

The creative activity was done by Anna and Emma with the mother joining in as the activity progressed. Each had a turn at making up a short musical phrase on Figurenotes for another to play. Anna, Emma, and their mother each did this willingly and enthusiastically, seeming to enjoy the opportunity to create their own patterns. There was very little interaction between the two children, however. After this it seemed that we had done enough for first session. There was a lot for the children, the parent, and for me, to get used to just in the setting up and novelty of it, and I felt the energy in the session had been largely used up by that time.

Session 2

Session 2 occurred a week later, again in the family's living area. Once again, Anna was playing on her iPad as I set up, but she got up and went to the keyboard as soon as her mother told her that it was time to begin.

Activity 1: turn-taking (Anna and Emma) - Twinkle Twinkle Little Star

In this session, *Twinkle Twinkle Little Star* was played with both players on the keyboard, rather than one on keyboard and one on glockenspiel as had been done in Session 1. I wanted to see how the siblings interacted and performed when they were sitting side by side at the keyboard. As in the first session, I prompted their reading of the Figurenotes score by pointing. Later, on reflection I questioned whether this was this really necessary, as they were playing confidently already, and Emma had actually asked me to "stop pointing". After playing the arrangement once, we repeated it with swapped parts and positions. Anna was very willing to swap parts, Emma less so.

Activity 2: Turn-taking and playing together (Anna and Emma) - Old MacDonald

Emma started this activity well but then became visibly upset (was it too challenging?), so the mother enthusiastically volunteered to take her place. Anna and her mother repeated the song, this time without me assisting by pointing at the score, and they achieved it well.

Activity 3: Creative activity (Anna, Emma and mother)

The mother participated in this session with the two siblings. Each had a turn at making up a short phrase for another to play, using glockenspiel. The mother spoke to each of the

children during this activity, and possibly this encouraged the children to interact with each other more than in the previous session. Each of them created and performed with interest and engagement. All the magnets used were one-beat notes, but the eagerness with which the participants undertook this activity suggested that a greater variety of note durations could be used as a stimulus to creating more rhythmically complex melodies. Reflection on this session led to me adding two-beat note magnets to the creative activity for the following session.

Activity 4: turn-taking (Anna and Emma) - Bananas in Pyjamas

Before this activity could begin, Anna stood up and walked away. Her mother said that Anna probably just needed a time out. So I took the opportunity to ask Emma to play with me, in order to help her gain more confidence in her playing. Emma played better when I held the Figurenotes score close to her and pointed at her notes. Then Anna was invited back and she and Emma played together. Anna needed help with understanding the Figurenotes with arrows, so the first time was hesitant, but then we did it again and her performance was more fluent.

The interactions between Anna, Emma, and their mother during this session were more frequent and of higher quality during this session. The activities used were more challenging than in the first two sessions and designed to stimulate communication between participants. The fact that the participants were willing and able to engage in a higher level of interactions in order to accomplish the activities points to their motivation to undertake the activities, as well as an increasing sense of confidence in their musical skills. An interesting aspect of this session was that the Figurenotes sticker of one keyboard key (the red circle) came off during the session, which prompted Anna to cry out in surprise. However, she was able to play that note correctly whenever needed in the activities. Each time she would start sobbing in what I and her mother realised were mock tears, as she smiled immediately afterwards. When I was able to replace the sticker, during the creative work, Anna sighed exaggeratedly and said "Thank you!".

During the creative activity, Anna laughed out loud at the sound of one of the musical phrases created. Emma asked her "why did you laugh?", to which no response was given except for a disdainful look. When the mother made up a phrase for Anna to play, Anna

hesitated slightly before starting, upon which Emma took the beater from Anna and played it, saying "this way, Anna!". However, Emma's performance of the phrase was disjointed and hesitant, and as soon as Emma returned the beater to her sister, Anna proceeded to perform the phrase with much more fluency than her sister. Emma was very surprised that her sister had done this, indicating that it was not usual for Anna to be better at something than her sister. Emma may have taken the beater from Anna assuming that Anna needed help to play it, whereas in fact it was Emma who needed help.

Session 3

Activity 1: turn-taking (Anna and Emma) - Bananas in Pyjamas

Emma seemed grumpy at the start of Session 3. Her mother said she was "having a bad day". Emma did not want to participate and had to be cajoled by her mother in order to do anything. When I arrived, Emma was playing a game with her dad on the sofa, and later when I was leaving she was outside with her dad too. They seemed to get on well and as it seemed that the mother is often busy with Anna, Emma spends more time with her father. It is also possible that Emma values her time with her father and the music session was less important to her than this.

Activity 2: playing together and turn-taking (Anna and mother) - Old MacDonald

Anna once again expressed a willingness and enthusiasm to play with her mother. In contrast to the previous sessions, this time Anna voluntarily sat on the seat to the left of the keyboard to play the lower part.

Activity 3: turn-taking (Emma and Anna) - Twinkle Twinkle Little Star

Emma finally agreed to participate in playing with her sister. Anna seemed aware that Emma had been unwilling to play and was not playing well. Anna expressed some frustration at this by sighing loudly during the playing of *Twinkle Twinkle Little Star*, but as previously she was still able to slow down and wait for her sister.

Activity 4: creative activities (Emma, Anna and mother)

The creative activities in this session were enhanced when Anna produced a picture she had drawn herself prior to the session. In a similar way to Katherine's *Ocean* picture in the Group Phase, Anna had drawn a picture which described a scene with characters and using

Figurenotes. In the picture Anna drew, entitled (by her) *Rula*, all aspects of the scene (sun, cloud, raindrops, grass, and even the girl's body parts and clothes) are depicted as Figurenotes. Anna was therefore able to 'perform' the picture by playing the pitches indicated by the Figurenotes, while speaking about each part of the image in turn. It is likely that this remarkable demonstration of creativity (shown in Figure 66 below) could only have occurred because Anna was by this time very familiar with Figurenotes and could thus use it in this way as a tool in her self-expression.

Figure 66 - *Rula*, Figurenotes picture drawn by Anna.

Activity 5: turn-taking (Anna and mother) - Heads, Shoulders, Knees and Toes

Anna played willingly with her mother once again. *Heads, Shoulders, Knees and Toes* was a new item, yet Anna seemed comfortable with playing her part, and moreover showed awareness of her mother's part, correcting her playing at one point. This behaviour points not only to Anna's increasing self-competence as the sessions proceeded, but also suggests that her motivation was becoming largely intrinsic, with the activities being rewarding for her for their own sake, without the need for external reward. At the end of this activity both Anna and her mother expressed satisfaction at their performance by smiling.

In this session that Anna was very calm, focussed and engaged in the activities. There are several possible reasons for this. Anna now seemed comfortable with the session situation, and unstressed by it. The sessions were in her familiar family home environment, and the session activities were clearly structured. Anna was also by then very familiar with using Figurenotes. Also, in this session I consciously stepped back from micro-managing every aspect of the sessions. It was interesting to see what happened when I was *not* directing – an example is when I did not immediately count in for the songs, and Anna took over this role herself by counting clearly "3,2,1, go!".

Session 4

As usual, when Anna was told it was time to begin, she came and waited patiently. The mother told me that Emma was unwilling to participate today, that she found the activities "boring". However, Emma was in the session room when I entered, and responded with a smile when I greeted her. I told Emma that she could "just watch", and could join in if she wanted to.

Activity 1: turn-taking - Bananas in Pyjamas (Anna and researcher)

As Emma was unwilling to play and the mother had momentarily left the room, I played this activity with Anna. At first Anna played hesitantly, but the second time she was very confident. Her sense of steady tempo was secure and this assisted us to perform the turn-taking in the activity successfully.

Activity 2: playing together and turn-taking (Anna and mother) - Old MacDonald

I asked the mother to play in Old MacDonald as she and Anna had done that last time. A count-in was needed - I asked Anna to do it but my instructions were not understood at first by Anna, so her mother asked her to do it, following which Anna gave a very clear count-in ("3-2-1-go!"). Initially Anna played faster than her mother, who could not keep up with Anna. Although able to wait for her partner in turn-taking arrangements, in playing together items Anna often played at a pace which was too fast for her sister or mother and was either unaware of this, or was unwilling to slow down. In the sessions Anna's music turn taking was generally better than her playing together. Despite some improvements through the sessions, playing together seemed to be an uncomfortable activity for Anna. She occasionally expressed frustration at needing to wait for her mother or sister during a musical activity and she was almost always quicker at reading and playing than they were. In turn-taking however, Anna was quite willing and able to wait for her turn, and this was also the case for her social turn-taking, and showed that she understood how to take turns, and the need to do so.

Activity 3: Playing together and turn-taking (Anna and mother) - Incy-Wincy Spider

I asked Anna and her mother if they knew this new song, and Anna's mum said that she did not think Anna knew it. So I introduced it by singing the song while doing actions representing the spider climbing. I had not rehearsed this before the session, and as a result my singing and actions were not confident. Nevertheless, Anna was willing to play the Figurenotes arrangement with her mother immediately afterwards. Their performance was hesitant the first time, but more fluent on repetition.

Activity 4: Creative activity (Anna, Emma and mother)

We all sat on the floor for the creative activity. Emma was around, hovering, and when she saw what we were doing she asked to do it. Later, the mother mentioned that Emma probably wanted to participate in this activity because she was not directly asked to. It was also perhaps because Emma felt that this activity was less challenging than the earlier ones. This activity turned out to be the longest single activity in the whole of the sessions, lasting a full 25 minutes. I had planned another turn-taking activity to finish the session, but the creative activity took all the remaining time allocated for the session.

The activity again involved taking turns making melodies on the whiteboard using Figurenotes magnets. I had brought in more magnets today and these were used with enthusiasm. The creative work was a very interesting (and long) activity today revealing more of the relationship between Emma and Anna. Emma was trying to show Anna how to play each colour by saying the colour name and pointing to the metal glockenspiel bars – of course, Anna did not need that help! Emma also made up tunes where it was not to be read in the usual left-to-right, top-to-bottom way, but instead the reverse of this. Anna seemed confused at first, until Emma showed her by tracing with her finger the direction of reading on the whiteboard and verbally explaining. This was the first instance of a genuinely positive communication between Emma and Anna during the sessions.

Anna seemed quite comfortable with her mother throughout these sessions; she seems to like interacting with adults. It was clear that Anna had a better relationship with her mother than with her sister. At most times she only tolerated Emma's presence, and did not interact positively with her. Likewise, Emma seemed mostly uninterested in what Anna could do. In Session 3 in particular, the siblings did not interact in any meaningful way. Overall, Anna's communication with her parent was better than with her sister (as shown in Figure 67 below) and she generally seemed more secure with her mother.

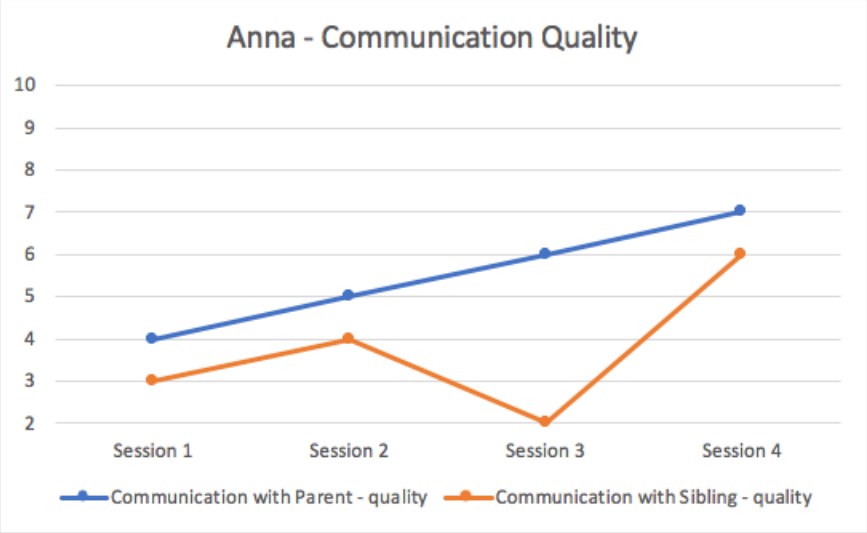


Figure 67 - Anna, communication quality ratings with parent, and with sibling.

Anna seemed to enjoy these family sessions. Her mother commented that she "looked like a different person" when playing on the keyboard. Her mother also noted that Anna and

Emma interacted in new ways during the sessions. However, Emma was reluctant to participate at times, and it seemed that she was not as comfortable with using Figurenotes as Anna was. Figurenotes was a familiar tool for Anna because of her participation in the Individual Phase, whereas it was new for Emma. However, Emma's reluctance may have been due more to external factors, such as her strained relationship with Anna, than to her unfamiliarity with Figurenotes. Nevertheless, the moments in the sessions where Emma was surprised by Anna's skills, and where the two siblings actively assisted each other, demonstrated a potential for genuine change in their relationship.

Summaries of Other Participants

Steven

The family sessions with Steven's family involved Steven, his younger brother John, and their mother. There were positive changes in behaviour observed between Steven and his brother during the sessions. Steven's communication showed a larger improvement with his sibling than with his mother, as shown in Figure 68 below.

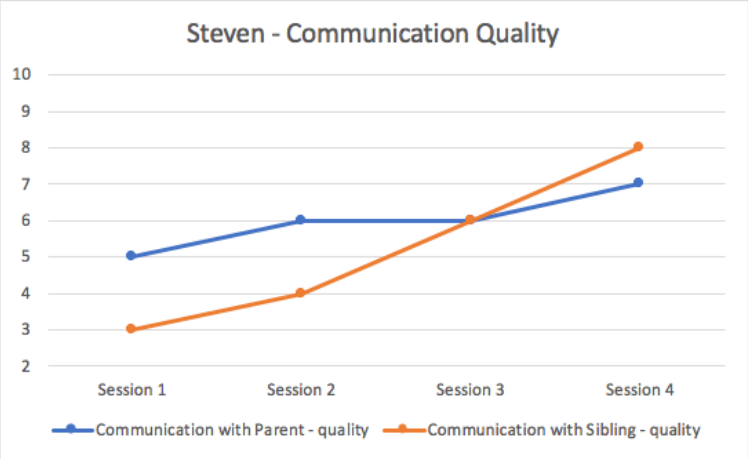


Figure 68 - Steven, social interaction ratings in communication quality.

Steven's communication quality with his mother was higher than with his brother in Sessions 1 and 2, but by Session 3 it was equal, and in Session 4 communication quality was higher with his brother. Steven's brother was initially reluctant to participate in the sessions and needed encouragement from his mother. By the final session, John was participating willingly, and Steven and John were observed to be enjoying their joint activities in both the ensemble and creative activities.

In contrast to other participants, turn-taking between Steven and John were similar or slightly higher in creative work than in performing, as shown in Figure 69, below.

Figure 69 - Steven, ratings in turn-taking with sibling.

Alexander

As in Anna's case, the mother of Alexander was initially reluctant to participate, and did not do so in Session 1 playing together activities. Sessions with Alexander's family suggested, more than any other family, that Figurenotes can be very suited to family work due to being able to be understood quickly and intuitively by even musical novices, enabling ensembles to be formed easily. Alexander's scores in music skills and social interaction were higher in activities with his sister than with his mother, but scores in interactions with his mother did improve significantly through the sessions. In Session 4 Alexander's sister spontaneously started conducting her brother in his playing of Old MacDonald, as I was setting up the camera equipment for the session. This points to a potential for families to use Figurenotes without the need for outside facilitation in the longer term.

Alexander's mother did not participate in ensemble activities in Session 1. However, from Session 2 to Session 4, ratings of Alexander's turn-taking with his parent were higher in music activities than in non-music activities, as shown in Figure 70 on the following page. This suggests that turn-taking was easier in musical activities, and also that the turn-taking in music positively impacted turn-taking in the social activities.

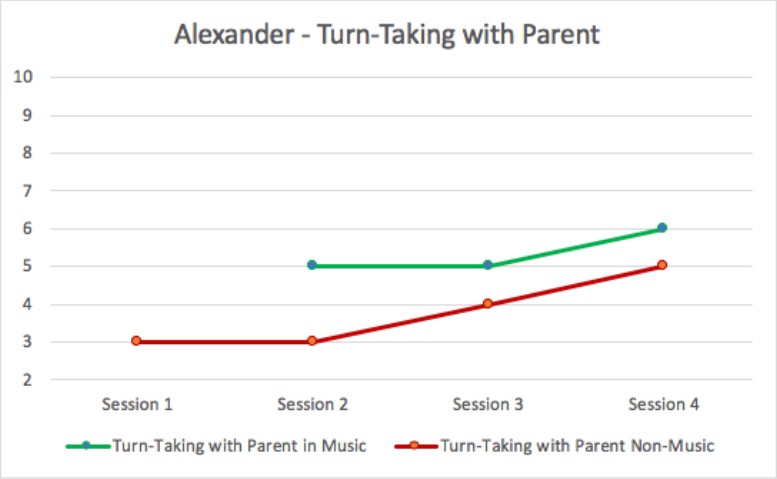


Figure 70 - Alexander - scores in turn-taking with parent.

Neal

In contrast with Steven's mother, Neal's mother was enthusiastic about participation in the sessions from the beginning. In Session 3, there was a dramatic increase in interaction, communication and musical activity between Neal and his mother (see Figure 71 below).

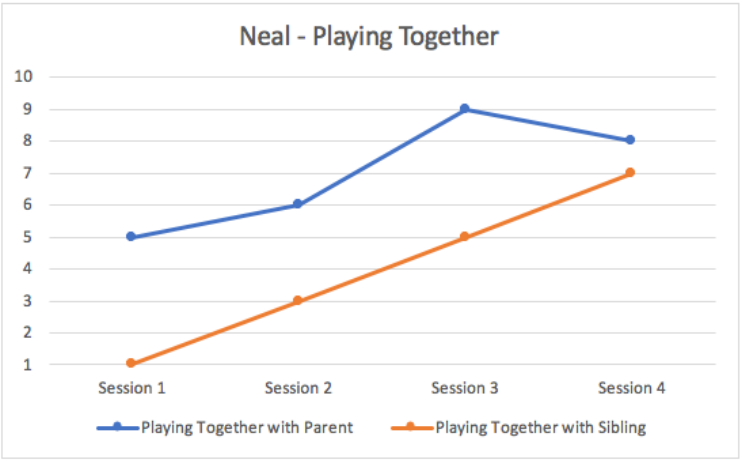


Figure 71 - Neal - playing together ratings with parent and with sibling.

The catalyst for this was the strong positive response shown by Neal's mother to the use of *Lean on Me*, a song which was a song she had loved as a teenager. When we began, Neal's mother exclaimed "Oh, I love this song! I used to listen to it all the time. Let's play it together, Neal!" Neal responded to his mother's warmth and good humour in this session. According to his mother, Neal and his mother already had a good relationship prior to the research sessions, so perhaps the Figurenotes activities acted more as a facilitating environment rather than an intervention to change patterns of behaviour. In contrast to

some other families, Neal's brother Scott was reluctant to participate initially, but their interactions improved significantly during the sessions.

Sebastian

Sebastian's family sessions were at times dominated by his brother Dean, who expressed his feelings and opinions quite strongly during the sessions, choosing when (and whether) to participate. Moreover, Sebastian's music skills were relatively low (when compared with the other participants and as observed in the individual sessions). Nevertheless, when Sebastian played with Dean they made effective ensembles, each even helping the other. Dean's domination, therefore, seems to have been accepted by Sebastian. In these sessions it became clear that participant personality had an effect on the effectiveness of the musical ensembles. Sebastian communicated more frequently with his brother during the sessions, but the quality of communication was higher with his mother. It was found that Sebastian's turn-taking was more effective within the structured musical ensembles than in the unstructured creative work, particularly in activities with his brother, although there was an improvement in Sebastian's turn-taking in all parts of the sessions, as shown in Figure 72 below.

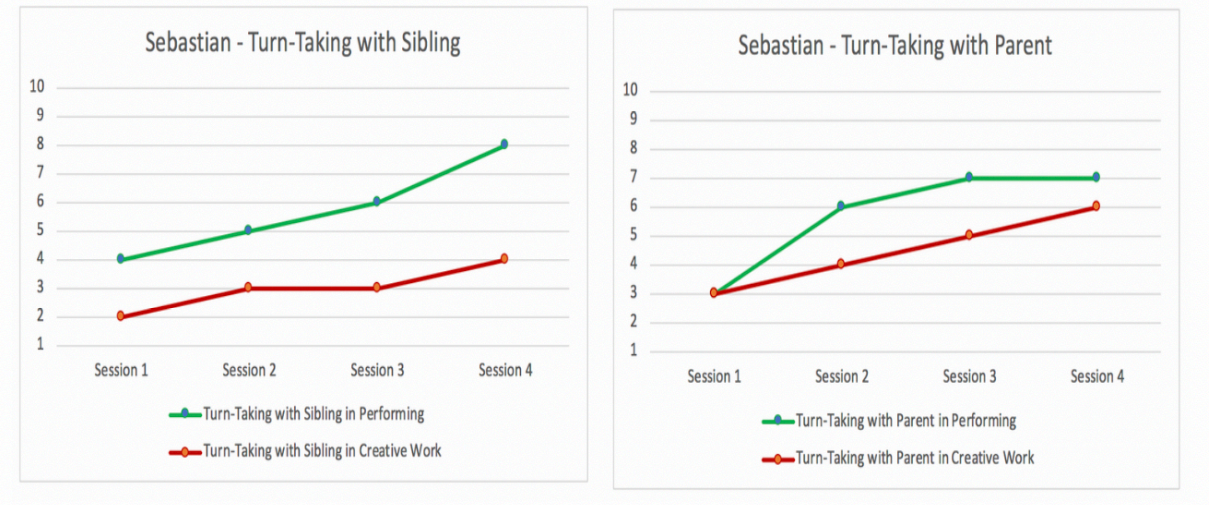


Figure 72 - Sebastian, turn-taking ratings with sibling and with parent.

Sebastian tended to be diffident and hesitant at first, however during the sessions these behaviours were increasingly interspersed with successful musical and social interactions.

Sean

Sean was enthusiastic in the family sessions but had difficulty every time he played in his preferred manner (as fast as possible). The ensemble activities involved the need for participants to be aware of and match tempi, and Sean frequently played much too fast for his sister or mother to keep up. Nevertheless, as the sessions preceded he was able to develop some listening skills and showed clear improvement in both turn-taking and playing together. The fact that Figurenotes was an effective way of conceptualising and reading the music for Sean may have allowed the development of these ensemble skills.

As is the case with his sister Charlotte, Sean's scores were consistently higher with his mother than with his sibling, as shown in Figure 73 below.

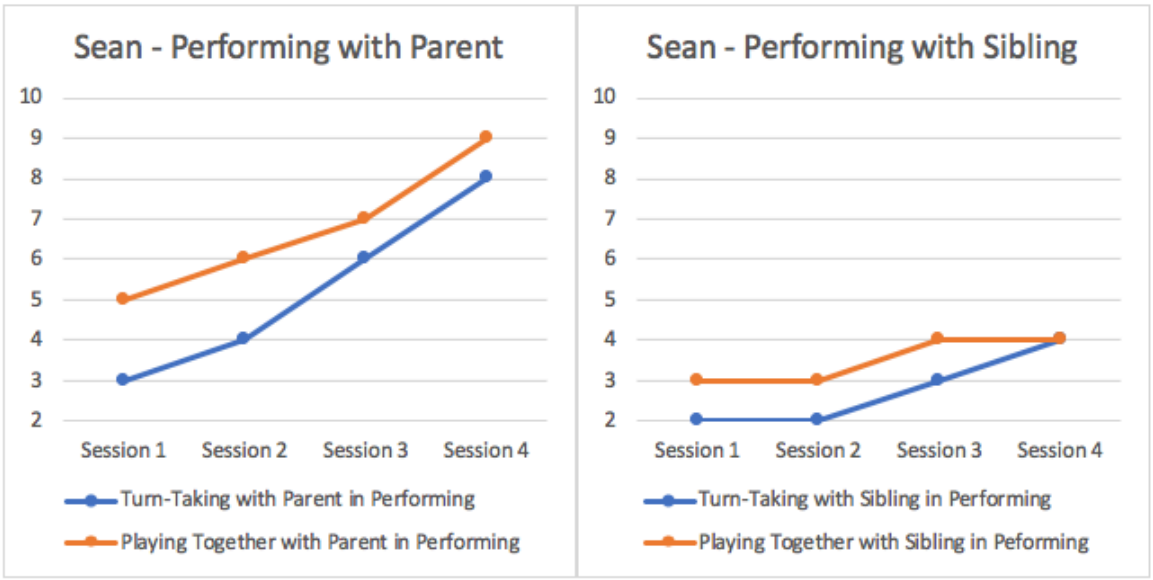


Figure 73 - Sean, performing ratings, with parent and with sibling.

Charlotte

Sean and Charlotte were the only participants both with autism in one family. As well as both siblings having autism, they were also the youngest of the children with autism in the Family Phase. They needed more direction in the sessions than the other sibling groupings, and ensembles with Charlotte and Sean were not fluent immediately. I needed to spend more time was needed with each of them individually before they were able to participate in either the playing together or turn-taking activities. Ensembles involving either of them and their mother were much more fluent. The mother took on the role of a facilitator in the sessions, guiding the two children in their playing by counting the beat and pointing to the

correct position on the Figurenotes score. Charlotte's scores were higher with her mother than with her brother Sean in all areas. This result may be connected with the fact that Sean also had autism, which was not the case with the other Family Phase sibling participants. The largest difference between scores with parent and scores with sibling occurred in Charlotte's turn-taking in creative work, as shown in Figure 74 below.

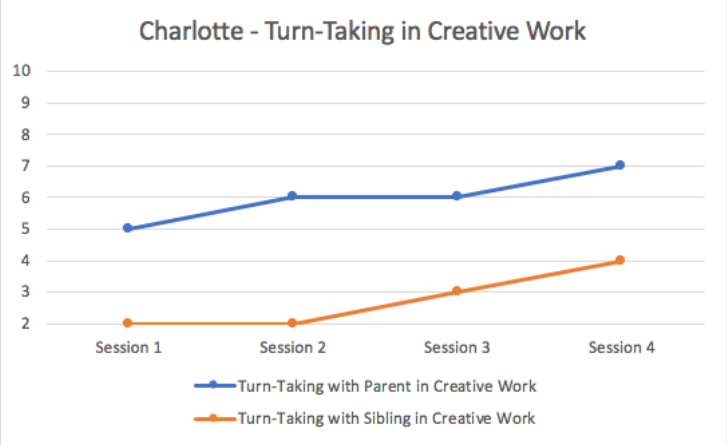


Figure 74 - Charlotte, turn-taking in creative work ratings, with parent and with sibling.

However, scores with her brother showed at least a modest increase between Session 1 and Session 4 in all areas. Scores in the performing activities (playing together and turn-taking) were similar with her mother, but scores with her brother in playing together were higher than in turn-taking, as shown in Figure 75 below.

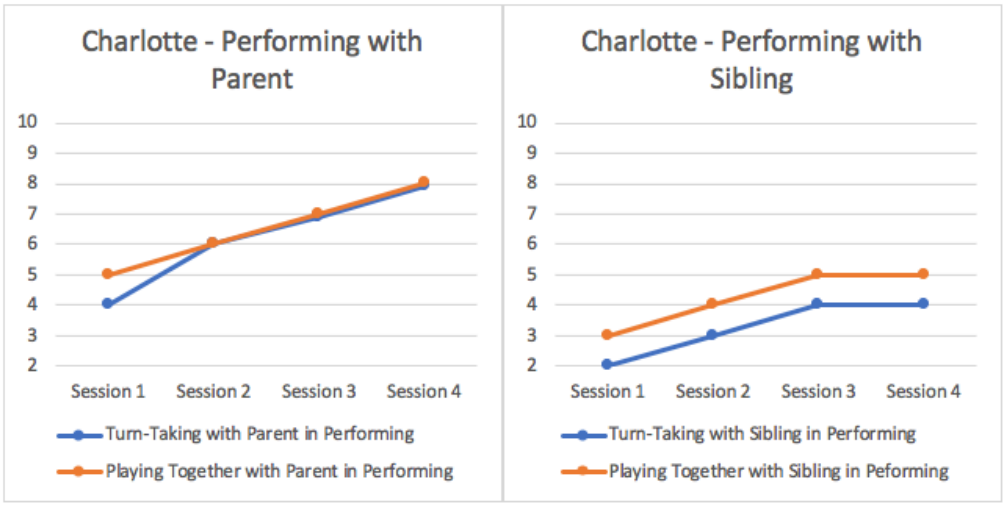


Figure 75 - Charlotte, performing ratings, with parent and with sibling.

Table 21 below, lists a key outcome for each participant in the Family Phase.

Table 21 - Family Phase participants, key outcomes

Participant	Key Outcome
Alexander	Potential for families to utilise Figurenotes on their own
Neal	Interactions improved with sibling and reinforced with parent
Sebastian	Effective ensemble playing despite low skill level
Steven	Figurenotes facilitated sibling interaction
Anna	Self-competence enabling positive interactions
Charlotte	Activities with parent more successful than with sibling
Sean	Figurenotes enabling task focus but also possibility of communication

Combined Family Sessions

At the conclusion of the planned sessions, it was felt that in order to broaden the results obtained, and to enable a more nuanced understanding of issues raised regarding the effect of Figurenotes on social interaction, a small number of extra sessions should be organised involving four of the families. Two families participated together in one session, and two other families participated in a separate session. This arrangement was possible primarily because the two sets of families knew each other already, and were very happy to participate in these combined sessions.

Sessions were structured in a similar way to the main family sessions, except that there were no creative work activities. Ensemble arrangements of well-known melodies, arranged for turn-taking or playing together in duets, were the same as used in regular family sessions. Additionally, special arrangements were made of two of the melodies, enabling the two families to play together in a larger group. No numerical ratings were given, as there was only one session for each grouping, and the session was primarily for the purpose of drawing out emerging themes from the earlier sessions.

Case Study: Families of Sebastian and Steven

The session involving Sebastian and Steven's families began with a duet arrangement of *Old McDonald*. I played the melody to signal the start of the session and to familiarise them with the arrangement. Steven was outside the room but immediately came in when he heard the tune. Steven's mother was in the room already. At one point, Sebastian missed a bass note and Steven leaned over to show him the correct note. After the first play through, Steven's mother asked if we could do it again. The second time, the children played more together, showing an increasing awareness of each other. Sebastian's brother came in during the second play-through and gave the players a rating of "9.5 out of 10!". Steven's mother and brother asked to play *Old McDonald* too, so they played the same arrangement while Steven and Sebastian watched and listened. The performance was similar in accuracy to the earlier one by Steven and Sebastian. In this instance it appeared that Figurenotes was enabling all participants to participate equally.

Next, the two children swapped parts so Sebastian was playing the melody and Steven playing the bass. Next, Sebastian played with his brother. At one point his brother showed some annoyance at an error made by Sebastian, and he reached over and guided Sebastian's finger to the correct note. I also needed to point to the current location on the score in order for them to know where they were up to. Both children recognised the need to work on the ensemble however and were willing to repeat and refine until it was correct. In the following duet item, *Happy Birthday*, each child needed to play through their part by themselves first, due to the greater complexity of the arrangement. The performance was reasonably accurate, and it improved further when I asked them to listen to each other more.

Following this, we used the specially-arranged trio arrangement of *Twinkle Twinkle Little Star*. A second keyboard was set up adjacent to the first keyboard for the third player to use. We began with Steven playing melody and Sebastian's brother playing bass on the main keyboard – I hypothesised that playing as a duet first would enable the ensemble to be built up and prevented the participants experiencing a cognitive or sensory overload from having too many parts going on at once at the start. This strategy seemed to work, as the duet went smoothly and when Sebastian was asked to come to the second keyboard, he did so willingly and purposefully, as if he understood that he was now going to add another important part

to this tune which was already familiar and comfortable. However, when it was played with all three parts, it became clear that each player (or at least each keyboard) needed guidance, as adding the third part changed the sound and the balance significantly. There were several false starts. Unfortunately, neither parent was able to be in the room during this ensemble. It was clear from this experience that if ensembles for three or more players using more than one instrument, were to be successfully introduced, a sufficient level of guidance needed to be provided at the outset.

The session ended with *Old McDonald* (previously used in the first session), this time with Sebastian and his mother playing, followed by Steven and his mother. It was interesting to observe the difference between the confidence levels of the two parents – Sebastian's mother did not seem at all confident (even though she was actually playing quite accurately and responsively), whereas Steven's mother knew what she was doing and needed no guidance.

The combined family session enabled a variety of interactions to take place both within the musical activities, and between them. Of particular interest was the playing in duet of the two participants with autism, Steven and Sebastian. During these activities each showed awareness that their partner was reacting differently to the way their sibling or parent would, and importantly each made allowance for this. Whilst not able to verbalise the process, both Steven and Sebastian showed the necessary skills for musical and social interaction through their flexibility and awareness. The familiar and predictable structure of the Figurenotes arrangements, as well as being in a home environment with active support by caring parents, enabled the participants to fully demonstrate the skills that they possessed.

6.3 Reflective Practice Outcomes

Themes in reflective practice identified in the Individual and Group Phases were carefully considered when planning for the Family Phase. Once the Family Phase sessions began, careful observation was made of each session with reflection on the session outcomes, and this reflection was used for planning and carrying out the subsequent sessions. However, I noticed a difference in my practice in the Family Phase: I did not proceed in as much of a trial-and-error fashion as I had in the earlier phases. Insights gained in using Figurenotes and working with individuals and groups in the earlier phases enabled me to be more confident that the activities I prepared would be successful. In a sense I was able to anticipate problems, and make adjustments before the sessions rather than during the sessions or afterwards. This is not to say that there were no challenges. The Family Phase sessions were particularly challenging for me as a practitioner in negotiating the often complex and problematic relationships between family members, and the fact that the sessions were carried out in the family home made me feel sometimes as through I had intruded into private domestic situations. Additional issues and challenges occurred around my practice and the use of Figurenotes. Four emerging themes in reflective practice are described in the following sections.

Need to simplify the ensembles

In the Family Phase, activities were needed which were appropriate for the particular grouping of parent, child with autism, and sibling used in this phase. As there were only four sessions allocated for each family, the emphasis needed to be on ensembles which would be quickly achievable. I made arrangements in Figurenotes which seemed simple and clear enough, and when introducing a new ensemble, I asked each player to play through their part alone, before the music was played together. However, doing this proved unwieldy and time-consuming. The participants not playing their part became distracted and lost focus. Yet there was a need to ensure each player in an ensemble played their part separately, as the parts, although simple, needed careful attention to details of pitch and rhythm. In most cases the children with autism were able to perform their part as given. However, the parent or sibling sometimes found their part too difficult. In order to address this situation, I revised these ensembles so the parent or sibling's part was made simpler. I had not anticipated that

the arrangements would need to be simplified, and had assumed that the parent and sibling would be more adept at playing than they actually were.

Arrangements also sometimes needed to be revised in order to enable participants to listen and watch each other, rather than needing to focus completely on the performance of their own part. Figure 76, below, shows the original arrangement of *Old MacDonald* used in the Family Phase.

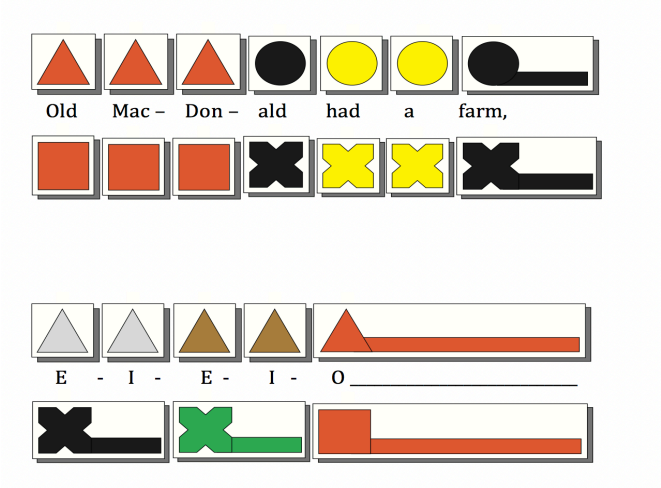


Figure 76 - Old Macdonald, original Figurenotes arrangement.

The child with autism played the upper part, with their sibling or parent playing the lower part. I observed the parents and siblings struggling with their part, so I made changes to the lower (bass) part by removing two notes in their part at that point, which resulted in a much better ensemble. Figure 77, below, shows the revised version.

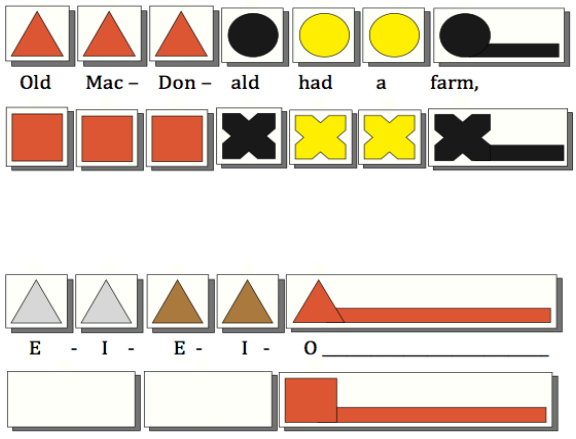


Figure 77 - Old MacDonald, revised arrangement.

There were occasions, however, when an arrangement seemed too easy for particular participants and greater complexity was added in order to maintain the participants' interest. An example is seen in *Hallelujah* (Figure 78 below) where I initially made an arrangement for two players.

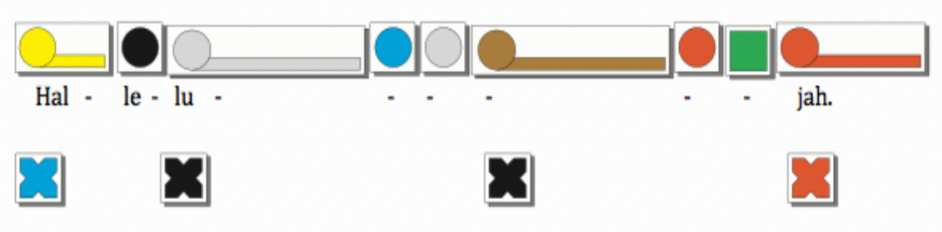


Figure 78 - Hallelujah, last line, original version.

The two-part arrangement was quickly achieved by the participants and seemed a little too easy for them. I added a third part, as shown in Figure 79 below. This enabled both the parent and the sibling to play with the child with autism.

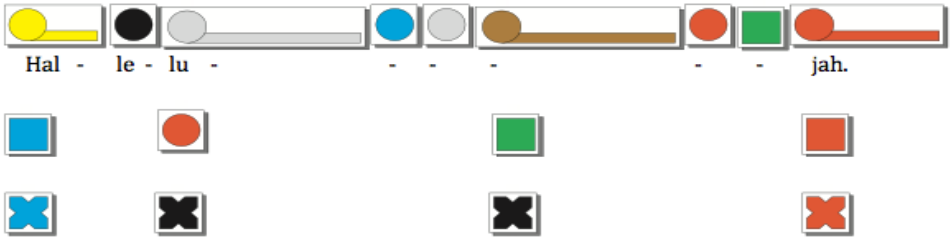


Figure 79 - Hallelujah, last line, revised version.

Being sensitive to family relationships

Working with members of a family in their home environment was a special and privileged position for me as the researcher. I was privy to various kinds of interactions and behaviours which are unlikely to be known to many outside the families. I began to notice that the sessions proceeded most smoothly if I maintained my position as an impartial facilitator, careful not to show any favouritism to any family member. Relationships between the siblings and their parent seemed quite delicate in most cases, most likely a result of one of the siblings having autism. I had to be careful to make myself understood and available to all, but also to allow each family member to have an equal role in the activities.

During the early sessions I noticed I was rather tense; in particular I felt a little uncomfortable facilitating the parent involvement in the sessions. This reflected to me that

as a therapist and teacher I am frequently more comfortable working with children than with adults. Whilst this situation did not change as a result of undertaking this study, my understanding of it did. I learned to allow for my potential discomfort by planning time to speak to the parents before each session so they understood the structure and aims of the session. In this way I did not need to spend time during the sessions trying to answer parents' questions about the activities. With the families in this phase I learned to do less and allow more. I made the ensembles simpler (as discussed in the previous section), and during the sessions I also simplified my involvement, seeing myself as a facilitator or guide, ready to step in when needed but otherwise allowing the families to enjoy playing the ensembles together.

Planned and spontaneous creativity

In the Family Phase, creative activities were designed for all sessions. However, the structured and planned creative activities in the Family Phase seemed to have less of an impact on participants than the spontaneous, participant-generated creative activities in the Individual and Group phases. There are two possible explanations for this. Firstly, by planning the activities beforehand, and giving instructions to participants on what was required, I may have inadvertently communicated to them that spontaneity was not required or desired from them in these activities; all they had to do was follow instructions. This was not my intention but it may have seemed that way to them. Another explanation is that the family environment was not as conducive to the kind of imaginative exploration which occurred in the Group Phase, where participants may have been stimulated to creative interpretations of the Figurenotes work by the presence of peers. Parents and siblings may not have provided the same kind of stimulus as peers at school, possibly due to differences in their areas of interest. The tension which existed between some family members (as described earlier) may have also contributed to the lack of spontaneous creativity shown in these sessions.

Repetition

I had expected that the children with autism would want to repeat activities. however, in reality one of the most difficult things to ask participants to do was to repeat and refine an activity, particularly a shorter section of an activity. Participants typically wanted only to

move on to the next arrangement or activity, and often became visibly agitated when I turned back the page to an already-performed section and asked them to repeat it. They were happy to repeat activities from one session to the next, but not within a session. It was not only the children with autism who showed a reluctance to repeat and refine sections of ensembles, but also the parents and siblings. For the parents, even if they could understand the need to do so, a lack of confidence in their own abilities and a desire to allow their child to go on to another piece, may have been a stronger motivation. For the siblings, their younger age (between 6 and 10) and lack of experience in activities such as music may have meant they did not yet have the self-discipline to correct their performance.

There were usually sections in each arrangement which required further repetition and refinement, and the participants usually recognised this need themselves. However it was rare for the performance of an ensemble to fall apart completely. As the Family Phase sessions proceeded, there was an increasing sensitivity to the quality of performance in the ensembles, and thus to the need to refine the performances.

6.4 Music Skills

Figurenotes facilitated family instrumental ensembles

All participating families were able to perform their ensembles with at least some degree of accuracy without any prior practice or coaching, and with an understanding of how the parts of the ensemble fitted together to form a unified whole. In Session 1 with Alexander's family, the first ensemble used was *Twinkle Twinkle Little Star*. This was performed with an accuracy and fluency which seemed to surprise even the family members. Another example of this was when *Old MacDonald* was performed by Neal and Alexander in their combined family session. The ensemble was played twice: in the first performance the tempo was slightly unsteady, as it seemed neither child (both with autism) was sufficiently confident with playing together or turn-taking. There were no instructions or corrections from me prior to the second performance immediately afterwards, yet it was very secure. This suggests that the turn-taking and playing together elements in the ensemble were able to be

understood by the participants once they had the opportunity to familiarise themselves with it.

There were, however, a few instances of participants needing guidance on performing their part in order to achieve the ensemble. When Charlotte played *Twinkle Twinkle Little* Star with her brother Sean in Session 1, it became obvious after a few attempts that the ensemble could not work until each participant had guidance on performing their own part, particularly in being aware of when the parts were together and when turn-taking was required. This is perhaps not a surprising result, considering both twins have autism.

The role of Figurenotes as an effective visual medium to communicate ensemble arrangements has been discussed in the Group Phase results. Figurenotes also played an important part in the quick comprehension of the Family Phase ensembles. Another aspect which can also be considered effective is the familiarity of the songs used as the basis for many of the ensembles, which enabled participants to begin with a pre-existing conception of the music. An example of the last line of *Bananas in Pyjamas* (Figure 80 below) shows how a familiar song, arranged in Figurenotes using both turn-taking and playing together techniques, can be an effective tool for encouraging and developing these skills in family ensembles.

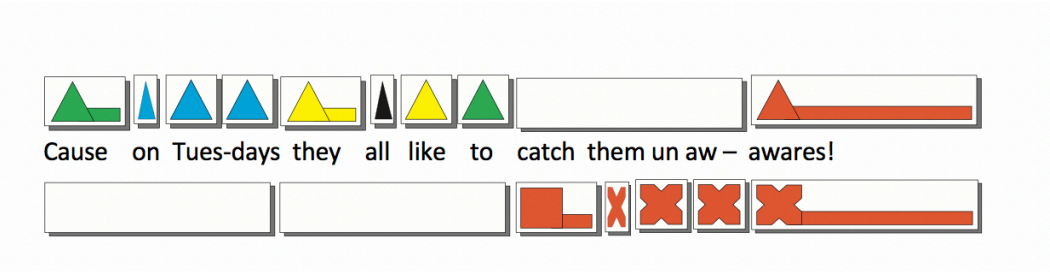


Figure 80 - Figurenotes score of Bananas in Pyjamas, last line.

Moreover, success in ensemble playing was achieved despite (in some cases) a low level of technique, accuracy, and fluency by individual participants. Sebastian had showed relatively low scores in all these areas in his individual sessions, yet in his family sessions the ensembles were all achieved, and his skills in turn-taking in performing increased as the sessions proceeded, as shown in Figure 81, on the following page.

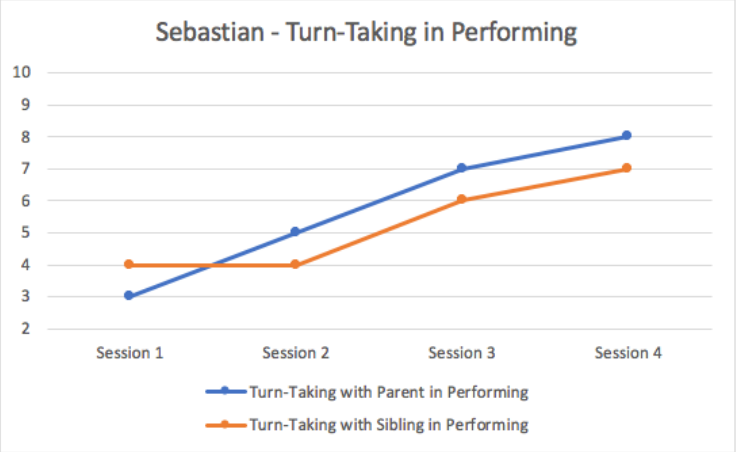


Figure 81 - Sebastian, Turn-Taking in Performing scores.

The ensembles in the Family Phase, where participants played on keyboards or tuned percussion, were mostly achieved and enjoyed. Another study found singing and listening were sustained by families following a music therapy intervention, but instrument playing was not sustained (Thompson, 2014). However, the success of family instrumental ensembles in this study suggests that family instrumental music-making using Figurenotes do have the potential to sustain beyond the period of a music intervention. Further longitudinal research could establish if this is the case.

Children with autism developed musical awareness of parent and sibling

Ratings of music skills in both playing together and in turn-taking increased from Session 1 to Session 4 with all participants, and in playing with both parent and sibling. This result indicates a broad and consistent development in these skills. In order to engage in turn-taking and playing together in musical ensembles, a performer has to be aware of the others in the ensemble and respond to their playing. There were some notable instances of these skills being demonstrated in the family sessions. In Session 3 of Neal's family sessions, Neal and his mother performed *Lean on Me*. Neal's mother hesitated at the start of line 4 (shown in Figure 82 on the following page). Instead of continuing to play, as he had done previously, Neal this time showed awareness and flexibility by waiting for his mother to begin the line. As it was a playing together section, he showed not only an awareness of her prior hesitation, but also demonstrated an ability to watch her hand on the keyboard in order to begin the next line with her.

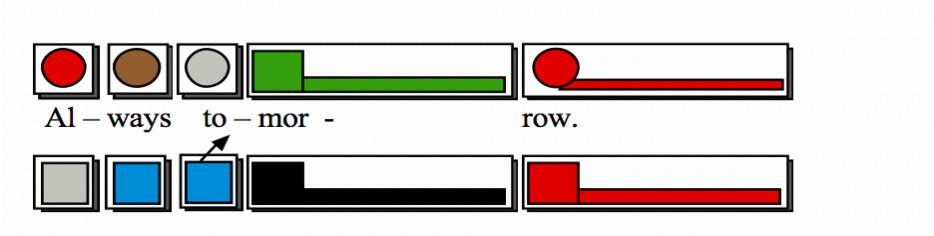


Figure 82 - Figurenotes score of Lean on Me, line 4.

Charlotte and Sean initially showed very little awareness of each other in ensemble playing, and it was difficult to establish any fluency in their performing. However, when each child performed with their mother, they were able to develop their playing together and turn-taking skills. In Session 3, Charlotte and Sean performed *Old MacDonald* together but after the first four lines were not able to continue. I then asked their mother to play with firstly Charlotte, then with Sean, and then both of them played the ensemble together once more. After the experience of playing with their mother, they were able to be aware enough of each other to finish the ensemble successfully. When *Old MacDonald* was performed by Neal and Alexander in the Combined Family session, Neal's mother observed that "there was harmony between them", an observation borne out by the successful performance of the ensemble from start to finish, requiring awareness and sensitivity from both players.

Skill in playing together preceded skill in music turn-taking

Scores in playing together were initially higher than scores in turn-taking, for participants playing with both their parent and their sibling. I observed that participants had a greater understanding of ensemble playing where each player performed simultaneously, than where players needed to wait for their partner to complete a phrase before playing their own phrase. However, as the sessions progressed scores in turn-taking increased and by the final session were close to equalling the scores in playing together, as shown in Figure 83 on the following page.

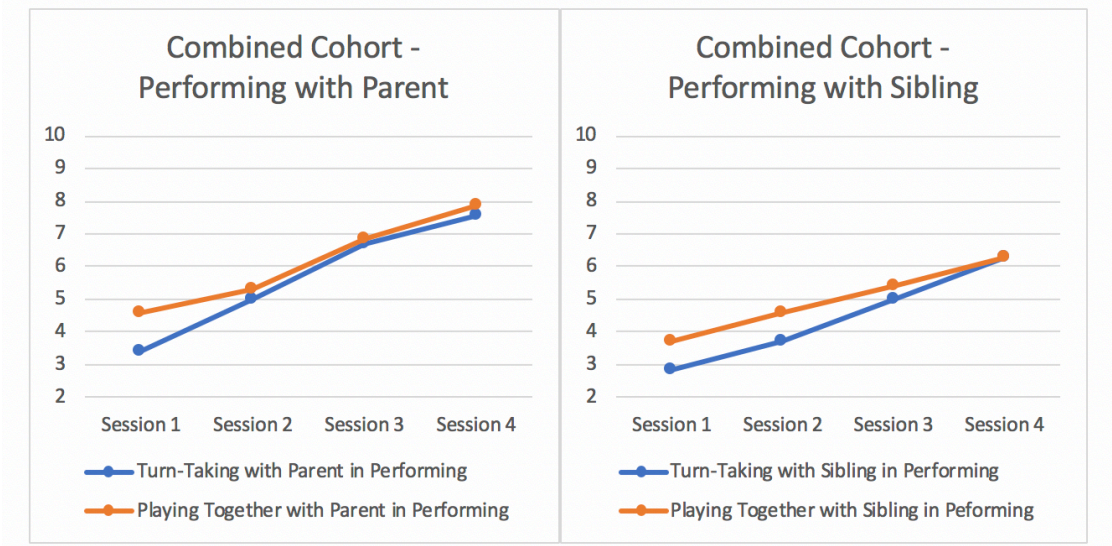


Figure 83 - Family Phase combined cohort, averaged ratings in performing.

The greater increase in turn-taking scores, but not to the extent of becoming higher than playing together, may be connected to the initially quite low scores. However, I observed in the Group Phase results that playing together seemed to provide a pathway to developing skills in turn-taking in performance for several participants. Playing music simultaneously with a partner may be a less threatening and more intuitive way of performing than turn-taking, which involves the need to perform alone and also a precise awareness of the endings and beginnings of a partner's playing. These results point to the value of a greater understanding of the role of turn-taking and playing together in developing the music skills of children with autism. Further research is needed to elucidate the interplay between these areas of performance.

Music turn-taking better than social turn-taking

It was found that turn-taking was generally better in the performing activities than in the creative activities, with both parents and siblings, as shown in Figure 84 on the following page.

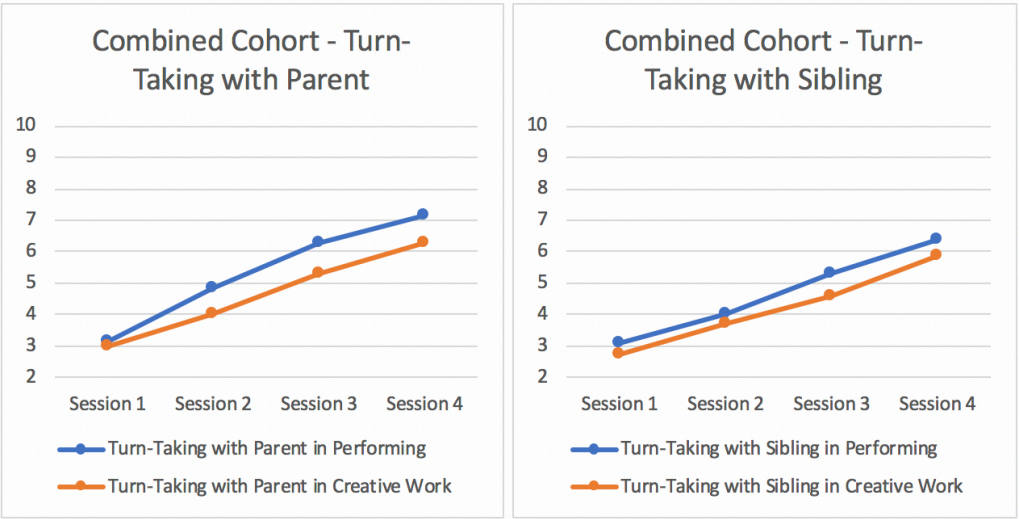


Figure 84 - Family Phase, combined cohort, averaged turn-taking ratings.

Although not a large difference, these results show that turn-taking was consistently better in performing than in the creative activities, and is supported by observations from the sessions. However, scores in turn-taking in creative activities, although initially quite low overall, did increase as sessions progressed. In Anna's case, her turn-taking in creative work improved rapidly, such that by the final session it was equal to her turn-taking in performing (Figure 85 below).

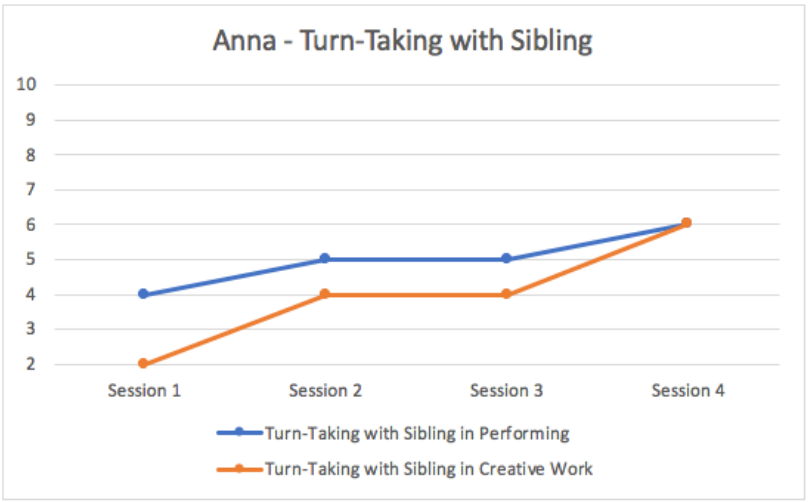


Figure 85 - Anna, ratings in turn-taking with sibling.

It can be seen that the difference between Anna's turn-taking in performing and in creative work decreased through the sessions, and by the final session the scores were equal. These results point to the need for further research into the potential of turn-taking skills

developed in musical ensembles to be used in non-musical situations by children with autism.

Children with autism performed better with parent than with sibling

A general trend was observed that the children with autism performed better with their parent than with their sibling, as shown in Figure 86 below.

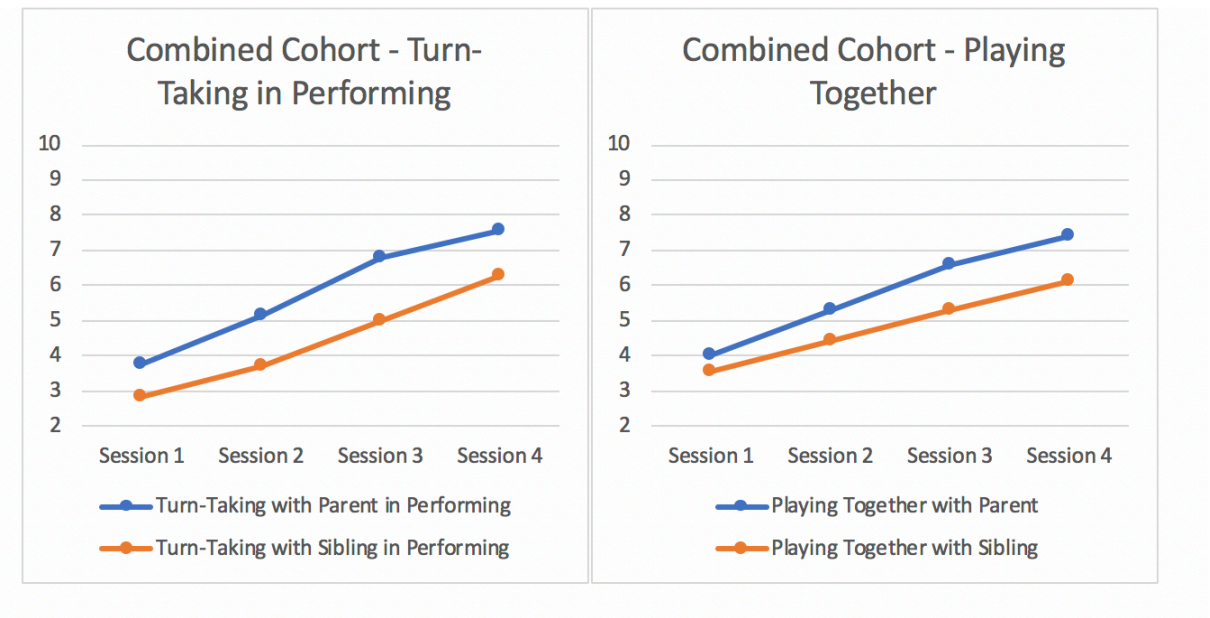


Figure 86 - Family Phase, combined cohort averaged turn-taking and playing together ratings.

The children with autism were frequently observed to be more comfortable with their parent than with their sibling, and the results in both playing together and in turn-taking show higher scores with the parent. The parents were in most cases more enthusiastic about the family sessions than the siblings, notwithstanding that two parents (the mothers of Anna and Alexander) declined to participate until Session 2. Neal's mother was so interested in the sessions and in using Figurenotes that she even made a Figurenotes score using coloured markers on her own, between sessions, as shown in Figure 87 on the following page.

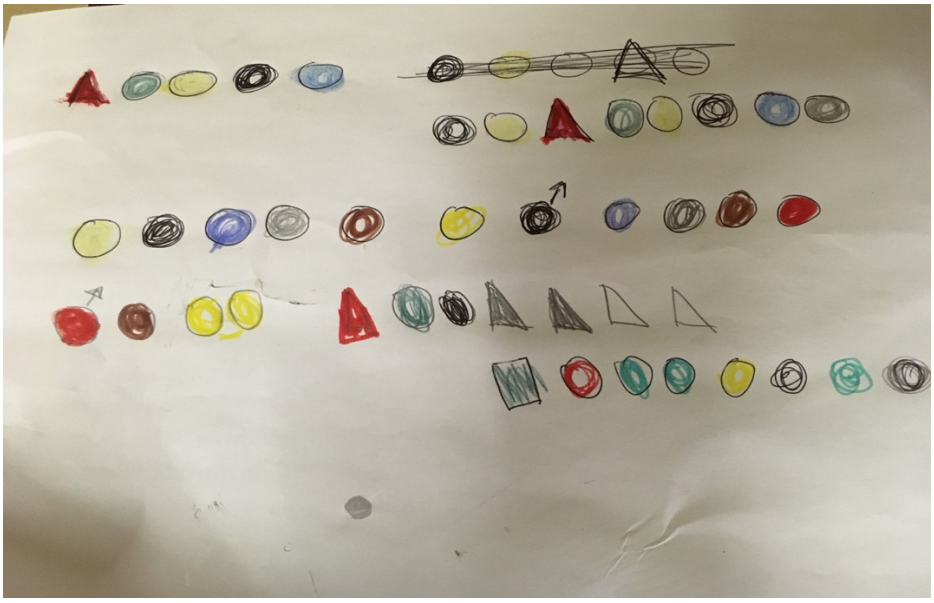


Figure 87 - Neal's mother's hand-drawn Figurenotes score.

Neal's mother asked Neal if he would like to perform her composition in Session 3, and when Neal said "no", his mother sat at the keyboard and played it herself. In response, Neal said "I like it, mumma!", but he then pointed to the unshaded triangle figures in the score and said "these are wrong!".

It is possible that the enthusiasm of the parents, combined with their more developed general motor and reading skills, enabled the children with autism to perform better with them than with their less-developed siblings. However, there were some examples of the child with autism performing better with their sibling than with their parent. Steven initially performed better with his parent but scores with his sibling increased steadily and by the final session were actually higher than with his parent. As with turn-taking, further research would be needed to establish whether the child with autism playing first with their more enthusiastic and skilful parent can positively affect their later playing with a sibling, but these results seem to indicate that this is possible.

Children with autism demonstrated skills to siblings and parents

The children with autism frequently surprised their siblings and their parents with what they could do. In some of the family sessions the child with autism was even observed helping their sibling. In Session 2 with Alexander's family, Alexander and his sister performed *Twinkle Twinkle Little Star*. Alexander's sister struggled with her part, and Alexander turned

to her and exclaimed "Come on!". When she continued to struggle, Alexander reached out with his free (non-playing) hand, grasped his sister's finger, and proceeded to place her finger on the correct notes at the correct tempo - all while continuing to play his part. Similarly, in Anna's family sessions, on the occasion when Anna was about to start to play her sister Emma's composition, Emma took the glockenspiel beater from her and said "Play it this way", and played the sequence of notes quite slowly with some hesitation. Then Anna took back the beater, and with a certain nonchalance proceeded to perform the same melody considerably quicker and more fluently than her sister had.

Seeing the child with autism able to perform a musical task better than their non-autistic sibling was often contrary to parents' expectations. At the conclusion of the sessions, Neal's mother expressed a sense of surprise at Neal's competence at playing the keyboard: "I didn't think that Neal could do that ... I mean, I've always known that he had it within him, but he doesn't usually get a chance to show that he can be good at something". Other parents also expressed surprise at their child's competence in the sessions, as did the siblings, who may have considered themselves generally more able than their sibling with autism.

Breaks needed after family ensembles

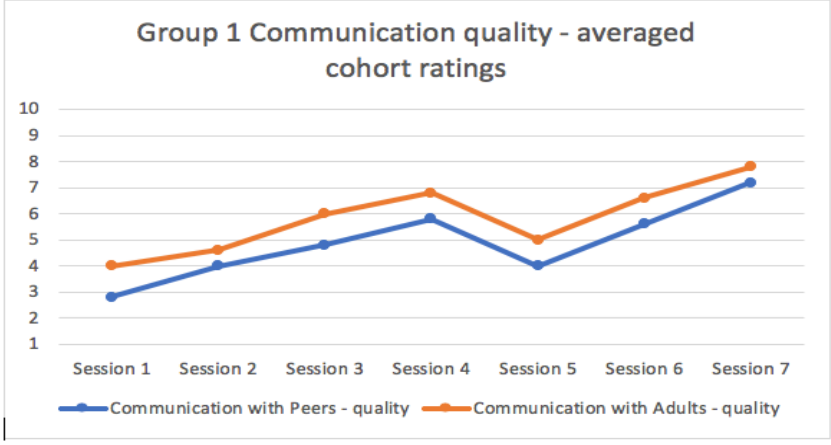
In Session 2 of Steven's family sessions, after working on *Muffin Man* with his brother, Steven stood up and walked out of the room, without any obvious reason. The performance of *Muffin Man* had not been easy; the ensemble needed to be repeated a few times to enable Steven's brother to place his bass notes at the right point with Steven's melody. Steven had no difficulties with performing his melody part, but the difficulties were in achieving an exact ensemble. The experience appeared to cause enough stress to Steven that he was unable to continue to sit and focus on the activities and needed time out of the activity. His mother noticed him walking out and followed him, and after two minutes was able to lead him back into the room for the session to continue, after which Steven was able to focus. This scenario was played out on other occasions both with Steven and other participants and seems to indicate that playing with others added a level of cognitive and emotional stress to musical performance, such that participants actually needed to physically remove themselves from the situation in order to re-establish an equilibrium.

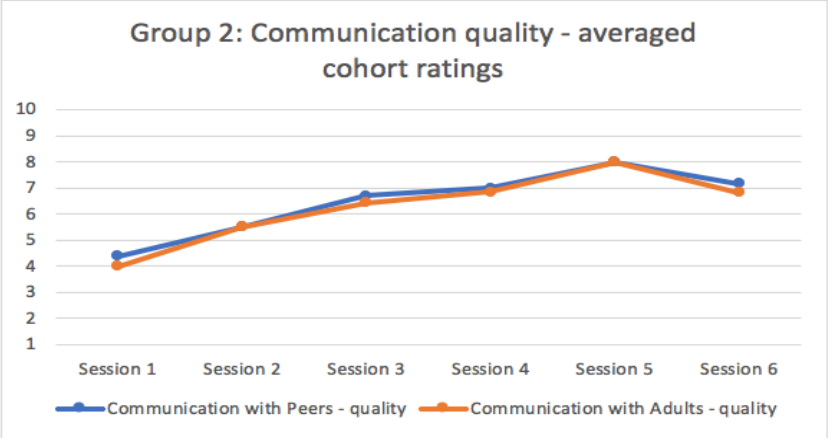
In the Individual and Group phases, participants did not physically leave the room when participation became overwhelming for them. There were several instances of participants showing they needed a little time between musical activities, and this was almost always after performing with others. In the Family Phase, the children with autism more frequently needed time-outs. This may be due to stressful relationships with their parent or sibling, or to the fact that the participants were in the family home where there was more implicit freedom to participate or not. It is likely that the interpersonal interactions required in the performance of the ensembles was the main factor that caused the increased stress. This finding shows that the children with autism needed to be allowed time and space to process and recover from possibly quite stressful activities involving interaction with others, in order to successfully continue participating.

6.5 Social Interaction

Social interactions in the Family Phase were different to those in the Group Phase because of the different social situations of each (the school classroom for group sessions, the family home for family sessions). However, some findings were similar. In both phases it was found that participants' communication with adults was generally better than with peers or siblings. Additionally, changes in communication with adults were matched by parallel rises or falls in communication with peers or siblings in each phase. This suggests that changes in participants' communication were affected more by other factors than by any changes in their communication with other people within their sessions. The musical activities may have been one such factor.

Figure 88, on the following page, shows the communication ratings from both groups in the Group Phase and from the Family Phase.





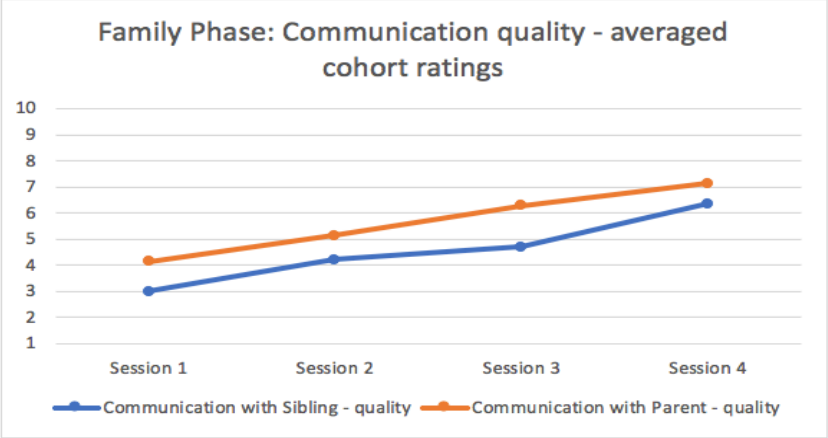


Figure 88 - comparison of Group and Family phase communication ratings.

Three emerging themes in social interaction are described in the following sections.

Social interactions better with parents than with siblings

Both measures of participant social interaction (communication and turn-taking) showed a higher level of interaction with parents than with siblings, as shown in Figure 89 on the following page.

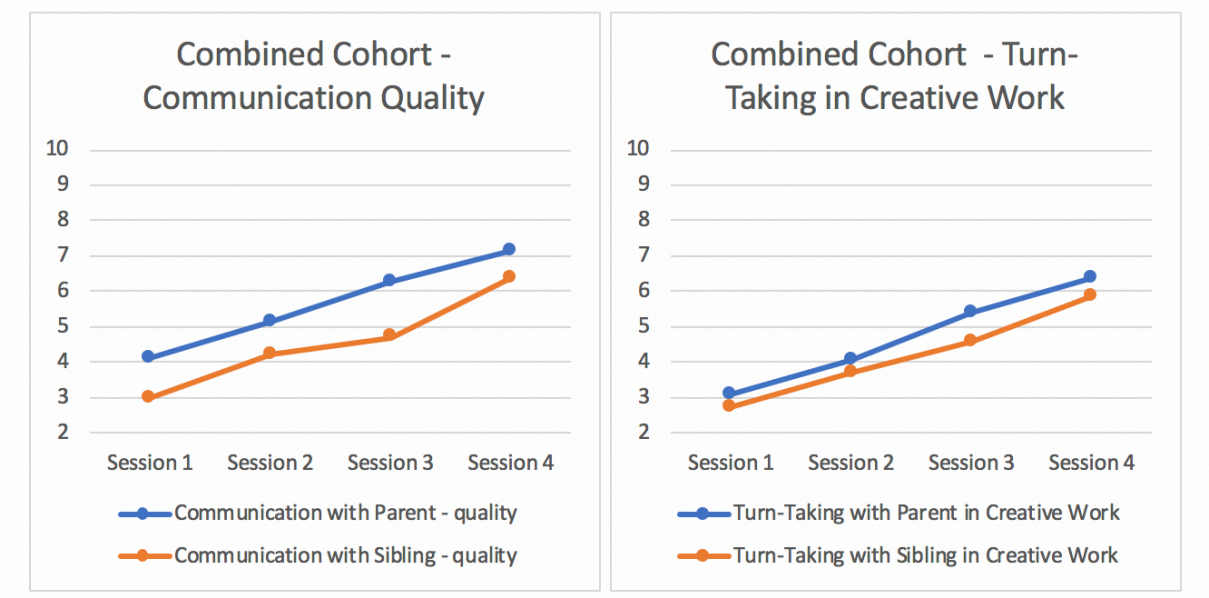


Figure 89 - Family Phase, averaged ratings, communication quality and turn-taking in creative work.

This result is similar to that found in music skills and supports observations made with most families, that the child with autism was more comfortable with their parent than with their sibling, and also that they were more able to interact with them in more effective ways. In Session 1 of Neal's family sessions, Neal stated very clearly that "I want to play with mumma!". Other participants also expressed a preference for undertaking activities with their parent by non-verbal means, such as a smile when the parent was asked to join an activity, and a turning-away or frown when the sibling joined in.

The findings in this area from both the Group and Family Phases suggest that the children with autism were more likely to interact with adults than with children close to their own age, and were more comfortable doing so. This may be because these relationships are generally more stable and involve clear role distinctions (teacher-student and parent-child) rather than the more fluid and difficult to negotiate relationships of peers or siblings.

Despite the interactions of the children with autism being better overall with the parent than the sibling, it was noted that the frequency of communication (as opposed to the quality of those communications) did increase more with the sibling, as shown in Figure 90 on the following page.

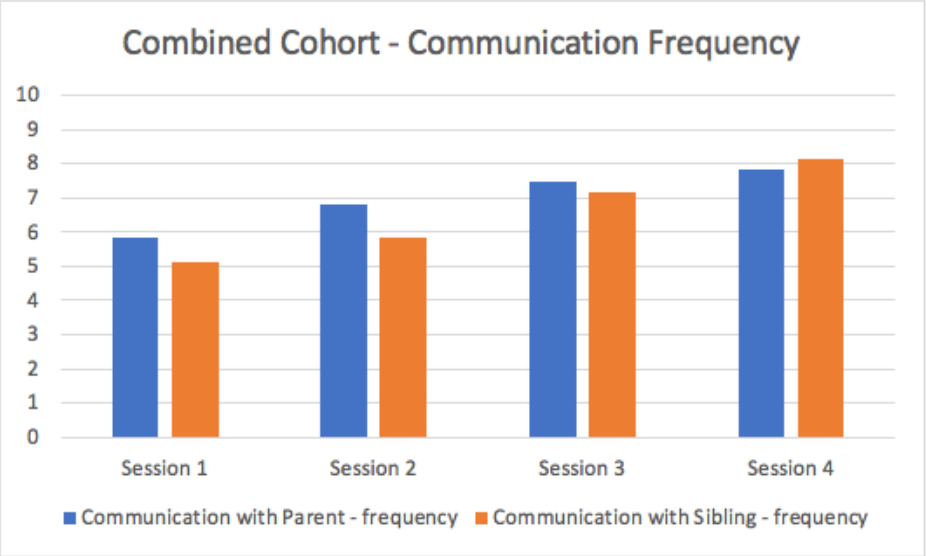


Figure 90 - Family Phase, combined cohort averaged ratings, communication frequency.

The frequency of communication by the children with autism to their siblings was actually higher than with their parents by the final session, and also rose considerably from Session 1 to Session 4.

Presence of parent facilitated sibling interactions

The family sessions, involving the simultaneous participation of parents and siblings with the children with autism, allowed observations to be made of the interactions of each family member. This included occasions when the parents were watching and listening to their siblings playing together. The parents of Neal, Steven, Charlotte, and Sean took an active role at these times, encouraging their children in their participation, and giving positive reinforcement to them. They also encouraged their children to interact more with each other, with Neal's mother frequently asking Neal if he had heard what his brother said during the session. In general, the child with autism and their sibling interacted more frequently in the sessions when the parent was actively encouraging them. This was particularly apparent during the creative activities. During the performing activities, siblings interacted more and did not require as much assistance or encouragement to interact. This may be due to the clear structure of interactions dictated by the music, which carried a pre-determined sequence of interactions. During the creative activities, there was no musical script and therefore the parent's presence and active encouragement was needed to facilitate interactions between the siblings.

The finding that the presence of parents facilitated sibling interactions is of importance because not only did it allow more effective work in the Family Sessions in both performing and creative activities, but it also supports evidence in the literature of the vital role of parents of children with autism in facilitating the development of their child. As described in the Family Phase results, whilst the performing activities came with their own pre-determined and clear structure, the creative activities had less structure, and the turn-taking of the children with autism was lower in both frequency and quality than turn-taking in the performing activities. Yet it was also observed that in the presence of a parent, better interactions did occur between the siblings, and this was often associated with the parents taking an active leadership role in the situation, as with Neal's and Steven's parents. The fact that these parents volunteered their leadership in these situations also points to their being comfortable using Figurenotes.

Social turn-taking improved in creative activities

Although participants' music turn-taking was better than their social turn-taking (see Figure 87, p.216), participants' social turn-taking improved over the sessions, both with their siblings and with their parents, as shown in Figure 91 below.

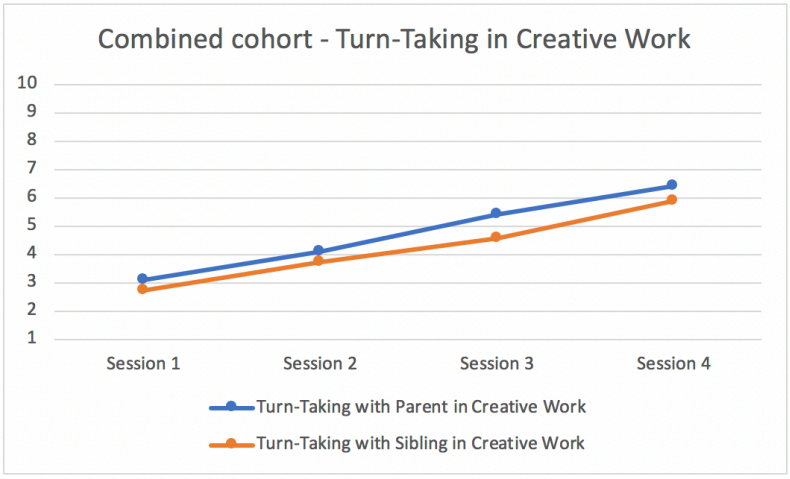


Figure 91 - Family Phase, social (creative work) turn-taking.

The creative activities in the Family Phase employed creative uses of Figurenotes systematically in the facilitation of social turn-taking. The improvements in social turn-taking in the Family Phase can thus be seen as a validation of the effectiveness of these creative activities in facilitating social turn-taking. However, it may not have been the creative

activities which solely facilitated the improvements in social turn-taking. Placing the creative activities directly after the performing activities may have enabled the music turn-taking in the Figurenotes arrangements to be used by the participants as a model for social turn-taking in the creative activities.

6.7 Self-Concept

The first two phases had revealed evidence of changes to participants' self-concept during the Figurenotes sessions. The results also pointed to the benefit of looking further at the behavioural manifestations of self-concept in participants, specifically participants' emotional and affective responses to their experiences. In the Group Phase, additional data on participants' thoughts and feelings about their self-competence and acceptance by others was sought by using the Perceived Competence and Social Acceptance Scale. Results from the measure gave some insights, however administering this scale had proven time-consuming and logistically difficult. Moreover, there was a question over the accuracy and validity of the results obtained, due to communication and comprehension difficulties by some participants. The key question regarding self-concept in the study was whether there was an association between the development of music skills by the participants, and changes in their self-concept. It was felt that the best way to further proceed would not be to use the Perceived Competence and Social Acceptance Scale in the Family Phase. Instead, close observation of participant responses, behaviours, and communication during the actual sessions was undertaken.

Themes in self-concept of participant children with autism identified during the Family Phase often reflected themes identified in the earlier phases, particularly regarding the positive effect of opportunities to demonstrate performing skills to others. However, the Family Phase provided a setting for the use of music-making skills by participants which was different to the earlier phases. Additionally, the direct involvement of parents and siblings in this phase afforded unique opportunities to observe the affective responses of the children with autism to their experiences in sessions with these siblings and parents. From the Family

Phase three new themes in self-concept emerged, which are described in the following sections.

Sense of purpose

During the third session with Neal's family, Neal played *Lean on Me* with his mother. His mother had mentioned previously that she loved this song and it was "my song at school". She eagerly performed her bass part with Neal playing the melody. Neal did not speak during the performance but was focussed on playing accurately and fluently. As soon as the music ended, Neal exclaimed "I'm being a pro!". This statement, from a primarily non-verbal child, with the accompanying enthusiasm towards participating, suggests that Neal perceived his competence very positively when performing this ensemble with his mother. It also suggests that Neal attached importance and value to succeeding at performing the song. Neal has a close relationship with his mother, and his mother's liking for the song may have influenced the value Neal gave to succeeding in performing it. In this way, Neal gained a sense of purpose from performing with his mother.

Other participants also exhibited behaviour suggesting a sense of purpose gained through participating in the Figurenotes ensembles with family members. Anna's mother commented that Anna was "showing who she really is" through participating in the sessions, and that she thought Anna sat up straighter and was more interested in the session activities than in other activities she was also doing in her weekly routine at the time. Another parent observation similarly points to participants finding purpose in the Figurenotes activities: Sean's mother commented after one session that Sean "loves this system".

As these demonstrations of gaining purpose in musical engagement occurred in the context of family sessions, the sense of purpose that the children with autism demonstrated became a way of communicating a potentially new aspect of themselves to others in their families. In the context of the relationships amongst family members, having the child with autism show a different and positive behaviour may have encouraged family relationships to be strengthened and re-imagined. This may be the case particularly for the families where the relationships between the children with autism and their typically-developing siblings were difficult.

Leadership qualities

In the Individual Phase, some participants showed independence and initiative in their music-making. The creative ideas offered by participants in the Group Phase also were demonstrations of individual and group initiative. In the Family Phase there were further examples of participants showing independent thinking as well as concern for others. In the ensembles played by Sebastian, Alexander, Neal, and Steven with their family members, their counting in at the start demonstrated not only that they understood the activity and what was needed, but also showed what can be termed leadership qualities within the performance context. Musical leadership often requires a leader to indicate the tempo or to beat a bar before an ensemble begins, and this is exactly what these participants did in their family ensembles, giving a clear sense of direction for their accompanying parent or sibling. The child with autism understood that their parent or sibling did not know when to begin playing, and so they helped them. This also suggests that the children with autism wanted to demonstrate this skill to others in their family. In this way, they demonstrated an understanding of, and identification with, the goals of the activity.

Enjoyment

The children with autism, as well as their siblings and parents, often expressed their enjoyment of the sessions. At the end of one performing activity with Steven's family, the mother grinned, raised her arms in the air and exclaimed "Yes! We did it!". As the Family Phase sessions continued, the participant children with autism became more demonstrative in their enjoyment of the sessions. Steven did not smile during the first few sessions, maintaining a straight face or even a frown at times, but in Session 4 when he did finally smile it was a broad grin, indicating a clear sense of enjoyment. At the end of some sessions, Alexander asked “Can we do another one?”, indicating his enthusiasm. And when a new rhythm exercise was introduced, Sebastian exclaimed “OK, let’s try this one now!”. Enjoyment of the musical activities enabled more relaxed interactions during the sessions.

One activity which was particularly enjoyed was the one shown in Figure 92 on the following page. Participants referred to this as "snap" because they felt it was like the game they knew of this name where two players take turns laying down cards, one on top of the other.

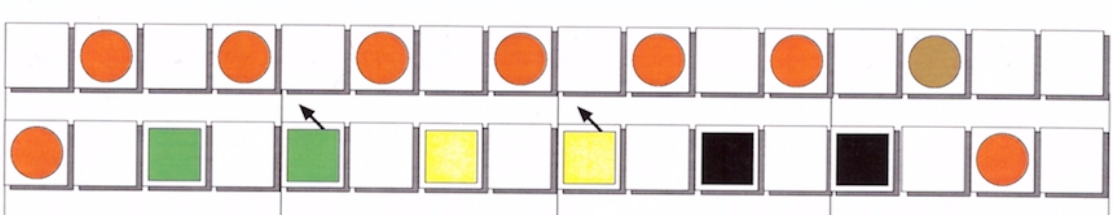


Figure 92 - Figurenotes Snap.

Summary

The Family Phase provided the opportunity to investigate more deeply the outcomes from the previous Individual and Group Phases, and in different settings. The phase focussed on the music skills of turn-taking and playing together, the role of musical interactions in promoting social interactions, possible changes in the reference point used by participants for their perceived competence, and the role of creativity in the study's key focus areas. Importantly, because the participating children with autism in the Family Phase were the same as those in the Individual Phase, the Family Phase provided the opportunity for participants to build on their experiences in developing music skills, their social interactions, and their self-concept. In the same way, it afforded me the opportunity to further develop and refine my understanding and skills as a practitioner with the same participants over a longer period. Despite challenges in conducting these sessions, observing the families interacting and playing music together was a rewarding experience.

CHAPTER 7 - CONCLUSIONS

Chapter 7 synthesises the outcomes of the three study phases into unified main findings of the study. It begins with a discussion of reflective practice outcomes. Following this, findings in the key focus areas of music skills, social interaction, and self-concept are discussed. Two additional main findings in creativity and music-making by families (which emerged from the action research approach used in the study) are also discussed. A final section then describes this study's limitations and implications for further research.

7.1 Reflective Practice Outcomes

This study was as much about how and what I learned as a practitioner as it was about the participants' development. This section specifically addresses the first research sub-question and discusses the extent to which reflective practice in this study facilitated the outcomes for both practitioner and participants. In this section I firstly show how the elements of action research were used in this study to facilitate the reflective practice undertaken. Following this, the themes identified in the reflective practice are discussed and synthesised. I then identify and discuss the main practitioner outcomes, describing specific impacts of this study on my ongoing practice. Finally, I discuss links between the practitioner outcomes and the outcomes for participants.

Action research into practice

Action research was the primary means by which reflective practice was incorporated into the study. The action research approach embedded a process of continuous professional development for me as a music therapist and music teacher into each of the study phases. Action research, described as a "practice-changing practice" (Kemmis, 2009, p. 467), has changed and developed my practice in many ways while undertaking this study. It has allowed me to grow, learn, and extend my skills as a practitioner in ways which I did not anticipate. The flexibility enabled by the action research approach meant that different practitioner approaches could be trialled, observed, and refined. I found myself very much at home with the concept of action research as an emancipatory methodological approach, and one that has the potential to reveal a wider context around the data that are collected

(Alvesson & Sköldberg, 2017). Reflective practice through the study phases was greatly facilitated by engaging in the *cyclical, iterative, reflexive,* and *formative* processes used, in the ways described in the following sections.

Cyclical learning

Action research has at its core a cyclical process (Stringer et al., 2009). Action precedes reflection, which in turn feeds back into further action. Whilst these cycles were certainly real for me, and the model above broadly reflects the reality of this study on a macro-level, my experience of the cyclical process during this study is that these cycles are not always neat and clearly-defined. At times, I certainly found it "messy, complex, and frustrating" (Atkinson, 1994, p. 392). All the steps in the cycle sometimes seemed to need to happen simultaneously when in the middle of a session, and at times I felt that my reflection or planning on a round of sessions had not been completed before it was time for the next round. Points in the cycle also did not always follow each other sequentially, and the boundary between *formative* and *summative* reflection was blurred. For example, at times reflection proceeded to direct action, without conscious planning taking place.

On a smaller scale, there sometimes seemed to be mini-cycles within the larger cycles, as depicted in Figure 93 below. Issues sometimes arose which needed additional cycles of planning, acting, observing, and reflecting, even while other cycles were continuing.

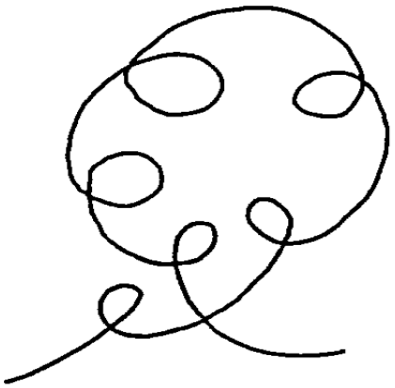


Figure 94 - Mini-cycles within a larger cycle (Atkinson, 1994, p.395).

An example of this model of cycles-within-cycles is when in the Group Phase I was simultaneously refining the Figurenotes arrangements to provide a clearer music structure

for participants, while at the same trying to allow for more spontaneity in session structure and participant-led creative work. These two seemingly contradictory objectives were carried out simultaneously in my reflection and planning process.

Iterative learning

In the participant sessions, I would frequently repeat the same activities in each participant's weekly sessions. However, in each session that I conducted I made changes to these activities as a direct result of learning from the previous session. Also, as I proceeded with concurrent sessions with multiple participants (in the Individual and Family Phases) or two concurrent group sessions (in the Group Phase), I was able to apply new knowledge from one participant or group over into another. Thus, the iterative process occurred both from one participant to another within a weekly round of sessions, as well as from one session week to another.

The result of repeating activities with different participants in concurrent sessions, with the multiplying effect of repeating activities with participants in subsequent sessions, meant that the total number of possible iterations of a given activity was very large. This enabled much refinement of the activities and Figurenotes arrangements, as well as my approach to facilitating them. I was able to keep what worked well, and discard or change things which did not work.

Formative and summative evaluation

At the outset of this study, I anticipated that evaluation in this study would be formative, occurring during the process of conducting the research, in order to make the action research process effective. In the initial Individual Phase, things were largely done by trial-and-error; the phase was used to establish the best ways to use Figurenotes. Evaluation needed to be carried out continually, and I found that much more time had to be allocated to this than I had planned for. The evaluation did not just occur after the sessions; during the sessions I often needed to quickly reflect on what was happening and adjust my approach to manage the situation. In the Group Phase, whilst I had a base of experience in using Figurenotes with individual participants to draw upon, the group work was quite different and necessitated further continual reflection in order to facilitate the participants' engagement.

By the time the Family Phase was reached, I had a large toolbox of techniques and resources to employ. Family sessions were essentially small group sessions. However, many techniques and logistical issues were drawn from the Individual Phase because Family sessions were again held in participants' homes, and the group sizes were small, consisting of only two or three members. As a consequence, activities could be run in a similar way to individual activities. Family Phase sessions ran more smoothly than those in the earlier phases; I was able to anticipate issues much more readily and plan for them. I found therefore in the Family Phase that I was usually able to carry out the session according to a pre-determined plan. Therefore, I did the majority of evaluation at the end of the phase. Thus, the method of evaluation changed over the phases, from primarily formative evaluation in the early Individual Phase, to a more summative evaluation method in the Family Phase, with the Group Phase employing more of an equal mix of both types of evaluation.

Both formative and summative evaluation were necessary for this study. However, I sometimes noticed in myself a tension between within-practice and outside-practice evaluation: how frequently and deeply should I be reflecting on the sessions? There was a practical need to maintain the weekly session schedule and it was not possible to observe all the video footage from week to week. Therefore, session notes made at the conclusion of each session were the primary source used for session-to-session evaluation. The video footage was used for summative evaluation at the conclusion of each session phase, which included session ratings in music skills and social interaction. Observation of the video footage also provided me with many valuable insights into my own ways of working with participants in the sessions.

Reflection and reflexion

In this study I used a combination of reflective and reflexive methods. In reflexive action, I put into practice what I became aware of in reflection. Reflexion became a driver for the cyclical process of action research. When a participant was not able to play a piece, I asked myself: is it the Figurenotes arrangement that is not working, is it my presentation, or is it something in the participant? This question, and questions like it, asked over and over again, became the means by which the study progressed and grew. Through action research I feel that I have also grown in my ability to involve others in my work generally, and I have

discovered that conducting action research "means above all to have faith in people" (Noffke, 2009, p.69).

Themes in reflective practice

A re-examination of session notes, interviews, and video observations from each phase has found that most themes were actually present in phases other than the one in which they were identified. This indicates that some themes existed across multiple phases, and also that themes fluctuated in importance from phase to phase, as illustrated in Table 22 below.

Table 22 - Reflective practice themes by phase: clearly present (green shading); latent (amber shading); not present (red shading).

Theme	Individual Phase	Group Phase	Family Phase
Concrete feedback effective			
Importance of matching colours			
Arrangements needed refining			
Potential for family involvement			
Allowing participants to be creative			
Making room for spontaneity			
Importance of giving information visually			
Keeping the music flowing			
Value of using humour			
Need to simplify the ensembles			
Being sensitive to family relationships			
Planned and spontaneous creativity			
Repetition			

All the themes first identified in the Individual Phase (choosing the right music, developing the arrangements, and potential for family involvement) were present in at least one of the subsequent phases. It is likely that this is because these themes were intrinsic to the way in

which the study sessions were carried out: the selection of music and the arrangements made formed a major aspect of the learning process I experienced through this study; also, the potential for family involvement came to fruition in the addition of the Family Phase.

Developing suitable arrangements was a key process throughout the phases. From session to session I was engaged in a process of continual refinement of the Figurenotes scores used, but I also became more adept at preparing arrangements which were likely to be effective the first time they were used. Every aspect of the visual environment of the scores used contributed to their usefulness for participants. Details such as the amount of blank space between lines and the size of the Figurenotes symbols contributed in either positive or negative ways to the participants' comprehension of the scores. Additionally, simplifying the ensembles is a theme identified in the Family Phase, where development of the Figurenotes arrangements often needed simplification to enable the family members to perform them successfully.

A re-arrangement of a score was sometimes necessary for another reason, such as slight errors in the printed notation, or to allow for a greater or lesser number of players, as happened occasionally in the group and family sessions. It was found by a process of trial and error during the sessions that the less cluttered the score was, and the more the score reflected the way in which the music was naturally structured, the more likely it was to be interpreted accurately by participants. An example is provided by showing a change in the score layout of *Twinkle Twinkle Little Star*, used in the Individual Phase. At first the score was set out in three long lines, with a landscape orientation, as shown in Figure 94 on the following page.

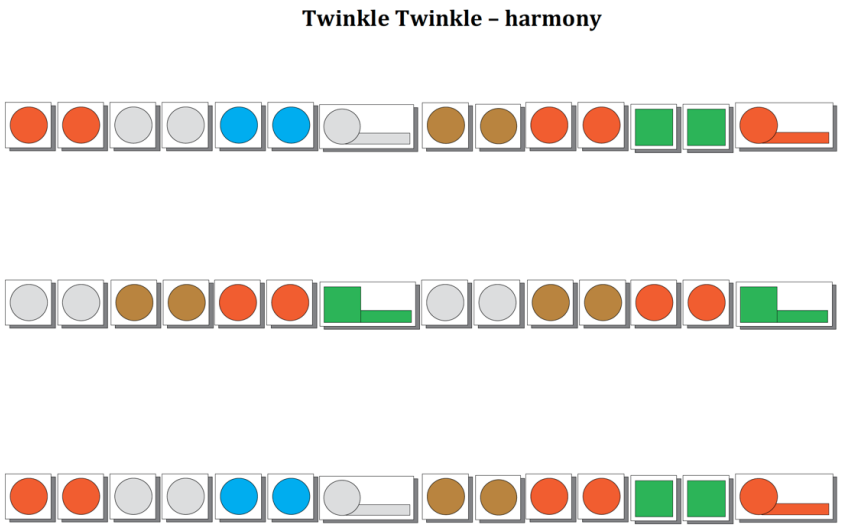


Figure 94 - Twinkle Twinkle Little Star, original layout.

However, this layout was found to be difficult for participants. Most of them got lost while attempting to read and play this score. It seemed that the lines were too long and contained too many notes. I re-arranged the score for the following sessions, making the lines shorter and following the musical phrase structure, as shown in Figure 95 below.

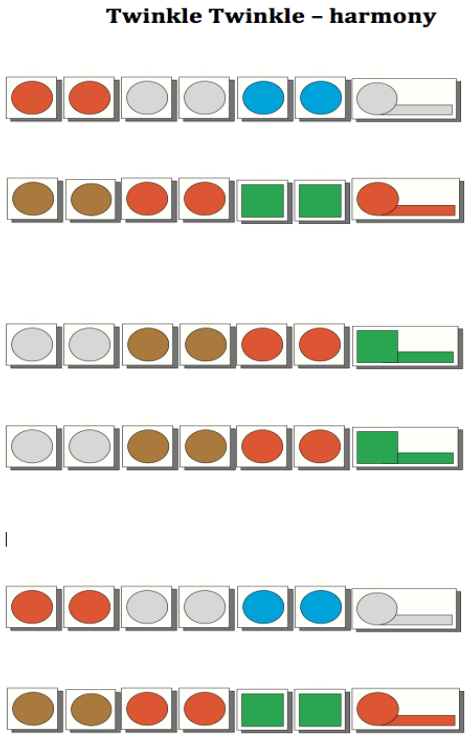


Figure 95 - Twinkle Twinkle Little Star, revised layout.

Several other arrangements went through a similar process of revision throughout the session phases. In some earlier arrangements, several different attempts were needed before an arrangement suited the participants' levels of interest and ability. However, I became more adept at arranging the score as the phases continued, so that by the Family Phase they typically did not need as much refining from their original form. This affected my planning for sessions, as I could more confidently introduce an arrangement which was effective from the first session, and participants could use the same arrangement for subsequent sessions.

The need to find an optimal arrangement to enable maximum engagement by participants has a conceptual basis in optimal experience, the description of a flow state of an individual (Massimini, Csikszentmihalyi, & Carli, 1987), where it is postulated that the ideal conditions for an activity are where the perceived challenge of an activity balances with a person's perceived skill level. In a sense, my striving to achieve the "right" arrangement was a striving after an optimal experience level for the participants. It can also be seen as attempting to provide participants with appropriate scaffolding for their learning of the music and in this way relates to Vygotsky's *zones of proximal development* (Shabani, Khatib, & Ebadi, 2010), and also Piaget's *theory of equilibration* (Di Paolo, Barandiaran, Beaton, & Buhrmann, 2014). The more effective Figurenotes arrangements may have been able to assist participants to progress from simple assimilation of the material, to accommodating and performing more extended musical ideas than those with which they were currently comfortable. The arrangements helped participants to to attain a level beyond their current development, acting as a zone of proximal development. This supports Ansdell (2005) in emphasising the importance of sensitively and carefully considering musical arrangements in performance as a presentation of the self.

In the Group Phase, the themes identified were generally also latent or present in other phases. *Making room for spontaneity* was identified in the Group Phase, the larger participant cohort necessitating a higher degree of flexibility in this phase. However, I also had experiences of needing to become more flexible in the Individual Phase and Family Phase. Similarly, *importance of giving information visually* was a theme identified in the

Group Phase but present throughout the phases. The clear preference shown by participants for visual, rather than verbal information was a finding which was important for planning sessions and my presentation of information across all phases.

The observation of Group Phase participants not paying attention when I spoke to them led to an oft-repeated dictum to myself: "Less talk, more music!". This was not an issue during the Individual Phase, perhaps due to the fact that the sessions were focussed on the individual participants and musical interactions were more easily combined with verbal and other interactions. However, in the Group Phase participants lost focus when I spoke for extended periods, and I learned to keep my spoken instructions short. Also, I observed participants losing focus when the tempo chosen for an activity was either too fast for them to keep up, or slower than they needed. Maintaining flow in the music was also important in the Family Phase because of the need to maintain accurate musical ensemble among the participants.

Value of using humour became a theme in the Group Phase. Figurenotes provided many opportunities for humour when participants associated Figurenotes colours and shapes with animate or inanimate objects (such as the fruit-salad rhythms). In the Family Phase humour played a role, too. An example of this is parents' laughing at themselves when they made accidental errors while playing. This helped their children to better understand the role of humour.

Potential for family involvement was first identified as a theme in the Individual Phase. This theme was very important for the subsequent trajectory of the study, as it was through my experiences of and reflection on the interest of parents and siblings within the Individual Phase, that the idea of adding a Family Phase was born. The widening of the participant cohort to include families is for me one of the most enlightening, important, and rewarding aspects of the study. From the first tentative signs of interest shown by Steven's brother poking his head shyly around the corner of the door during his brother's sessions, to Neal's mum's exclamation of "I can play too!" when given a turn after one of Neal's sessions, the possibility of involving family members was often sensed, but only became a clear theme in the Individual Sessions after careful reflection. This points to the importance of reflecting on the actions undertaken in the action research cycle.

The theme of *being sensitive to family relationships* is by definition restricted to the Family Phase. During the Family Phase, I encountered significant challenges in coping with the different approaches needed for each family member. Careful reflection and planning was needed in order to adequately and sensitively accommodate the existing and emerging relationships between siblings and between children and parents.

Practitioner outcomes

Becoming a reflective practitioner

My own reflecting on my evolving practice in this study has been one of the most rewarding aspects of undertaking this study. I now find that I am incorporating a reflective practice orientation into my daily work, as a modus operandi. However, becoming a reflective practitioner is not easy. There is often not enough time to adequately reflect on one session or a day's work before the demands of the next one come along. An issue which frequently arises is how much reflection to allow, given the constraints of time and logistics. Moreover I have found, like Atkinson (1994), that the cycle of steps in an action research cycle (plan, act, observe, reflect) frequently occur simultaneously in practice, and "at any moment I could be doing all four of these things" (p. 397). I am becoming aware that each decision I make in the process of professional practice can be seen as a mini-plan, arrived at through a mini-reflection, leading to a mini-action: a cycle within a larger cycle.

I am also aware of a tension between the demands of practice and those of good research, between making quick, intuitive judgements about situations or techniques, and a more considered, explicit analysis. In practice it is usually the quick judgement which must win out, but it is my experience that conducting formal action research has armed me with the skills and techniques to be more aware of how and why I reach quick judgements. Overall, the discipline of action research, and keeping a general orientation towards the process being as important as the product (Stringer, 2007) has opened me up to taking a more objective view of the work I do. I am cultivating an ability to observe myself and ask what can be done better. In this way, action research is indeed proving to be a meta-practice (Kemmis, 2009) for me, a practice which changes other practices. Moreover, it is providing a model of how links between theory, research, and practice can be maintained even within the demands of professional life.

Working with children with autism

In 1.1 I described my personal interest in autism and my reasons for wanting to investigate music-making by children with autism. As a direct result of undertaking the study, I am now working primarily with children and adolescents with autism, both within a specialised autism service, and in private practice. The reasons for this are not only practical ones, relating to experience and expertise gained. During participant sessions during this study I become aware of a strong sense of rightness about my work with the participants, a sense that I understood them and could be a conduit for their needs to be met. Relating to people on the autism spectrum is often difficult because of their different or restricted forms of communication (Grandin, 2013), and although that proved the case in this study, I often sensed a strong connection with these young people who frequently seemed to be grateful that a way of making music was being offered to them which suited their needs, even though they could not express it in words.

My sense of connection with the participants was accompanied by a deep curiosity. I found myself wanting to find out what lay behind the often-perplexing behaviours of these children, guided by a feeling that they were very capable human beings, needing and wanting understanding. Each participant was a different universe, however, and the diversity of personalities and behaviours of even this relatively small cohort points to the fact that there is still a great deal to be discovered about autism. I sense that finding out more about people with autism can help us discover more about human functioning generally. While conducting the sessions with the children with autism in this study I often recalled the following statement attributed to Kaarlo Uusitalo, the inventor of Figurenotes: "I sometimes think that my pupils do not have a learning difficulty. All things are possible. It is us that have a teaching difficulty" (Sparkes, 2012, p.12). Moreover, the positive outcomes for participants in this study support the assertion that the experiences of the participants can be enhanced when the researcher can relate to them (Sutherns, Bourgeault, & James, 2014).

Using Figurenotes

Figurenotes has made a strong and positive impact on my practice as a music therapist and teacher. I find that I am increasingly utilising Figurenotes in various ways in my practice, many of them specifically developed through this study. I am using Figurenotes with clients and students of various ages and abilities, many of whom have autism, but also some with other conditions and needs. As well as utilising techniques and activities developed as part of this study I am also continuing to explore ways of using Figurenotes. Figurenotes continues to greatly enrich and expand my practice as a direct result of this study.

Participating children with autism in this study generally did not need any verbal or written instruction in using Figurenotes, and one of the themes identified in music skills is the early success that Figurenotes afforded the participants. In the Family Phase, some of the parents involved expressed that they needed some instruction when using Figurenotes for the first time. This may have been because they were used to needing guidance when using any new tool or technique. The need for instruction for parents suggests that in future work using Figurenotes in families, I could offer mini-lessons for parents beforehand.

Links between practitioner outcomes and participant outcomes

Not only did the reflective practice enable more effective outcomes for both the practitioner and the participants, but there were clear links between the practitioner outcomes and the participant outcomes. Finding connections between how and what I was learning as a practitioner during the study phases, and how and what the participants were learning, was an unexpected discovery. The connections are elucidated by using the concept of engagement – participants and practitioner engaging together in a journey of exploring together music-making with the use of Figurenotes. Four aspects of engagement are shown in Figure 96 (on the following page): s*teps towards engagement, engaging with the participants, engaging with the music* and *widening the circle of engagement*. These can be related to the four steps of the action research process: planning, acting, observing, and reflecting.

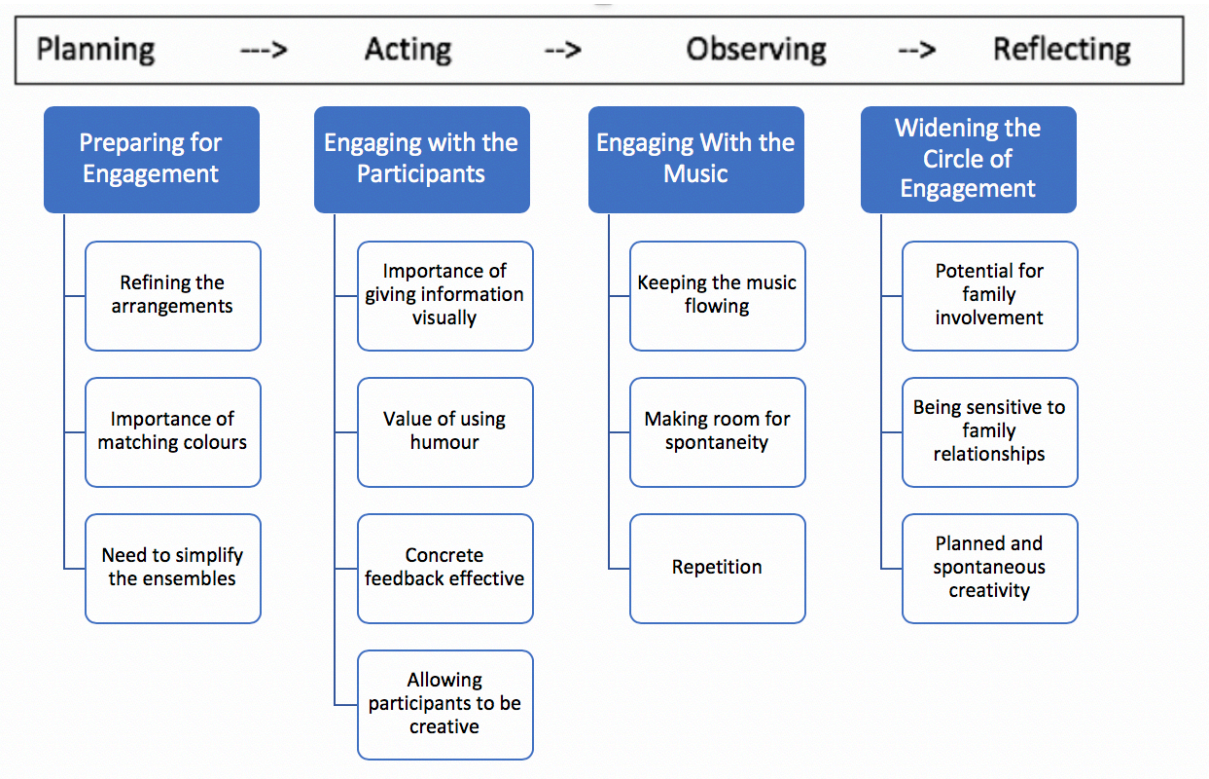


Figure 96 - Reflective practice themes mapped to participant engagement and action research cycles.

The first category, *preparing for engagement*, contains the themes focussing on my selection and arrangement of musical activities for the participant sessions. These themes relate to creating the conditions for participants to engage fully in music-making. The second category, *engaging with the participants*, includes the themes focussing on my relating with participants during the sessions: importance of giving Information visually, and value of using humour. *Engaging with the music-making* is the category which groups themes related to the ways in which I helped participants engage in the musical arrangements themselves. The final category is *widening the circle of engagement*. The themes grouped here relate to the process of the addition of the Family Phase through reflection on the Individual Phase, and the learning process I went through while conducting the Family Phase. The four categories are linked to the four steps used in the action research cycle during this study: planning, acting, observing, and reflecting. *Preparing for engagement* primarily relates to the process of planning phases, sessions, and activities. *Engaging with the participants* is a step of action, focussing on the ways I acted in the sessions to engage with participants. *Engaging with the music*, incorporating themes relating to participants' engagement with the music, is linked to my observing the participants (and myself) during the musical activities.

Finally, *widening the circle of engagement* is connected with reflecting, as it was through careful reflection that the participant cohort was widened by the addition of the Family Phase. Each of the identified reflective practice themes were aspects of the development of my skills in using Figurenotes with the participants. The way in which the development of my skills was able to directly influence outcomes for participants in this study is a direct result of the use of action research, with its focus on "making the tacit explicit" (Coughlan, 2002, p.38). As the study progressed, the skills I developed as a practitioner were used to develop more effective uses of Figurenotes to facilitate music-making for the participants. In this way, the reflective practice enabled effective outcomes for both the practitioner and the participants. This linking of practitioner and participant outcomes through reflective practice using action research gives the fields of music therapy and special music education a model for future such research.

7.2 Music Skills

Three concepts about music skills identified the literature review – that music-making requires music skills, that the development of music skills can allow extra-musical benefits, and that there is a need to find suitable ways for people with additional needs to develop their music skills (2.3) – pointed to a need for further research into the development of music-making skills by people with additional needs. This study addressed that need by focussing on the use of Figurenotes to facilitate development of basic musical skills in children with autism. The main findings in participants' development in five main music skills (accuracy, fluency, technique, playing together, and turn-taking) will be discussed in the following sections. Following this will be a discussion of two aspects of participants' music-making (latent music skills and early success) which emerged as a result of the action research approach taken in the study. Finally, the specific role of Figurenotes in facilitating the development of music-making skills of participants will be discussed.

Accuracy

Early in their participation, participants' skill in accuracy (the precision with which participants played the pitches of notes) was generally higher than in any other skill. At the beginning, participants were able to successfully read the music scores by matching the Figurenotes shapes and colours on the score with the corresponding notes on the

instrument being played. As the participants became more familiar with the music by hearing the melodic lines they were playing and by utilising visual and motor memory, they were able to rely less on the Figurenotes score, while still being able to readily use it to maintain accuracy when needed. This suggests that Figurenotes acted as both an initial means, and an ongoing support, in facilitating participants' accuracy in playing.

Fluency

Participants' fluency (how well participants played the correct durations of notes in a melody) generally improved as sessions proceeded. Figurenotes facilitated this fluency through clear visual representation of note duration. The findings suggest that improvements in fluency may have been enabled by participants' high accuracy and initial success in identifying and playing melodies with accurate pitches; in other words, playing with a high level of pitch accuracy may have allowed fluency to develop more quickly. Participants' sense of steady tempo was also reinforced by the clear visual representation of relative note durations given in Figurenotes. Participants' fluency was also connected to their technique: as fine motor control improved, the ability of participants to match the visual representation of note durations while keeping a steady beat also improved.

Technique

Figurenotes was found to facilitate the playing of technical exercises in the Individual Phase, and in the Group Phase the technical skill of participants influenced other music skills. This suggests that Figurenotes can be linked to the development of participants' technique of through the ease of comprehension of the Figurenotes technical exercises. This suggests that Figurenotes can be used successfully for the notation of technical exercises, and these exercises can help build overall music skills. Moreover, not only were the technical exercises in Figurenotes easily understood, they were enjoyed by participants, and this has implications for the use of technical exercises in music engagement activities, even where skill development is not the main objective. The enjoyment of these exercises by many participants demonstrated that they could also be used to address goals in the social-emotional domain.

Playing together

Playing together, where players perform separate parts but simultaneously, was often more successful for the participants than turn-taking, where players perform separate parts but must wait for and respond to each other. Common wisdom may suggest that it would be easier to take turns than to fit one's part in with another played at the same time, however the results obtained in this study suggest the opposite. This may have implications for the way in which not only musical activities, but also other social activities are considered for children with autism. Playing together successfully requires watching and listening to others, and through playing together activities participants developed in their musical awareness of those playing with them including peers and family members. This finding points to the potential of Figurenotes as tool in developing musical awareness between children with autism and other people generally.

Music turn-taking

Participants'' music turn-taking was generally better than their social turn-taking. This suggests that music turn-taking activities were easier for the participants. In the Family Phase, music and social turn-taking were directly compared, with the creative activities involving social turn-taking negotiated verbally and not supported by any visual instructions, in contrast to the musical ensembles where music turn-taking was clearly indicated on the Figurenotes scores. Improvements in turn-taking in performing activities preceded improvements in the non-performing activities. This suggests that participation in musical ensembles using Figurenotes enabled the children with autism to have successful experiences of turn-taking which could they could then apply in non-musical situations. In this way, turn-taking in musical ensembles may provide an effective pathway into turn-taking in social activities for children with autism.

Latent music skills

In this study, participants demonstrated and developed music skills other than those ones directly measured in the ratings. Participants demonstrated varying pre-existing latent musical abilities in their sessions. Several times participants' parents, siblings, and teachers expressed surprise at the demonstration of these abilities. The Figurenotes activities were simple and achievable enough to allow these previously-unrecognised musical abilities to be

expressed. Additionally, these pre-existing skills were able to be developed by increasing the complexity of the musical activities using changes in the Figurenotes notation. The key appeared to be the quick and successful comprehension of the visual information presented, enabling a confidence and interest from participants in attempting these challenges.

One of these latent skills was singing. it was noted in the Individual Phase that participants vocalised when performing on the keyboard, both by singing the lyrics and in nonverbal, scat-singing styles. The participants' echoed my singing of the names of Figurenotes colours. Also, participants' spontaneous scat-singing during their playing of Figurenotes activities suggests that these activities provided opportunities for them to utilise their singing ability as well as motivation to do so.

In the Family Phase, the participating children with autism frequently demonstrated superior music skills to those of their siblings or parents. It must be remembered that these children had previously participated in the Individual Phase and therefore had gained skills and experience through those sessions. Therefore, it may be expected that they would have begun the Family Phase with a higher level of skill. Nevertheless, what was not expected was the way in which the children with autism demonstrated these skills within ensemble playing, which was not a feature of the Individual Phase. Moreover, the children with autism sometimes assisted their parents and siblings in their performance, pointing to the correct key or note in the score, or even physically moving their parent's or sibling's hand. In the context of living in a world which focusses more on what they cannot do, this provides a powerful demonstration of the potential of these children with autism. The creativity shown by participants provides further examples of this potential and points to the potential of providing them with tools and opportunities to demonstrate and develop their latent skills.

Early success

All participants were able to achieve the simple activities presented initially in the sessions. Rhythmic exercises and simple melodies were performed with success even at the first attempt. In the Individual Phase, participants were able to immediately grasp the technical exercises given. In the Family Phase, family groupings were able to perform ensembles notated in Figurenotes without any prior practice (and in the case of the parent and sibling, without any prior experience in using Figurenotes). This immediate success in playing music

experienced by participants enabled an immediate sense of achievement, which provided a strong motivation to continue. Thus, participants' early success was an important factor in the development of their music skills.

The role of Figurenotes

Figurenotes enabled participants to easily comprehend basic musical elements. The clear depiction of pitch, duration, melody, rhythm, and multiple parts which Figurenotes provided the participants enabled them to read (absorbing musical information presented visually), understand, and play (translate this information and understanding into musical expression). In reading Figurenotes, participants were assisted by easily-absorbed images: the shapes used in Figurenotes were ones which were likely to have been already familiar to participants (circles, squares, triangles, and crosses), and the colours used in Figurenotes are common (red, brown, grey, blue, black, yellow, green).

Participants' musical understanding was also facilitated by Figurenotes. Specifically, Figurenotes facilitated participants' understanding of duration through using accurately proportional figures (a note twice the duration of another is represented by a Figurenotes symbol twice the width of another), and through the concrete representation of pitches (the colour and shape of printed notes is matched on the notes of an instrument by stickers of the same colour and shape). It is possible that using a different music notation would have produced similar results, as the visual representation of music can be accomplished in many ways However, the themes which emerged in music skills are likely to be at least partly due to the specific use of Figurenotes because of the overall tendency for the participants to engage easily with Figurenotes. Also, a thread running through all themes was the way in which Figurenotes was able to be used flexibly and responsively to engage participants. Figurenotes thus had a decisive role in facilitating the development of music-making skills for the participants in this study.

The visual information presented with Figurenotes prompted participants to react to the pure visual aspects of the colours and shapes. Edward's strong and repeated statements, "I don't like blue!" and his preference shown for the red Figurenotes are indicative of clear personal preference. The identification shown by Edward (and others) with particular colours and shapes shows self-knowledge, and it also points to another aspect of

Figurenotes which has the potential to be harnessed in order to develop engagement in music by children with autism: the applicability of the colours and shapes to ways of learning and engaging which are already familiar and accessible to them.

The success of Figurenotes as a facilitator of music-making skills for the children with autism in this study suggests that Figurenotes may be inherently suitable for other children with autism. Given the preference for absorbing information visually shown by many children with autism (Flippin, Reszka, & Watson, 2010), the fact that Figurenotes provided easily-absorbed musical information in visual form was a significant factor in its effectiveness as a tool for developing the music-making skills of participants. A preference for visual learning in many children with autism may mean that playing music by reading it on a score may be as effective as playing by hearing it first. Ideally, reading and playing occur almost simultaneously in the act of sight playing unfamiliar music, but a lack of coherence in the visual information presented can slow this process down, particularly for children with autism (Happe et al., 2001). It is likely that the precise matching of Figurenotes shapes and colours from score to instrument decreased the cognitive load and increased the fluency for participants when they were playing. In this way, Figurenotes facilitated their music-making.

Implications of these findings

The developments in participants' music skills found in the study (in the focussed skills of accuracy, fluency, technique, turn-taking, and playing together, as well as in singing), as well as the way in which Figurenotes facilitated these developments, contributes to a greater understanding of music skills development in children with autism, and addresses gaps in the literature identified by Fong & Lee (2012) and Lubet (2017). These findings also suggest a value of further research in investigating whether the connection between musical sounds and visual information in Figurenotes can assist children with autism to gain in their ability to make associations and produce novel ideas. Further research is also warranted linking Piaget's theory of equilibration and Vygotsky's *Zone of Proximal Development* (Di Paolo, Barandiaran, Beaton, & Buhrmann, 2014) with concepts of *optimal experience* and *flow state* (Massimini, Csikszentmihalyi, & Carli, 1987). These theories should be used in future research to examine the use of musical arrangements using Figurenotes to assist individuals with autism, and the wider population, to engage more easily in creative music-making.

Moreover, this study has found that music-making by children with autism is associated with extra-musical benefits (in social interaction and self-concept) via the development of basic music skills, and this finding gives the study a unique position in the literature. The social interaction and self-concept findings are discussed in the following section.

7.3 Social Interaction and Self-Concept

Social interaction

In the literature review, some evidence was identified of increases in social interaction through participation in musical activities (2.4). This literature points to the possibility that improvements in social interaction associated with music skills development could be more pronounced when there are more pre-existing deficiencies in social interaction, with autism being an obvious exemplar of this. However, the lack of evidence for these increases being associated with developments in music skills puts the onus on further research to "determine whether music training can benefit social skills" (Rickard et al., 2013, p. 304).

This study aimed to address this by investigating associations between music skill development using Figurenotes, and social interaction. During the Individual Phase of the study, participants engaged in musical interaction with me by vocalising, making body movements, and playing instrumental duets. Development of musical interactions by focusing on music skills needed to make music with others were seen as a possible mechanism for development of participants' social interaction, and the action research approach of the study allowed the subsequent Group and Family phases to look more closely at possible synergies between musical and social interaction. In both the Group and Family Phases of the study, Figurenotes facilitated peer-to-peer interactions. In the Family Phase, these interactions also involved interactions between participating children with autism and their parents. In these two phases, a focus on *music turn-taking and social turn-taking* as well as *playing together and communication* enabled participants' music skills and social interactions to be more closely studied and compared. These areas are discussed in the following two sections.

Music and social turn-taking

Turn-taking was included in this study both as a music skill and also as an aspect of social interaction, which allowed a comparison to be made between them. Observations were made of turn-taking in both music-making and social interaction. This offered the possibility of elucidation of potential links between changes in turn-taking within musical activities and outside musical activities.

Turn-taking as a music skill in this study involved the synchronisation of parts played simultaneously by two or more participants, where the participants read from Figurenotes scores. In the Group Phase it was found that participants were more successful in turn-taking during the musical activities than outside of the musical activities. Within the musical activities, participants were able to use the patterns and structures in the music to use and develop their turn-taking ability. Participants' learning was reinforced by the visual representation in Figurenotes of these patterns and structures. Outside of the musical activities, participants' turn-taking was generally less successful, but did increase as the sessions proceeded. For Group 1, social turn-taking was equal to music turn-taking by the final session, as shown in Figure 97 below.

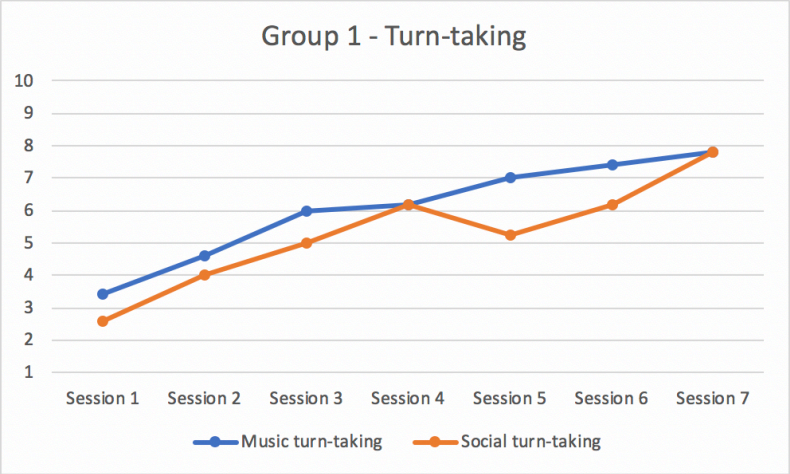


Figure 97 - Group 1, music and social turn-taking.

In the Family Phase, sessions were structured so that ensemble activities (involving music turn-taking) were placed directly before creative activities (which involved social turn-taking). Both music and social turn-taking increased during these sessions, although music-turn-taking remained higher throughout, as shown in Figure 98 on the following page.

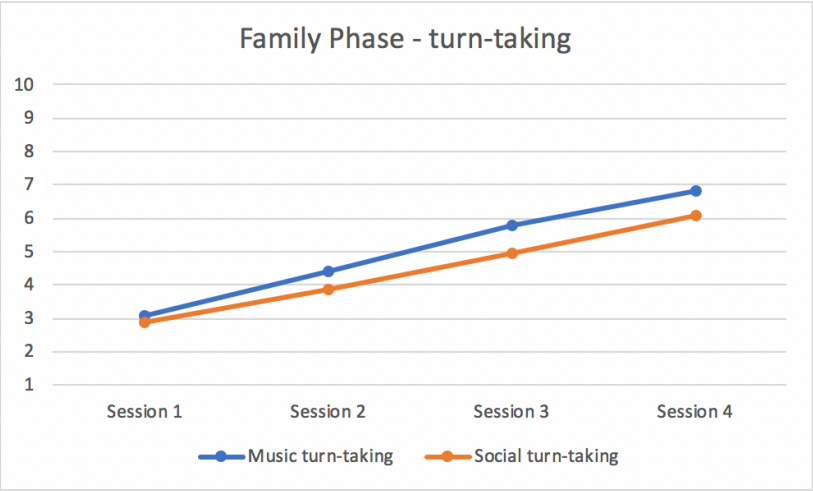


Figure 98 - Family Phase, music and social turn-taking.

These results suggest two things: firstly, that children with autism may find turn-taking more achievable when participating in music-making than in non-musical settings; and secondly, that development of turn-taking in music-making by children with autism may positively affect the development of their social turn-taking.

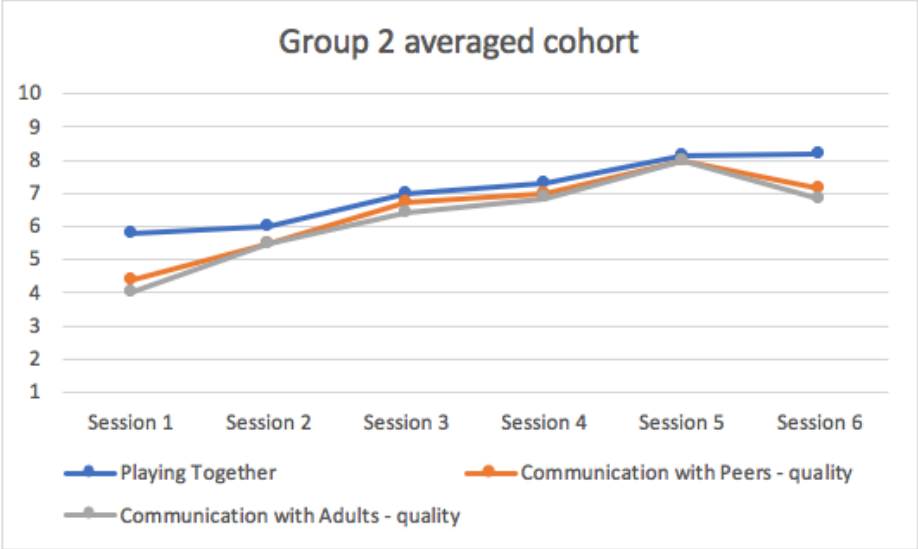
Playing together and communication

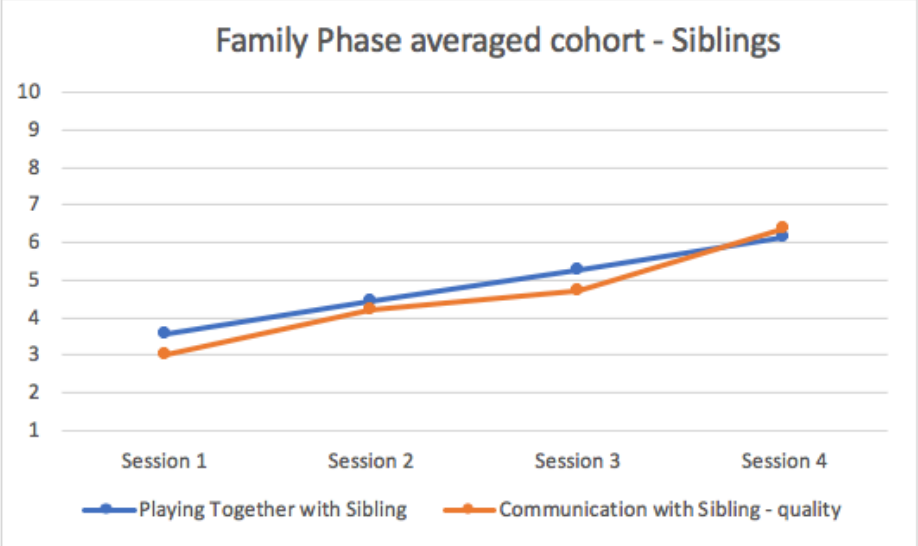
In the same way as for music turn-taking, playing together involved participants playing with one or more others using Figurenotes scores. The difference in playing together was that the parts were identical and designed to be played together, where all participants moved from note to note together. The skill required an awareness of other participants within the musical activities. In the Individual Phase it became clear that there were parallels between the participants' skill in playing together and their general level of communication. It was not originally intended in this study for playing together (as a music skill) to be compared with communication (as a social interaction). However, when I observed on several occasions that changes in one area were matched by changes in the other, the action research approach used in the study allowed comparisons between these areas to be made and incorporated into session planning.

A comparison of ratings of playing together with ratings of communication quality in all study phases reveals that in each case, participants were able at the outset to play together with others at a higher level than their communication with others. However, as sessions

proceeded, their communication generally increased at a faster rate than their playing together skill. This is shown in Figures 99 (below) and 100 (on the following page).

Figure 99 - Playing together and communication ratings, Individual Phase and Group 1.





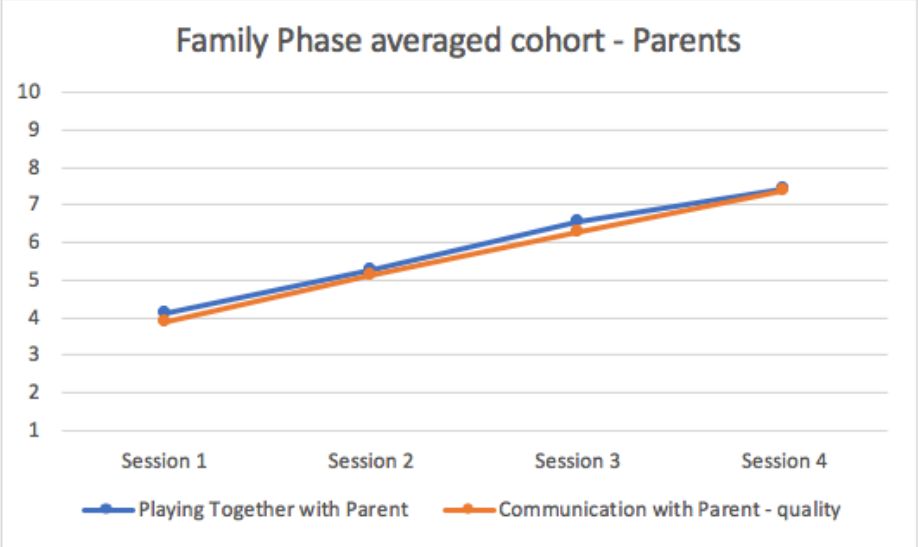


Figure 100 -Playing together and communication ratings, Group 2 and Family Phase.

Of note is the result for Group 1. In Session 5 for this group, communication (and other social interactions) decreased, possibly due to the card-stealing incident described in the Case Study in 5.2. However, participants' playing together in the music activities did not show any decrease in this session. This suggests that interactions in the music activities were not negatively influenced as in the non-music activities, and therefore that the musical interactions were a more robust means of maintaining communication than interactions outside of the musical activities.

In the Family Phase, not only did communication develop in parallel with playing together, but I observed that the children with autism developed greater awareness of close family members and were even able to demonstrate and assist their siblings in the music-making activities. Another theme identified in the Family Phase was that skill in playing together preceded skill in turn-taking. Common wisdom may suggest that it would be easier to take turns in playing music than to try and fit one's part in with another played at the same time. However, the results obtained in this study suggest the opposite. In structured musical activities, playing together was generally more successful for the participants than turn-taking, particularly in the early sessions in each phase. The reason for this is not clear, but it may have something to do with an ability in participants to imitate immediately what they were seeing and hearing their playing partner doing, without reference to the Figurenotes score. In the turn-taking, participants always had to play a different sequence of notes to what they had just heard their partner play, and the aural feedback may have interfered with the accuracy of their reading of the Figurenotes scores at that point.

Implications of these findings

The findings in music turn-taking and social turn-taking, and playing together and communication, clearly show improvements in both areas across all phases of the study. It can thus be claimed that there is an association between the social interactions of participants and their musical interactions in this study. However, the findings do not show that improvements in musical interactions preceded improvements in social interactions, and thus can claim no causality of social interaction improvements by musical interaction improvements. The fact that musical interactions were generally better than social interactions in participants' early sessions may relate to Ockelford's description of music

providing “a secure framework for the risky business of reaching out into the far from predictable world of other people, setting parameters and establishing the boundaries within which socialisation can occur” (2013, p.205). Participants may have used the musical interactions early on to become more comfortable with social interactions. This would also be consistent with the assertion that music offers an alternative to the usual methods of interpersonal interaction and provides a "structured approach to social communication" for children with autism (Sharda at al., 2018, p.7). It is feasible that participants’ musical interactions improved as a result of improving social interactions, and that the (more unstructured general social interactions may have really assisted the more structured interactions in the music. Notwithstanding this uncertainty, it is clear that interacting musically certainly did not have a negative effect on the participants’ interactions generally. Improvements in both musical and social turn-taking by participants in this phase point to the potential of using music-making with Figurenotes to facilitate connections by children with autism with peers and other people more generally. Further research into music-making with Figurenotes involving a wider spectrum of the community would enable this potential to be explored.

Self-concept

Self-concept was the second aspect of participants’ wellbeing which this study examined. The literature review described how the development of music skills may be able to positively influence self-concept for children with autism through improvements in their perception of their level of competence (2.5). This study therefore assessed participants' perceptions of their competence using observations of participants' behaviour, communication, and overall demeanour during the Figurenotes sessions. These assessments were made using observations of participants' behaviour, communication, and overall demeanour during the music sessions. Additionally in the Group Phase, *The Perceived Competence and Social Acceptance Scale for Children* was used to obtain participant self-ratings. Chapters 4, 5, and 6 described the emerging themes in participants' self-concept identified in each phase. The following sections draw on these themes to describe firstly the observed changes in participants' perception of their competence, and then how these

changes may have been mediated by two factors: the importance ascribed by participants to succeeding in the activities, and the reference point they used to determine their level of competence. In a nutshell, this study was interested in how good they participants thought they were in the musical activities, how important being good was to them, and with whom they compared themselves.

Perceived competence

Several themes emerging from the Individual, Group, and Family Phases relate to participants' perception of their competence. Some participants exhibited low levels of perceived competence, hesitating when asked to perform a Figurenotes arrangement which looked difficult, or when another participant (in the group and family sessions) had prior difficulty with it. Alexander's poignant question "Is it too hard?" regarding an arrangement I asked him to play in the Individual Phase encapsulates well the sensitivity and nervousness participants sometimes showed. The tendency to avoid novel things may be a factor in the hesitation shown by participants. Another possibility is that as participants became increasingly familiar with Figurenotes, they were able to predict the difficulty of an arrangement by looking at it, and therefore became anxious when it looked difficult.

Occasionally participants expressed frustration when confronted with a task, such as Anna, as described in her case study (6.2). Anna's frustration may have been caused by her impatience in needing to wait for her parent or sibling to catch up to her in ensemble playing activities. Frustration may have also played a part in Ellen's vigorous beating of the chime bar (described in her case study, 5.2). In Anna's case, the frustration produced a positive effect as she was in fact playing her part more fluently than her sister and parent were playing theirs, and Anna showed awareness of this. In Ellen's case, the frustration was more negative as it caused a negative reaction in her peers. Being sensitive to the cause and sense of frustration in participants enabled them to more quickly gain a sense of competence.

Participants' level of confidence may be a factor in both the perception of difficulty expressed by participants, as well as the unwillingness to repeat and refine items. However, these tended to decrease as sessions progressed and were replaced by more instances of participants showing confidence in their skills and abilities, from Sebastian's tentative "No, of course it's not difficult" to Neal's significant decision to return to tennis lessons after

participating in the Figurenotes sessions. By becoming aware of their skills in performing music using Figurenotes, participants were able to feel confident about not only their musical abilities, but their potential to develop their skills in other areas of endeavour. Further research is needed to explore the connections between development of musical skills and skills in other areas, however these results point to a connection between improved music skills and the development of general self-competence for children with autism.

It was found that participants were able to engage and achieve success in the Figurenotes activities from the beginning of the sessions. Andrew's assertion that "It's going to be easy!" exemplifies this. This early engagement and success may have been important for participants' later behaviour and development of their music skills. Participants were attracted by Figurenotes and focussed their attention on the activities presented. They then achieved these initial activities successfully. As participants understood these activities and could receive aural feedback (through their performance of the music) they became motivated to undertake further activities, and when successful in these, were enthusiastic about the next one, and so the cycle continued.

When participants in the Group Phase were given the opportunity to perform for their peers and teachers, these performances produced reactions in participants which indicated that they not only took their own performances very seriously, but also that the resulting appreciation shown by their audience also was important to them. Susan's first solo performance in her sessions was very important for her, as shown by her nervous shaking but determined desire prior to performing, her broad grin after the performance, and her improved engagement in the remaining sessions. This example, also seen to a less dramatic degree in other participants, indicates a positive effect on the self-competence of children with autism of performing music in front of other people. It was expected prior to the sessions that the participants would not be interested or willing to perform solos, and therefore this finding is unexpected but illuminates a potential area of development.

Participants were able to use the musical activities using Figurenotes to express themselves in various ways. In the Individual Phase, Alexander's choosing his own activities from those presented in the session Figurenotes arrangement book indicates not only a strong sense of

initiative, but a degree of self-expression both unexpected and carrying a potential for further development. Alexander, along with Neal in his identification with *Wake Up Jeff!*, and some participants in the Group and Family Phases, was able to use the musical activities to express moods and personal ideas in a musical way, even when unable or unwilling to verbalise them. Finally, the enjoyment expressed by many participants during and after the sessions in which they participated may be connected with their increasing sense of competence in the Figurenotes activities. Participants frequently indicated a natural and unforced enjoyment in their participation by smiling and verbally expressing satisfaction, such as Christopher's telling me "I liked the music sessions, they were fun".

Importance of competence

The importance given by participants of being competent at the musical activities was the second area of interest. Neal's exclamation, "I'm being a pro!", Anna's mother's observation that Anna was "showing who she really is", and Sean's mother reporting that Sean "loves this system" are all statements pointing to participants gaining a sense of purpose through their participation in the Figurenotes activities. This sense of purpose may represent a deeper form of engagement than mere interest in the activities and showed a potential for long-term use of music for self-expression and social engagement in these participants.

A somewhat unexpected finding was the initiative and independence taken by participants in some musical activities. As shown in Steven's unprompted beginning of activities and Alexander's jumping ahead in the book of session musical arrangements, the initiative shown may indicate participants' sufficient engagement and sense of self-competence to take ownership of the session activities. In the Family Phase, the finding that some participants spontaneously counted in to begin activities is a further demonstration of participant initiative. The counting-in is particularly of interest because not only does it show initiative, but also a clear understanding of musical purpose and the mechanics of music-making. Although the skill was learned by rote by the participants, the fact that participants showed initiative and independence in suggests that they valued the activity enough to utilise their abilities spontaneously and with no reward apart from that intrinsically offered by the activity.

It was found in the Individual Phase that the sessions had a calming effect on some participants. Observations of participants over the course of the sessions showed that prior to the sessions, participants were often restless and agitated. Although during the sessions the participants remained somewhat restless and were only able to maintain focus and seating position for short periods, by the end of sessions most participants were considerably more physically settled. A few parents reported their child to be calmer after the sessions and that this state lasted for up to a few hours. The calming effect by which agitated participants were able to use the Figurenotes activities to reduce agitation may be because participants valued the activities highly enough to allow them to affect their emotional state. As the activities became longer the participants stayed calm and focussed for longer, which suggests that it was the activities themselves which had this effect.

Reference point

The third area of interest was who the participants were comparing themselves to in order to gain their perception of their competence. Participant responses suggest that many were initially externally-motivated, with parents of participants using the promise of rewards as a way to encourage them to participate. At the beginning of their participation, participants also used external reference points in determining their perceptions of competence in the music activities. Participants compared their performance to that of others and made judgements about their own abilities from this comparison. They also may have used feedback from others to form their views of themselves. However, as a result of experiences in the Figurenotes activities, participants may have been able to change their point of reference to an internal one. The Figurenotes activities were enjoyed and understood by participants, and in them participants had successful music-making experiences. Thus, not only was success achieved by participants, it was understood in ways which were meaningful to them. Through these experiences, the reference point participants used to determine their level of competence may have changed from external to internal. Instead of comparing themselves with others, they could compare their new experiences of success with past experiences of failure.

An example of this is Susan's performance of *Butterfly Jump Jump* in the Group Phase. Not only did Susan succeed in this, but she understood that it was a real success, based on her understanding of what the activity required and also the importance that succeeding had for

her. The strong impact of this experience, as shown by Susan's shaking and grinning, suggested that the reference point she was using in order to assess her level of competence was changing as a result of her experience. She may have formerly compared herself unfavourably with her peers, but was now able to compare her successful performance favourably with earlier experiences.

Links between social interaction and self-concept findings

In the literature review, links were identified between development of children's self-concept and their social skills (Verté, Roeyers, & Buysse, 2003), with deficits in one area associated with deficits in another. A potential for research investigating effects of music interventions on both self-concept and social interaction was identified through existing studies which included both social interaction and self-concept in assessing social-emotional wellbeing associated with a music intervention (Rickard et al., 2013; Welch, Papageorgi, & Sarazin, 2014; Wood, Ivery, Donovan, & Lambin, 2013). These studies provided precedents in the inclusion of social interaction and self-concept as dual areas of focus.

In this study, understanding the performance-related nature of much of the participant outcomes obtained elucidates a link between the findings in social interaction and in self-concept. As described in 2.4, performances are intrinsically social activities which can "create and sustain networks of relationships between and amongst people, institutions and communities" (Ansdell, 2005, p.4). Participants performed for their peers in the Group Phase and for family members in the Family Phase, and these performances are linked to improvements in participants' perceived competence. Performing for others is also a form of social interaction, and so this finding additionally points to an association between gains in social interaction and gains in self-concept. Also as described in 2.4, the social motivation theory of autism suggests that an underlying desire and motivation to engage in social activities may be lacking in individuals with autism. Given that music has been shown to effectively stimulate the reward systems in the brain (Kraus et al., 2014), facilitating social interactions through musical interactions may potentially have positively affected participants' motivation to engage in social activities. Thus, participants' musical interactions may have increased participants' motivation for social interactions generally, and may even have prompted participants to value those social interactions more highly.

Implications of these findings

As described in 3.3, self-concept is not an easily-measured construct, particularly so in children with autism (Capps, Sigman, & Yirmiya, 1995). The effects of music interventions on individuals' self-concept has thus far been the subject of little empirical research (Rickard & McFerran, 2011). Yet self-concept is considered important, to the extent of being "the cornerstone of both social and emotional development" in children (Kagan, Moore, & Bredekamp, 1998, p.18). In evaluating the contribution of this study to the literature on music interventions and self-concept, the paucity of existing literature actively attempting to observe and measure this construct must be considered.

Bem's theory of self-perception, that people form concepts of themselves and their abilities and interests from what they are already doing (Bem, 1972) was used in this study to guide how self-concept was examined. Participants experienced themselves participating in music-making activities where they were exercising the use of specific music skills, which gave them the opportunity to gain a sense of their competence. However, it is important to note that it was not the development of music skills themselves which is claimed to have affected the self-concept of participants. Instead, it was participants' perception of their skills. Harter's (1984) assertion that it is not the actual level of an individual's competence that really matters, but an individual's *perception* of their competence, was used to inform the use of observational tools to guage participants' perceptions of their competence, which went alongside the observer ratings of actual participant skills. Two aspects of participants' perception of their competence were also considered. The first was based on the idea of level of aspiration (James, 1913), used by Goopy (2013) to argue that the importance an individual places on being competent in music may be a significant factor in the effect of any competence on their self-concept. The second factor is the reference group participants used to compare themselves, based on the idea developed by March (1994) and others that the feelings individuals have about themselves are often developed as a result of feedback from others (Miller & Moran, 2012).

The outcomes of this this study serve to support these concepts. It does indeed seem clear that that how good they participants thought they were in the musical activities, how important being good was to them, and with whom they compared themselves, were important factors in the development of their self-concept. Yet these assertions are essentially theoretical, since this study can claim no objective assessment of the actual levels of these aspects of participants' inner lives. All that can be claimed is that this study contributes by linking the ideas of perception of competence, importance of competence, and reference group, and thus the contribution of this study to the literature of self-concept and music interventions lies in a more theoretical domain than does the contribution of the other key focus areas of the study.

One further outcome, a somewhat less-anticipated one, is the way in which many of the musical activities undertaken by participants acted as musical performances. Indeed, most of the activities undertaken could be seen that way. This links the self-concept in participants with the idea that musical performance by an individual can be seen as a presentation of self (Ansdell, 2005). Moreover, the musical activities undertaken by participants operated as *zones of proximal development* as formulated by Vygotsky (Shabani, Khatib, & Ebadi, 2010). In that sense, the process I went through to develop and refine these activities as part of my reflective practice (and allowed by the action research approach of the study) was a process of seeking and facilitating the correct zones for the participants in order to allow their self-concept to develop. Given the performative nature of many of the activities undertaken by participants in this study, this study thus points to the value of establishing optimal conditions for musical performance in order to enhance self-competence of children with autism.

7.4 Creativity

The creativity shown by participants when engaging with Figurenotes in music-making was an unexpected finding of this study. Participants' creative adaptions of the Figurenotes arrangements increased opportunities to make music and engage in social interactions. Additionally, the imaginative use of Figurenotes colours and shapes can be associated with improvements in participants' social interaction, and their self-concept. These aspects of participants' creativity will be discussed in the following two sections.

Creativity and social interaction

In the Group Phase, participants used Figurenotes in spontaneously creative ways. This facilitated social interactions outside the structured musical activities. Creative activities were not planned in the Group Phase, but as sessions progressed and participants increasingly contributed in creative ways, this theme emerged. Group 1 participants' creative use of self-generated musical structures in the spontaneous singing of learned songs prior to the sessions enabled social interaction to occur where it may not have otherwise. Group 2 participants suggested new and creative uses of Figurenotes within the musical activities. They suggested musical sounds for characters such as Pinocchio in the musical stories, and associated particular colours and shapes with objects from their daily lives such as fruit.

These results from the Group Phase suggested that Figurenotes may be an effective tool to facilitate social interactions through music, and so in the Family Phase, creative activities were planned. These creative activities used Figurenotes magnets, a whiteboard, and simple tuned percussion instruments. The resources were utilised to encourage social interactions between the participants with autism and their siblings and parents. Turn-taking within the creative work did increase somewhat through the sessions for all participants, although the fact that these activities were given as set activities and were not spontaneous expressions from participants, as had occurred in the Group Phase, may have contributed to smaller increase in social interaction in the Family Phase than in the Group Phase. Thus, a picture emerged of social interactions of participants initially being better within the musical activities than in other interactions. However, when participants were able to utilise and transpose the musical structures into their everyday interactions, and were able to

creatively develop their own ideas using the musical materials, social interactions outside the musical activities improved.

Creativity and self-concept

The imaginative and playful way in which elements of Figurenotes were used (spontaneously at first in the Group Phase and then in a more planned way in the Family Phase) points to the importance of creativity in development of participants' self-concept. The Figurenotes picture stories drawn by Katherine and Anna are examples of participants' imaginative employing of the characteristics of Figurenotes (the colours and shapes representing musical sounds) to express their inner world. These findings support other research (Hakomäki, 2013) in providing evidence of the potential of Figurenotes as a tool for children with autism to explore and express their inner world.

Cognitive traits common in people with autism may facilitate aspects of creativity, while hindering others (Craig & Baron-Cohen, 1999). Novel ideas may be generated more slowly by people with autism, but they may be better at generating unusual responses. Also, people with autism may show deficits in their ability to make associations between different categories of items, but at the same time be more proficient than average at the ability to build novel concepts by connecting small details in unusual ways. Imaginative connections were observed in this study when participants associated the colours and shapes of Figurenotes with other objects, or identified emotions or aspects of their own inner world with Figurenotes. It is possible that the clear connection between musical sounds and visual information in Figurenotes assisted participants to gain in their ability to make associations in this way, and also in their fluency in generating novel ideas.

Implications of these findings

The findings that creativity played a role in the development of both social interaction and self-concept of participants implies a value of activities which are both musical and creative in developing the social interactions of children with autism. It may also offer a new perspective on creativity in children with autism. There is limited existing research into the development of creativity in people with autism, and creativity in people with autism has been described as "impoverished" (Craig & Baron-Cohen, 1999, p. 325), with limitations in

their imaginative abilities. However, imagination was demonstrated by participants in this study, and many creative activities were prompted initially by participants themselves. This suggests that for some children with autism, their latent imagination may only need the right conditions in order to become manifest.

The outcomes of this study show that Figurenotes is a flexible tool which can be used in a variety of creative ways. Thus, this study contributes to and extends the research literature examining how musical creativity may be enhanced and facilitated through the use Figurenotes. Moreover, whilst the findings relate specifically to children with autism, these findings point to a potential for Figurenotes to be used in the development of musical creativity with other populations as well. The wider community can benefit from further research and development in using Figurenotes in the ways used by this study's participants: creating and sharing musical ideas, notating heard rhythms, drawing and performing pictures, and associating sounds with visual images. In this way, the observations of participants in this study support the description by Best, Arora, Porter, and Doherty (2015) of how people with autism "may approach creativity problems in a different way…[and are more likely to use strategies that result in unusual responses" (p.4071).

7.5 Music-Making by Families

A second unexpected finding of this study is in the music-making by families of the children with autism. As with the creativity finding, this area emerged as a result of the action research approach taken in the study. In the Individual Phase sessions conducted in participants' homes, parents and siblings of the participating children with autism showed considerable interest in the activities undertaken. The sessions were often closely observed by other family members, with some parents and siblings present in the session room and asking to be given the opportunity to play a Figurenotes score after the sessions. Parents also played important direct roles in some early individual sessions, with Tony's case study (4.2) an example of this. The action research approach used in the study allowed the potential shown for family members to be involved in the research to be translated into the addition of an additional study phase involving participants' family members. In this Family

Phase, families of the participating children with autism engaged in music-making together. These ensembles involved the participating child with autism, their sibling, and a parent playing specially-arranged ensembles using Figurenotes on keyboard and tuned percussion instruments. Four specific findings are discussed below.

Parental involvement

This study found that the participating children with autism performed in the Figurenotes ensembles better with their parents than with their siblings. Social interactions by participating children with autism were also better with their parents than their siblings. Furthermore, the presence of parents in the sessions enhanced interactions between the participants with autism and their siblings. These findings provide evidence of the value of parental involvement in musical activities involving children with autism, and add weight to previous research which suggests the important capacity-building potential of parents' use of music in the home with their child with autism (Thompson, 2014). At the same time this study provides a model of how a specific tool (in this case, Figurenotes) may be used to achieve such a purpose.

Sibling relationships

Relationships between siblings in the participating families were sometimes difficult. Participating parents reported that their child with autism spent little time with their sibling and there were very few activities the siblings did together. In the Family Phase sessions, the participating siblings successfully engaged in simple musical ensembles using Figurenotes where each had a different, but complementary part, either playing together or taking turns within the music. Moreover, as well as successful musical interactions, social interactions between siblings also improved. These outcomes address the need for interventions supporting positive interactions and relationships between family members in families where one child has autism (Habelrih, Hicks, & Vanstone, 2018), and warrant further research in investigating interventions using group instrumental music-making to promote healthy relationships in these families.

Skill and leadership shown by children with autism

Siblings and parents were frequently surprised by the music-making skill of the children with autism. For example, Neal's mother expressed "I didn't think that Neal could do that ... I mean, I've always known that he had it within him, but he doesn't usually get a chance to show that he can be good at something". Participating children with autism exhibited a generally higher level of skill in performing music than their siblings or parents. This contradicted the expectations of the parents and siblings, who expressed surprise at the skills of the child with autism. This demonstration of skills may have affected the siblings' and parents' attitudes to the child with autism in their families. The children with autism also showed developing musical awareness of their family members in music-making, and demonstrated musical leadership, counting in before the start of ensemble items in order to communicate the tempo and to enable the players to start together.

Independence of families in playing ensembles

After some initial guidance, families could perform simple musical ensembles independently without the need for continuous supervision, as when Alexander's sister guided his playing, and when Charlotte and Sean's mother guided the ensemble playing. These family members demonstrated the confidence to make music on their own, even after only one or two sessions with my guidance. Figurenotes played an important role in this, given that all participants were reading the musical scores in Figurenotes and were able to perform their parts as well as understand the parts of the other players.

Implications of these findings

The themes described above demonstrate that shared music-making using Figurenotes can give children with autism and their families a new and positive way of interacting. The findings contribute to research into the involvement of families of children with autism in music-making (Humpal & Kern, 2012; Cridland, Jones, Magee, & Caputi, 2013; Jacobsen et al., 2016, Thompson, Shanahan, & Gordon, 2019), specifically by contributing examples of the potential of music-making by the playing of instrumental ensembles by families. Additionally, these findings contribute to knowledge about ecological approaches to music therapy with families (Thompson, 2014), by exploring the use of Figurenotes to facilitate

music-making by families, and by further elucidating the role of music-making in enhancing family relationships (Nemesh, 2017).

Jampel (2011) characterises group performance as "[creating] a new kind of musical family, one in which each could be safely heard and listened to" (p.12). The findings of this study can be related to the idea of musical performance as representing this ideal of how people can work together in social situations. In the field of community music, these findings also provide an example of an ecological approach which seeks to embed music-making as a sustainable and accessible community and leisure activity (van der Schyff, 2015). However, the short-term nature of the Family Phase sessions must be seen in perspective against the much wider background of the ongoing life of the participating families, and thus their effects could perhaps be best seen as giving a model or example of how more effective relationships might be understood by these families.

7.6 Limitations and Implications of this Study

Limitations

The limitations of this study are important, all the more so given that the study had several areas of investigation. In essence, the limitations centre around challenges in data collection and generalisability of outcomes, although the final limitation functions also as a direction for further research.

Limitation of ratings system

The potential benefits in including some numerical data in an otherwise qualitative study were outlined in 3.1. In consideration of this, a system of researcher-given ratings of participants' music skills and social interaction using a 10-point Likert scale was devised for this study. The ratings are norm-referenced, not criterion-referenced, comparing the participants with each other and not an external standard, as it was primarily the relationship between the ratings given that was of interest. The ratings were used primarily to support the thematic analysis of data obtained in the session notes and interviews, and was not intended to operate independently of this purpose. However, a limitation of the

session ratings used in this study is that they were primarily researcher-given and not subject to external validation. In the early Individual Phase sessions, video footage was co-reviewed by my principal supervisor and I, and ratings were given after discussion and agreement. While this aided the clarity of criteria and fostered an objective perspective on subsequent ratings, all the remaining ratings were given solely by myself, using a ratings system also designed by myself. In order to further elucidate the focus areas used in this study, further research should involve measurement by more objective means, such as a team of observers, and also utilise a wider range of valid measures.

As described in 3.3, The *Perceived Competence and Social Acceptance Scale for Children* was only used for the Group Phase due to limitations on time and resources. The scale was not specifically designed to be used with children with autism, which reduces the potential validity of its use in this study. Additionally, the results obtained may have been confounded by factors such as the effect of events of the day on participants, possible misunderstanding of the questions by participants, and specific connections participants may have drawn between the situations described in the verbal or visual information with situations in their own experience. For these reasons, results obtained using the scale must be used with caution. They are of use primarily to support findings from observations of participants during the sessions.

Limitations to self-concept findings

The key question regarding self-concept in the study was whether there was an association between the development of music skills by the participants, and changes in their self-concept. It was noted in the literature review that self-concept may an under-researched area of effect for music interventions because of challenges in measuring and reporting, including "a paucity of theoretical models, psychometrically sound instruments, and appropriate statistical analyses" (Marsh, 1994, p.439). The difficulty of objectively gauging an individual's self-concept was certainly a challenge in this study. The *Perceived Competence and Social Acceptance Scale* (used in the Group Phase) was used to obtain some insights, but as described above, there was doubt over the accuracy and validity of the results obtained, due to communication and comprehension difficulties by some participants. Instead, the question of the connection between music skills and self-concept was better addressed through observing participants' behaviours and responses as

accurately as possible, and mapping that on to the concepts of perception of competence, importance of competence, and reference point.

There remains some uncertainty about the conclusions that have been made: for example, Neal's slouching during sessions may have been more about being tired than any apprehension about the session activities, and Sean's love of repeating certain melodies may have been more about the self-stimulation and regulation of repetition, than any real enthusiasm for music-making as such. Nevertheless, the findings on perception and importance of competence, and reference point, have value if taken as informed interpretations based on real observed changes in behaviour. Moreover, taking on the challenge of examining self-concept in children with autism is important. People with autism may be particularly prone to low levels of self-concept. Low self-concept may be related to a lack of positive experiences of success, and may also be related to lower levels of social functioning (McChesney & Toseeb, 2018). Addressing low self-concept in children with autism through intervention is thus an area of need to which this study makes a contribution.

Limitations to generalisability

The number of participants in this study (36) was large enough to enable the research questions to be answered, but not a large enough sample size to make any of the outcomes generalisable to the general population of children with autism. Participation in this study was limited to children diagnosed at Level 2 Autism. Results of the study therefore refer only to participants at Level 2, not at Levels 1 or 3. While this study contributes to the research literature on music interventions specifically for children with Level 2 autism, there can be no generalisation even to the subset of that population at Level 2 autism and aged between 6 and 13. Additionally, the ratings system used to assess participants' music skills and social interactions, whilst useful for evaluating changes in individuals, cannot be used to provide a general picture of changes to be expected within the general population of children with autism, given the small sample size. All the findings of this study can claim is that the observed changes occurred for the participants involved, and therefore hold the potential to occur with others in the same category.

The size of the participant cohort was limited by the scope and resources of the study, and also by the choice of action research as the research approach which favoured working with a smaller participant cohort. However, the advantage of the cohort size was that it was small enough to enable close observation, flexibility in planning and carrying out participant sessions, and to allow for participant input. An additional limitation in the Family Phase was that it involved only families containing one other sibling in addition to the child with autism, and only one parent who was in all cases the mother. The outcomes of the Family Phase can therefore again not be generalised or applied to other family groupings apart from pointing to the potential of Figurenotes to facilitate musical and social interactions within families.

No comparison of Figurenotes with other music notations

This study did not compare Figurenotes with other notation systems. The literature review showed that music-making by children with autism may be facilitated by the use of adapted music notations, identified Figurenotes as having the potential to be an effective such music notation, and also identified a need for research specifically into Figurenotes. This study has found that Figurenotes effectively facilitated music-making by children with autism by removing barriers to participants' comprehension of basic musical elements. Investigation using an action research approach of one alternative notation system was considered preferable to an evaluative comparison between several notation systems, due to this study's focus on associations between music-making skills, social interaction and self-concept in children with autism.

Implications and further research

Links between music therapy and music education

During this study I utilised and developed my skills as a music therapist and also as a music teacher. My dual orientation has informed this study, and I believe has enabled a deeper and more nuanced investigation into the role of Figurenotes in music-making. Whilst there is a very necessary and important distinction between the goals of music education and music therapy, this study does not focus on this distinction as it was not needed in order to investigate the research questions. This study has shown that music-making was facilitated in the participating children with autism through music skill development using Figurenotes. This conclusion relates to music education. The study has also shown that music skill

development using Figurenotes was associated with improvements in participants' social interaction and self-concept, which are both areas of focus in music therapy. Thus my own dual identities, as well as the outcomes of the study, inevitably mean that the context for this inquiry has been both music therapy and music education.

The journey undertaken in this study has enabled me to gain a clearer sense of how I understand my role within each field, however. I have gained an understanding of my work being at all times focused on the wellbeing of those with whom I am working, even while helping them reach for deeper levels of musical knowledge and skill. My goal is always "to actively support people as they strive to improve their health, functioning and wellbeing" (Australian Music Therapy Association, 2018). Whilst I do not seek to impose this viewpoint on others, for me a primary identity as a music therapist allows my aims to be clear and also to communicate this more precisely.

Additionally, this study contributes to a re-examination of traditional roles that have developed in both fields: of practitioner-client (in therapy) and teacher-student (in education). This study provides an example of reflection-led action research where the responses of participants were integral to the development of practice. The way in which Figurenotes was found in this study to facilitate peer-to-peer sharing of skills, and within-family sharing of skills, can also contribute to a critical re-examination of roles in the context outlined by Laes & Westerlund (2017).

Research and practice combining music education and music therapy principles and techniques is likely to yield positive benefits for our understanding of the role of music in peoples' lives and wellbeing. Specifically, this study points to a value of research utilising music skill development leading to performance of music (which could be facilitated by Figurenotes), along with participation in improvisational music therapy. Such research may enable extensions of the use of both Figurenotes and improvisational music therapy modalities when used in combination to impact self-competence through musical expression. Overall, if a closer dialogue and more collaborative approach can be taken more generally by practitioners and researchers in music education and music therapy, there is potential for enhanced outcomes in both fields.

Further research into Figurenotes

This study demonstrated short-term benefits for the participating children with autism on their music-making skills, social interaction and self-concept. These results point to a potential for examining longer-term effects of the use of Figurenotes. As children with autism grow up and move into adulthood, the effect of cumulative music-making experiences using Figurenotes could be examined using longitudinal studies. Whether longer-term use of Figurenotes produces long-term benefits in music-making skills, social interaction, or self-concept could be investigated, along with other possible longer-term effects. More generally, the longer-term effects of music-making using Figurenotes by individuals, groups, and families could be studied.

This study found that Figurenotes is an effective music notation system in enabling children with autism to engage in music-making. In this way, the study contributes to the limited number of existing studies investigating the effect and applicability of alternative music notation systems in facilitating music-making for children with autism. The finding that Figurenotes was easily comprehended by the participating children with autism points to a value of further research into the use of Figurenotes in supporting music-making by children with autism. Future research in this area could compare the use of Figurenotes with the use of traditional notation. Research could also investigate the use of alternative notations generally, including solutions developed using digital technology. The role of visual or other sensory representations of music in facilitating musical engagement needs to be more fully understood. Research using eye-tracking and other technologies may be able to illuminate the ways in which musical notation is read, processed, and translated into the production of musical sounds.

This study also points to an alternative perspective on *inclusion*. Inclusion is typically understood as including people with special needs as members in activities for the mainstream population (Blandford & Duarte, 2004). Existing tools can be modified, usually simplified, in order to be accessible to people with special needs. However, there is a need for further research investigating interventions for people of differing abilities from a perspective beyond that of merely making an attempt to include people who have been traditionally excluded from an activity or sphere of life (Hanbury, 2012). This study thus shows how the traditional concept of inclusion can be expanded to include a meaning of

involving able-bodied people in activities actually normally reserved for people with disabilities (Ainscow, 2005). When Figurenotes, which is a tool specifically developed for people with special needs, was used in this study by the participating children with autism, they showed initiative and even leadership. This was a demonstration of not merely inclusion as it is normally understood, but inclusion in reverse: the participating children with autism shared activities designed for them with others, including peers and family members.

Further research is thus warranted into how tools and resources such as Figurenotes (and others adhering to the principles of Universal Design), originally for use by people with disabilities, are found to be useful for the wider population. This concept has been referred to as a *kerb-cut effect* (Blackwell, 2017), in which something designed for one group (for example, kerb cuts for wheelchair users) has unintended positive impacts on others (kerb cuts also make it easier for bicycle users, mothers with prams, delivery people, and other users). In this way, Figurenotes is an example of a tool which may be useful for a world which is moving beyond inclusion as traditionally conceived (Laes & Westerlund, 2017).

The role of music in developing social interaction

This study provides evidence of a link between changes in the interactions of participants during musical ensemble playing, and changes in their social interactions outside of music activities. This finding is consistent with the proposition that "musical ensemble performance is a form of social collaborative behaviour that requires multiple individuals to anticipate and adapt to each other's actions" (D'Ausilio, Novembre, Fadiga, & Keller, 2015, p.112). Future research is warranted to investigate further the possible mechanisms by which music-making and social functioning are linked.

Specifically, three areas are particularly worthy of investigation. The first is turn-taking. Research combining music and linguistics can build on *enchronic* perspectives on language, where verbal conversation is considered as a move-by-move flow of interaction similar to musical interaction (Enfield & Sidnell, 2014). The second area is *synchrony*. Synchrony (simultaneous action) may be important for human social bonding (Launay, Tarr, & Dunbar 2016). This study found that participants' playing ensembles together is associated with improvements in their social communication. Further research into synchrony within music-

making may reveal ways in which music interventions targeting synchrony may be effective in addressing social deficits in children with autism. Thirdly, research is warranted into the possible *motivational* effect of music-making on social interaction for people with autism. A lack of social motivation may lead to the pervasive lack of social skills in people with autism (Chevallier, Kohls, Troiani, Brodkin, & Schultz, 2012). Further research could enable elucidation of the factors involved in the development of music-making skills to positively impact the motivation of children with autism to attend to others, to take pleasure in collaboration, and to maintain social relationships.

Perception of competence

People with autism may be particularly prone to low levels of self-concept, and this may be related to a lack of opportunities for positive experiences of success. In this study, development of the participating children with autism's music-making skills using Figurenotes is associated with improvements in their self-concept through changes in perception of their competence. Participants experienced success in the Figurenotes activities within social environments including peers and families, and the positive effect of this was enhanced by the importance to them of succeeding. These findings give weight to the need for interventions targeted at enabling individuals with autism to experience success in specific activities, and to do so within a social environment. The perceptions that children with autism have about themselves and their abilities are valid and important. Thus, as well as research into social and functional outcomes for children with autism, there is equally a need for further research in the emotional wellbeing of these children.

Music-making in families of children with autism

The Family Phase of this study contributes to the literature on the role of music-making in enhancing family relationships. Findings from this study add to those from previous studies which demonstrate the potential for music interventions involving families of children with autism. Further research into the role of Figurenotes in facilitating music-making in families of children with autism is suggested. A particular area worthy of further investigation is music-making by siblings in which one sibling has autism and the other is typically-developing. Typically-developing siblings of children with autism may experience negative effects of having a disabled sibling. Findings in the Family Phase of this study have suggested

that this stigma may be reduced if the child with autism is able to demonstrate skills in a particular activity, such as music.

The families in this study were able to play many of the arranged ensembles independently. This suggests that after some initial expert guidance, families could perform simple musical ensembles together using Figurenotes without the need for continuous supervision by a therapist or teacher. Further research is needed to elucidate this possibility, but the outcomes of this study suggest a high potential for long-term family music-making using Figurenotes. Moreover, by showing the effectiveness of the use of Figurenotes with families of children with autism in their family homes, this study points to the potential of music interventions to extend beyond the immediate intervention context to a wider ecological context. The results obtained point to a potential generalising effect of the effects of the participant sessions which may be elucidated by further research.

A demonstration of the role of action research and reflective practice in professional practice

In terms of a meta-theoretical contribution, this study offers the fields of music therapy and special music education a demonstration of an effective role for reflective practice and action research within these fields. Action research is not as widely utilised in music therapy as it is in the fields of education and social sciences, despite holding the potential to contribute to music therapy research and practice (Stige & McFerran, 2016). This study provides evidence of the effectiveness of action research as an effective research approach in music therapy. Music therapists must maintain a flexible and adaptive approach to their work, and in this study action research provided a structure within which opportunities that arose during the process of research could be acknowledged and acted upon. This is exemplified by the addition of a Family Phase to the study when it became clear there was a value in doing so. This study demonstrates how action research can be an effective approach for music therapy practitioner research, by showing how the researcher can constantly adapt techniques to match the unique challenges of working with a particular population while maintaining integrity and coherence in a research approach.

This study also provides further evidence for a value in action research studies involving people with additional needs. This study has shown that action research can be a highly effective way to discover and develop more effective tools, methods, and techniques for

enabling people with additional needs to reach their goals. In this study, the participating children with autism were actively involved in exploring uses of Figurenotes, and this provides an example of how action research can effectively enable participation from this population in developing effective interventions which can assist other children with autism. This study also points to the potential for participatory action research involving children with autism and their families. Additionally, the outcomes of this study support a view that "the problem-solving orientation of the action research process is highly compatible with the goal of discovering new opportunities for authentic engagement...for learners with disabilities" (Bruce, 2010, p. 134).

Practitioner adaptability is an important issue when working with children with special needs, as "being able to adapt musical strategies to meet the unique learning style of each student is critical" (McFerran, Thompson, & Bolger, 2016, p. 255). This study addresses the need "to demonstrate how to blend the general educators' focus on curriculum-based instructional strategies and the special educators' focus on student- based instructional strategies" (Bruce, 2010, p. 133). In other words, this study demonstrates how a balance may be achieved between employing a specific tool (in this case, Figurenotes) and the need for practitioners to work in a nuanced, individualised way. Additionally, the way in which Figurenotes was found to facilitate the sharing of skills between peers and family members, offers an alternative perspective to traditional practitioner-client or teacher-student relationships, and contributes to a re-examination of these roles (Laes & Westerlund, 2017). These traditional roles are being questioned, and new alternatives are needed for the future.

FINAL WORDS

This thesis begins with a quotation from *Cushla and Her Books*, by Dorothy Butler (1979). Cushla is a child with severe developmental disabilities. Cushla discovers books and learns to read, and this opens a window to a new world in which she can participate, in spite of her impairments. In this study, I began with the concept of *dig where you stand*, the importance of investigating a topic encountered in everyday life. I began where I stood, as a music therapist and music teacher working with children with autism. The other concept undergirding the study, reflective practice, has resulted in a journey of discovery and learning emanating from this starting point. In this study, I have investigated, reflected on, and developed this work, and have discovered Figurenotes providing a window to a world, like reading was for Cushla. The children with autism I worked with participated in the joy of music-making and experienced themselves and others differently through doing so. The journey has been an inspiring and humbling experience.

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Appendix 1

Locked Bag 1797
Penrith NSW 2751 Australia
Office of Research Services

ORS Reference: H11477

HUMAN RESEARCH ETHICS COMMITTEE

14 March 2016

Associate Professor Diana Blom
School of Humanities and Communication Arts

Dear Diana,

I wish to formally advise you that the Human Research Ethics Committee has approved your research proposal H11477 "Figurenotes: facilitating musical engagement for individuals with special needs", until 31 December 2016 with the provision of a progress report annually if over 12 months and a final report on completion.

Conditions of Approval

1. A progress report will be due annually on the anniversary of the approval date.

2. A final report will be due at the expiration of the approval period.

3. Any amendments to the project must be approved by the Human Research Ethics Committee prior to being implemented. Amendments must be requested using the HREC Amendment Request Form: http://www.westernsydney.edu.au/__data/assets/pdf_file/0018/491130/HREC_Amendment_Request_Form.pdf

4. Any serious or unexpected adverse events on participants must be reported to the Human Ethics Officer as a matter of priority.

5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the Committee as a matter of priority

6. Consent forms are to be retained within the archives of the School or Research Institute and made available to the Committee upon request.

Please quote the registration number and title as indicated above in the subject line on all future correspondence related to this project. All correspondence should be sent to the email address humanethics@westernsydney.edu.au.

This protocol covers the following researchers:
Diana Blom, Kirstin Robertson-Gillam, Christine Johnston, Matthew Breaden

Yours sincerely

[redacted]
Professor Elizabeth Deane
Presiding Member,
Human Researcher Ethics Committee

Appendix 2

WESTERN SYDNEY
UNIVERSITY

Participant Information Sheet – Parents and Siblings

Project Title: Figurenotes: Facilitating Musical Engagement

Project Summary: Investigating the effectiveness of *Figurenotes*, a simplified musical notation system, in enabling children with autism and their families to develop and utilise basic musical skills.

You and your child are invited to participate in a research study being conducted by Mr Matthew Breaden, which will form the basis for the degree of PhD at the University of Western Sydney under the supervision of Assoc Prof Diana Blom, Assoc Prof Christine Johnston, and Dr Kirstin Robertson-Gillam. The research involves a small cohort of selected participants, who will be children aged between 6 and 12 diagnosed with Autism Spectrum Disorder, and their families. Participants will be involved in sessions using *Figurenotes* to facilitate the development and use of basic musical skills. *Figurenotes* is a music notation system using concrete visual symbols based on colour and shape, designed for use by individuals with special needs. It was developed in Finland and is now used in several countries.

How is the study being paid for?

The study is being undertaken as a higher-degree research project at Western Sydney University.

What will I be asked to do?

You will be asked to participate in a series of four, weekly, 45 minute sessions where you, your child with ASD, and their sibling, will be guided through a series of activities using *Figurenotes* to facilitate playing on a keyboard and simple percussion instruments (supplied by the researcher). No previous musical experience is necessary for any participants.

Sessions will be videoed for the purpose of enabling the researcher to assess the effectiveness of *Figurenotes* in the development and use of basic musical skills in participants, and to support data obtained from session notes taken by the researcher.

How much of my time will I need to give?

There will be four sessions over four weeks, and each session will last for 45 minutes.

What benefits will I, and/or the broader community, receive for participating?

The study is designed to facilitate the development of basic musical skills through the use of *Figurenotes* as well as providing an opportunity for use of these skills by participants in family groups. Attendance and participation in project sessions is at no financial cost for participants' families. The researcher is a trained and qualified music teacher and music therapist.

Will the study involve any risk or discomfort for me? If so, what will be done to rectify it?

If any participant experiences discomfort as a result of using a musical instrument, or for any other reason, this will be addressed immediately.

How do you intend to publish or disseminate the results?

It is anticipated that the results of this research project will be published and/or presented in a variety of forums. In any publication and/or presentation, information will be provided in such a way that the

participant cannot be identified, except with your permission. A report of the study will be submitted as a thesis to Western Sydney University, but individual participants will not be identifiable in this. Video recordings of sessions will be made solely for the purpose of session analysis by the researcher to evaluate the intervention and it's effect.

Will the data and information that I have provided be disposed of?

Please be assured that only the researchers will have access to the raw data you provide and that your data will not be used in any other projects. Please note that minimum retention period for data collection is five years post publication. The data and information you have provided will be securely disposed of.

Can I withdraw from the study?

Participation is entirely voluntary and you are not obliged to be involved. If you do participate you can withdraw at any time without giving reason

If you do choose to withdraw, any written, audio, and video records of your participation in sessions up to that point will be destroyed.

Can I tell other people about the study?

Yes, you may tell other people about the study by providing them with the Chief Investigator's contact details. They can contact the Chief Investigator to discuss their participation in the research project and obtain a copy of the information sheet.

What if I require further information?

Please contact Matthew Breaden, should you wish to discuss the research further before deciding whether or not to participate, at. m.breaden@westernsydney.edu.au, or by phone on 0414 924 398.

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through Research Engagement, Development and Innovation (REDI) on Tel +61 2 4736 0229 or email humanethics@westernsydney.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

If you agree to participate in this study, you may be asked to sign the Participant Consent Form. The information sheet is for you to keep and the consent form is retained by the researcher/s.

This study has been approved by the Western Sydney University Human Research Ethics Committee. The Approval number is H11477.

Appendix 3

Participant Consent Form for Parents/Caregivers

Project Title: Figurenotes: Facilitating Musical Engagement

I give consent for my child to participate in the research project titled Figurenotes: Facilitating Musical Engagement. I acknowledge that:

- I have read the participant information sheet and have been given the opportunity to discuss the information and my child's involvement in the project with the researcher.
- The procedures required for the project and the time involved have been explained, and any questions I have about the project have been answered to my satisfaction.

I have discussed participation in the project with my child and my child agrees to their participation in the project.

I understand that my child's involvement is confidential and that the information gained during the study may be published but no information about my child will be used in any way that reveals my child's identity.

I consent to the video recording of sessions for analysis by the researcher. If the researcher desires to use any of these recordings as part of the final thesis, or in any presentations (conferences etc.), specific permission will be sought and obtained from myself prior to use.

I understand that my child's participation in this project is voluntary. I can withdraw my child from the study at any time, and they are free to withdraw their participation at any time.

Name of child: _____

Name of parent / caregiver _____

Signature: _____ Date: _____

Mr. Matthew Breaden,
HDR Candidate
School of Humanities and Communication Arts
Western Sydney University

This study has been approved by the University of Western Sydney Human Research Ethics Committee, approval number H 11477. Project Supervisor: Associate Prof Diana Blom, School of Humanities and Communication Arts, Western Sydney University, Locked Bag 1797, Penrith NSW 2751

If you have any complaints or reservations about the ethical conduct of this research, you may contact the

Ethics Committee through Research Engagement, Development and Innovation (REDI) on Tel +61 2 4736 0229 or email humanethics@uws.edu.au. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix 4

WESTERN SYDNEY UNIVERSITY

Information Sheet (Parent/Caregiver)
Project Title: Figurenotes: Facilitating Musical Engagement

Who is carrying out the study?

The primary investigator is Matthew Breaden, an HDR candidate at Western Sydney University.

Your child is invited to participate in a study conducted by Matthew Breaden and will form the basis for the degree of MA (Hons) at the University of Western Sydney under the supervision of Assoc Prof Christine Johnston, Assoc Prof Diana Blom, and Dr Kirstin Robertson-Gillam.

What is the study about?

The purpose is to investigate the effectiveness of *Figurenotes* (a simplified musical notation system) in enabling children with autism to develop and utilise basic musical skills.

What does the study involve?

The study involves a small cohort of selected participants, who will be children aged between 6 and 12, and diagnosed with Autism Spectrum Disorder. Participants will be involved in sessions using *Figurenotes* to facilitate the development and use of basic musical skills. Figurenotes is a music notation system using concrete visual symbols based on colour and shape, designed for use by individuals with special needs. It was developed in Finland and is now used in several countries.

Your child would take part in a series of eight sessions conducted as part of regular school music lessons. The sessions are designed to fit smoothly into the existing curriculum and would involve children grouped in the same way as they are normally.

Your child would be asked to complete short surveys of self-concept and musical identity at the beginning, at mid-point, and at the end of the series of sessions. These surveys will be given during regular sessions. The surveys will involve multiple-choice, pictorial or written questions and are designed to be suitable for all participants.

Sessions will be videoed for the purpose of enabling the researcher to assess the musical development of participants, and to support data obtained from the surveys.

How much time will the study take?

There will be eight weekly Figurenotes sessions, conducted during regular school music lesson times. The sessions are planned to take place between September and November, 2016.

Will the study benefit me?

The study is designed to facilitate the development of basic musical skills through the use of *Figurenotes* as well as providing an opportunity for use of these skills by participants in group performance. Attendance and participation in project sessions is at no financial cost for participants' families. The researcher is a trained and qualified music teacher and music therapist.

Will the study have any discomforts?

If any participant experiences discomfort as a result of using a musical instrument, or for any other reason, this will be addressed immediately.

How is this study being paid for?

The study is being undertaken as a higher-degree research project at Western Sydney University.

Will anyone else know the results? How will the results be disseminated?

All aspects of the study, including results, will be confidential and only the researcher will have access to results obtained relating to your child. A report of the study will be submitted as a thesis to Western Sydney University, but individual participants will not be identifiable in this. Video recordings of sessions will be made solely for the purpose of session analysis by the researcher to evaluate the intervention and it's effect.

Can I withdraw my child from the study?

Your child's participation in the study is entirely voluntary: you are not obliged to consent. Your child may withdraw from the study at any time - or you may withdraw your child from the study at which point, written, audio, and video records of your child's participation in individual sessions will be destroyed. It may not be possible to completely de-identify your child from video records of group sessions, however.

Can I tell other people about the study?

Yes, you can tell other people about the study by providing them with the chief investigator's contact details. They can contact the chief investigator to discuss their participation in the research project and obtain an information sheet.

What if I require further information?

When you have read this information, Matthew Breaden will discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Matthew Breaden at m.breaden@westernsydney.edu.au, or phone 0414 924 398.

What if I have a complaint?

This study has been approved by the University of Western Sydney Human Research Ethics Committee. The Approval number is H11477

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services on Tel +61 2 4736 0229 Fax +61 2 4736 0013 or email humanethics@uws.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

If you agree to participate in this study, you will be asked to sign the Participant Consent Form.

Appendix 5

WESTERN SYDNEY
UNIVERSITY

Participant Consent Form for Parents/Caregivers

Project Title: Figurenotes: Facilitating Musical Engagement

I give consent for my child to participate in the research project titled Figurenotes: Facilitating Musical Engagement. I acknowledge that:

- I have read the participant information sheet and have been given the opportunity to discuss the information and my child's involvement in the project with the researcher.
- The procedures required for the project and the time involved have been explained, and any questions I have about the project have been answered to my satisfaction.
- I have discussed participation in the project with my child and my child agrees to their participation in the project.
- I understand that my child's involvement is confidential and that the information gained during the study may be published but no information about my child will be used in any way that reveals my child's identity.
- I consent to the audio and video recording of individual and group sessions for analysis by the researcher. If the researcher desires to use any of these recordings as part of the final thesis, or in any presentations (conferences etc.), specific permission will be sought and obtained from myself prior to use.
- I understand that my child's participation in this project is voluntary. I can withdraw my child from the study at any time, and they are free to withdraw their participation at any time.

Name of child: _____

Name of parent / caregiver : _____

Signature: _____ Date: _____

Please return to Mr Matthew Breaden, c/o York Public School, South Penrith
Thank you

Mr Matthew Breaden
HDR Candidate
School of Humanities and Communication Arts
Western Sydney University

This study has been approved by the University of Western Sydney Human Research Ethics Committee, approval number H 11477. Project Supervisor: Associate Prof Christine Johnston, School of Education, Western Sydney University, Locked Bag 1797, Penrith NSW 2751

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services on Tel +61 2 4736 0229 Fax +61 2 4736 0013 or email humanethics@uws.edu.au. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix 6

Locked Bag 1797
Penrith NSW 2751 Australia
Research Engagement, Development and Innovation (REDI)

WESTERN SYDNEY UNIVERSITY

REDI Reference: H11477
Expiry Date: 31 December 2017

HUMAN RESEARCH ETHICS COMMITTEE

1 February 2017

Associate Professor Diana Blom
School of Humanities and Communication Arts

Dear Diana,

RE: Amendment Request to H11477

Research Engagement, Development and Innovation (REDI) has received a request to amend your approved research protocol H11477 "Figurenotes: facilitating musical engagement for individuals with special needs".

The amendment has been reviewed and I am pleased to advise that it has been approved, as follows:

Change to information sheet to accommodate new group

Change to participant groups: addition of siblings and parents aged 4-12 of children with autism, a total of 8-10 additional participants within 3-5 families

Ethics approval extended to 31/12/2017

Please do not hesitate to contact the Human Ethics Officer at humanethics@westernsydney.edu.au, if you require any further information.

Regards

Professor Elizabeth Deane

Presiding Member,
Human Researcher Ethics Committee
Western Sydney University

Appendix 7

WESTERN SYDNEY
UNIVERSITY

Consent Form – Parents

Project Title: Figurenotes: Facilitating Musical Engagement

I hereby consent to participate in the above named research project.

I acknowledge that:

- I have read the participant information sheet (or where appropriate, have had it read to me) and have been given the opportunity to discuss the information and my involvement in the project with the researcher/s
- The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.

I consent to:

☐ *Participate in sessions using Figurenotes*

☐ *Having these sessions video recorded for purposes of session analysis by the researcher*

I consent for my data and information provided to be used for this project.

I understand that my involvement is confidential and that the information gained during the study may be published but no information about me will be used in any way that reveals my identity.

I understand that I can withdraw from the study at any time without affecting my relationship with the researcher/s, and any organisations involved, now or in the future.

Signed:

Name:_____

Date: _____

This study has been approved by the Human Research Ethics Committee at Western Sydney University. The ethics reference number is: H11477

What if I have a complaint?

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through Research Engagement, Development and Innovation (REDI) on Tel +61 2 4736 0229 or email humanethics@westernsydney.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

Appendix 8

Parent Interview - Individual Phase

1. Did you notice any changes in your child after this session compared with before the session, in any of the following areas?

- Behaviour
- Communication
- General demeanour

If so, please describe the changes.

2. Did you notice any changes in your child between last session and this session, in any of the following areas?

- Behaviour
- Communication
- General demeanour

If so, please describe.

Appendix 9

Teacher Interview - Group Phase

1. Did you notice any changes in the students' music skills? If so, please give specific examples.

_____

_____

_____

_____

2. What effect did Figurenotes have on the way in which the group of students played music together (as an ensemble)?

_____

_____

_____

_____

3. Did you notice any changes in the students' social interaction? (if so, any specific students?)

_____

_____

_____

_____

4. Did you notice any changes in the students' sense of competence during the sessions? (if so, any specific students?)

_____

_____

_____

_____

_____

Appendix 10

Parent Questionnaire - Family Phase

1. Please give a general rating for [insert child name] (out of 10) in the following areas:

- turn-taking ___
- following directions ___
- ability to transition from one activity to the next ___

2. In the music sessions:

a. did you notice [insert child name] interacting with [insert sibling name] any differently than normal?

_____

_____

b. did [insert child name] interact with you any differently than normal?

_____

_____

3. Please give a rating (out of 10) for [insert child name]'s participation in the following activities (how successful they were):

- songs for two players <u>take turns</u> playing sections of the melody (e.g. Twinkle, Bananas in Pyjamas, Incy-Wincy Spider) __
- songs for two players to play the melody <u>together</u> (e.g. Old Macdonald, Heads Shoulders Knees and Toes) __
- using magnets to make up short melodies for each other to play __

4. Has using Figurenotes (the colours & shapes for musical notes) helped [insert child name], [insert sibling name] and yourself participate in playing songs in the sessions? If so, in what way?

_____

_____

Appendix 11

Harter scale Pictorial Plates - Group 1 girls