Music therapy for a 10-year old child experiencing agitation during posttraumatic amnesia: An intrinsic mixed methods case study

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Submitted in partial fulfillment of the requirements of the degree of Master of Music (by Research)

July 2010

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Produced on archival quality paper
ABSTRACT

A mixed methods case study was developed to explore the use of music therapy for children, aged 2-14 years, experiencing agitation during the posttraumatic amnesia phase of recovery following severe traumatic brain injury. The study developed pragmatically within a real world research context, and was undertaken in the Children’s Neuroscience Centre at The Royal Children’s Hospital Melbourne (Australia). The collection of qualitative data was embedded in a quantitative protocol, and data was collected concurrently.

During the recruitment phase of the study, only one participant met the full eligibility criteria. The study subsequently evolved as an intrinsic case study. Data collection took place every day (excluding weekends) for the first ten days of posttraumatic amnesia. Data collection included the participant being video recorded pre, during, and post each daily music therapy intervention. The music therapy intervention involved the music therapist-researcher singing familiar songs. The aim of the quantitative data collection and analysis was to measure the effect of music therapy on agitation, and included two independent reviewers viewing the video data and rating the participant’s agitation pre, during, and post each music therapy intervention using the Agitated Behavior Scale (Corrigan, 1989). These ratings were then analysed statistically. The analysis of qualitative data aimed to explore the responses of both the participant and the music therapist-researcher during the music therapy interventions, and was an emergent process undertaken using Morse and Pooler’s (2002) tri-tiered method of analysis for videotaped data.

The participant (a 10-year old girl) sustained an extremely severe traumatic brain injury as a result of a transport accident. Severe cognitive impairments and a significantly reduced level of consciousness resulted in the participant presenting with only Islands of Awareness during the music therapy interventions. Analysis of the quantitative data yielded inconclusive results as to the effect of music therapy in reducing agitation during and post
each music therapy intervention. Micro-description and analysis of the qualitative data revealed that the participant displayed four distinct categories of behaviours during the music therapy interventions: Neutral, Acceptance, Recruitment and Rejection. The final three categories of participant behaviours were responses to the familiar songs. Further, the music therapist-researcher responded to the participant’s behaviours in four distinct, corresponding ways; Holding, Affirming, Enticing, and Containing.

The interpretation of these categories of behaviours and responses was that through offering a consistent musical *holding* for the participant’s behaviours, and adaptation of the familiar songs in a contingent manner in response to the participant, the music therapist-researcher offered an Environment of Potential to maximise the participant’s Islands of Awareness. The Environment of Potential maximised early stimulation to optimise the participant’s early recovery of consciousness and cognitive abilities.
Declaration

This is to certify that:

1. the thesis comprises only my original work towards the Masters Degree,
2. due acknowledgement has been made in the text to all other material used,
3. the thesis is 30 000 words in length, inclusive of footnotes, but exclusive of tables, references, and appendices.

Signed__________________________________

Janeen M. Bower (Mackenzie)
Acknowledgements

I gratefully acknowledge the contribution of my principal supervisor Prof. Denise Grocke for her research wisdom and guidance. Also, Assoc. Prof. Cathy Catroppa, my second supervisor, for her procedural and organisational knowledge. I also acknowledge Ian Gordon for his assistance with statistical analysis.

I would like to thank my fellow NaMTRU researchers and the research advisors for their support and feedback throughout the development of this study. Thank you also to the Music Therapy Team at RCH for their professional and personal encouragement.

I would like to thank Dr. Helen Shoemark for the unfailing support she offered me as both a clinician and a research student. Helen, thank you for nurturing my ability to think for myself and constantly challenging my skills and knowledge. I thank you with all of my heart for being my mentor, and my friend.

Thank you to the wonderful staff in the Children’s Neuroscience Centre for supporting this study, especially the Care Managers, Nicki Mountford and Nuala Kentish for their efforts in recruiting participants. I would like to acknowledge Jane Galvin for her assistance with the logistics of the study. Thank you also to Kath Bakker, Deb Houston, and Anne Baker for their valuable assistance and suggestions.

Thank you to my fabulous family and friends; especially my parents and grandmother for their endless love and nurturing, and my wonderful husband Dale for supporting my passions and for being able to make me laugh. A special thanks to my ‘cards buddies’ Kate Teggelove, Karen Bolger, and Lucy Bolger, I cherish our discussion and debates.

Last, however most definitely not least, thank you to Evelyn’s family for generously allowing me to share and document part of Evelyn’s journey. This study is gratefully dedicated to you and Evelyn.
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CHAPTER 1
INTRODUCTION


Children presenting with agitation during PTA are at an increased risk of harming themselves and others, as agitation may manifest as aggression, continuous movement, self stimulating behaviours, excessive and repetitive talking, attempts to abscond from the hospital environment, and/or attempts to remove medical devices (Levin & Grossman, 1978; Levy et al., 2005). Despite this increased potential for self harm and injury, disruption to the hospital environment, and high levels of nursing care required, there is a paucity of literature detailing clinical management strategies for children experiencing agitation during PTA. It has been argued that pharmacological management of agitation during this phase is contraindicated as medications may have a sedative effect, exacerbating confusion and cognitive deficits, and therefore increasing agitation (Levy et al., 2005). Therefore, environmental interventions are encouraged. These interventions aim to promote familiarity, comfort, and reduce the potential for over stimulation, and include providing familiar objects, toys, and photographs, and restricting the number of visitors in the child’s room (The Royal Children's Hospital Melbourne: Department of Rehabilitation, 2007a). However, while clinically recommended, environmental and other non-pharmacological interventions to reduce agitation have not been systematically explored.
The music therapist-researcher (MTR) in the current study is employed as a clinical music therapist in the Children’s Neuroscience Centre at The Royal Children’s Hospital Melbourne (RCH). The impetus for undertaking this study developed from powerful clinical experiences the MTR had with children who were experiencing agitation during PTA. One such clinical experience was with Simone1, a 12 year old who sustained a severe TBI as a result of a transport accident.

As Simone emerged from a prolonged period of coma and progressed to PTA she became increasingly agitated. She presented with impulsive behaviours, verbal and physical aggressions toward staff, continuous and repetitive crying and calling out, sudden changes in mood, short attention span, impaired short-term memory, and frequent attempts to escape from the hospital ward. Simone also reported high levels of pain related to her broken femur, which was reconstructed with an external fixator. This pain was likely exacerbated by Simone’s frequent attempts to get out of bed and crawl out of her room. The presence of agitation significantly increased the risk of Simone injuring herself, her family, staff, and other patients on the hospital ward. Simone was cared for in an isolation room to reduce extraneous environmental stimulation with the intention of reducing agitation. She also had continuous one-to-one nursing supervision. Simone remained in PTA for over 4 months.

Simone was referred to music therapy by the Nursing Care Manager, with the intention that music therapy calm Simone. Simone participated in music therapy sessions three times a week while she was in PTA. The session described here took place approximately seven weeks after Simone’s accident. At this stage in her recovery Simone was still presenting in deep PTA, with medical and nursing staff reporting significant levels

1 A pseudonym has been used to protect patient identity. Demographic and medical details have also been altered to maintain confidentiality, however the description of the outcomes of the music therapy session remains accurate.
of agitation. The first person is used in this narrative, as the narrative is the MTR’s reflections on a clinical scenario.

I entered Simone’s room with my guitar and sat on the floor next to Simone, who was sitting on a high-low bed set to the lowest level on the floor. The head of the bed was raised so that it was supporting Simone in a sitting position. I was wearing a pink cardigan on this day (the importance of the colour will become apparent). Simone was constantly adjusting her sheets and moving around the bed. I introduced myself by saying that I was here to sing some songs together like we had on previous days. Simone replied, “I’m in pain, I’m in pain”. I verbally acknowledged this comment, however was aware that Simone had refused her pain medication and constant movement potentially exacerbated this pain. Therefore, I quickly moved into introducing music. I started singing one of Simone’s favourite songs (as reported by her family), Feist’s ‘1, 2, 3, 4’ at a relatively fast pace to match Simone’s presenting energy level, however, played with a simple strumming on the beat accompaniment on the guitar to emphasise to organisation and structure inherent in the song. As she had done in previous sessions, Simone began to sing along.

Toward the end of the second repetition of the song, Simone stopped singing and again began repeating, “I’m in pain, I’m in pain”, although with decreased pacing and volume in her voice than at the beginning of the session. I slightly increased the volume of my singing and playing, and left off the last word of the phrase I was singing, e.g. ‘1, 2, 3, 4 tell me that you love me _____ (more)’ with the intention of re-engaging Simone with a potentially automatic response. Simone sang the missing lyric and then continued singing along with me. I observed that Simone was matching my slower paced singing, taking deeper breathes at the end of phrases, and appeared sleepy, with drooping eyelids and slouched body posture. I finished singing the verse and quietly suggested to Simone that she should lie down. Simone lay down and I helped her adjust her pillow and covered her with a sheet.
Cautious of allowing too much time in which Simone may become distracted or
disengaged, I began singing another of Simone’s favourite songs, ‘Can You Feel the Love
Tonight’ from The Lion King movie. I sang with a quiet, plucked guitar accompaniment.
Throughout the repetitions of the song I reduced the volume and tempo, and emphasised the
melody of the song rather than the lyrics, singing in a legato style. Without prompting,
Simone sang along and then drifted to sleep. I continued singing the song for another
complete repetition aiming to encourage the transition to deeper sleep.

As I was preparing to leave the room Simone’s bedside nurse, who had been
observing the session from outside the room, quietly entered the room and whispered “This is
great, she needs to sleep” further reporting that Simone had not slept for more than three
consecutive hours at a time over the past four days. The nurse then lowered the head of
Simone’s bed so Simone was lying flat and turned off the lights in the room before quietly
leaving. However, these actions were enough to rouse Simone. Simone opened her eyes so I
quickly sat back down next to her bed intending to continue singing. Simone looked at me and
said, “Where is my iPod? It’s big and pink, and it was singing to me!” I chuckled to myself
as I thought, “she thinks I’m her iPod”. I commented that I didn’t know where her iPod was
but that I would sing instead.

I sang ‘Can You Feel the Love Tonight’ again and Simone quickly drifted back to
sleep. I continued singing this song to Simone for a couple of minutes to reduce the chance of
any sudden changes in the auditory environment that may wake her. I slowly faded out the
music, sat quietly for a few moments to observe Simone and then quietly left the room.
Simone’s bedside nurse later reported that Simone slept for over five hours after the music
therapy session.

While working with Simone, and other patients experiencing agitation during PTA, I
became increasingly aware of my own inner dialogue and questions about music therapy for
these children. Whilst amusing that Simone thought I was her iPod after rousing from sleep, this response is important because during PTA Simone had severely impaired short-term memory, yet had some memory of music being present in her room. Further, Simone was able to actively engage in the session by singing along to familiar songs despite staff and family reporting that Simone did not appear to respond to verbal interactions. Finally, attempts to verbally soothe and calm Simone, and other environmental interventions (including being cared for in an isolation room), were not effective in reducing Simone’s agitation, whereas the attuned singing of familiar songs was. It was these thoughts that provoked an interest in undertaking a more systematic exploration of the use of music therapy for children experiencing agitation during PTA.

For the purpose of this study, Dileo and Bradt’s (2005) definition of music therapy in medicine was used, highlighting that an intervention is classified as music therapy if a [qualified] music therapist uses music therapy methods when implementing an ‘in-person’ treatment, as distinguished from the use of recorded music by medical persons. Further, that music therapy involves a relationship between the client and therapist, a therapeutic process, and a ‘live’ music experience within a medical setting (Dileo & Bradt, 2005). Other key definitions, including epidemiological details of TBI in children and further definition of PTA, are presented in Chapter 2.

At RCH, music therapy is standard clinical care for children experiencing agitation during PTA. Clinical observations by hospital staff indicate that music therapy is effective in reducing agitation in these children. Thus, a mixed methods multiple case study was developed to explore this clinical application of music therapy. However, the low incidence of severe TBI in children (Crowe, Babl, Anderson, & Catroppa, 2009) impinged on enrolment and during the data collection period only one child was eligible for participation
in this study. At the point of data analysis, the design of the study was modified to a single intrinsic mixed methods case study.

**Aim of the Study**

The aim of this study was to provide a preliminary exploration of the use of music therapy at RCH to reduce agitation in children during PTA. The MTR employed a mixed methods design with the intention of collecting the richest possible range of data from a limited number of participants. The study was guided by the research question: Is music therapy effective in reducing agitation in children aged 2-14 years during the PTA phase of recovery following a severe TBI? The quantitative component of this study sought to measure the effect of music therapy during and immediately post a music therapy intervention, and the qualitative component emerged with the intention of developing a rich description and interpretation of the responses of both the child and the MTR during a music therapy intervention. As the study sought to investigate current clinical practice in music therapy at RCH, it was developed pragmatically within a real world approach (Robson, 2002) and influenced by a constructivist paradigm.

**Thesis Overview**

To report the study this thesis takes the following format:

- Chapter 2 – presents a review of literature pertinent to development of this study, including a general overview of PTA and the presence of agitation during PTA. Current methods for managing agitation in a clinical setting and the use of music therapy for children following TBI are also explored.
- Chapter 3 – presents an outline of the development of the research design used for exploring the effect of music therapy for children experiencing agitation during
PTA. The original multiple case study design is presented in Chapter 3, and the subsequent development of the intrinsic case study is detailed in Chapter 4.

- Chapter 4 – the development of the intrinsic case study design and details of the single case are explored. The results of the quantitative statistical analysis are then presented, followed by the results of the qualitative analysis and a brief interpretation of these qualitative results.

- Chapter 5 – the results presented in Chapter 4 are integrated into an overall interpretation of the results throughout the discussion in this chapter. The quantitative and qualitative results are explored separately followed by discussion of the research method, recommendations for further study, contributions of this study to the music therapy field, and an overall conclusion to the study.
CHAPTER 2

LITERATURE REVIEW

This chapter presents pertinent literature in four sections. In the first section, epidemiological and etiological aspects of TBI in children will be provided, and theories highlighting the unique recovery trajectory of children will be detailed. A discussion of PTA and the presence of agitation during PTA will follow and constitute the second section of this chapter. The second section will also include a review of current methods of treating agitation in an acute hospital setting to provide a rationale for the use of music therapy as a treatment option for children. The third section of the chapter will detail Baker’s (2009) study, exploring the use of live and recorded familiar music to reduce agitation in the adults in PTA, as this is the only reported systematic research of music for patients of any age presenting with agitation during PTA. Finally, to provide a foundation for the use of music therapy with this population, the fourth section of the chapter will outline the use of music therapy for children in the early coma phase and the post acute rehabilitation phase following TBI. Literature pertaining to the neural processing of music and mother-infant musicality will also be presented in the final section of this chapter to offer a further theoretical consideration in the use of music therapy with children who are in a reduced state of consciousness following neural damage.

Traumatic Brain Injury

Definition, causes, and prevalence.

TBI is a leading cause of death and acquired disability in children worldwide (Adelson & Kochanek, 1998; Snow & Hooper, 1994; World Health Organisation, 2009). TBI is caused by damage to living brain tissue that results from an external force or insult to the brain (Helps, Henley, & Harrison, 2008; Lehmkuhl, 1992; Snow & Hooper, 1994), and does
not include brain injuries resulting from stroke, hypoxia, toxic substance, seizure, tumour, surgery, infection, congenital disorder, birth trauma, or degenerative neurological condition (Snow & Hooper, 1994; World Health Organisation, 2009). In Australia, the primary causes of TBI in children are motor vehicle related accidents and falls (Crowe et al., 2009; Helps et al., 2008; Rushworth, 2008). Other prominent causes include non-accidental injuries/child abuse, assault, and sports/recreation related injuries (Kraus, 1995; McKinlay et al., 2008; Rushworth, 2008).

TBI results from either a penetrating or non-penetrating insult to the brain. Penetrating injuries are less common and occur when a missile penetrates the skull and brain, or an external object strikes the skull with sufficient force to cause a skull fracture where bone fragments cause brain laceration (Helps et al., 2008; Snow & Hooper, 1994). Non-penetrating, or closed head injuries, do not involve any actual penetration of foreign matter into the brain tissue. For example, a motor vehicle accident can result in rapid acceleration and deceleration of the brain causing the brain to impact with the skull leading to bruising, bleeding, compression, and/or shearing of brain tissue without the actual penetration of any foreign matter into the brain. Further, an incident where the brain is subjected to high-speed rotation in the skull may tear or shear the connecting neural fibres resulting in a diffuse axonal injury (Adelson & Kochanek, 1998; Fortune & Wen, 1999; Greenwald, Burnett, & Miller, 2003; Snow & Hooper, 1994).

TBI can present as either focal or diffuse depending on the mechanism of the injury (National Institute of Neurological Disorders and Stroke, 2002). Focal injuries are confined to one area of the brain whereas diffuse injuries involve more than one area of the brain (Snow & Hooper, 1994). The majority of moderate to severe TBIs result in widespread, diffuse neurologic damage as the force of the trauma causes the brain to impact with the skull (Lehmkuhl, 1992).
The international population incidence of TBI in children is estimated at between 180 to 350 per 100,000 children per year (Crowe et al., 2009; Kraus, 1995). In 2004, 1,115 children with a TBI presented to The Royal Children’s Hospital Melbourne (RCH), where this study was undertaken. Of these injuries, approximately 89 percent were classified as mild, 8 percent as moderate, and only 3 percent were classified as severe (Crowe et al., 2009).

**Measuring injury severity.**

The Glasgow Coma Scale (GCS) is used in the acute phase immediately following the trauma to assess the severity of brain injury (Helps et al., 2008; Sandel, Zwil, & Fugate, 1995). The GCS is a standardised assessment that measures the best visual, verbal, and motor responses to stimulation to assess the degree of brain dysfunction. The highest possible score of 15 indicates normal neurological functioning and the lowest score of 3 indicates no response to stimulation and severe neurological damage. TBI severity, as assessed by the GCS, is divided into three categories; a GCS rating of 13-15 is indicative of a mild head injury, 9-12 a moderate head injury, and 3-8 a severe head injury (Arciniegas & McAllister, 2008; Lehmkuhl, 1992). Currently, the GCS is the only standardised measure used at RCH to assess neurological function and injury severity during the acute phase of recovery following TBI.

The GCS in its standard form is inapplicable for children and infants under five years of age, as age related changes of the nervous system in children make some of the assessment criteria unobtainable (Reilly, Simpson, Sprod, & Thomas, 1988). A modified paediatric version of the GCS is used at RCH and assesses developmentally appropriate responses to stimuli, for example; the best verbal response for an infant aged less than 18 months is observed if the infant has periods of quiet wakefulness and cries, coos, and babbles as expected for their age (The Royal Children's Hospital Melbourne, 2010).
Recovery from TBI.

Recovery from TBI is directly correlated to the severity of the trauma (Adelson & Kochanek, 1998; Anderson, Catropppa, Morse, Haritou, & Rosenfeld, 2000). Severe TBI in children is consistently related to poorer recovery in all aspects of functioning, including physical, cognitive, social, emotional, behavioural, and developmental (Anderson & Yeates, 2007; Snow & Hooper, 1994; World Health Organisation, 2009). Children who sustain a severe TBI will likely have permanent and ongoing deficits (Anderson et al., 2009).

While it is acknowledged in the literature that traumatic injury to the developing brain of a child is distinct to injury in an adult brain, theories of recovery following TBI in children continue to be debated (Anderson, Catropppa, Morse, Haritou, & Rosenfeld, 2005; Giza & Prins, 2006). The plasticity theory argued that the immature brain is less rigidly specialised and more malleable to external stimuli, or more plastic, which results in less susceptibility to the impact of neurological damage (Giza & Prins, 2006; Kennard, 1940). However, the foundational theory of recovery at RCH is the early vulnerability theory. Therefore the current study is underpinned by this theory. The early vulnerability theory emphasises that the young brain is uniquely susceptible to the impact of cerebral trauma. Early trauma may disrupt the rapidly developing neuronal networks of the immature brain and neurologic insult resulting from trauma can disrupt the future acquisition of skills leading to compounding difficulties rather than recovery (Anderson et al., 2000; Anderson et al., 2005; Anderson et al., 2009; Hudspeth & Pribram, 1990; Levin & Grossman, 1978). Anderson and Yeates (2007) emphasised that the growing evidence for a developmentally specific response to TBI means that “it is not possible to simply translate adult knowledge and theories to the child population” (p.269). This lack of portability from adults to children necessitates specific research of treatment and recovery trajectories in children. This is pertinent to the current
study as research and literature supporting the use of music therapy for adult patients with a TBI may not be directly translatable to children.

**Sequelae of TBI.**

A period of unconsciousness is one of the most common sequelae of TBI (Centre for Neuro Skills, 2009; Russell & Smith, 1961). Unconsciousness may be a brief and transient state, however individuals who sustain a more severe TBI, and remain unconscious for greater than an hour are classified as being in a coma (Stevens & Bhardwaj, 2006). Coma is a “deep, unrousable, sustained pathologic unconsciousness with the eyes closed” and is characterised by the absence of wakefulness and awareness (Ashwal, 2003, pp. 535-536). In an early but still pertinent description of coma, Russell & Nathan (1946) noted coma as a period of “instantaneous paralysis of brain function-of motor, sensory, reflex and mental [functions]” in which there is no registration of, or response to, stimulation or surroundings (p. 280). Individuals in coma may not even demonstrate a response to painful stimulation (Young, 2009). Coma may be a consequence of permanent brain damage or temporary brain dysfunction (Stevens & Bhardwaj, 2006; Young, 2009). For children who sustain a TBI, coma is typically a transient state (Young, 2009). Regardless of injury severity, the significant majority of children who sustain a TBI will progress to some level of functional recovery (Stevens & Bhardwaj, 2006; Young, 2009).

The period of coma emergence is referred to as posttraumatic amnesia (PTA) (Levin & Grossman, 1978; Nakase-Richardson et al., 2009; National Institute of Neurological Disorders and Stroke, 2002; Russell, 1935, 1971). PTA is a well documented phenomenon that characterises early recovery following TBI (Weir, Doig, Fleming, Wiemers, & Zemljic, 2006). As an individual’s brain begins to recover during coma emergence, the intact or undamaged higher elements of brain function gradually return as the individual progresses through PTA to full consciousness (Russell, 1954).
Rehabilitation follows the acute phase of coma and coma emergence/PTA and is aimed at improving an individual’s ability to function in all aspects of family, school and community life (NIH Consensus Developmental Panel on Rehabilitation of Persons with Traumatic Brain Injury, 1999). Rehabilitation addressing the longer-term sequelae of a TBI may focus on functional deficits in the cognitive, physical, social, educational, emotional, and psychological domains (Anderson & Yeates, 2007; Lemkuhl, 1992).

The current study focused specifically on children in the PTA phase of acute recovery following TBI. Therefore, the following section of this chapter will provide greater detail on the definition, measurement, and current methods of treatment of PTA.

Posttraumatic Amnesia (PTA)

Definition of PTA.

PTA is a transient period of reduced consciousness following coma (Zafonte et al., 1997). PTA is indicative of neurologic dysfunction and is characterised by confusion and disorientation (Ahmed et al., 2000; Zafonte et al., 1997). It is classified according to two primary symptoms; an inability to orientate to the environment and an inability to encode and recall new information (Russell & Nathan, 1946; The Royal Children's Hospital Melbourne: Department of Rehabilitation, 2007a). Patients in PTA present with fluctuating levels of consciousness and impaired cognition and awareness (Sandel et al., 1995), and because of this, it is common that patients do not participate in active rehabilitative therapies during this stage of recovery (Leach, Kinsella, Jackson, & Matyas, 2006; The Royal Children's Hospital Melbourne: Department of Rehabilitation, 2007a).

The term PTA was first utilised by Symonds in 1928 to describe a period of coma and reduced consciousness, with disturbed memory function, that follows an injury to the head (Forrester, Encel, & Geffen, 1994). Thus, the duration of PTA is calculated from initial injury
until the return to consciousness, incorporating the ability to continuously store new memories and orientate to the environment (Russell & Nathan, 1946).

The duration of PTA is predictive of injury severity and long-term outcome (Russell, 1971). That is, a greater length of PTA is correlated with increased injury severity and poorer functional outcome (Weir et al., 2006). Table 1 details the relationship between the duration of PTA and the severity of TBI as described by Russell (1971). These predictors of injury severity remain current.

Table 1.

*Relationship between Duration of PTA and Severity of Brain Injury (Russell, 1971)*

<table>
<thead>
<tr>
<th>Length of PTA</th>
<th>Severity of TBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 minutes</td>
<td>Very mild</td>
</tr>
<tr>
<td>5 minutes to 1 hour</td>
<td>Mild</td>
</tr>
<tr>
<td>1 to 24 hours</td>
<td>Moderate</td>
</tr>
<tr>
<td>1 to 7 days</td>
<td>Severe</td>
</tr>
<tr>
<td>Greater than 7 days</td>
<td>Very severe</td>
</tr>
</tbody>
</table>

Assessment and treatment of PTA.

A number of tools have been developed for measuring the presence and duration of PTA in adults and older children. Currently there are no standardised measures of PTA for children under the age of seven years (The Royal Children's Hospital Melbourne: Department of Rehabilitation, 2007a).

The Westmead PTA Scale is a standardised, prospective measure of PTA consisting of 12 questions targeting disorientation and anterograde amnesia (the ability to create new memories or memories after the trauma) (Forrester et al., 1994; Marosszeky, Ryan, Shores, Batchelor, & Marosszeky, 1997). The scale is administered daily by nursing staff and a patient is assessed as having emerged from PTA when a score of 12 out of 12 is achieved on
three consecutive days (Marosszeky et al., 1997). The Westmead Scale is used to assess the emergence from PTA and not the actual presence of PTA.

Given the length of PTA is indicative of the injury severity, interventions during this phase aim to reduce the duration of PTA (De Guise, Leblanc, Feyz, Thomas, & Gosselin, 2005). The most reported non-pharmacological treatment is use of Reality Orientation Programs that aim to reduce the symptoms of disorientation and confusion. Reality orientation training aims to enhance a patient’s internal structuring processes through exposure to externally structured information that is presented in a highly repetitious and consistent manner (Corrigan, Arnett, Houck, & Jackson, 1985). Environmental cues, including familiar possessions, photographs, information about the hospital, and the patient’s current condition may aid reorientation. Further, clocks and calendars may assists with cueing temporal orientation (Watanabe, Black, Zafonte, Millis, & Mann, 1998). Despite being the most reported non-pharmacological treatment for PTA, only a small number of articles describing this intervention were found. Given PTA is a transient period of spontaneous neurological recovery, it is difficult to separate the natural recovery trajectory from any treatment effect. Therefore, it is difficult to confirm the effects of these treatments or interventions (Ahmed et al., 2000).

Empirical evidence supporting the use of reality orientation programs with children was not found. Such programs are potentially unsuitable for young children who in the course of typical development may not have developed abstract concepts like time. However, in the clinical context at RCH, families are encouraged to provide familiar toys and photographs for their child to reduce the potential agitation and distress during PTA that may be exacerbated by the unfamiliar hospital environment (The Royal Children's Hospital Melbourne: Department of Rehabilitation, 2007a).
Agitation during PTA.

Agitation is frequently one of the earliest symptoms present as a patient emerges from coma and progresses to PTA (Corrigan & Mysiw, 1988). One of the earliest descriptions of behaviours associated with agitation during PTA was presented by Denny-Brown in 1945, who described restlessness as a natural sequelae after TBI (Denny-Brown, 1945). Agitation during this phase of recovery is associated with impaired consciousness, reduced cognition, and disorientation (Lequerica et al., 2007; Nott, Chapparo, & Baguley, 2006; Sandel et al., 1995; Watanabe et al., 1998). Bogner & Corrigan (1995) emphasised that “agitation is a single construct characterised by any variety of behaviors” (p. 295) and key definitions of agitation note that behaviours are excessive, inappropriate, and incongruous to stimulation present in the environment (Fugate et al., 1997; Nott et al., 2006). Further, agitation present during PTA occurs in a state of reduced consciousness resulting from impaired neurologic functioning, hence patients do not have the capacity to inhibit the behaviours (Corrigan, 1989; Fugate et al., 1997; Levy et al., 2005; Reyes, Bhattachayya, & Heller, 1981; Sandel & Mysiw, 1996). Agitation is categorised by the behavioural, cognitive, communicative, and psycho-motor aspects of the individual’s presentation (Corrigan, 1989).

The incidence of agitation in adults during PTA has been estimated at between 30% and 90%, with some authors even suggesting that all adults who sustain a severe TBI will experience agitation at some point during their emergence from coma (Bogner & Corrigan, 1995; Denny-Brown, 1945; Levin & Grossman, 1978; Mysiw & Jackson, 1995; Nott et al., 2006; Reyes et al., 1981). No data was found that reported the incidence of agitation in children as they emerge from coma. However, it is reported that agitation is a likely presentation in children during PTA (The Royal Children's Hospital Melbourne: Department of Rehabilitation, 2007a).
The cause of agitation during PTA remains largely speculative and is likely dependant on the nature and location of the neural trauma (Bogner & Corrigan, 1995; Mysiw & Sandel, 1997; Sandel et al., 1995). Potential pathological substrates of agitation include lesions, compression, changes in cerebral blood flow, or interruption to the balance of neurotransmitters in the fronto-temporal regions of the brain. Damage to these neural regions is associated with impulsivity, disinhibition, inattention, and memory impairment (Bogner & Corrigan, 1995; Levy et al., 2005). Diffuse brain injuries, resulting in damage to the subcortical and brain stem regions that coordinate arousal, attention, and limbic behavioural functions may also result in agitation during PTA (Mysiw & Sandel, 1997; Sandel & Mysiw, 1996). Interplay between impaired arousal, cognition, and motor control may result in over-stimulation that can exacerbate agitation (Flanagan, 2009; Pryor, 2004). Cognitive improvement in patients in PTA has been found to precede a decrease in agitation (Corrigan & Mysiw, 1988; Sandel & Mysiw, 1996).

**Treatment of agitation.**

A patient of any age presenting with agitation during PTA is at a significantly increased risk of harming themselves, family members, and hospital staff (Fleminger, Greenwood, & Oliver, 2006; Levy et al., 2005). Patients experiencing agitation may remove medical devices including intravenous lines and feeding tubes, obstruct treatment, and attempt to abscond from the hospital environment (Levy et al., 2005; Sandel et al., 1995; The Royal Children's Hospital Melbourne: Department of Rehabilitation, 2007b). The presence of agitation can also have a deleterious effect on a patient’s ability to participate in rehabilitative therapies, and therefore limits potential gains in the early stages of recovery (Lequerica et al., 2007). Further, patients experiencing agitation require high levels of supervision, can disrupt the environment in an acute hospital ward, and the significant changes from pre-morbid behaviour can distress family members and caregivers (Bogner & Corrigan, 1995; Fleminger
et al., 2006; Levy et al., 2005). Despite these factors, there are few interventions reported in the literature that target the management of agitation during PTA in either adults or children (Baker, 2009).

A Cochrane Review of pharmacological management of agitation in adult patients following TBI highlighted a lack of homogeneity in medications used to reduce agitation, and further, a lack of systematic and statistically significant research providing evidence to support the use of pharmacological interventions (Fleminger et al., 2006). Only one study was found that explored pharmacological management of agitation in children during PTA. Scott and colleagues (2009) explored the use of the antipsychotic drug, ziprasidone, to reduce agitation in children in the immediate post-injury recovery phase. The study incorporated a case series of 20 children ranging in age from 9 months to 17 years. Ziprasidone was found to result in a “significant reduction” in agitation as measured by the Riker Sedation-Agitation Scale (Scott et al., 2009, p. 486). No adverse events, including arrhythmia, hypotension, or gastrointestinal intolerance, were reported in the case series (Scott et al., 2009). However, it has been suggested that pharmacological treatments may actually be contraindicated in the treatment of agitation during PTA as medications that sedate the patients may exacerbate confusion and cognitive deficits, subsequently resulting in increased agitation (Corrigan & Mysiw, 1988; Fleminger et al., 2006; Sandel et al., 1995). For this reason, environmental and non-pharmacological interventions are preferred when managing the presence of agitation in a patient in PTA (Levy et al., 2005).

Environmental interventions to treat agitation are similar to those suggested in the management of PTA, and focus on providing structure, consistency, predictability, and familiarity in the patient’s environment (Levy et al., 2005). In the care of children, families are often encouraged to place familiar objects and photographs in a patients hospital room to provide environmental cues the patient may recognise and gain comfort from (The Royal
Further, environments that minimise excessive sensory stimulation and do not place demands on the cognitive capacities of the patient, yet offer the opportunity for involvement in productive and meaningful activities, are highlighted as a potential intervention to reduce agitation (Flanagan, 2009; Mysiw & Sandel, 1997). No empirical evidence that supporting the use of environmental and non-pharmacological management of agitation in children during PTA was found, highlighting a need for preliminary research.

In one of very few studies that explored a non-pharmacological intervention to reduce agitation in adult patients in PTA, Baker (2009) found familiar music effective in providing structured and predictable stimulation. Similar to familiar possessions and photographs, familiar music offered participants the potential to recognise an aspect of an otherwise unfamiliar environment, which enhanced the participant’s awareness without requiring high levels of cognitive processing (Baker, 2009). Baker’s study is the only systematic research reporting on the use of music therapy adult patients experiencing agitation during PTA and will be explored in greater detail in the following section of this chapter.

**Familiar Music and Agitation**

A large number of studies were found that reported the use of music and music therapy to reduce agitation in older adults with Alzheimer’s Disease (AD). Given the widely accepted theory that there is a developmentally specific response to TBI in children (Anderson et al., 2005) it was unrealistic in the current study to directly translate knowledge relating to older adult patients with degenerative neurological conditions to the rapid onset neurological trauma of children who sustain a TBI. The literature relating to treatment of agitation in the population with AD will therefore not be discussed in relation to the current study. Theories relating to the neural processing of music will be discussed later in this chapter to offer rationale for the music therapy intervention used in the current study.
Music therapy has been reported to be effective in reducing agitation and aggression, and promoting more positive behaviours in adult patients in the post-acute phase of recovery following TBI. Hitchen and colleagues (2010) reported increased task engagement and compliance in two adult males during a music therapy condition. These patients were two and three years post their injury. The inherent structure of songs was found to offer a framework for the patient’s behaviour during rehabilitative and re-learning tasks associated with activities of daily living. It was concluded that music therapy can offer positive behavioural interventions, however further investigation is required (Hitchen et al., 2010). In a clinical vignette, Kennelly and Edwards (1997) briefly described the use of music therapy to facilitate a reduction in physical agitation and calling out in a child in the ICU. The music therapist observed physical stilling and increased focus in the child in response to music therapy. However, this vignette was brief and did not include any diagnosis or description of PTA as a distinct phase in recovery from severe TBI.

Searches of Medline, CINAHL, PsychINFO, and Cochrane databases using the search terms ‘music/music therapy/auditory stimulation, agitation/behaviour (behavior)/aggression, behaviour treatment/behaviour management/intervention’ revealed Baker’s study as the only reported systematic research that explores the use of music as a treatment modality to reduce agitation in patients in PTA (Baker, 2009).

In her seminal contribution to the music therapy literature and literature pertaining to the clinical management of PTA, Baker (2009) compared the effect of live and pre-recorded familiar music to no music on agitation. The twenty two participants included in Baker’s study ranged in age from 15 to 66 years, had sustained a severe TBI resulting in an extended period of PTA, and were all inpatients in a sub-acute rehabilitation facility. The study comprised three conditions; (1) live familiar music, (2) recorded familiar music and (3) no music/control. A crossover design was adapted so that each participant received each of the
three conditions twice over a period of six days in random order. Participants acted as their own controls. The ABS (Corrigan, 1989) was used to assess agitation immediately pre and post each condition.

Music selections in Baker’s (2009) study were chosen from a list of familiar and preferred music offered by each participant’s family. For participants with no next of kin, selections were chosen based on music styles that were popular during the participants early adult years. In both music conditions, participants were presented with three songs and instructed to sit and listen to the music. In the live music condition, the researcher sang with a keyboard accompaniment, and in the recorded music condition the songs were played on a tape/cassette player. All interventions were 10-12 minutes in duration and the researcher was present in the room for all conditions, including the control condition. During the control condition no instructions were given to the participants and verbal interactions where kept to a minimum, with the intention that the circumstances of this condition were the same as the two musical conditions with the exclusion of the music (Baker, 2009).

Results of the study indicated that both presentations of familiar music had a statistically significant effect in reducing agitation in adult patients in PTA when compared to the no music/control condition ($p<0.0001$) (Baker, 2009). Trends also suggested that music had a greater effect in reducing agitation in participants who were severely agitated (Baker, 1999, 2009).

Baker emphasised that the familiar music selections utilised in the study were suitable to the cognitive abilities of the participants regardless of the musical genre of the selection. Many of the music selections were repetitive, predictable, and simply structured ensuring minimal cognitive arousal was required when listening to the preferred music (Baker, 2009). Further, many participants were able to engage with the music through singing along or rhythmically timed body movement, and this may have allowed for the appropriate
expression of psychomotor components of agitation and an increased level of organisation in the patient’s otherwise disorganised and non-purposeful movements (Baker, 1999, 2001, 2009). It was suggested that this increased organisation may have been the result of pre-cognitive synchronisation to the temporally organised auditory stimulation (Baker & Tamplin, 2006).

No significant effect between the live and recorded music conditions was found in Baker’s study. To maintain the integrity of the live versus recorded presentation of the music, Baker reported attempts to actively maintain the consistent presentation of the live music conditions, however, noted that slight alterations in the music may have occurred. As an experienced music therapist, Baker may have subconsciously altered the presentation of the live music in response to the participant’s agitation and arousal level. Music therapists are trained to respond ‘in the moment’ to the changing needs of clients and the flexibility of live music has been attributed as superior over taped music (Standley, 1992 in Baker, 1999). Baker further reported that her vocal style may have been more soothing and relaxing to that of the original artist heard in the taped presentation, as study participants reported a preference for the live presentation condition (Baker, 2009). Participant preference for the live presentation of familiar music was not explored in Baker’s study nor was the effect of any subconscious adaptation of the familiar music.

In an attempt to actively translate Baker’s findings for children, a similar study was undertaken with children at the Royal Children’s Hospital Brisbane (Queensland, Australia). However, insufficient participants were enrolled in the study to undertake statistical analysis and subsequently no quantitative or qualitative data from the study have been reported in the literature to date (F. Baker and J. Kennelly, personal communication, 21 April, 2009).

Systematic exploration of use of familiar music as an intervention to reduce agitation in children during PTA has not been reported. A flexible music therapy approach that
manipulates the elements of familiar music contingent upon the child’s fluctuating presentation during PTA has also not been systematically explored. The most pertinent precedent for this application of music therapy comes from music therapy studies and clinically based reports exploring the use of music with children during the early coma phase of recovery and later functional rehabilitation.

**Music Therapy for Children Who Have Sustained a TBI**

The application of music therapy for individuals who have sustained a TBI has continued to expand in the last decade, and published empirical evidence and clinically based reports have predominately focussed on the post acute rehabilitation phase of treatment/recovery for adult patients (Gilbertson, 1999). This literature contributes to the field of adult neurorehabilitation particularly in the areas of physical/motor and communicative rehabilitation, however, the paediatric population remains underrepresented in the current music therapy literature.

In an article titled *A Reference Standard Bibliography*, Gilbertson (2009) highlighted the value of clinical case studies and clinically based anecdotal reports, as well as the more widely accepted systematic research, in providing evidence for the therapeutic possibilities of music therapy for children who have sustained a TBI. It is these clinically based reports and the few systematic studies that will be discussed in this section. This literature does not provide a direct precedent for the use of music therapy for children experiencing agitation during PTA, rather, it offers a clinical precedent for using music therapy with children who have sustained a TBI.

**Music therapy for children in coma.**

As discussed earlier in this chapter, the length of PTA (including coma) is directly correlated to injury severity and subsequent potential for rehabilitative outcomes. Therefore, music therapy interventions for both adults and children in coma aim to accelerate coma
emergence (Claeys, Miller, Dalloul-Rampersad, & Kollar, 1989; Lucia, 1987; Tamplin, 2000). Currently, there are no studies that systematically explore the impact of music therapy interventions on accelerating coma emergence in children. However, Eilander and colleagues (2005) reported favourable indications for the use of an early neurorehabilitation program to accelerate the return to a higher level of consciousness in patients aged 0-25 years. The early neurorehabilitation program described included the structured stimulation of all sensory modalities including; vision, smell, taste, touch, and hearing. The program was based on the philosophy that an active approach may induce recovery of brain functions (Eilander et al., 2005). The method of structured auditory stimulation was not detailed, but may support the use of music therapy for patients in a coma.

Hurt-Thaut & Johnson (2003) described the a clinical vignette of a four year old patient admitted to the ICU following a severe TBI. The patient was unresponsive to external stimuli but was observed to calm, with a decreased heart rate and blood pressure, when presented with singing and gentle music. Hurt-Thaut & Johnson (2003) utilised Musical Sensory and Orientation Training (MSOT), a Neurologic Music Therapy (NMT)\(^2\) method, to stimulate arousal, meaningful responses, and recovery of wake states in patients in an altered or reduced state of consciousness (Thaut, 2005a).

The live singing of familiar songs has further been reported in clinical vignettes to stimulate a range of physiological, behavioural, communicative, and emotional responses in children in coma. These responses were interpreted as indicative of an increase in coma arousal and orientation levels following brain injury (Kennelly & Edwards, 1997; Rosenfeld

\(^2\) NMT is the therapeutic application of music to address areas of motor, cognitive and sensory dysfunction that result from disease or damage to the central nervous system. NMT utilises a system of standardised clinical techniques that are based on a neuroscience model of music perception and production and the influence of music on non-music neurological functions (Hurt-Thaut & Johnson, 2003; Thaut, 2005).
Reported responses included crying, limb movements, eye opening, visual tracking, oral movements, vocalisations, verbalisations, changes in breathing patterns, decreased muscle tone, and orientation to the music therapist (Kennelly & Edwards, 1997; Rosenfeld & Dun, 1999). Songs familiar to the patients were used to support a sense of predictability, comfort, and orientation through the structured and ordered characteristics of the music. The use of familiar songs to successfully support predictability, comfort, and orientation has implications for children during PTA experiencing reduced orientation and unfamiliarity with the environment. The unique ability of music to offer opportunities for human contact for children in coma was also highlighted (Kennelly & Edwards, 1997).

Kennelly and Edwards (1997) and Rosenfeld and Dun (1999) advocated the use of pre-composed familiar songs during music therapy interventions, arguing these songs may be easier for children in states of reduced consciousness to recognise than improvised music. Thus, familiar pre-composed music potentially requires less active cognitive processing than improvised music (Purdie, 1997). No studies comparing familiar pre-composed and improvised music for either adults or children in coma were found in the current music therapy literature.

Aldridge and colleagues (1990) hypothesised that music has the potential to offer an alternative form of temporal organisation for patients with neurological damage who are lacking orientation. That is, patients in a coma are in a state of neural disorganisation and may have difficulty orientating in an environment of random, loud machine and non-interpersonal human noise. For these patients, improvised music based on the rhythmic context of their own breathing may provide a focus for orienting and increased awareness (Aldridge et al., 1990). Further, human contact is central in improvised singing and can encourage human interaction in a fundamental form (Aldridge et al., 1990). The fundamental form of human interaction described by Aldridge and colleagues (1990) related to the non-
verbal elements of music, including rhythm and melody, that the comatose patient may respond to, despite an apparent lack of response to language based interactions. This idea is supported by Magee and Baker (2009) who advocated the theoretical principle that music has the potential to enable the adult patient to express immediate feeling states and communicative intent when language is lost as a result of a TBI. This theoretical principle has not been explored in children however it is widely accepted that infants respond to the emotional and fundamentally musical components of early interactions well before they are able to comprehend language (Trehub, 2001). It is therefore possible that music may provide opportunities to express feeling states and communicative intent in children who have communicative deficits resulting from TBI.

Patients in a state of coma are at risk of over stimulation as low levels of arousal result in an impaired ability to process environmental stimulation. Paradoxically, it is thought that these patients may also be at an increased risk of under-stimulation resulting from sensory deprivation and a lack of meaningful human contact (Baker & Tamplin, 2006; Kennelly & Edwards, 1997). Baker and Tamplin (2006) hypothesised that music therapy interventions that utilise the human voice may hold a greater emotional significance and interpersonal potential for patients in coma than interventions using other musical instruments. Therefore, music therapy interventions that are implemented using the voice may facilitate meaningful sensory stimulation to optimise arousal and early cognitive recovery (Aldridge, 2001; Baker & Tamplin, 2006; Eilander et al., 2005).

There is debate in the literature concerning responses to music made by adults in coma and other reduced states of consciousness (Aldridge et al., 1990; W.L. Magee, 2007). The Music Therapy Assessment Tool for Low Awareness States (MATLAS) was developed to assess awareness and arousal responses in adult patients in post-acute neurorehabilitation (Magee, 2007a). The assessment was specifically designed for adult patients presenting in
persistent vegetative or minimally conscious states. Magee (2007) stated that no observable response from patients with severe neurological deficits is indicative of no meaningful processing, therefore it may be inappropriate to continue music therapy intervention with these patients. Persistent states of reduced consciousness are rare in children, with only an estimated 5 -10 % of patients who sustain a severe TBI at risk of remaining in a vegetative state, thus it is difficult to determine the applicability of the MATLAS for children (Ashwal, 2004; Stevens & Bhardwaj, 2006). Conversely, this research is aligned with Aldridge and colleagues (1990) who emphasised that a patient observed as “not acting” should not be perceived as “not responding” (p. 345). As emphasised by Aigen (2009), response and awareness are functionally separate. Further, Rosenfeld and Dun (1999) hypothesised that music has the potential to stimulate the emotional and pre-verbal centres of a child’s injured brain through activating the mechanisms in the reticular activating system. Activation of the reticular activating system may stimulate and direct attention and cognition, and provide emotional stimulation (Rosenfeld & Dun, 1999). Music, as a complex and multi-layered stimulus incorporating aspects of melody, rhythm, tempo, and timbre, may stimulate more than one level of attention, increasing the potential for response from the patient in coma (Purdie, 1997).

In both the adult and paediatric literature explored thus far, a preference for live music therapy interventions, as opposed to the use of recorded music, has been emphasised because of the human interaction inherent in the presentation of live music (Aldridge, 2001; Aldridge et al., 1990; Baker & Tamplin, 2006; Kennelly & Edwards, 1997; Rosenfeld & Dun, 1999). Musical components (e.g. rhythm, melody, and harmony) form the fundamentals of human communication and interaction. Therefore music as a pre-verbal, emotionally focussed stimulus may have the potential to stimulate a patient’s fundamental communicative,
emotional, social, and cognitive capacities despite a seemingly non-responsive presentation (Aldridge, 1989, 2001; Jochims, 1994).

**Music therapy in the rehabilitation of children following TBI.**

Music therapy literature pertaining to the post acute rehabilitative phase of recovery in children who have sustained a TBI is more commonly reported than music therapy interventions in the earlier acute phases of recovery (Gilbertson, 2009). Rehabilitation typically commences when a child has emerged from coma and PTA.

Highlighting the unique developmental phenomenon that distinguishes the rehabilitation of children from that of adults, Kennelly & Brien-Elliott (2001) outlined that music therapy goals in paediatric neurorehabilitation fall into four main areas; 1) motor skills, 2) behavioural/cognitive skills, 3) speech/language/communication skills, and 4) psychosocial care. These areas of neurorehabilitation for children are also emphasised by Hurt-Thaut and Johnson (2003) in their use of NMT with children to address areas of sensorimotor cognitive and speech/language dysfunction. These areas of neuro rehabilitation addressed by music therapy will be discussed in the following paragraphs.

1. **Motor skills**

Music therapy can provide structure, stimulation, and motivation to encourage participation in motor and physical rehabilitation (Kennelly & Brien-Elliott, 2001). Hurt-Thaut and Johnson (2003) note that rhythm plays a central role in the therapeutic application of music to areas of sensorimotor rehabilitation due to the temporal organising potential and the human capacity to entrain to an external beat. This temporal organising potential of music may provide an external organisation to children in PTA who are confused and disorientated.

2. **Behavioural/cognitive skills**

One of the more commonly described effects of music therapy in the cognitive rehabilitation of children is an increase in attention and focus (Hurt-Thaut & Johnson, 2003;
Kennelly & Brien-Elliott, 2001). Music is inherently structured, which may increase an individual’s capacity to organise and sequence information (Thaut, 2005a). This knowledge highlights the potential for music therapy to increase attention and the ability to organise information PTA.

3. Speech, language and communication skills

Singing songs and vocal exercises are enjoyable and motivating ways to address the speech/language/communicative rehabilitation needs of children (Hurt-Thaut & Johnson, 2003; Kennelly & Brien-Elliott, 2001; Kennelly, Hamilton, & Cross, 2001). Singing and speaking share a number of common elements including pitch, phrasing, rhythm, volume and articulation (Cohen, 1992), and therefore music has been used to address aspects of expressive and receptive language including speech intelligibility in children with a TBI (Kennelly et al., 2001).

4. Psychosocial care

In a study exploring the themes in songs written by patients with TBI, Baker and colleagues (2005) found that reactions to TBI vary considerably across the lifespan. Lyric analysis revealed that children and adolescents focussed on memories of their (non-injured) past and concerns about the future (Baker, Kennelly, & Tamplin, 2005). In a clinical vignette exploring psychosocial rehabilitation, Kennelly & Brien Elliot (2001) described the use of song writing, instrumental improvisation, and song singing to offer opportunities for self-expression, and increased motivation and determination. One of the unique values of music therapy in addressing the diverse psychosocial needs of children in neurorehabilitation is its effectiveness in addressing the needs of the child regardless of their level of functioning (Kennelly & Brien-Elliott, 2001). The inherent interpersonal context of music therapy may provide opportunities to address the psychosocial needs of children from their early acute recovery through functional rehabilitation following TBI.
In his significant contribution to the paediatric neurorehabilitation literature, Gilbertson found that relationships were at the core of neurorehabilitation (Gilbertson, 2006; Gilbertson & Aldridge, 2008). Gilbertson undertook systematic observation and analysis of video recorded episodes, taken from clinical practice in music therapy. Of the three patients whose music therapy sessions were included in Gilbertson’s research, two were children, aged 9 and 14 years, both of whom had sustained a severe TBI. The clinical music therapy sessions that were explored were based on Nordoff and Robbin’s improvisational, Creative Music Therapy approach and took place in an early rehabilitation facility. Twelve episodes were selected for analysis using purposive sampling. From the inductive analysis the categories of musical expression, communication, agency, emotionality, and participation were elicited. These categories were subjected to a further level of abstraction and analysis and two new categories were developed. These two categories; 1) isolated-integrated, and 2) idiosyncratic-conventional were presented as polarities. In his findings, Gilbertson suggested that one of the roles of a music therapist is to reverse the isolation an individual with a TBI may experience as a result of enormous physical and psychological barriers. That is, in moving away from isolated, the individual may become integrated in their ability to interact and engage with people and his/her surroundings. Further, idiosyncratic behaviours or responses of an individual with a TBI may compound isolation and thus in assisting the patient to move toward conventional isolation may be reduced.

“Conventional-integrated behaviour means that those people begin to communicate and are understood by others. No longer isolated and idiosyncratic they are returned as active human beings within a community of significant others” (Gilbertson & Aldridge, 2008, p. 141).

Gilbertson further explained that the essence of these polar categories, or the core category, was relationship. Through the music therapy experience, the participants were able
to relate to others in a meaningful way. Music provided a flexible temporal organisation that promoted the opportunity for early communication and relationships (Gilbertson & Aldridge, 2008).

The use of music to increase the social capacity of a child with a non-traumatic brain injury has also been explored by Bower and Shoemark (2009). In the clinical vignette described, the child had emerged from coma but was unable to commence functional speech rehabilitation as a result of deficits in interpersonal interaction. The authors outlined the use of song singing and instrumental improvisation during music therapy and combined music therapy/speech pathology interventions to engage the child in musical interactions. These music therapy methods also provided opportunities to rehearse interactive skills in a child who was observed to be unresponsive to verbal interactions (Bower & Shoemark, 2009). Bower and Shoemark (2009) suggested that the clinical vignette highlighted the potential of music therapy to re-establish meaningful interpersonal interaction in a child who initially did not respond to language alone.

**Neural processing of music.**

The application of music therapy for children following TBI is informed by knowledge of the neural processing of music. The pioneering work of Michael Thaut and his colleagues is acknowledged as one of the key influences in encouraging the MTR to explore the neuroscientific foundations of music. Thaut (2005b) stated that “music – based on its uniquely ordered structure of sensory patterns in aesthetic forms – initially engages human behavior and brain function meaningfully by arousing, guiding, organizing, focussing and modulating perception, attention and behavior in the affective, cognitive and sensorimotor domains” (p. 304). That is, the inherent structure of music can engage, organise, and alter behaviour by stimulating a range of global neurological functions.
Historically, it was thought that music was predominantly processed in the right hemisphere of the brain, and language in the left. While some laterality effects do exist, this theory is now considered an oversimplification (Levitin & Tirovolas, 2009). There is no ‘single music centre’ in the brain (Levitin, 2006). The neural processing of pitch and rhythm appears to result from processes in two largely distinct networks (Peretz & Zatorre, 2005). Musical pitch processing predominantly involves the right auditory cortex, with the right temporal neocortex having a particularly significant role, whereas the processing of the rhythmic and temporal aspects of music recruits a more widespread bilateral neural network (Peretz & Zatorre, 2005). Further, activation of the frontal, temporal, occipital, and parietal lobes and subcortical neural regions may occur depending on the nature of the music activity that an individual is involved in (Levitin, 2006). The brain processes the many, potentially independent, elements of music before integrating them as a coherent whole (Levitin, 2006; Levitin & Tirovolas, 2009; Peretz, 2006).

As a musical sound reaches the eardrum it stimulates a “complex cascade” of neural events in the brain which result in the perception of the sound as music (Peretz & Zatorre, 2005, p. 90). The primary auditory circuit in the brain consists of the auditory nerve, brainstem, thalamus and auditory cortex (Boso, Politi, Barale, & Emanuele, 2006; Peretz & Zatorre, 2005). Boso and colleagues (2006) highlighted that music is evaluated on both perceptual and emotional levels and therefore the neural correlates of the emotional processes must also be considered in any description of the neural processing of music. Results from imaging studies indicate that listening to music activates the limbic system and paralimbic structures, which represent the subcortical core for emotional processing (Blood, Zatorre, Bermudez, & Evans, 1999; Boso et al., 2006; Koelsch, 2009). It has been argued that the strong emotional power of music enhances the consolidation of memory for music (Samson, Dellacherie, & Platel, 2009).
The majority of imaging studies exploring the neural processing of music, and all of those cited above, have been undertaken in the adult population and it has been theorised that much of the neural circuitry develops as a result of ongoing exposure to music (Perani et al., 2010). However, a recent study by Perani and colleagues (2010) found the neural architecture involved in the processing of music is present at birth. Further, results also suggested music effects the core emotional centres of the newborn brain, similar to the neural substrates of emotional responses to music seen in adults. It could therefore be expected that the global neural processing of music is present in children.

Music, used as a therapeutic intervention, may “provide an alternative entry point into a ‘broken’ brain system to remediate impaired neural processes or neural connections by engaging and linking up brain centres that would otherwise not be engaged or linked with each other” (Schlaug, 2009, p. 372). The possibility of an ‘alternative entry point’ into the brain damaged by trauma is a result of the large distribution of neural areas involved in the processing of music. Large, global neural processes are less likely to be impaired as a result of brain damage or trauma (Samson et al., 2009). Further, music is a complex stimulus, involving elements of pitch, rhythm, timbre, tempo, metre, contour, loudness, and spatial location, that activates a global firing of neuronal connections in both the cortical and subcortical regions of the brain (Levitin, 2006; Peretz & Zatorre, 2005). For children presenting with agitation during PTA, music may stimulate a global network of cortical and subcortical functions, maximising opportunity for the music therapist to utilise the inherent temporal structure of music to decrease confusion (O’Callaghan, 1999; Perani et al., 2010; Thaut, 2005b). Further, due to global processing and strong emotional connections, music may stimulate therapeutic interaction in children who are non-communicative as a result of neural damage. This therapeutic interaction is based on the fundamentals of mother-infant musicality, which are explored below.
Mother-infant musicality.

In providing a rationale for the use of music as a treatment medium in neurorehabilitation, Magee (2005; 2009) highlighted the musical nature of infant’s pre-verbal interactions and the innate nature of music, to emphasise that communicative intent may be expressed through music when a patient’s language capabilities are impaired as a result of neural damage. Trevarthen and Malloch (2002) also noted that “music is therapeutic because it attunes to the essential efforts that the mind makes to regulate the body, both in its inner neurochemical, hormonal, and metabolic processes, and in its purposeful engagements with the objects of the world, and with other people” (p. 13). That is, musical interaction has the potential to bring a child, who may be isolated as a result of physical or cognitive deficit, into companionship, and companionship or interaction with another is a fundamental need of all humans (Trevarthen & Malloch, 2002). This concept was confirmed in Gilbertson’s study (Gilbertson & Aldridge, 2008) which is explored above.

According to Trevarthen: “The principles of infant mental health define the fundamental interpersonal needs for the whole life cycle” (2001, p. 95). Infants have an intrinsic need for companionship with a primary caregiver, usually the mother, and this need for companionship is equal to the need for nutrition and protection (Papousek & Papousek, 1992; Trevarthen, 2001). Infant survival and development are dependant on interaction and pre-verbal communication with their mother (Trevarthen & Aitken, 2001). Infants interact with their mother to regulate their internal physiological states and these early interactions are fundamental in the infant’s ongoing cognitive, emotional, and psychological health and development (Trevarthen, 2001; Tronick, 1998). For children presenting with agitation during PTA a decreased level of consciousness may result in an inability to regulate their internal and external states. Interaction with another, more organised individual may act as a ‘scaffold’ for the child to increase their level of organisation (Tronick, 1998).
The foundations of early mother-infant interactions are musical (Trehub, 2001; Trevarthen, 2001). Human beings are innately musical (Mithen, 2005; Peretz, 2006), as evident in the ability to meaningfully process music from birth (Perani et al., 2010; Trehub, 2001). Further, relating to others through music is also innate (Trevarthen & Malloch, 2002). Infants are biologically pre-disposed to attend to melodic contour and rhythmic patterning of sounds, and to interpret the musical meaning present in early interactions (Trehub, 2001). Infants respond to the musical elements present in early interactions well before they have developed the ability to process language (Trevarthen & Aitken, 2001).

An infant’s intrinsic ability to seek and respond to interactions is likely mediated by the brain stem and limbic system, and pre-verbal communication is likely processed in areas of the limbic and neocortical regions of the infant’s brain (Trevarthen & Aitken, 2001). Papousek (2007) stated that pre-verbal communication is a non-consciously regulated intuitive behaviour. For children with cortical damage as a result of a TBI, therapeutic interactions utilising music may stimulate the subcortical and limbic regions associated with early pre-verbal interactions.

**Music Therapy for Children Experiencing Agitation during PTA**

There is a paucity of literature detailing the management and treatment of children experiencing agitation during PTA. PTA is a clinically difficult phase to manage and music therapy may offer a non-pharmacological treatment to reduce agitation. However, literature pertaining to children with a brain injury has focused primarily on the areas of coma arousal and post acute rehabilitation. The use of music therapy for children displaying agitated behaviours during the early stages of recovery following a TBI is mentioned only briefly in the literature by Kennelly and Edwards (1997) and Rosenfeld and Dun (1999). To date, there are no systematic explorations of outcomes following a music therapy intervention or detailed
descriptions and analyses of the music therapy processes with children presenting with agitation during PTA presented in the literature.

The current study is the first reported systematic research to explore the use of music therapy for children experiencing agitation during PTA following a severe TBI. The current study specifically explored the use of live familiar music. The live presentation of familiar music was selected to foster fundamental interpersonal interactions between the MTR and participant. The use of live music further offered an inherent flexibility that allowed music to be adapted in direct response to the participant whilst maintaining the temporal organisation present in pre-composed songs.

The presentation of children during PTA can change drastically over the course of any on day, and especially across days. Given that the natural recovery trajectory of the child precedes a reduction in agitation, it was not appropriate to attempt to determine if music therapy had any cumulative effect on the agitation levels of the participants across the course of the data collection period. The current study sought only to explore music therapy during and immediately after each music therapy intervention, leading to the development of the research questions presented below.

**Research Questions**

The current study was a mixed methods case study and the primary research question was: Is music therapy effective in reducing agitation in children aged 2-14 years during the posttraumatic amnesia phase of recovery following a severe traumatic brain injury?

The quantitative objectives of the study were:

1. To measure the immediate post intervention effect of music therapy in reducing agitation in children aged 2-14 years during PTA.
2. To measure the during intervention effect of music therapy in reducing agitation in children aged 2-14 years during PTA.
The qualitative component of this research was embedded in the quantitative protocol and was an emergent design. The qualitative sub questions were: During a music therapy intervention with a child presenting with agitation during the PTA phase of recovery following a severe TBI:

1. What are the responses of the child and the music therapist?
2. How are these responses interpreted?
CHAPTER 3

METHOD

The methodological design of this mixed method case study was underscored by the real world context in which it was implemented. Influenced by pragmatic and constructivist paradigms, the emergent qualitative aspect of the study was embedded in a quantitative protocol. This chapter will explain the real world context and paradigmatic foundation of the study. This will be followed by a description of the methodology, including the mixed method and case study designs. Finally, the research procedure will outline the details of how the study was conducted.

Research Context

The study was undertaken in the Children’s Neuroscience Centre (CNC) at RCH. The CNC is recognised as a Centre for Excellence for its clinical and research programs with children and babies with disorders of the central nervous and neuromuscular systems. The CNC incorporates a specialist 32-bed inpatient unit that provides comprehensive care to patients with neurological, neurosurgical, ophthalmological, otolaryngology conditions, and inpatients of the Victorian Paediatric Rehabilitation Service. Brain injuries (including TBI) are among the most common conditions treated in the CNC (The Royal Children's Hospital Melbourne, 2009).

This study was designed utilising a real world research approach (Robson, 2002). Real world research is an investigation undertaken in the actual context where the area of interest occurs, in this study, the CNC. Undertaking research in a real world context, rather than a laboratory setting, acknowledges that the research setting is complex and this is often reflected in a mixed method research design (Robson, 2002). Robson (2002) stated that “effectively, many real world studies are evaluations. They try to provide information about
how some intervention … is functioning; and how it might be improved” (p. xvi). This study developed from clinical practice in music therapy and a principal interest in developing understanding about the music therapy process with children in PTA. A further intention of the study was to quantify the outcomes of music therapy with children who are experiencing agitation during PTA.

An additional real world aspect of this research was time constraint. Limited time was available for data collection due to the requirements of the music therapist-researcher’s (MTR) university enrolment. Time constraints therefore limited the potential number of children available for enrolment in the study. The use of mixed methods to maximise data available from limited participants is discussed below.

Music therapy is a standard clinical intervention in the CNC for children who have sustained a severe TBI. The MTR is employed three days per week as the sole music therapy clinician in the CNC. The majority of her caseload consists of children who have sustained an ABI, either from trauma (TBI) or other cause. For children who have sustained a TBI, music therapy is utilised throughout their individual recovery trajectory; from the early acute coma phase, through PTA and rehabilitation, until the child is discharged home. This research was developed in response to the MTR’s experiences in working with children who present with agitation during PTA (these experiences are explored further in Chapter 1 and Appendix A).

While there is a limited amount of literature exploring clinical techniques to manage the symptoms of PTA in the adult population (see Chapter 2, page 17), there is no reported evidence supporting the use of these techniques to manage agitation in children in PTA. In the CNC, medical, nursing, and allied health staff have observed music therapy to be effective in reducing agitation. However, this use of music therapy with children has not been systematically evaluated or researched at RCH, nor reported in the literature. As the music therapist in a Centre of Excellence, the MTR was in a unique position to scrutinize this
application of music therapy. The idea for this study was initiated by the MTR who then sought to enrol in an academic environment that would support her development as an early researcher. This study was undertaken in partial fulfilment of the Master of Music Degree (by research) at the University of Melbourne.

Ethics approval for this study was gained from the RCH Research and Human Ethics Committee (HREC 29084A). Requirements for submission for ethics approval included written acknowledgement from the head of the Department of Neurosurgery indicating approval and support of the study, and pre-review by two independent researchers from the Murdoch Children’s Research Institute. Ethics approval was granted with the stipulation that no child receive less than standard music therapy clinical care and, further, participation in the research would not affect any child’s access to any standard medical, nursing, and allied health care during their treatment in the CNC (see Appendix B for the Certificate of Ethics Approval). Complying with the ethics requirements was straightforward as the intention of the study was to examine the current clinical protocol in the CNC. The music therapy intervention used in this study will be detailed later in this chapter (see page 49).

Paradigmatic Framework

A paradigm is a “basic set of beliefs that guides action” (Guba, 1990, p. 17). Edwards (1999) argued that a paradigm is foundational in the development of music therapy research as it involves not only theoretical dimensions, but a “total encompassing framework” through which the phenomenon is viewed (Edwards, 1999).

This study was developed pragmatically, influenced by a constructivist paradigm. Constructivism highlights that knowledge is not found or discovered, rather constructed. Concepts, models, and schemes are invented in the construction of this knowledge (Schwandt, 2000). In this way, Schwandt (2000) argued that all humans are constructivists if we believe that the mind is active in the construction of knowledge. Constructivists
emphasise that research cannot be value free or conducted in isolation. All research is undertaken within personal, historical, and sociocultural contexts (Creswell, 2009; Schwandt, 2000), as highlighted by Edwards who stated: “Knowledge is understood as contextual or context bound. Without reference to the context in which knowledge is generated, there can be no understanding” (1999, p. 76). The context of the current study was of central importance. The quantitative component of the study sought to address the largely positivist context of the paediatric hospital, and the qualitative component embraced constructionism in the intention to explore the music therapy process. Further, any interpretation of the qualitative results was embedded in the MTR’s background as an early career music therapy clinician, an early researcher, and both her research and clinical philosophical underpinnings. The mixed methods design of the study is discussed in greater detail below.

There was a dichotomy of the MTR’s roles in this study as the MTR was the music therapist who facilitated the music therapy interventions, and the researcher who undertook the data analysis. Constructivism embraced this bias as all interpretation was undertaken subjectively (Creswell & Plano Clark, 2007; Edwards, 1999; Guba, 1990). The Stance of the Researcher (Appendix A) provides further details of the MTR’s contextual backgrounds and dual roles in this study.

An assumption of constructivism is that individuals seek an understanding of the world in which they live and work and the individual will develop a subjective meaning of their experiences (Creswell, 2009). Research conducted in the constructivist paradigm often addresses the process of interaction between people, and the researcher and the researched are fused into a single entity (Guba, 1990). Exploring the interaction between people does not aim to define the phenomenon, rather capture something of the experience (Edwards, 1999). Robson (2002) highlighted that constructivist researchers frequently utilise multiple methods
of data collection as the use of multiple methods encourages the acquisition of multiple realities within complex situations and contexts, as was the case in this study.

Research conducted in the constructivist paradigm is largely inductive. That is, meaning is generated from the data collected and used to build broader themes and potentially generate theory (Creswell & Plano Clark, 2007). Any theories developed may be temporary and are time and place bound (Guba, 1990). This is as opposed to research in which data is collected purely with the intention of testing a hypothesis (Guba, 1990). Given the paucity of evidence and literature detailing the clinical management of children presenting with agitation during PTA, the intention of this study was to offer a preliminary measure of the effect of music therapy, and exploration of the music therapy process with this population.

**Mixed Method Design**

There is a low incidence of severe TBI in children (Crowe et al., 2009) and when designing this study it was anticipated that a limited number of children would be available for enrolment. Further, children with a TBI represent a heterogeneous population as their clinical presentation and recovery trajectory are impacted by the severity and location of their TBI, and their pre-morbid development (Nott, Chapparo, & Heard, 2008). These constraints of the population offered limited opportunity for research, and a mixed method design was employed to maximise the data available from limited participants. Mixed method research supports the collection of a richer and stronger array of evidence than can be accomplished by a single method (Yin, 2009).

For the purpose of this study mixed methods was defined as research involving the collection and analysis of both quantitative and qualitative data (Creswell & Plano Clark, 2007). Emerging from pragmatism, the combining of methods encourages a more thorough understanding of the research problem than can be gained from either quantitative or
qualitative approaches alone (Creswell, 2009; Creswell & Plano Clark, 2007). Quantitative research provides measurable outcomes of an intervention or phenomenon free from bias (Bonde, 2007). However, Creswell and Plano Clark (2007) argued that quantitative research is weak in its understanding of context and the processes that contribute to these measurable outcomes are often neglected (Bonde, 2007). Conversely, qualitative research embraces personal bias and interpretation, and is intended to describe and explain a person’s experiences, behaviours, interactions, and social contexts (Fossey, Harvey, McDermott, & Davidson, 2002; Strauss & Corbin, 1990). Combining the two approaches can offset the weaknesses of either approach by combining quantifiable outcomes with descriptions and interpretation (Bonde, 2007). It was anticipated that combining methods in this study would present an expanded exploration of the use of music therapy for children presenting with agitation during PTA, more so than either a quantitative or qualitative approaches alone.

This study was designed using an embedded mixed methods design (Creswell & Plano Clark, 2007). Qualitative data collection was embedded in a quantitative research protocol. This design was chosen as the MTR intended to qualitatively examine the process of the music therapy intervention in addition to quantifying the outcomes of the intervention.

Case Study Design

As described in the previous section, constraints of the population to be studied potentially hindered large-scale research efforts. For this reason it has been argued that case study is the most appropriate method to undertake research with this population (Forsyth, Salorio, & Christensen, 2010; Nott et al., 2008). This study was designed as a multiple case study to capture the complexities of individual cases and to maximise what could be learned from these cases (Stake, 1995). Case study was also chosen to “retain the holistic and meaningful characteristics of real-life events” (Yin, 2009, p. 4); the real life events being music therapy interventions for children experiencing agitation during PTA.
Case study is not a methodological choice, but rather a choice of what is to be studied (Stake, 2003; Yin, 2009). A case is a specific, unique, bounded system (Stake, 2003). Yin (2009) argued that the most important applications of case study are to explain presumed causal links in real-life interventions that are too complex for traditional experimental strategies, and to describe an intervention in the real-life context in which it occurred. In this study, employing a case study design allowed the incorporation of observational and empirical data while maintaining the emphasis on the individual (Magee, 2007b). The emphasis on the individual remained essential in a clinical research setting where the medical and therapeutic needs of a critically ill child are of primary importance.

**Research Procedure**

The research procedure undertaken in this study was scrutinized regularly by the MTR’s supervisors and mentor, all experienced researchers, and twice yearly throughout the MTR’s university degree when the study was presented and discussed at the intensive research seminars at the National Music Therapy Research Unit (NaMTRU), The University of Melbourne.

**Participants.**

Inclusion and exclusion criteria for the study were deliberately broad to encourage maximum enrolment. The criteria were as follows:

**Inclusion criteria.**

*At the time of admission to the CNC.*

- **Child aged 2-14 years** – This age bracket was chosen as it is understood in the clinical context that infants aged less than two years presenting with agitation during PTA display a different range of symptoms than children older than two, and that adolescents older than 14 are frequently treated at adult medical facilitates. Further, the only music therapy research conducted with patients
experiencing agitation during PTA incorporated participants from the age of 15 years. The use of music therapy for children 14 years and younger experiencing agitation during PTA has not yet been reported.

- **Diagnosis of a severe TBI** – Children who sustain a severe TBI have a greater period of PTA, which would allow the MTR to collect a greater and richer array of data. As described in Chapter 2 (see Table 1), a severe TBI is classified according to a period of PTA greater than 1 day. It was deemed impractical in a clinical setting to enrol participants and collect data in a time period of less than one day/24 hours as this would likely cause interruption to standard medical, nursing, and allied health treatment.

*As the participant emerged from coma.*

- **Presence of PTA as assessed by the treating medical team** – Assessment by the treating medical team was determined to be the most reliable indicator PTA, as there are no standardised measures of PTA for children under the age of seven and the clinically used Westmead PTA Scale assesses the emergence from PTA not the actual presence of PTA. Further, standardised clinical measure of PTA required children to answer orientation questions and these tools are not suitable for children who are non-verbal as a result of their TBI. The treating medical team assessed for PTA through a thorough evaluation of the child’s level of consciousness, orientation, and ability to recall new information and formulate new memories. Age appropriate parameters were taken into consideration when assessing the child.

- **Baseline score of greater than 14 on the ABS** – For the purpose of this study a child was recruited if they scored greater than 14, indicative of the presence of any one or more indicators of agitation. The intention of this broad categorisation of
agitation was that the maximum possible number of children be eligible for participation.

**Exclusion criteria.**

- **TBI resulting from suspected non-accidental injury/child abuse** – These children were excluded because of the likelihood of legal proceedings involving the parent/guardian and subsequent difficulties in gaining consent for participation.

- **Child with pre-existing profound hearing loss** – It is acknowledged in the clinical context that adapted music therapy methods are utilised for a child with a profound hearing loss. Further, these children represent only an extremely small subgroup of children who sustain a severe TBI. Given the adapted music therapy methods used with these children, any outcomes obtained from this population could not be generalised to the broader paediatric TBI population.

- **Child’s parent/guardian with no/or minimal English skills** – It was beyond the financial scope of this study to employ translators for the purpose of explaining the study to non-English speaking parents to gain consent for participation.

**Participant Recruitment.**

The CNC Nursing Care Manager notified the MTR when a child aged 2-14 years with a severe TBI was admitted to the CNC following transfer from the ICU. The MTR completed the *Eligibility for Recruitment* form (Appendix C). The MTR approached the child’s parents for consent within 24 hours of the child’s admission to the CNC. The MTR explained the study to the parent in person, and gave the parent a copy of the *Parent/Guardian Information and Consent Form (PICF)* (Appendix D). The parent was then asked to sign the PICF and the RCH *Clinical Photography Consent Form* (Appendix E).

Early parental consent was sought to optimise time available for data collection as the transient nature of PTA may have resulted in a rapid transition to full consciousness in some
children. It was clearly outlined to parents that despite consent being given, not all children present with agitation during PTA, and should their child not present with agitation, he/she would not meet the full criteria for inclusion in the study but would be offered clinical music therapy.

In line with the clinical protocol, at the time of their first meeting the MTR engaged the parent in discussion about their child’s musical preferences and past musical experiences to determine music that may be familiar to the child. The MTR completed the *Participant Music Preferences* form (Appendix F) at the time of the child’s enrolment in the study.

When the medical team assessed the participant to be in PTA, the MTR completed a baseline ABS to assess for the presence of agitation. If the participant scored greater than 14 on the ABS, therefore meeting the full inclusion criteria, the study protocol commenced at the earliest clinically appropriate time, within 24 hours of this baseline being completed. If the participant scored 14 on the ABS, indicative of no agitation, they were excluded from participation in the study and received clinical music therapy.

The study complied with the RCH’s family centred care policy. Participant’s parents were given the option of being present during the daily data collection (i.e. pre, during, and post the music therapy intervention, as outlined below). Parents were asked to be consistent in their presence or absence for the 10 days of data collection. If a parent chose to be present for the daily data collection the MTR requested they care for their child in whatever fashion was the norm for their family, with the exception that they not to sing or play music to their child for the duration of the daily data collection. Parents were asked to refrain from providing music to their child as this may have impacted on any effect of music presented during the study.
Study Protocol

The data collection period was the first ten days of PTA (excluding weekends) or the duration of PTA, whichever was shorter. As discussed in Chapter 2 cognitive recovery precedes a decrease in agitation, therefore it was likely that agitation would be at its greatest level early in the PTA phase of the participant’s recovery. Data collection took place on weekdays only. As a study undertaken in a real world approach it was determined this was the most clinically realistic option.

Data collection occurred at the same time, or as near as clinically possibly to the same time, every day of this data collection period. Maintaining the time for the data collection attempted to control for any effects of regular medications and/or treatments.

Data collection took place at the participant’s bed, the natural clinical setting for music therapy for children in PTA at RCH. It was deemed unethical and potentially medically unsafe to remove participants from their hospital room and associated medical and nursing supervision.

Data collection included the participant being video recorded using a Sony Handycam Digital Video Camera Recorder DCR-SX40E. The participant was video recorded pre, during, and post each music therapy intervention (MTI) as follows:

- **Ten minutes pre the MTI.** The participant was videoed for the ten minutes immediately preceding the MTI to capture a baseline of the participant’s presentation and agitation level before the MTI. Participants received standard medical and nursing care during the pre-MTI time period, as the aim was to capture a typical representation of the participant’s agitation in the clinical setting immediately before each MTI.

- **The duration of the MTI.** The participant was videoed for the duration of the MTI to capture their behaviour and responses during the MTI and the MTR’s musical
responses to the participant. Details of the MTI are discussed in the following section.

- **Ten minutes post the MTI.** The participant was videoed for the ten minutes immediately following the MTI to capture a baseline of the participant’s presentation and agitation immediately after the MTI. Participants received standard medical and nursing care during the post-MTI time period, as the aim was to capture a typical representation of the participant’s agitation in the clinical setting immediately after each MTI.

The video camera was placed on a tripod in a location deemed best by the MTR to capture the participant’s face and body and also the face of the MTR during the MTI. The tripod was placed, as much as possible, in a position that did not interfere with hospital staff and family access to the participant should it be required in a medical emergency. The recording of video footage as a method of data collection is discussed later in this chapter.

**Music therapy intervention (MTI).**

The music therapy method used was the live singing of familiar songs. Songs were assessed to be familiar to the participant depending on family-reported musical history and song preference pre-TBI. The familiar songs were sung by the MTR either with or without guitar accompaniment. Songs were presented live rather than recorded because of the potential for live songs to be adapted, in the moment, in response to the participant. This might include the MTR mirroring the participant’s vocalisations within the song structure and/or musically matching the participant’s observed level of energy during the MTI.

The MTI was reflexively developed based on the MTR’s clinical experiences with children experiencing agitation during PTA. There are two strongly related developing premises that formed the basis for the MTI used in this study:
1. The predictability and structure inherent in familiar songs has the potential to contain and ameliorate the neural disorganisation of the child that manifests as agitation.

2. This potential is realised by an attuned music therapist who manipulates the musical elements of the familiar song contingent on the child’s erratic presentation and responses.

These two premises were developed utilising current knowledge on the neural processing of music and mother-infant musicality as theoretical bases as discussed in the previous chapter.

**Data Collected**

**Video data.**

In this study, video data was used for the collection of both quantitative and qualitative data. Morse and Pooler (2002) argued that video data presents a unique opportunity for capturing an understanding of interactions when undertaking research. The manipulation of data, including the opportunity to replay, speed up, slow down, or pause, has the potential to provide insights that would otherwise be unobtainable (Morse & Pooler, 2002).

The use of video data attended to several key issues. The MTR and her supervisors deemed it ethically and clinically inappropriate to introduce a number of new people into a participant’s room to collect data. In the clinical care of children in PTA the number of visitors is restricted to reduce the potential for overstimulation. Allowing additional people into the participant’s room for data collection had the potential to negatively impact on the clinical management of the participant. Another possibility for the collection of data may have been to have the participant’s bedside nurse collect data. It was decided this option was also clinically inappropriate as it was not possible to guarantee the availability of the nurse at
any particular time. Hospital nursing staff are frequently assigned to the care of a number of patients and medical needs of another child may have necessitated the nurse be absent from the participant at the required time for data collection. Further, it would have not been possible for the nurse to be blind to the study condition potentially biasing any quantitative results.

**Quantitative data collection.**

The quantitative data collected consisted of two independent reviewers scoring the participant’s agitation at each of the pre, during, and post MTI time periods in each MTI session using the ABS. The ABS is detailed in the following section of this chapter. Both reviewers had clinical experience working with children experiencing agitation during PTA. Both reviewers also had previous research experience with the paediatric TBI population. Neither reviewer had used the ABS prior to this study.

The two reviewers independently examined the pre, during, and post MTI time periods from the video data for every MTI for all participants. The reviewers numerically rated the participant’s agitation at each time period using the ABS. The reviewers examined the ten minutes pre-MTI video data and 10 minutes post-MTI video data to rate the participant’s agitation immediately before and after the MTI. The reviewers also examined a 30 second segment of video data selected from the midpoint of the MTI when music was present, or the closest time point after the midpoint when music was present, to rate the participant’s agitation during the MTI.

The pre/post periods from all MTI sessions were randomised and burnt onto a DVD to ensure that the reviewers were blinded to the order. The procedure for randomising the pre and post periods is detailed in Appendix G.

Given the presence of music in the ‘during’ MTI time periods, and the absence of music in the pre and post MTI periods, it was not possible for the reviewers to be blind to this
condition. The MTR burnt each of the ‘during’ MTI periods onto DVD in random order so the reviewers were blind to which MTI the ‘during’ period came from. The procedure for randomising the ‘during’ time periods is detailed in Appendix H. Further, the reviewers examined the ‘during’ MTI periods three weeks after they examined the pre and post periods to reduce the potential for any reviewer association between the ‘during’ and the pre/post time periods.

Quantitative measure.

The Agitated Behavior Scale (ABS) (Corrigan, 1989) was used to rate the participant’s agitation pre, during, and post each MTI (see Appendix I). The ABS was the only measure of agitation validated for use in the TBI population (Corrigan, 1989; Fugate et al., 1997). The ABS was developed for use in the adult population however early investigation reported high inter-rater reliability when the scale was used with children (Kaitz, Cooper, & Lundine, 2006).

Prior to the development of the ABS, agitation was measured only according to its presence or absence (Bogner, Corrigan, Stange, & Rabold, 1999; Fugate et al., 1997). The ABS provided an objective measure to record subtle changes in a patient’s presentation and also measures the effectiveness of interventions aimed at reducing agitation (Bogner, Corrigan, Bode, & Heinemann, 2000; Bogner et al., 1999).

The ABS consists of 14 items/observable behaviours for assessing agitation. Each behaviour is assigned a rating of 1 to 4; with 1 indicating the behaviour is not present, 2 indicating the behaviour is present to a slight degree, 3 indicating the behaviour is present to a moderate degree, and a rating of 4 indicating the behaviour is present to an extreme degree and cannot be redirected (Bogner et al., 2000; Bogner et al., 1999; Corrigan, 1989; Corrigan & Bogner, 1995).
The minimum possible score on the ABS is 14. On the original ABS, a score greater than 36 on the ABS is indicative of severe agitation, 29 – 35 moderately agitated, and 22-28 mildly agitated (Bogner et al., 2000). However, these scores are for adult patients and no similar indicators have been reported for children.

Qualitative data collection and sampling.

The qualitative component of this study was an emergent design because of the lack of precedent in undertaking qualitative research with this population. The principal qualitative data in this study was the video data collected during each MTI. It was not practical to analyse every MTI in its entirety and specific MTIs were selected for qualitative analysis according to Stake’s (1995) criteria for the selection of cases that would likely lead to significant understandings and assertions. Further, entire MTIs were selected for analysis to counter the temptation to examine only the most positive events within individual MTIs (Stake, 1995). The selection of these MTIs is detailed in the following chapter.

More traditional methods of qualitative data collection, including interviewing participants, were not viable in this study. As discussed in the Literature Review one of the indicators of PTA is impaired memory, so it was unlikely that participants would be able to recall the details of the MTI after it had occurred. Further, participants with a very severe TBI may have damaged expressive and receptive language capabilities, and would therefore be unable to take part in an interview or discussion relating to their experience of the MTI. However, the MTR was also a participant in the MTI and therefore offered a unique perspective in the collection and analysis of qualitative data.

The MTR completed MTI session notes after each MTI, which also formed part of the qualitative data collected for analysis. These notes were structured to provide a chronological description of the MTI detailing any significant participant responses, and the MTR’s
thoughts and the rationale underpinning the choices made in response to the participant (see Appendix J for a pro forma of the *MTI Brief Session Notes Form*).

**Other data collected.**

In addition to video data and the MTR’s session notes, the following data was collected:

- A complete medical history of the participant, including: pre-morbid conditions, details of the participant’s TBI, imaging results, ICU treatments, surgeries, interventions, and total duration of PTA. The MTR obtained this information from the participant’s medical charts and discussion with the medical and nursing team responsible for the care of the participant (See Appendix K, *Participant Medical History Form*).

- A daily medical handover detailing the participant’s presentation on every day of the data collection period. Information collected included: current medical and neurological status, presentation throughout the previous 24 hours, medication regimes, and participation in any medical or allied health treatments or interventions. This information was collected from the participant’s medical charts and discussion with the participant’s bedside nurse (see Appendix L, *Participant Daily pre-MTI Status Form*).

**Data Analysis**

This study was not seeking to examine any cumulative effect of music therapy on agitation present in children during PTA. PTA is a transient phase and the natural progression of recovery would typically result in improved cognitive functioning and a subsequent reduction in agitation (Corrigan & Mysiw, 1988). Analysis of results therefore sought to quantify any effect of music therapy during each MTI and immediately after each MTI, and
further, to provide preliminary exploration and description of use of familiar songs as a therapeutic intervention for children experiencing agitation during PTA.

**Quantitative data analysis.**

Descriptive statistics were used to graph the pre, during, and post MTI ABS scores for both reviewers, for each participant. Formal analysis of this data was also carried out to quantify the results presented descriptively. An analysis of variance (ANOVA) was carried out separately for both reviewers for each participant for both Session (MTI) and Period (e.g., pre, during, and post MTI). The ANOVA of Session explored the difference in mean ABS scores for each MTI and the ANOVA of Period explored the difference in mean pre, mean during, and mean post ABS scores across the total number of MTIs that each participant received.

The agreement between the two reviewers was also examined. A “Bland Altman” plot was used to plot the difference between the two reviewers against the average score for each pre, during, and post MTI time period rated.

**Qualitative data analysis.**

Morse and Pooler’s (2002) tri-tiered method of analysis was used to undertake qualitative analysis. This tri-tier method was developed specifically for use with video data when participants are unable to verify any analysis or interpretation of results. As Morse and Pooler stated:

“When data are not accompanied by interview data or written records, or when videotaped data has been obtained from participants who are pre- or non-verbal, or unable to verbalize (due to intubation, sedation, confusion, and so forth), issues of interpretation are risky. In these situations, it is impossible to conduct the analysis from the perspective of the participants, or to verify one’s analysis. Without the benefit of interaction and shared meaning, one is only left with description or
inference” (Morse & Pooler, 2002, p.3).

A precedent for using this method of qualitative analysis in music therapy research set in an acute paediatric hospital setting was established by Shoemark (2007). While significant differences in the populations studied are noted, participants in both studies were unable to partake in more traditional methods of qualitative data collection and analysis. Both Shoemark’s and the current study were also early investigations seeking to describe a music therapy process.

Similar also to Shoemark’s PhD, the video data selected for qualitative analysis in this study was viewed by another music therapist to increase the amount of data available and to offer a more varied perspective on any observations and analysis (Shoemark, 2007). In her study, Shoemark and an additional four reviewers, including music therapists and professionals experienced in infant observation, reviewed the selected segments of video data (Shoemark, 2007). It was impractical to undertake this level of qualitative analysis in a mixed method Masters level study. Therefore, the MTR and one additional qualitative reviewer (QR) reviewed the selected MTIs. The QR was an expert music therapy clinician and an experienced researcher with expertise in undertaking video analysis of music therapy interventions in an acute medical setting. The QR also completed her entry-level training at the same institute as the MTR ensuring some parallel in fundamental philosophical underpinnings of clinical work.

It was not practical to undertake qualitative analysis of all of the video data from the MTIs for all participants. Selected video data was analysed using the tri-tiered method of analysis. The steps involved in the tri-tiered analysis (Morse & Pooler, 2002) included:

1. **Description.** In this first level of analysis, participant behaviours and MTR responses were described in careful detail. This level of analysis was purely descriptive and inference and interpretation were absent. Both the MTR and QR
independently undertook a micro-description of the selected video data. The MTR and QR viewed the selected video data, and described the participant’s behaviours during the chosen MTIs and the MTR’s responses to the participant in 10 second epochs.

2. Analysis. While fundamental for developing a detailed description of participant behaviours and the MTR’s responses during the selected video data, the first level of analysis contributed little to an understanding of the meaning of the participant’s and MTR’s responses. In this second level of analysis meaning was attributed to the participant’s behaviours and MTR’s responses, and inference was derived from shared meaning, common experiences, prior research, and the literature. In this study, several key steps were undertaken as part of this second level of analysis.

   a. The MTR and QR jointly viewed the selected video data and engaged in discourse centred on the similarities and difference in their micro-descriptions. At this point the MTR and QR began to attribute meaning to the participant’s behavioural presentations during the selected video data, and also the MTR’s adaptation of the familiar songs in response to the participant. Meaning was constructed and attributed based on the MTR’s and QR’s own clinical experiences and theoretical knowledge. The MTR’s session notes were included in the discourse to describe the MTR’s intentions during the selected video data.

   b. The MTR transcribed the above discourse deleting redundancies and comments irrelevant to the current qualitative research questions. The MTR began grouping the discourse around behavioural presentations of the participant and responses of the MTR.
c. To answer the first qualitative sub question (What are the responses of the child and the music therapist?), categories of participant behaviours and MTR responses were established from the above transcription and micro-descriptions. These categories emerged from recurrent meanings attributed to the participant’s behaviours during the selected video data, and the MTR’s musical responses to the participant. The development of categories enabled the MTR to cluster similarly labelled descriptions for examination and retrieve descriptions when considering patterns and connections related to the research question (Fossey et al., 2002). The categories will be presented in the results chapter (Chapter 4).

d. To answer the second qualitative sub question (How are these responses interpreted?), the categories of participant responses and MTR responses were compared and contrasted based on the MTR’s current theoretical frameworks. Connections and discontinuities between the categories of response were explored to develop an interpretation of these. A short interpretation of the qualitative results will be presented in the results chapter of this thesis (Chapter 4).

3. Interpretation. Analysis was more interpretive in this final level. Behavioural descriptions and earlier analysis were extended with the use of theoretical inference (Morse & Pooler, 2002). This detailed interpretation of the participant and MTR’s responses will be presented in the discussion chapter (Chapter 5).

Chapter Summary

Quantitative and qualitative data about the use of music therapy for children experiencing agitation during the PTA phase of recovery following severe TBI was collected and analysed in this study. This chapter described the research context and pragmatic
development of the mixed methods case study design influenced by a constructivist paradigmatic framework. Finally, the chapter detailed the research method, including how data was collected and analysed. The results of the quantitative and qualitative analyses will be presented in Chapter 4 and these findings will be integrated in the discussion of the results in Chapter 5.
CHAPTER 4

RESULTS

As outlined in the previous chapter, this study was designed as a multiple case study. Consent was obtained for three children to participate in the study. However, two of these children did not present with agitation during PTA, as indicated by a baseline score of 14 on the ABS. The first of these children was a four-year old female who sustained a diffuse axonal injury and multiple bilateral cerebral contusions as a result of a motor vehicle accident. The second was a seven-year old male who sustained a depressed right parietal skull fracture and a large right parietal haemorrhagic contusion, also as a result of a motor vehicle accident. As these children did not meet the full inclusion criteria for participation in this study (see page 44) they were excluded from the study but received clinical music therapy.

At the point at which data collection ceased in this study only one child, a 10-year old female, met the eligibility criteria and had participated in data collection. Consequently, the study developed as an intrinsic (single) case study, as defined by Stake (1995) who emphasised that a case or participant is explored because of the uniqueness and complexities intrinsic to that individual, not because it is representative of other cases.

**Modified Research Questions**

The research questions were modified to reflect the intrinsic mixed methods case study design. Thus general research question addressed by the study was: Is music therapy effective in reducing agitation in a 10-year old child during the PTA phase of recovery following a severe TBI?

The quantitative objectives were:
1. To measure the immediate post intervention effect of music therapy on reducing agitation in a 10-year old child during PTA.

2. To measure the during intervention effect of music therapy on reducing agitation in a 10-year old child during PTA.

The qualitative component of the study was an emergent design and the qualitative sub questions remained: During a music therapy intervention with a child presenting with agitation during the PTA phase of recovery following a severe TBI:

1. What are the responses of the child and the music therapist?

2. How are these responses interpreted?

This chapter presents the demographic and medical details of the single participant, including the cause of the participant’s TBI, medical imaging results detailing the severity of the participant’s TBI, medical interventions and presentation at the commencement of the study. Following this, the main research question is answered and the quantitative and qualitative sub-components of the study explored.

The Intrinsic Case

The participant will be given the pseudonym ‘Evelyn’ for the purpose of this thesis. Evelyn is a 10-year old girl who sustained an extremely severe TBI as a result of a school bus accident. Evelyn was a passenger in a school bus that was struck by a large truck and was seated at the site of impact.

Prior to the accident, Evelyn was a typically developing child with no pre-morbid medical conditions. Evelyn is the youngest of four children and her parents described her as a bright and active child, who loved being outdoors and spending time with friends. Evelyn had received no formal music education but her mother reported recorded music was regularly present in the home environment and Evelyn frequently sang and danced along with this music. Evelyn’s mother and older sister reported that her favourite musical artists were:
Abba, Miley Cyrus, Taylor Swift, Bob Dylan and Pink. Her favourite song was *Waterloo* by Abba and she also liked the music from the movie *Shrek*.

Evelyn had a GCS of 6 at the scene of the accident, indicative of a severe brain injury. She was intubated and transferred to RCH where she was admitted to the ICU. Medical imaging results indicated that Evelyn sustained:

- Multi fragmented depressed skull fractures of the left occipital, parietal, frontal, and temporal bones, with extensive areas of haemorrhage (bleeding) under the parietal bone fracture.
- Extensive areas of haematoma (collection of blood) overlying the left parietal and temporal lobes extending into the ventricular system.
- Midline shift (shift of the brain past its centre line).
- Contrecoup injury (injury on the opposite side of the head to the site of impact) of the right frontotemporal region.
- Contusions (bruising) in both frontal and temporal lobes.
- A diffuse axonal injury (shearing or tearing of the axons) of the corpus callosum.
- A small haemorrhage of the brainstem.

The extensive and extremely severe nature of Evelyn’s TBI further resulted in significant oedema (swelling) of the brain. At admission to the ICU Evelyn’s pupils were fixed and dilated and she underwent an emergency left decompressive craniotomy, where a portion of her left skull bone was surgically removed to allow the brain to swell, minimising the potential for secondary damage. The bone was replaced approximately five months after the accident. On the day of her admission to the ICU, Evelyn was placed in an induced state of hypothermia (32 degrees Celsius) for 72 hours to reduce the potential for raised intracranial pressure, which may also result in secondary brain damage. Seven days after her admission to the ICU Evelyn had a tracheostomy tube inserted (a tube creating an airway
directly into the trachea or windpipe). Evelyn remained in the ICU for 18 days. She was ventilated for 17 of these days and transferred to the CNC 24 hours after ventilation was successfully weaned. In the CNC, she was further diagnosed with autonomic dysfunction resulting in fluctuating heart rate, blood pressure, and temperature.

At the time of admission to the CNC, the medical staff reported Evelyn to be emerging from coma and entering PTA. Parental permission was gained for Evelyn to participate in this study within 24 hours of her being transferred to the CNC from ICU and the study protocol commenced on the following day.

Evelyn received the maximum of ten music therapy interventions during her enrolment in the study and these interventions occurred over a total period of 14 days. Evelyn remained in PTA for over five months. This extended duration of PTA is indicative of an extremely severe TBI (see Table 1 for relationship between duration of PTA and injury severity). However, her treating team emphasised the difficulty in assessing emergence from PTA in a child with such an extremely severe TBI. At her time of discharge from RCH, approximately six months after the accident, Evelyn remained non-verbal with severely impaired receptive and expressive language capabilities, and was therefore unable to participate in standard PTA testing using the Westmead Scale (Marosszeky et al., 1997). The treating team further reported that, given her extremely severe cognitive deficits, it would be difficult to assess the difference between an extended but still transient period of PTA, and more permanent cognitive damage resulting from an extremely severe TBI.

The Effectiveness of Music Therapy in Reducing Agitation in a 10-year old Child During the PTA Phase of Recovery Following a Severe TBI

The results of this study were inconclusive in answering this main question. The results of the quantitative data analysis are explored first, followed by the results of the qualitative data analysis.
Quantitative Results

Quantitative data analysis included descriptive and formal statistics reporting on the ‘during’ and immediate ‘post’ intervention effect of music therapy in reducing Evelyn’s agitation. Inter-reviewer agreement of the two reviewers who scored the ABS at the pre, during, and post time periods for each MTI was also explored.

The two independent reviewers used the ABS (Corrigan, 1989) to rate Evelyn’s agitation pre, during, and post each of the ten MTIs. Figure 1 presents the data recorded by these two reviewers. Each line in the figure represents a separate MTI.

![ABS scores by period within each MTI for the two reviewers.](image)

**Figure 1.** ABS scores by period within each MTI for the two reviewers.

There are several features to be noted about this figure:

1. The lines are drawn in order to more clearly identify which ABS scores came from the same MTI.

2. The ABS scores have been ‘jittered’ randomly a little in the vertical direction, in order to see all of them; without jittering, some sessions’ data are not apparent because they are identical to others. Note for example, that in Reviewer 1’s data, three sessions were rated ABS=14 during the session, and ABS=16 post-session.
Because of the jittering, it is possible to discern these three MTIs. The ABS score in fact takes whole number values; the jittering is minor, so that no confusion of the actual value is likely.

An alternate representation of the data in Figure 1 also includes the correspondence between MTIs for Reviewers 1 and 2 is presented in Figure 2.

![Graph](image)

**Figure 2.** ABS scores by period, MTI, and reviewer. The panel variable is the MTI.

Table 2, presented below, quantifies what can be seen in the Figures 1 and 2, and presents the mean pre, during, and post ABS scores and the standard deviations, for both reviewers, N equals the number of MTIs.
Table 2.

*Mean ABS Scores and Standard Deviation (SD) for Both Reviewers for 10 MTIs*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Period</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reviewer 1</td>
<td>pre MTI</td>
<td>10</td>
<td>16.200</td>
<td>2.201</td>
</tr>
<tr>
<td></td>
<td>during MTI</td>
<td>10</td>
<td>14.900</td>
<td>2.183</td>
</tr>
<tr>
<td></td>
<td>post MTI</td>
<td>10</td>
<td>16.200</td>
<td>2.098</td>
</tr>
<tr>
<td>Reviewer 2</td>
<td>pre MTI</td>
<td>10</td>
<td>16.400</td>
<td>2.066</td>
</tr>
<tr>
<td></td>
<td>during MTI</td>
<td>10</td>
<td>16.500</td>
<td>1.780</td>
</tr>
<tr>
<td></td>
<td>post MTI</td>
<td>10</td>
<td>17.000</td>
<td>2.108</td>
</tr>
</tbody>
</table>

An analysis of variance (ANOVA) was also conducted on the data from the two reviewers.

**Analysis of Reviewer 1’s scores.**

An ANOVA was carried out on Reviewer 1’s scores and is presented below in Table 3.

Table 3.

*Analysis of Variance for Reviewer 1, using Adjusted SS for Tests*

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Seq SS</th>
<th>Adj SS</th>
<th>Adj MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>2</td>
<td>11.267</td>
<td>11.267</td>
<td>5.633</td>
<td>9.45</td>
<td>0.002</td>
</tr>
<tr>
<td>Session</td>
<td>9</td>
<td>115.367</td>
<td>115.367</td>
<td>12.819</td>
<td>21.50</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>18</td>
<td>10.733</td>
<td>10.733</td>
<td>0.596</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>137.367</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ANOVA of Session compared the mean score of each session (MTI) across the ten sessions (MTIs), that is, the mean pre, during, and post ABS scores for each MTI. The ANOVA for Reviewer 1 showed that Session was very statistically significant (p < 0.001). This indicated that there was a statistically significant difference in the scoring of agitation by Reviewer 1 between MTIs.
The ANOVA of Period was an overall test of whether there were no differences, on average, between the three periods, that is between the pre, during, and post time periods. The small p value was evidence against this ($p = 0.002$) indicating there was a statistically significant difference in Evelyn’s agitation between the time periods according to Reviewer 1. However, the ANOVA of Period did not reveal in which period or in which directions this difference was found. Therefore further analysis of this difference was undertaken, and is presented in Table 4. Pairwise differences were analysed, adjusted for multiple comparisons using Tukey’s method.

Table 4.

*Pairwise Comparison of Session Differences for Reviewer 1*

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Estimate</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre minus during</td>
<td>1.3</td>
<td>0.4 to 2.2</td>
<td>0.004</td>
</tr>
<tr>
<td>Pre minus post</td>
<td>0.0</td>
<td>-0.8 to 0.8</td>
<td>1.00</td>
</tr>
<tr>
<td>Post minus during</td>
<td>1.3</td>
<td>0.4 to 2.2</td>
<td>0.004</td>
</tr>
</tbody>
</table>

As presented in Table 4, the ‘during’ MTI scores were lower by 1.3 on average, than each of the ‘pre’ and ‘post’ scores and in each case this result had a p-value of 0.004, indicating a statistically significant difference. That is, there was a significant difference between the pre/during ABS scores and a significant difference between the during/post scores, however no difference between the pre/post scores. Hence, there is evidence to suggest there was a ‘during’ MTI effect for Evelyn as scored by Reviewer 1 but no post MTI effect.

**Analysis of Reviewer 2’s scores.**

An ANOVA was also carried out on Reviewer 2’s scores and is presented below in Table 5.
Table 5.

*Analysis of Variance for Reviewer 2, using Adjusted SS for Tests*

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Seq SS</th>
<th>Adj SS</th>
<th>Adj MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>2</td>
<td>2.067</td>
<td>2.067</td>
<td>1.033</td>
<td>0.76</td>
<td>0.484</td>
</tr>
<tr>
<td>Session</td>
<td>9</td>
<td>82.300</td>
<td>82.300</td>
<td>9.144</td>
<td>6.69</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>18</td>
<td>24.600</td>
<td>24.600</td>
<td>1.367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>108.967</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ANOVA of Reviewer 2’s scores showed there was a statistically significant Session effect (p<0.001), again indicating a statistically significant difference in agitation between MTIs, as scored by Reviewer 2. The P-value for Period was p = 0.48, so there was no strong evidence of a Period effect. That is, according to Reviewer 2, there was no evidence to indicate a ‘during’ or ‘post’ MTI effect.

**Agreement between the two reviewers.**

The difference between the two reviewers’ scores is visually presented in Figure 2 as the distances between the red squares and the black circles for each of the 30 combinations of Session and Period. There is a clear indication from Figures 1 and 2 and Table 2 that the two reviewers’ patterns of scoring were different. Notably, Reviewer 1 generally gave lower scores ‘during’ the MTI, while Reviewer 2 did not.

A standard way to examine this difference further was to produce a Bland-Altman Plot, which plots the differences between scores for the two reviewers, against the average score. The Bland-Altman Plot for these data is shown below in Figure 3, with some random jittering to distinguish points.
Given that the range of the ABS is from 14 to 56, one aspect of the Figure 3 shows a ‘floor’ effect; the only way that the average can be 14 is for both Reviewers to give the minimum possible score. Hence it is impossible for the difference to be anything other than zero when the average is 14. Figure 3 does not show any clear association between the difference and the average, in general terms.

The Bland-Altman approach is to consider the actual differences, and find 95% “limits of agreement”. The average difference was 0.87; the standard deviation (sd) was 1.22. The limits of agreement are calculated by the formula (mean ± 2×sd); this gives a range of 1.58 to 3.32. These limits give an indication of the range within which we can reasonably expect 95% of differences between Reviewer 2 and Reviewer 1 to lie. In this study, this is indicative of poor inter-reviewer agreement in the scoring of Evelyn’s agitation, using the ABS, at the pre, during, and post MTI time periods.
Qualitative Results

To answer the qualitative sub-questions of this study video data was analysed using Morse and Pooler’s (2002) tri-tiered method of analysis. The results presented in this chapter include the description and categorisation of Evelyn’s behaviours and the MTR’s responses during the MTIs, and a brief interpretation of these (2c. and 2d. of the tri-tiered method of analysis, see page 58). The earlier levels of description and analysis are presented in the Appendices (Appendices M, N, O, and P). The final level of analysis in the tri-tiered method, the detailed interpretation and integration of the above analysis will be presented in Chapter 5 of this thesis.

Evelyn participated in ten MTIs for this study, consisting of approximately 160 minutes of video data. It was not practical to analyse all of this data, therefore:

- MTIs 1 and 2 were excluded from analysis as they were held very early in Evelyn’s recovery and she presented with very minute responses that were difficult to analyse from the video data.
- MTIs 3 and 7 were excluded due to significant (medical) interruptions during the MTIs.
- MTIs 5, 6, and 8 were excluded because the position of Evelyn or the MTR, or considerable noise in the ward environment resulted in poor quality video data.
- MTI 9 was excluded as Evelyn was asleep prior to the MTI, and despite significant attempts by Evelyn’s mother, she was not able to be roused from this sleep for participation in the MTI.

Hence, the MTR selected MTI 4 and MTI 10 for analysis to answer the qualitative research questions, as these MTIs offered the greatest opportunity for understanding and describing Evelyn’s behaviours and the responses of the MTR during the MTIs (Stake, 1995). These two MTIs were examined in their entirety to reduce the temptation to examine only the
most positive moments within individual MTIs (Stake, 1995). The inclusion of negative moments for analysis reflected the fullest possible range of Evelyn’s behaviours during the MTIs and therefore offered the greatest potential for describing, analysing, and interpreting music therapy for a child presenting with agitation during PTA. MTIs 4 and 10 were also chosen for analysis because:

- Evelyn was at her most agitated in MTI 10, compared to the other nine MTIs. Therefore, analysis of this MTI offered the greatest opportunity for the exploration of music therapy with a child presenting with agitation during PTA.
- The MTIs were separated by a period of eight days. A significant variation in Evelyn’s clinical presentation was observed over this period, and examination of these MTIs facilitated exploration of a greater range of Evelyn’s behaviours than examination of two MTIs that took place on consecutive days.
- There were minimal clinical interruptions in both of these MTIs, causing minimal disruption to the implementation of the MTI.

A brief description of Evelyn’s neurological status during these selected MTIs is presented to provide a foundation for the analysis and interpretation of her behaviours and responses during the MTIs. The categorisation of Evelyn’s behaviours during the MTIs is then introduced followed by the categorisation of the MTR’s responses.

**MTI 4.**

MTI 4 took place eight days after Evelyn’s admission to the CNC. Evelyn had a GCS of 9; was spontaneously opening her eyes but was not fixing or following, was withdrawing to painful stimulation, not following commands, and was presenting with lip smacking. She had a significant right hemiplegia and presented with some dystonic arm movements in her left arm. Her tracheostomy remained in situ and she remained non-verbal, however, she was spontaneously vocalising with the use of a speaking valve attached to her tracheostomy.
Nursing staff reported that she presented with periods of agitation and being unsettled and at these times an increase in her blood pressure and heart rate could be observed.

**MTI 10.**

On the day of MTI 10, 16 days after her admission to the CNC, Evelyn had a GCS of 10; she was spontaneously opening her eyes but not fixing of following, she was responding to tactile stimulation, however she did not display any purposeful movement, and continued to have a significant right-sided hemiplegia. Nursing and medical reports indicated that she was very agitated, displaying constant and non-purposeful crying out/plaintive vocalisations and thrashing movements of her left arm. Further, the constant presence of these agitated behaviours interrupted Evelyn’s sleep overnight and she had slept little in the 24 hours prior to MTI 10.

**The responses of the child and the MTR during the MTIs.**

An analysis of the video micro-description (see Appendices M and N) and discourse transcription (see Appendices O and P) revealed consensus around the classification of distinct categories of Evelyn’s behaviours during the MTIs and the MTR’s responses to these behaviours. To answer the first qualitative sub question ‘What are the responses of the child and the music therapist?’ the categories of Evelyn’s behaviours are presented, followed by the categories of MTR response.

**Categories of Evelyn’s behaviours.**

Evelyn’s behaviours during the MTI emerged as four distinct categories. These categories were; Neutral, Acceptance, Recruitment and Rejection. *Neutral* behaviours were analysed to be indicative of a non-response during the MTIs and *acceptance, recruitment*, and *rejection* behaviours were analysed to be indicative of a response.
Neutral.

Neutral behaviours were categorised according to Evelyn’s presentation when she was observed to have no response to the familiar music. Neutral behaviours were thus indicative of a non-response. The category was given the title neutral as the behaviours were the predominant behaviours displayed when Evelyn was awake and observed to be non-responsive; this was her neutral state of presentation. These were the behaviours that nursing and medical staff observed when classifying Evelyn’s presentation as agitated. Therefore, neutral behaviours indicated a state of agitation. It is important to note that this category represents a neutral responsiveness, not a neutral behavioural presentation. In these moments of no response, Evelyn remained in, or returned to, the repetitive, involuntary, and non-purposeful behaviours she displayed prior to the commencement of the MTI, behaviours that were present when no intentional sensory stimulation was present in her immediate environment.

Neutral behaviours were observed in both MTIs and were described by the MTR (during the discourse with the QR) as moments when “there is not any sense that we are in the same [musical] place together at this point”, indicating Evelyn was not perceived to be displaying any awareness of the music. Given Evelyn’s recovery trajectory, and subsequent different levels of functioning in MTI 4 and MTI 10, neutral behaviours were observed to be different in MTI 4 and MTI 10, however, remained indicative of no observed response.

In MTI 4, neutral behaviours included:

- Continuous, involuntary, and repetitive lip smacking movements, that were observed to be similar to an open mouth chewing action, interspersed with episodes of asymmetrical mouth shape where Evelyn’s mouth would pull down in the left corner.
• Small dystonic movements of Evelyn’s left arm, which were observed to be small, twitch like tremors most evident from the bent elbow to the hand, which was clenched and positioned close to her left ear. Dystonia is a neurologic movement disorder that results from an increase in muscle tone (National Institute of Neurological Disorders and Stroke, 2010).

• Small leg movements, similar to a slight rising and falling of Evelyn’s knees under the bed sheets.

In MTI 10, behaviours categorised as neutral included:

• Continuous, involuntary, and repetitive vocalising. These vocalisations had a primitive, plaintive, cry-like quality and descended in pitch over a small pitch range. The vocalisation typically had a volume range of \( mp – f. \)

• Lip smacking movements (as described above) between the repetitive vocalisations.

• Continuous thrashing movements of Evelyn’s left arm, observed to be either a near complete rotation of Evelyn’s arm from the shoulder, with a near straight elbow, or a smaller circling of the hand and fingers the elbow bent at approximately 30 degrees. During these movements, Evelyn’s fingers displayed a tonal pattern with the index finger held straight and the other fingers bent from the knuckle and straight through the finger joints.

• Leg movements similar to those observed during MTI 4, but with a slightly increased range of rising and falling.

A clear example of neutral behaviours occurred at the beginning of the song Waterloo during MTI 4 (at 04:47 – 04:57 on the video, see Appendix Q): As the MTR sang the beginning of song Waterloo, Evelyn’s mouth was closed and she continued presenting with frequent and regular lip smacking movements, movements similar to those that she displayed
when no intentional stimulation was present in her environment. Her mouth pulled to the left, her left arm was observed to ‘twitch’ a couple of times and her legs rose briefly under the sheets. There was no observable connection between Evelyn’s continuous and non-purposeful movements and the MTR’s steady and consistent presentation of Evelyn’s favourite song. Analyses of these behaviours lead to the categorisation of a neutral response.

Further examples of neutral behaviours included: At the beginning of Mamma Mia in MTI 10 (07:00 – 07:19) and during the song Blowin’ in the Wind in MTI 10 (14:50 – 15:00).

Acceptance.

The category acceptance was developed to denote moments when there was a pause, cessation, or reduction in the presentation of Evelyn’s neutral involuntary and repetitive facial and body movements. Acceptance behaviours were interpreted as a response during the MTIs. When describing an acceptance during the discourse the QR commented “her mouth is relaxed, still, and symmetrical when she is attending to you [the MTR] . . . her visible behaviour alters and her muscle tone changes” further, that “there was a cessation of one action in response to a new stimulus”.

The category was given the title acceptance to acknowledge that the observed stilling or relaxing was a positive response to the music, and, indicative of a reduction in agitation. For example, in MTI 4 significant acceptance behaviours were observed as Evelyn transitioned to sleep during the singing of Taylor Swift’s Love Story. A defining feature of acceptance was an absence of tension in Evelyn’s face. The acceptance behaviours were consistent across both MTI 4 and MTI 10.

 Behaviours indicative of acceptance were:

- A calm, still, and symmetrical facial expression. Evelyn’s eyebrows were slightly raised, eyes open, and her mouth/lips was relaxed and slightly open. There was an absence of the lip smacking and mouth pulling to the left movements.
• Stilling and relaxing of Evelyn’s left arm. In MTI 4 this included a slight relaxing of the dystonic left arm movements which allowed Evelyn’s arm to rest back on the pillow next to her head, and in MTI 10 a cessation or reduction of the repetitive, rotating left arm movements was observed.

• Stilling of Evelyn’s leg movements.

An example of acceptance behaviours occurred at the beginning of Jingle Bells in MTI 10 (12:34 – 12:48): After the MTR put down her guitar at the end of the song Knowing Me Knowing You, she took Evelyn’s left hand in her own right hand. Assisting Evelyn’s left hand, the MTR tapped a steady rhythm against her own left hand and began singing Jingle Bells (it was two days before Christmas) with only the basic rhythmic accompaniment. Evelyn’s previously consistent rotating left arm movement/thrashing paused, her arm relaxed as she made no attempt to pull away from the MTR’s gentle hand tapping. Evelyn’s face relaxed too, her eyebrows were slightly raised and there were only small lip smacking movements. Most notably, Evelyn was quiet; there were no plaintive vocalisations.

Other examples of acceptance behaviours included: The first presentation of the Hello Song in MTI 4 (01:31 – 01:45), the beginning of the song Waterloo in MTI 4 (04:40 – 04:47) and during the singing of Love Story in MTI 4 (13:10 – 15:33).

Recruitment.

This category of behaviours was titled recruitment as Evelyn displayed an overt and consistent physical tensing that was typically followed by a vocalisation, as if she were recruiting physical behaviours for the effort involved in producing a vocalisation. The QR made the observation, “perhaps there is a pattern of preparation that is needed before she can muster the effort to produce a sound”. A defining feature of recruitment was an observed tensing followed by a release (in the form of a vocalisation) or relaxing. The pattern of behaviours observed during recruitment was largely consistent across the MTIs in that
Evelyn inhaled, followed by a change in quality of arm movement, mouth movement, and leg movement. Recruitment was analysed to be a positive response during the MTI as it was indicative of a more active response to the music. However, given Evelyn’s recovery trajectory and subsequent different levels of functioning in MTI 4 and MTI 10, there were some subtle differences. At the time of MTI 10, Evelyn’s tracheostomy had been removed and she was spontaneously vocalising, however, the vocalisations observed after a recruitment were distinguishable from those present in Evelyn’s neutral behavioural state, by the behaviours that preceded them.

In MTI 4, recruitment behaviours were:

- A visible expansion of Evelyn’s chest as she inhaled.
- A large mouth movement in which Evelyn’s lips pull down to the left.
- Increased muscle tension in her left arm.
- Rising of Evelyn’s legs.

In MTI 10, recruitment behaviours included:

- A visible expansion of Evelyn’s chest as she inhaled.
- Tensing of Evelyn’s mouth.
- A pause in Evelyn’s repetitive left arm rotations, or a brief stilling of her left arm.
- Rising of Evelyn’s legs.

An example of recruitment behaviours occurred during the Hello Song in MTI 4 (at 02:24 – 02:34 on the video): The MTR simplified the Hello Song using the same chord progression to accompany her singing, but singing only the lyric “Hello”. As the MTR finished singing this simplified version of the song she paused. Evelyn’s left arm tensed backward, her mouth pulled to the left, her legs rose under the sheets and her chest rose as she obviously inhaled, then she vocalised. It was a very quiet vocalisation, produced through a speaking valve attached to her tracheostomy. However, the MTR mirrored the descending
intonation of this vocalisation on the word “Hi” before verbally acknowledging it by saying “I heard you use your voice then”.

Additional examples of recruitment behaviours also included: The end of the final phrase of the in the second repetition of the Hello Song in MTI 10 (01:13 – 01:34), during the chorus of Waterloo in MTI 4 (07:26 – 07:31).

Rejection.

The category rejection is the final category of observed behavioural response that occurred during the MTIs. Rejection behaviours were present only in MTI 10. The category was labelled rejection because Evelyn displayed an increase in the intensity of her neutral behaviours, as the QR described, “I wonder if she is annoyed at this point . . . she continues with plaintive cries approximately every 2-3 seconds, then a loud cry”. This, and other similar comments, described an overt increase in agitation apparently in response to the musical stimulus. During the discourse, the MTR queried if rejection behaviours were related to a potential overstimulation; “Whether or not [her response] . . . was . . . an escalation of agitation or she is not impressed . . . I wondered if the song was too overstimulating”. Rejection was analysed to be a negative response during MTI 10 because of this observed increase in agitated behaviours.

Rejection behaviours included:

- An increase in the intensity of Evelyn’s repetitive vocalisations, as evident in an increase in volume and force of the vocalisations.
- An increase in the frequency of Evelyn’s vocalisations.
- An increase in the frequency of Evelyn’s left arm rotating movement.
- An increase in the tension on Evelyn’s face, including eyebrows furrowed.

An example of rejection behaviours occurred during the song WATERLOO in MTI 10 (03:10 – 03:24): As the MTR sang the end of the chorus of the song the volume and
frequency of Evelyn’s vocalisations increased, her face appeared tense, and there was an increase in the frequency and force of the rotating arm movements of her left arm, there was an increase in the intensity of her behaviours. It was as though Evelyn was rejecting the music being sung by the MTR, and this resulted in an increase in Evelyn’s agitated, non-purposeful movements.

A further example of rejection behaviours occurred during the song Knowing Me Knowing You in MTI 10 (10:50 – 11:00).

Categories of MTR responses.

From analysis of the micro-descriptions and transcriptions of the discourse it emerged that the MTR responded to Evelyn’s behaviours in four distinct ways. The four categories of MTR responses were: Holding, Affirming, Enticing, and Containing. The MTR’s responses were inextricably linked to Evelyn’s behaviours. The titles of the categories of Evelyn’s behaviours are adjectives chosen to describe the behaviours. In contrast the titles of the categories of the MTR’s responses are verbs, chosen to reflect the active nature of the MTR’s responses.

Holding.

During moments when “[Evelyn] sets up a regular pattern of plaintive crying which does not seem to change for or with the music” (QR), the MTR was observed to musically support but not engage with Evelyn’s behaviours. This was categorised as a holding response. The MTR’s holding response was observed in response to Evelyn’s neutral behaviours. During a holding response the MTR was observed to sing ‘to’ Evelyn. While the tempo and timbre of the song were established to reflect the intensity of Evelyn’s behaviours, there was little or no interplay between the music and Evelyn. The QR observed during a holding response from the MTR that “your voice is a straight cover version of the original [song] . . . there is no sense that you are modifying it”. This was because the MTR presented a
consistent musical holding for Evelyn’s behaviours. The intention of a holding response was to hold a musical accompaniment for Evelyn’s behaviours and vocalisations to provide a structure and organisation for these non-purposeful behaviours. With the further intention that Evelyn may have an increased awareness of her behaviours within the musical structure, as stated by the MTR, “[I was] trying to provide structure to the cry and trying to provide some sense of the cry fitting in with the structure [of the song], and if it does, then you can change it, you can move it, but you have got to get that initial sense of belonging”. Holding responses were evident in both MTI 4 and 10.

The MTR’s holding response was indicated by:

- A steady, metered, and consistent singing of the song by the MTR.
- mp – mf volume of the song.
- Little adaptation of the song from its original form (i.e. a cover version of the song).
- A simple guitar accompaniment that emphasised the pulse of the song.

An example of a holding response occurred as the MTR sang the beginning of song *Waterloo*, during MTI 4 (at 04:47 – 04:57 on the video). Evelyn presented with neutral behaviours at the beginning of this song and the MTR continued singing in a consistent manner. The timbre of the MTR’s singing was bright, the lyrics of the song clearly articulated, and the melody line legato with little emphasis given to accents. The MTR maintained a steady volume and tempo and there was no obvious acknowledgment of Evelyn’s behaviours within the musical structure.

Further examples of a holding response included: At the beginning of *Mamma Mia* in MTI 10 (07:00 – 07:19), and during the song *Blowin’ in the Wind* in MTI 10 (14:50 – 15:00).
**Affirming.**

The MTR’s *affirming* response was observed to be congruent with Evelyn’s *acceptance* behaviours. The intention of an *affirming* response was to acknowledge and support Evelyn’s *acceptance* of the musical stimulus, and to maintain Evelyn’s response to assist the transition towards a more relaxed, less agitated state. The MTR commented, “when she is engaged with you in the moment everything stops because you are holding her” and that when this occurs, the affirming response is “about reducing the level of stimulation, moving towards a lullaby-ish type song” with the intention of calming Evelyn and reducing agitation. It was also noted by the MTR in MTI 4 that “she has dropped off to sleep and I am trying to support rather than engage”. A key component of the *affirming* response was supporting Evelyn’s *acceptance* to maintain a reduction in agitation.

The typical indicators of an *affirming* response included:

- A clear, legato melody line sung by the MTR.
- A sedate/calm singing of the song by the MTR, as indicated by decreased volume and tempo, and muted accents.
- A smooth guitar accompaniment (when guitar accompaniment present) with little or no attack.
- Little, or no, space left between phrases within the song, or between songs.
- mp – p volume, with little variation in the volume.

An example of an *affirming* response occurred in MTI 10 (12:34 – 12:48): Evelyn was observed to relax as the MTR began singing *Jingle Bells*, Evelyn was *accepting* of the musical stimulus. In response to this, the MTR was observed to continue singing the song but in a deliberately calm manner, slowing the tempo and maintaining a low volume. As Evelyn’s rotating arm movements were briefly contained in the tapping of the rhythm, the
MTR sang the melody line in a clear legato fashion, leaving no gaps in the lyric line to minimise any opportunity for Evelyn to lose awareness or concentration.

Further examples of the MTR affirming Evelyn’s responses included: The first presentation of the Hello Song in MTI 4 (01:30 – 01:45), the beginning of the song Waterloo in MTI 4 (04:40 – 04:47) and during the singing of Love Story in MTI 4 (13:10 – 15:33).

**Enticing.**

The category enticing emerged after analysis of the MTR’s responses to Evelyn’s recruitment behaviours. The title of this category emerged as the MTR was observed to encourage Evelyn’s recruiting behaviours, anticipating and affirming her behaviours within the structure of the song, that is, enticing Evelyn into a response. During a moment of enticing Evelyn, the MTR was observed by the QR to be “smiley” in her presentation; “I would say (my response) is quite excited, very welcoming of her contribution” (MTR). The QR described that during an enticing response the MTR was “waiting and anticipating her response”.

The MTR’s enticing response frequently had two components: first, encouraging and arousing a recruitment response from Evelyn by offering space within the musical structure, giving Evelyn increased time to respond, and second affirming and acknowledging any vocal response by mirroring the pitch, contour, and attack of Evelyn’s vocalisation. The mirroring of Evelyn’s vocalisation was intended to increase Evelyn’s awareness of the music and the MTR during the MTI. During moments of an enticing response from the MTR, there was a sense that the MTR was singing ‘with’ Evelyn, the pair forming a dyad within the music.

An enticing response was most typically indicated by:

- An overt ritardando in the music.
- An increased emphasis on the musical accents.
- Pauses in the lyrics of the songs to offer space for Evelyn to respond.
• A bright and happy vocal timbre.
• Gestural mirroring of Evelyn’s behaviours, including mirroring a large inhalation.
• Vocal mirroring of Evelyn’s vocalisations.

An example of an enticing response occurred during the Hello Song in MTI 4 (at 02:10 – 02:34 on the video): The MTR simplified the Hello Song, significantly slowing the tempo, simplifying the lyrics of the song so she was just singing “Hello”, and accompanying each repetition of the lyric “Hello” with a down strum on the guitar The MTR incorporated pauses and space into the simplified version of the Hello Song, offering Evelyn time to process the stimulus and time to produce a response. Evelyn vocalised as the MTR finished the simplified Hello Song with a V7-1 chord progression on the guitar. The MTR mirrored the descending intonation of this vocalisation on the word “Hi” before verbally acknowledging it by saying “I heard you use your voice then”. The MTR’s vocal timbre was bright and high pitched, and the smile on the MTR’s face was evident in this timbre.

Additional examples of an enticing response from the MTR were evident: During the Hello Song in MTI 4 (02:10 – 02:34), during the in the Hello Song in MTI 10 (01:13 – 01:34), during the chorus of Waterloo in MTI 4 (07:20 – 07:40).

Containing.

This final category of the MTR’s responses was classified as containing. When Evelyn was observed to be rejecting the musical stimulus the intention of the MTR’s response was to contain the increased intensity of Evelyn’s behaviours so that they would not escalate into increased agitation. The MTR reduced the level of musical stimulation by simplifying the guitar accompaniment and emphasising the basic musical elements, i.e. rhythm, to minimise and contain Evelyn’s rejection of the music. In reducing the level of stimulation present in the song, the MTR was aiming to make the song neurologically simpler to process, reducing the potential that the music was overstimulating. The MTR emphasised
the pulse of the songs during a containing response to accentuate the organisation inherent in the structure of the song.

As with Evelyn’s rejection behaviours, containing was observed only in MTI 10. The MTR reflected on a moment of containing, stating during the discourse with the QR “I wondered if the song was too overstimulating and I change the guitar accompaniment to strumming on the beat, a much simpler accompaniment”.

A containing response was indicated by:

- The MTR simplifying the guitar accompaniment of the song.
- Emphasis on the beat of the song, including strumming on the beat in the guitar accompaniment.
- A slow tempo.
- A steady, clearly enunciated lyric line.
- $mf$ - $f$ volume.

An example of a containing response occurred during the song Waterloo in MTI 10 (03:10 – 03:54): An increase in the intensity of Evelyn’s behaviours was observed, and in response the MTR altered the guitar accompaniment to a strumming on the beat pattern that emphasised the rhythmic structure inherent in the song, aiming that this would emphasise an external organisation and structure for Evelyn’s escalating behaviours. The MTR also slightly increased the volume of her singing, and clearly enunciated the lyric line to match the increased energy of Evelyn’s behaviours.

An additional example of a containing response was evident during the song Knowing Me Knowing You in MTI 10 (10:50 – 11:20).

**The interpretation of Evelyn’s and the MTR’s responses during the MTIs.**

As briefly detailed above, the categories of MTR response were inextricably linked with the categories of Evelyn’s behaviour; this is visually described below in Table 6.
Table 6.

The Development of the MTR’s Responses Contingent on Evelyn’s Responses

<table>
<thead>
<tr>
<th>Evelyn</th>
<th>MTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neutral</td>
<td>Holding</td>
</tr>
<tr>
<td>Acceptance</td>
<td>Affirming</td>
</tr>
<tr>
<td>Recruitment</td>
<td>Enticing</td>
</tr>
<tr>
<td>Rejection</td>
<td>Containment</td>
</tr>
</tbody>
</table>

As presented in Table 6, the MTR responded to Evelyn in a musically contingent way during the MTIs, deriving and adapting the musical elements of the familiar songs in direct response to Evelyn’s behaviours. In this interpretation of Evelyn’s behaviours and the MTR’s response, the concept of an Island of Awareness was evident. When data collection for this study was undertaken, Evelyn was diagnosed as being in PTA, that is, she was emerging from coma and remained in a state of reduced consciousness. Evelyn’s responses during the MTIs were restricted by the severity of her injury, and during the MTIs she displayed at times brief, but consistent and repeated periods of awareness and responsiveness to the contingent music stimulus. For the purpose of this study, these periods are defined as Islands of Awareness to denote that they were isolated but repeated episodes of awareness within Evelyn’s predominate state of non-responsiveness (Qiu, 2007; Schiff, 2005).

Evelyn did not present with continuous awareness of the music during the MTIs, and during the periods of no-awareness Evelyn presented with neutral behaviours. However, it was during the Islands of Awareness that Evelyn was available to be responsive to the music and presented with acceptance, recruiting, and rejection behaviours.

The interpretation of Evelyn’s behaviours and the MTR’s responses explored in this study is that the MTR offered a consistent musical holding for Evelyn’s behaviours. This musical holding offered an Environment of Potential. There was no expectation of Evelyn, however when Evelyn presented with an Island of Awareness, an island of availability for
response also emerged, and the MTR adapted the song in contingent manner offering the potential to maximise the Island of Awareness. The contingent adaptations of songs included the affirming, enticing, and containing responses from the MTR. Through holding a consistent Environment of Potential, that was accessible to Evelyn’s level of emerging consciousness, there was the potential for sustaining, progressing, and/or altering Evelyn’s behaviours during an Island of Awareness.

The concept of Islands of Awareness in patients with a severe TBI will be explored in greater detail in Chapter 5. The above interpretation of Evelyn’s behaviours and the MTR’s responses during the MTIs will also be integrated into current theories and literature in Chapter 5.

**Chapter Summary**

This chapter presented a detailed medical and demographic description of the single case explored in this intrinsic mixed methods case study. Both qualitative and quantitative outcomes of the study were presented. Quantitative results revealed poor inter-reviewer agreement between the two reviewers who rated Evelyn’s agitation at the ‘during’ and ‘post’ MTI time period. These quantitative results are therefore inconclusive in answering the main research question.

Four categories of Evelyn’s behaviours during the MTIs emerged from analysis of the qualitative data, and three of these categories of behaviours were indicative of a response to the familiar songs. The MTR responded to these distinct behaviours with four corresponding categories of response. Further analysis of these categories lead to the interpretation that by providing a consistent and contingent musical holding for Evelyn’s behaviours, the MTR was able to offer an Environment of Potential to maximise Evelyn’s Islands of Awareness. The following chapter will discuss these results from the quantitative and qualitative analyses,
integrating these results with current theories and then discuss the limitations of this study, and implications for future research with children experiencing agitation during PTA.
CHAPTER 5

DISCUSSION

In this intrinsic case study, empirical and descriptive data were collected pertaining to the use of music therapy for a 10-year old child experiencing agitation during PTA. The central research question was: Is music therapy effective in reducing agitation in a 10-year old child during the PTA phase of recovery following a severe TBI? The quantitative objectives of the study addressed the ‘during’ and ‘post’ intervention effect of music therapy and the qualitative sub-questions explored the behaviours of the responses of the participant and the MTR during the music therapy interventions. Quantitative and qualitative data were collected and analysed to produce the fullest possible picture of the intrinsic case.

Given the fundamentally different nature of the outcomes of the mixed methods of data collection, the quantitative and qualitative results will be discussed separately in this chapter. Following this, components of the study design will be discussed, and then recommendations made for further study of the use of music therapy with children experiencing agitation during PTA. The chapter concludes with potential contributions of this study to the fields of music therapy and clinical paediatric neurosciences.

Discussion of Results

Evelyn represented a truly ‘intrinsic’ case study according to Stake’s (1995) definition, as analysis of the qualitative data presented the MTR with an extraordinary opportunity to examine her severely limited range of behaviours and response during the MTIs. This opportunity is not available in clinical practice where it is not possible to pause, rewind, and review time, and the minutiae may not be decipherable within the larger context of the critically ill patient in an acute hospital setting.
Evelyn was 10-years old when she sustained an extremely severe TBI. According to Russell’s (1971) early description of injury severity, a period of PTA lasting greater than seven days is indicative of a very severe TBI (see Table 1 in Chapter 2). Evelyn remained in PTA for over five months. This extended duration of PTA and Evelyn’s medical imaging results (see page 61) were evidence of the extremely severe nature of her TBI. This injury severity and the morbidity that resulted from the TBI meant that at, the time of data collection in this study, Evelyn was non-verbal, had severely impaired receptive and expressive language skills, was non-ambulant, had severely impaired gross and fine motor functions, was in a state of severely impaired consciousnesses, and had profoundly impaired cognitive functions. This resulted in considerable limitations in her ability to display agitated behaviours limiting the quantitative measure the effect of music therapy on this agitation. However, the qualitative analysis enabled a unique in-depth exploration of the complex and idiosyncratic behaviours of a child with an extremely severe TBI during music therapy.

**Discussion of quantitative results.**

The overall intention to explore the effect of music therapy was attempted by measuring the ‘during’ and ‘post’ intervention effect. Using the ABS, Reviewer 1 reported a statistically significant ‘during’ intervention effect of music therapy in reducing Evelyn’s agitation. Reviewer 2 did not corroborate this finding, and consequently no conclusions can be drawn about the effectiveness of music therapy in reducing Evelyn’s agitation ‘during’ the music therapy intervention. Neither reviewer reported a statistically significant effect of music therapy in reducing Evelyn’s agitation immediately ‘post’ the MTI as scored using ABS. That is, Evelyn was not less agitated after the MTI than she was before the MTI. Therefore, quantitative data analysis yielded inconclusive results in answering the main research question.
It is noteworthy, that on several occasions the reviewers indicated on the ABS that Evelyn had an increased presence of agitation after the MTI (e.g. MTIs 4 and 8; see Figure 2 in Chapter 4). Potentially this was related to factors other than the MTI, including the extraneous noise present in the high dependency unit of the CNC where Evelyn was situated, medical and nursing intervention that occurred during the MTI, or internal physiological states that Evelyn was unable to communicate. An alternate possible explanation for this reported increase in agitation is that, despite rigorous attention to Evelyn’s state, components of the MTI were overstimulating for Evelyn. Evelyn’s damaged cognitive processes and altered state of consciousness may have impaired her ability to process the combination of musical elements presented in the familiar songs and resulted in an increase in her agitation. This is contrary to the findings of Baker (2009) who found familiar music to be suitable for the cognitive capacity of the adult participants in her study and, further that it was effective in reducing agitation. However, there are several notable difference between Baker’s (2009) study and the current study. Baker’s study was undertaken in a sub-acute rehabilitation facility with participants who were not acutely unwell and had higher levels of cognitive and communicative abilities as evident in the ability required to undertake the Westmead PTA Scale (Baker, 2009). By contrast, Evelyn was in a protracted early acute stage of coma emergence and presented with severely impaired cognitive and communicative abilities at the time of data collection.

A further explanation for the reported increase in agitation may have related to Evelyn’s profoundly reduced repertoire of responses during this phase of her recovery. Evelyn presented with a limited range of behaviours. In the qualitative review of the video footage it was considered that the same range of behaviours was used for all response to stimulation and that the intention of the behaviours was evidenced in changes in the quality of the behaviours rather than a completely different set of behaviours.
The use of familiar songs during the therapeutic interventions may have stimulated a range of intact and damaged cortical and subcortical processes that had an excitatory effect on Evelyn’s levels of arousal and responsiveness. However, with a limited range of behaviours, this increase in responsiveness may have appeared to the reviewers as an increase in agitation post the MTI. The quality of Evelyn’s behaviours at every pre, during, and post time periods is worthy of further consideration. The qualitative analysis and interpretation presented below offers some initial insights.

**Limitations of the quantitative component of the study.**

While Evelyn met the inclusion criteria, she presented at the extreme end of injury severity, which resulted in limitations in the collection, analysis, and results of the quantitative data. Measuring a ‘post’ intervention effect of music therapy assumed that music therapy would have a sustained effect in reducing agitation, which would have been a more appropriate expectation for other potential participants, with a less severe TBI. It could reasonably be expected that such children would have had a greater capacity for maintaining engagement in, or responsiveness to the MTI, subsequently increasing the likelihood that music therapy have a more sustained effect on their behaviours (for example, the patients more similar to Simone discussed in Chapter 1). However, enrolment of such participants did not eventuate. Given the significant disruption to Evelyn’s cognition and only intermittent Islands of Awareness, there was limited possibility that any outcome of music therapy would be maintained. Therefore attempting to measure this may have yielded contradictory results that impacted on the inconclusive nature of the quantitative results presented in this study. In future research, it may be more appropriate to rate agitation during an Island of Awareness when aiming to measure the effect of music therapy.
Poor inter-reviewer agreement.

Currently, the ABS (Corrigan, 1989) is the only tool validated for use with patients experiencing agitation during PTA. While developed for use with adult patients, high inter-rater reliability has been reported when the ABS has been used with children (Kaitz et al., 2006). This was not the case in the study, and presented a limitation in the results of the analysis of the quantitative data. Poor inter-reviewer agreement on the ABS may have resulted from the two reviewers receiving insufficient training in using the ABS. While the two reviewers were highly skilled in working clinically with children in PTA, and both had experience conducting research with this population, their skill level did differ and this may also have affected their scoring of the ABS.

Appropriateness of the ABS.

The reviewers’ scoring of the ABS in this study indicated the ABS was not sufficiently sensitive to capture the limited behavioural presentation of agitation in a child with an extremely severe TBI. Evelyn was clinically described as agitated however the two reviewers recorded only low scores on the ABS, indicating that Evelyn was not agitated according to the original criteria of the ABS (Bogner et al., 2000; Corrigan, 1989; Corrigan & Bogner, 1995). A number of the items rated on the ABS were inappropriate for Evelyn’s level of functioning at the time of data collection, resulting in Evelyn scoring a #1 and therefore indicating that the behaviour was absent. The behaviour was likely absent because it required a higher level of functioning than Evelyn was capable of, not because Evelyn did not present with agitation. For example; (8) wandering from the treatment area – Evelyn was non-ambulant at the time of data collection and therefore not able to wander from her hospital room, (11) rapid, loud or excessive talking – Evelyn remained non-verbal for the duration of the data collection. Further qualitative studies may generate descriptors that better articulate the behaviour range of a child with an extremely severe TBI. This is congruent with the
mixed methods methodology where quantitative or qualitative data can inform the other in subsequent studies.

*Time constraints.*

The 10-day data collection period was also a potential limitation of this study. Evelyn was in PTA for over 5 months, and repeating the study protocol at various time points may have yielded a greater range of behaviours and responses for exploration, offering a more complete exploration of music therapy during Evelyn’s progression through PTA. The MTR decided against multiple data collection points, as the initial intention of the study was to explore the use of music therapy in the early acute phase of PTA following a severe TBI, and further, at the point at which this decision was made it was unclear how many participants would be recruited for this study. Additionally, ethics approval was only gained for one series of MTIs per participant.

As briefly mentioned in Chapter 3, a significant real world constraint of this study was the time available for recruitment and data collection. The recruitment period lasted approximately eight months and this restricted the number of potential participants in the study, ultimately resulting in the enrolment of only one participant. The study was designed so that recruitment occurred during the summer school holidays, which is clinically acknowledged as a likely period of increased trauma admissions to the hospital. Despite this, there were an unprecedented low number of children aged 2-14 years who presented with agitation during PTA during this time period. Therefore, the recruitment of only one participant necessitated that the qualitative analysis reflect and foster the development of rich description of behaviours and responses during the MTIs.

**Discussion of the qualitative results.**

As presented in the previous chapter, the four categories of Evelyn’s behaviours were; *neutral, acceptance, recruitment,* and *rejection.* Defining and delineating the distinction
between neutral behaviours and acceptance, recruitment, and rejection behaviours is an important contribution of this study, as these responses have not previously been identified in the literature. The distinction is that neutral behaviours were not a response during the MTIs but an indication of Evelyn’s usual agitated state, and the other three categories were an observed behavioural response to the familiar songs. Whilst not necessarily a reduction in agitation, responses to intentional stimulation (i.e. acceptance, recruitment, and rejection behaviours), from a child emerging from coma were a positive indicator of emerging cognitive function and subsequent recovery (Taylor, Aird, Tate, & Lammi, 2007). Inconsistent and erratic responses are characteristic features of PTA and are indicative of general cognitive disturbance and neural reorganisation (Ahmed et al., 2000; Fugate et al., 1997; Lequerica et al., 2007; Taylor et al., 2007), and the inconsistent and erratic nature of Evelyn’s responses was likely compounded by the extremely severe nature of her TBI. As briefly discussed in the previous chapter, Evelyn presented with brief and intermittent Islands of Awareness during the MTIs, and during these islands she frequently displayed a response to the familiar music. However, given Evelyn’s profoundly impaired consciousness and cognitive abilities, these islands were not typically of sufficient duration for Evelyn to maintain a behavioural response. The intention of the MTR’s contingent musical responses was to maximise these islands.

**Evelyn’s behaviours and the MTR’s responses.**

The categorisation of Evelyn’s behaviours elucidated changes that were not completely different behaviours, but instead, a change in the quality of her behaviours. For example, rejection behaviours were indicated by an increase in the force, volume, and frequency of vocalisations, an increase in the rate of non-purposeful left arm movements, and an increase in the tension present on Evelyn’s face, compared to the presence of these behaviours during a neutral presentation. Further, acceptance behaviours were indicated by a
decrease in rate or pause in the behavioural elements present during a neutral presentation. So even at the extreme point, the difference between acceptance and rejection behaviours was observed only as an increase or decrease in the frequency and intensity of lip smacking, left arm movements, and vocalisations.

Evelyn’s behavioural responses were contextually bound to the stimulus provided by the MTR, that is, the behaviours were observed in response to the contingent presentation of the familiar songs and not as stand alone behaviours. Contingent on Evelyn’s behavioural presentation and responses during the MTIs, the MTR responded in four distinct ways; holding, affirming, enticing, and containing. The MTR adapted the presentation of the familiar songs directly related to Evelyn’s behaviours.

**The minimally conscious state and Islands of Awareness.**

The concept of an Island of Awareness was derived from the literature pertaining to patients in a minimally conscious state (MCS) following neurological trauma, disease, or degeneration (Qiu, 2007). The MCS is defined as “a condition of severely altered consciousness in which minimal but definite behavioural evidence of self or environmental awareness is demonstrated” (Giacino et al., 2002, pp. 350-351). The MCS is a distinct state of emergence from coma and may be a permanent state, or some individuals may progress through PTA to full consciousness and functional recovery (Ashwal & Cranford, 2002; Giacino et al., 2002; Taylor et al., 2007). Patients in a MCS may display Islands of Consciousness (Qiu, 2007). That is, patients display inconsistent periods of cognitively mediated behaviours, however the behaviours are reproducible and sustained for sufficient duration that they may be differentiated from a reflexive or automatic behaviour (Ashwal & Cranford, 2002; Giacino et al., 2002). These behaviours occur in response to relevant stimulation and are indicative of periods of consciousness within a general state of severely impaired consciousness (Giacino et al., 2002). Schiff (2005) proposed that patients in a MCS
present with instability in initiating, maintaining, and completing behaviours. The neural substrates of the MCS are largely unknown but are thought to include bilateral multifocal or diffuse injury to the cortical and/or subcortical regions, or focal injury of the brain stem (Ashwal, 2003; Ashwal & Cranford, 2002).

From the above descriptions of MCS, it could appear that Evelyn fits this classification. However, it is important to note that Evelyn was diagnosed as being in the transient phase of PTA during the data collection period of this study. PTA, as a phase of neural reorganisation during coma emergence, is characterised by reduced consciousness and impaired cognition, orientation, and memory (Corrigan et al., 1992; Zafonte et al., 1997) and Evelyn’s presentation was further impacted by the severity of her TBI. At the time of the medical team diagnosing Evelyn’s state, it was anticipated that she would make significant functional gains within the first 12 months following her injury, and that her presentation would be transient resulting from early neural reorganisation. Further, the presence of agitation was assessed to be indicative of PTA and not MCS. However, given the severe diffuse cortical and subcortical injury that Evelyn sustained, she displayed only short and infrequent Islands of Awareness during the MTI, and for the purpose of interpreting Evelyn’s behaviours during the MTIs, a parallel between Evelyn’s presentation during PTA and the presentation of a patient in a MCS was drawn.

Evelyn’s Islands of Awareness were, for the most part, observed to be only long enough for her to demonstrate an initial behavioural response to the familiar music. While these behaviours were an active response to the song, the Islands of Awareness were not typically long enough to engage in a sustained musical or other interaction with the MTR. The familiar songs were therapeutic in the context of offering contingent stimulation to maximise Evelyn’s emerging consciousness and cognition on a sensory level. The naturally occurring presence of an extended duration of an island resulted in a greater potential for the
MTR to use music to impact on Evelyn’s behaviours and potentially decrease her agitation. For example, a sustained *acceptance* was observed during the final song of MTI 4 (*Love Story*, 12:35 – 15:32 on the video) and the MTR supported and maximised this behaviour set with an *affirming* response, and subsequently, Evelyn settled to sleep. Sleep represented a significant decrease in Evelyn’s agitation. It is noteworthy that in the clinical work with Evelyn once data collection concluded, Evelyn continued to transition through PTA, and presented with more frequent and longer Islands of Awareness. During these the MTR did use familiar songs to support and impact Evelyn’s behaviours and responses.

It is clinically accepted at RCH that patients in PTA following a moderate to severe TBI present with periods of awareness and lucidity as the brain reorganises during the emergence to consciousness. Further, as the child progresses through PTA these periods will become more frequent and extended in duration. Hence, a music therapist could utilise familiar music to have a greater impact on the child’s behaviours, and therefore a greater reduction in agitation may be observed.

**Music therapy to promote an Environment of Potential.**

The principal aim of interventions with patients in states of reduced consciousness is to harness and nurture any available response (Jones, Hux, Morton-Anderson, & Knepper, 1994; Owen, Schiff, & Laureys, 2009; Turkstra, Holland, & Bays, 2003), and as stated by Jones et al., “a primary goal of rehabilitation professionals who advocate coma stimulation treatment is to increase a patient’s responsiveness and, thus, foster further recovery” (1994, p. 164). Further, it has been argued that rehabilitation should commence early in the patient’s acute phase of recovery, even while the patient is still mechanically ventilated, to maximise the potential for cognitive recovery (Gelling et al., 2004). For Evelyn, the MTR offering a contingent Environment of Potential to nurture her available responses may have increased the potential for maximising cognitive gains in the early acute stages of recovery. The use of
music therapy as an early rehabilitative intervention following neural damage has been explored by Forsblom and colleagues (2009) who reported that listening to familiar recorded music provided physical and mental activation in the early stages of recovery following stroke in 20 adults patients.

The concept of an Environment of Potential has been previously considered in the literature at a broad level. Jones and colleagues (1994) surmised that patients in the early stages of recovery following severe neurological trauma may not receive sufficient sensory stimulation to encourage the recovery of cognitive processes and consciousness. The use of familiar songs is perhaps the most obvious music intervention to promote optimal recovery thereby countering the potential for under-stimulation resulting from profound neural damage, because, “the refinement of behavior brings changes in experiences, which in turn alter the brain” resulting in improved cognitive functioning and consciousness (Turkstra et al., 2003, p. 604). Therapeutic interventions that provide opportunities for sensory enrichment may counter the risk of under-stimulation and enhance cognitive functioning, environmental awareness, and interactive capabilities. Within this study it was evident that aspects of the familiar songs during MTIs were successful in providing an Environment of Potential to maximise Evelyn’s responsiveness. Two interpretations of this concept were evident and are discussed below.

*Familiar music to support a naturally occurring Island of Awareness.*

Firstly, familiar music was utilised as a supportive strategy to maximise Evelyn’s potential to respond when an Island of Awareness emerged as an organic process during early PTA. This was illustrated when Evelyn presented with an extended Island of Awareness towards the end of MTI 4 and displayed an acceptance response to the song. The MTR supported Evelyn’s acceptance and transition to sleep by responding with an affirming musical response, which included the sedate and calm singing of the familiar song with
legato melody line and simple guitar accompaniment. By holding a consistent musical environment that was accessible to Evelyn’s level of emerging consciousness, there was the potential for the MTR to utilise familiar music to support, progress, and/or alter Evelyn’s behaviours.

*Familiar music to stimulate an Island of Awareness.*

Secondly, familiar songs were successful in exciting a response and stimulating an Island of Awareness. A notable finding of this study was that Evelyn frequently presented with a behavioural response at the quintessential moments in her favourite songs, particularly Abba songs. During the discourse between the MTR and QR, the QR highlighted these consistent behavioural responses from Evelyn during familiar songs, saying, “We see [responses] at key moments in this song, which are the most identifiable moments . . . So I think it is about the familiarity of the song”. The quintessential moments are the most recognisable moments of songs. In the MTIs, they were:

- As the MTR lead into the chorus of *Waterloo* in MTI 4 (7:00 – 7:07 on the video) singing, “…the history book on the shelf, is always repeating itself. Waterloo . . .” Evelyn presented with recruitment behaviours.
- During chorus of *Mamma Mia*, as the MTR sang the line “yes, I’ve been broken hearted, blue since the day we parted, why why . . .” (11:05 – 11:15), Evelyn presented with recruitment behaviours.
- As the MTR began singing *Waterloo* in MTI 10, Evelyn briefly displayed acceptance behaviours (2:17 – 2:26).

While not possible in this study to verify if contingent presentation of familiar songs supported or stimulated an Island of Awareness, or both, Evelyn’s responses add weight to the previous clinical precedent for the use of familiar, pre-composed songs with children in states of reduced consciousness.
The significance of familiar songs.

In a paper summarising studies of sensory stimulation for patients in altered states of consciousness, Turkstra and colleagues (2003) suggested that cognitive rehabilitation may be more effective if the stimuli are important to the patient. Experimentation with auditory stimulation such as recorded familiar music, nature sounds, and familial voices, has been shown to induce a widespread neural activation in adult patients in a MCS (Jones et al., 1994; Oh & Seo, 2003). These results encourage the use of auditory stimulation, including familiar music, as a cognitive rehabilitative therapy for patients in reduced states of consciousness (Jones et al., 1994; Laureys, Owen, & Schiff, 2004).

In reports of clinical programs, music therapists have advocated that familiar songs may require less cognitive processing than non-familiar music because of the predictability, structure, and comfort inherent in the songs (Kennelly & Edwards, 1997; Purdie, 1997; Rosenfeld & Dun, 1999). Further, in her study of familiar songs to reduce agitation in adult patients in PTA, Baker (2009) concluded that familiar songs were repetitive, familiar, and simply structured, ensuring a match between the level of stimulation presented and the cognitive capacity of the study participants. Also, that the songs increased the level of organisation in the participant’s behaviours (Baker, 2009). Evelyn’s consistent responses at the quintessential moments familiar songs suggest that the inherent structure and predictability of familiar songs stimulated the neural capabilities required to organise a meaningful response, and therefore support the findings of Baker’s study that familiar songs were appropriate to the cognitive capacities and level of consciousness of participants.

The contingent adaptations of familiar songs by MTR may have offered the opportunity to maximise Evelyn’s availability for meaningful sensory input during an Island of Awareness, therefore stimulating cognitive rehabilitation and consciousness recovery. The inherent structure and emotional salience of the familiar songs potentially stimulated global
neural activity, including the more intact limbic regions of Evelyn’s brain, organising the behaviours required to maximise responsiveness (Koelsch, 2009; Mithen, 2009; O’Callaghan, 1999; Peretz & Zatorre, 2005; Thaut, 2005a, 2005b).

*The Hello Song.*

Evelyn also displayed consistent behavioural responses during the *Hello Song.* The MTR first used the *Hello Song* during MTI 4, and continued to use the song at the beginning of every MTI. Arguably this song was not a pre-morbidly familiar song. The song was an adaptation of the well-known *Goodnight Ladies,* and was chosen because of its repetitive, basic structure. The song was harmonically simple (using only tonic, sub-dominant, and dominant chord accompaniment) and had a simple, repetitive melody that was constructed within a narrow pitch range of less than an octave, and contained predominantly consonant intervals. Schellenberg and Trehub (1996) hypothesised that humans have innate attentional preference and processing disposition for musical tones with simple ratios, as were present in the *Hello Song.* Given these musical aspects, this traditional folk song was potentially familiar and predictable in its general form and structure. The *Hello Song* was introduced by the MTR to utilise repetition of Evelyn’s name, as studies have suggested that one’s own name is a familiar stimulus that automatically stimulates attention (Laureys, Perrin, & Bredart, 2007). During the *Hello song* in both MTI 4 and MTI 10 Evelyn consistently presented with behaviours that were categorised as a response. This may have been because of the musical structure or the use of her name during the song. However, is nonetheless indicative that the song was appropriately suited to her emerging cognitive capacities and was therefore successful in facilitating intentional responses that were fundamental in the early cognitive recovery of a child in an altered state of consciousness.
Mother-infant musicality.

As described in Chapter 2, mother-infant musicality was a foundational theoretical framework for the use of music therapy with children during PTA and the development of this study. Similar to a mother offering an infant a contingent musical environment to expand the infant’s interactive capability and subsequently foster cognitive development (Papousek, 2007), the MTR offered Evelyn a contingent musical environment that maximised her Islands of Awareness. Infants regulate their arousal within the context of a contingent relationship with their caregiver, typically their mother (Bigsby, Coster, Lester, & Peucker, 1996; Trevarthen & Aitken, 2001; Tronick, 1998). The dyadic system that results from the mother-infant interaction is more complex, more coherent, and contains more information than the infant’s state alone and subsequently broadens the infant’s repertoire of experiences which results in cognitive development (Tronick, 1998). The mother’s decisions relating to modification of aspects of the dyadic interaction are influenced by the behavioural responses of the infant.

The transmission of information during a mother-infant interaction occurs on a pre-verbal, emotional level not reliant on higher cognitive language capabilities (Trehub, 2001; Trevarthen & Malloch, 2002). Further, the use of the parameters of preverbal communication may also be effective in older children whose communicative and interactional competencies are damaged (Papousek & Papousek, 1992). The early mother-infant interactions described above are predominantly musical in their presentation and it has been hypothesised that it is the musical elements present in a mother’s speech that are fundamental in successfully engaging and maintaining the infant’s interest in the interaction (Fernald, 1991; Trehub, 2003). It is the temporal and prosodic elements in these early vocal interactions that are fundamental to successful interaction on a preverbal level (Trevarthen & Aitken, 2001).
The infant’s intrinsic ability to participate in preverbal, musically based interaction is likely mediated by the subcortical regions of the brain, particularly the limbic system (Trevarthen & Aitken, 2001). These neural structures are also integral in processing musical stimuli, particularly the emotional components of music (Peretz, Gagnon, & Bouchard, 1998; Samson et al., 2009; Thaut, 2005a). The implication of this knowledge for a child with an extremely severe TBI, with extensive cortical damage presenting in an altered state of consciousness is well summarised by Trevarthen and Malloch (2002) who stated, “we believe that music is therapeutic because it attunes to the essential efforts that the mind makes to regulate the body . . . in its purposeful engagements with the objects of the world, and with other people” (p. 13), and further, that music is a “bridge of communication, experience, and learning” (p. 17). For Evelyn, music offered in a contingent manner by the MTR facilitated a response to a meaningful stimulation. The neural processing of music was likely mediated through a global network of connections. During Islands of Awareness, music with its inherent temporality stimulated an ability to organise a response in a child presenting in a prevailing state of neural disorganisation (Thaut, 2005b).

Despite the strong parallels with mother-infant interaction, it was not possible for music therapy to be an interpersonal process with Evelyn. Early mother-infant interaction relies on the presence of adequate responsiveness from both partners in the dyad (Papousek & Papousek, 1992). Trevarthen and Aitken (2001) further highlighted that for an infant to be able to contribute to the dyad of mother-infant interaction he/she must present with the rudimentary aspects of consciousness and intentionality. The interaction occurs on an interpersonal level as each partner of the dyad is aware of the others intention to interact, the infant displays a level of self-awareness (Trevarthen & Aitken, 2001). Laureys and colleagues (2007) described an awareness of the self as a more complex concept than an awareness of the environment or stimulation present in the environment. Self-awareness
permits an individual to understand their own behaviours and the behaviours of others, requiring a mental representation of the self versus others and the ability to distinguish stimulation relevant to the self (Laureys et al., 2007; Norhoff et al., 2006). During the MTIs, Evelyn presented with awareness of intentional sensory stimulation (the familiar songs) but a level self-awareness was not observed, and was likely not present given Evelyn’s severely interrupted cognitive processes and consciousness.

Music therapy as sensory stimulation not an interpersonal process.

Music therapy with Evelyn was predicated on sensory stimulation and not an interpersonal process. The presence of an attuned partner (the MTR) to offer the music in a contingent manner was fundamental in maximising the Evelyn’s potential to respond to the music. Without the self-awareness required to participate in an interpersonal process with the MTR, Evelyn was not an attuned partner in the intervention. However, the MTR was an attuned partner who could alter the sensory stimulation (familiar songs) in a way that accommodated, acknowledged, altered, and/or supported Evelyn’s responses when they were observed during an Island of Awareness. The use of music as a sensory stimulation reflected Evelyn’s stage of recovery.

Music therapists working with adult clients have also noted the importance of holding the therapeutic space at a sensory level. De Baker (2008) described the use of music therapy as sensorial play during instrumental improvisation with patients during an episode of acute psychosis. De Baker described how sensorial play occurred when the patient was able to play a musical instrument but unable to engage in joint music making with the therapist, remaining perceptually and emotionally detached. This inability to participate in joint music making was a result of the patient’s pathology. De Backer described the role of the music therapist during sensorial play stating: “In his/her therapeutic desire the therapist will continuously try to come into resonance in his/her musical play with the sensorial play of
the patient. The therapist hopes that the musical form he/[she] is playing will graft themselves onto the sensorial play of the patient, so the first contact originates in which the patient can co-resonate for a moment” (De Backer, 2008, p. 99). Sensorial play preceded moments of synchronicity and musical form in which the music therapist and patient experienced being equal within the improvisation. Musical form was perceived by De Baker as an inter-subjective experience, that allowed the patient to experience a sense of coherent organisation (De Backer, 2008).

During the sensorial play, the music therapist adopted empathic listening and created enduring musical conditions in the hope that his/her playing would “graft themselves” onto the playing of the patient (De Backer, 2008, p. 99). With Evelyn, the MTR held the musical environment to provide a coherent organisation and structure for Evelyn’s neutral behaviours until Evelyn presented with an availability to respond. Then the MTR attempted to more actively engage her in the music to extend her awareness of the sensory stimulation.

Andsell (1995) described a similar situation of using improvised music to accompany the playing of individuals who remain isolated within their own playing and unaware of the music therapist’s presence in an improvisation. The therapist is described as musically reaching out to the individual, but it is only when the individual becomes aware of the therapist’s response to him/her that the therapy can progress (Andsell, 1995). Once a musical response has occurred communication within the music can occur, reducing isolation in individuals whose physical, psychological, or social condition mean they are unable to experience the intimacy of relating to another (Andsell, 1995).

It should be noted that De Backer and Andsell’s use of instrumental music improvisation differed from the situation with Evelyn given that she did not have the fundamental abilities required to participate in instrumental improvisation, including the physical ability to hold an object (drum beater or musical instrument), or the cognitive
representation of the object as musical instrument and knowledge of how to play the instrument. However, they both described an initial phase of holding the music until the patient/individual was available to be responsive to the therapeutic intervention. Providing an Environment of Potential to maximise Evelyn’s Islands of Awareness represented this first step in therapy until Evelyn presented with greater levels of awareness and the therapeutic process could be dyadically expanded to have a greater impact on Evelyn’s behaviours further stimulating cognitive recovery.

In the conclusion of her PhD dissertation, Shoemark (2007) contended that an infant must be available before the music therapist and the infant can participate in an interpersonal process. Until the infant becomes available, the music therapist can offer only sensory and physical support. The current study advances this conclusion by exploring the concept of sensory support with a child with severe TBI. The MTR provided consistent and contingent sensory support to Evelyn who was unable to participate in an interpersonal process as a result of impaired self-awareness.

Evelyn’s potential to process music on a sensory level may also be considered in relation to Gilbertson’s (2008) conclusion that one of roles of a music therapist is to reverse the isolation an individual with a TBI may experience as a result of enormous physical and psychological barriers. For Evelyn, reducing isolation increased opportunities to engage with the familiar music, thus stimulating cognitive recovery. Gilbertson also reported that relationships were at the core of neurorehabilitation with children (Gilbertson & Aldridge, 2008). Compared to Evelyn, the children who participated in Gilbertson’s study had progressed out of the early acute phase of recovery. While music therapy with Evelyn was predicated on a sensory level, the presence of an attuned partner was essential in providing sensory support until the therapeutic process could progress at an interpersonal level.
The identification and categorisations of Evelyn’s behaviours contributes useful language to the understanding of the use of music therapy throughout the recovery trajectory of children following severe TBI. Complementing Gilbertson’s categorisations, the use of music therapy during recovery from TBI in children, is now explored at two points along the recovery trajectory; the sensory processing level for children in acute states of reduced consciousness and the interpersonal level for children in early neurorehabilitation.

**Limitations of the qualitative component of the study.**

*Video footage as a source of data.*

A significant advantage of using video footage as a method of data collection was that music therapy interventions could be segmented, paused, and repeatedly reviewed (Morse & Pooler, 2002). This offered the opportunity for detailed review of the minutiae of Evelyn’s behaviours during the MTIs, leading to interpretations about these behaviours and responses. As discussed previously, these behaviours and responses may have been almost imperceptible with only a single observation. This was evident when the MTR presented the video data of MTI 4 and MTI 10 at a music therapy research seminar. Several music therapists queried if there were any actual changes in Evelyn’s behaviours that could be interpreted as a response to the music. Multiple segmented viewings of this footage by the MTI and QR afforded the opportunity to perceive and compare Evelyn’s behaviours in greater detail.

The video footage itself did however present several limitations as a primary source of data. The quality of the both the audio and visual footage was limited by the quality of the video camera used. The microphone on the video camera was often not sensitive enough to capture Evelyn’s vocalisations in the noisy hospital ward environment and small physical responses may not have been successfully captured on the visual recording. Limited resources available for the study meant the video camera was placed on a tripod, offering
only a static view of Evelyn and the MTR. Given the need for medical and nursing staff to be able to access Evelyn in a medical emergency the MTR located the tripod at the foot of Evelyn’s bed. On occasions this compromised the view of Evelyn (for example, when she was lying on her side). The frame size of the video camera also meant that it was not possible to capture Evelyn’s and the MTR’s full faces and bodies without sacrificing the quality of footage that allowed the video to capture facial expressions. Evelyn’s physiological monitor displaying heart and respiration rates and oxygen saturation was not captured on the video data and in hindsight this may have offered valuable insight into Evelyn’s physiological responses during the MTIs.

*Qualitative review by two music therapists.*

Qualitative review of the video data by two music therapists (the MTR and QR) offered a highly sophisticated perspective on the observation of Evelyn’s behaviours and the MTR’s responses. However, the MTR and QR’s observations and analysis were bound by their own clinical and research experiences, and theoretical knowledge. Qualitative review and subsequent discourse including a clinician from a different discipline may have offered an alternative varied analysis and subsequent interpretation. A difficulty in defining the MTR’s categories of responses during the MTIs was encountered, as during the discourse the MTR and QR frequently did not clearly articulate the MTR’s responses to Evelyn’s behaviours. This may have been related to the fact that both the MTR and QR are music therapists who work in an acute medical setting and therefore shared an implicit understanding of the MTR’s responses to Evelyn.

**Discussion of Study Design**

As previously stated, this study was originally designed as a multiple case study, however developed as an intrinsic mixed methods case study when only one participant was enrolled.
Mixed methods case study.

It was anticipated when designing this study, that employing a mixed methods design would maximise the data available from a limited number of participants and even for an intrinsic case study this was confirmed. Further, emphasis on the individual remained essential throughout this study. As a child with an extremely severe TBI, Evelyn’s medical needs remained of principal importance in all treatment and interventions, and her location in an acute hospital setting had significant implications for the implementation of the study. For example there were frequent interruptions during the MTIs including medical and nursing interventions. Employing a case study design allowed the focus of the MTIs to remain on Evelyn’s multiple needs and complex recovery. The extremely severe nature of Evelyn’s TBI limited her behavioural presentation of agitation during PTA, subsequently limiting the usefulness of the results obtained from the quantitative data. However, employing mixed methods of data collection was pivotal in developing a more complete view of music therapy as a treatment intervention with Evelyn.

This intrinsic case study was undertaken using an embedded design, such that the collection of qualitative data was embedded within the quantitative protocol (Creswell & Plano Clark, 2007). Ideally quantitative and qualitative data are given equal weighting in mixed methods research (Creswell & Plano Clark, 2007). However, given the enrolment of a single participant in this study, the range of quantitative data collected was limited and the reporting of the quantitative results was ultimately supplementary to the analysis and interpretation of the qualitative data.

In this study, quantitative and qualitative data collection occurred concurrently. However, while the analysis of quantitative data was pre-determined, the emergent qualitative design allowed the analysis and interpretation of the qualitative data to develop in a pragmatic way that fostered the development of a reflexive qualitative methodology. The
emergent qualitative analysis facilitated an individualised, and in-depth exploration of the behaviours and responses of Evelyn and the MTR during the MTIs. Music therapy with Evelyn was a complex and individual process, and focussing on her as a single case yielded a level of description and interpretation not currently presented in the literature. This confirms Nott and colleagues’ (2008) assertion that case study is well suited to the inherently heterogeneous TBI population.

It has been argued that case study research is of limited value as the results are not readily generalisable to a broader population. However, Morse (2006) argued that insights invariably arise from single instances and exemplar cases, and that insights potentially make a greater contribution to scholarly study than replication and verification. Further, Flyvbjerg (2006) highlighted that development of skill relies on the intimate and context bound knowledge of a vast number of individual cases. In this case study the practical, case dependent, and contextually bound knowledge developed has provided an initial exploration of this application of music therapy, but more than this, has offered unique insight into the behaviours of a child with an extremely severe TBI during the MTIs and the MTR’s responses to these behaviours.

**Real world research.**

The foundation of this study was developed pragmatically within the real world context of an acute hospital setting, and this was represented by the mixed methods of data collection and analysis. Hospital settings are historically and typically positivist environments. Positivist research is experimental and is conducted in a bias free way with the intention that results represent time and context free generalisations. The subsidiary quantitative component of this study aimed to address the predominantly positivist context of the study, with the intention of providing empirical evidence for the use of music therapy with this population and further, developing the capability to measure this application of
music therapy. However, at this early point in researching the use of music therapy for the paediatric neuroscience population, a purely positivist research stance yielded little value in examining a therapeutic process when the intention was to articulate this work in ways not previously presented in the literature (Morse, 2006). By both testing the effect of music therapy, and qualitatively exploring the behaviours and responses of the participant and the MTR during the MTI, the richest possible data was collected and analysed.

Given the underlying quantitative protocol, the overall implementation of the MTIs during this study was formulaic, in that the live singing of familiar songs by the MTR was the pre-determined music therapy method used. Each MTI followed a similar pattern of an introductory/hello song to begin with and a slower, more sedate song or goodbye song to end the session. However, within this, and informed by the constructivist undertaking, the familiar songs were adapted by the MTR in a way that was contingent on Evelyn’s behaviours in the moment. The contingent adaptations of the familiar songs are represented in the MTR’s four categories of responses during the MTIs: holding, affirming, enticing, and containing. Thus one of the contributions of the qualitative analysis is the documentation of those detailed therapist responses allowing for scrutiny by future researchers and music therapy clinicians.

Undertaking the qualitative analyses within a constructivist paradigm recognised that this early exploration of music therapy was contextually bound, and interpretations were subjectively developed by the MTR. Hence, review of the video data by music therapists or researchers with fundamentally different philosophical foundations may have yielded different interpretations of Evelyn’s behaviours and the MTR’s responses to these behaviours.

The real world approach utilised in this study did not limit the constraints of the acute paediatric hospital setting, instead it affirmed these challenges and supported the use of a
mixed method case study research design to maximise the data available for investigation (Robson, 2002). In the CNC, music therapy for children experiencing agitation during PTA occurs at the child’s bedside. Removing Evelyn from this situation for the sake of controlling variables would have limited any understanding of the clinical reality of music therapy for Evelyn, and potentially confounded both the qualitative and quantitative outcomes of the study.

**Recommendations for Further Study**

This intrinsic case study provides more questions than answers, offering many possibilities for further study of the use of music therapy in acute paediatric neurosciences. As discussed above, previous research for patients in a MCS supported the implementation of music therapy as sensory stimulation to maximise early cognitive recovery in Evelyn, however, investigation is required. Imaging studies, including fMRI and EEG, would be fundamentally beneficial in understanding the neural correlates of music utilised as an early rehabilitative therapy following paediatric TBI, measuring both short-term and long-term outcomes.

This study presented an initial description of the use of familiar songs to offer an Environment of Potential to support and stimulate Islands of Awareness, and these ideas warrant further investigation. Further research should aim to verify, test, and refine these early ideas, and potentially measure the effectiveness of familiar songs in both supporting and stimulating a response in children in a state of reduced consciousness following an extremely severe TBI. Exploration of these ideas in broader populations of patients with severely limited behavioural responses is also warranted. Additionally, exploration and comparison of other forms of sensory stimulation, e.g. tactile stimulation, to support early cognitive recovery is needed.
At present, there is a paucity of literature exploring clinical management strategies for children experiencing agitation during PTA. Music therapy is a low risk, low cost, and non-invasive treatment intervention for these children and further study is required to both measure its effectiveness and also refine clinical practice. This study offers an early investigation of the use of music therapy with a 10-year old child with an extremely severe TBI who presented with very limited behaviours during the MTI. Further study with children with who present with less severe injuries and are more able to actively participate in music therapy during PTA (for example patients like Simone discussed in Chapter 1) is required. Given the positivist context of a hospital environment, research with these children should address the need for empirical evidence. However, in-depth exploration of these children’s responses during music therapy should also be undertaken to assist with the ongoing development of clinical practice.

Children aged less than two years represent a significant percentage of the paediatric TBI population (Crowe et al., 2009; Wetherington & Hooper, 2006) and research into the use of music therapy as an intervention to reduce agitation and distress in the acute phase of recovery is required for these children. There is also a need for the development of scales and tools to measure both the presence of PTA and agitation during PTA in younger children. Similarly there is a need for the development of scales to measure agitation in children with severe injuries who are not physically or cognitively capable of presenting with the more overt indicators of agitation. From this study, it could be recommended that further qualitative exploration of the behaviours and presentation of children with an extremely severe TBI may offer insights to assist with the development of scales that are sensitive enough to represent minute changes in the intensity of behaviours. These scales could then be used more effectively to measure the effect of interventions.
Research is also required to explore music therapy with the broader population of children who sustain an ABI, resulting from stroke, infection, hypoxia, and other non-traumatic causes. While PTA is a phase of recovery distinct to the TBI population, it is clinically recognised that agitation is common in children whose ABI results from non-traumatic causes. Music therapy may have implications for reducing agitation in these children however this is yet to be systematically investigated. Early investigations of the use of music listening after stroke in adults have indicated that exposure to music is effective in stimulating cognitive recovery (Forsblom et al., 2009; Sarkamo et al., 2008). This has not been explored in the paediatric population, nor has the live and contingent use of music as an intervention to stimulate cognitive recovery in the non-traumatic ABI population.

Finally, testing and refining both the categories of Evelyn’s behaviours and the MTR’s response would potentially offer further opportunity to develop clinical practice in music therapy, and also appropriate vocabulary to articulate the music therapy process.

**Contributions of This Study**

Early anecdotal accounts from the music therapy literature reported a broad range of behavioural responses from children in coma and reduced states of consciousness (Kennelly & Edwards, 1997; Rosenfeld & Dun, 1999). However the significant addition to this knowledge is that children in a severely reduced state of consciousness may present with clearly defined and different behaviours that are indicative of a response to familiar songs. A music therapist’s awareness of this potential affords the foresight to look for these behaviours and consequently improve the effect and efficacy of clinical practice. As stated by De Backer, one of the benefits of such findings is “most essentially being clinically alert to these possibilities” (2008, p. 100).

The conceptualisation of music therapy to promote an Environment of Potential during an Island of Awareness is relevant for staff working with children in the early stage of
recovery following a severe TBI, and also for the families of these children. Being aware that there are key periods where the child’s responsiveness is heightened allows staff members to develop suitable rehabilitation goals and treatments to maximise these islands. Further, families can be alerted to look for signs of awareness and assisted to respond to this awareness by providing familiar sensory stimulation.

The categorisation of Evelyn’s behaviours during music therapy may also have implications for music therapists working in diverse settings where the clients/patients are unable to portray overt responses during the music therapy intervention as a result of their pathology, for example; children in a special school setting. It can be difficult to assess the responses of children with severe and multiple difficulties because of a lack of established communication strategies and patterns. Defined categories of behaviours could help clinicians by providing a basis for observation in initial assessments, which could assist in developing individual communication strategies. Further, it would be useful to formally document and recognise behaviours that are displayed when the child is rejecting the intervention. This could allow clinicians to take their cues from the child thus ensuring the child is having a choice in the intervention (L. Docherty, personal communication, 1 July, 2010). Being conscious of the possibilities for various responses affords the music therapists the potential to adapt their clinical practice to respond to the individual and maximise therapeutic outcomes.

**CONCLUSION**

The aim of this study was to provide a preliminary exploration of the use of music therapy as an intervention to reduce agitation in children during the PTA phase of recovery following severe TBI. This exploration took the form of a quantitative evaluation and a qualitative exploration that constituted the mixed methods design. The challenge of undertaking research with a low incidence population was evident in the recruitment of only
a single participant, and by necessity the results of the mixed methods of data collection and analyses were explored separately to maximise the knowledge generated.

Evelyn was at the extreme end of the spectrum of TBI severity and her presentation of agitation and responses during the MTIs were severely limited by her level of functioning at the time of data collection. Therefore, the study offers limited and inconclusive quantitative outcomes. However, the emergent qualitative component of the study presented the opportunity to deeply explore these idiosyncratic behaviours. Only through the shared micro-analysis and discourse were Evelyn’s behaviours evident, elucidating three distinct responses to the contingent presentation of familiar songs during the MTIs; acceptance, recruitment, and rejection. This finding expands the current notion of generalised responses from an individual in a severely altered state of consciousness during a music therapy intervention, by defining distinguishable categories of response.

Further advancing and interpreting the categorisations of Evelyn’s and MTR’s responses during the MTIs, it was evident that the MTR offered a consistent musical holding for Evelyn’s behaviours and adapted the familiar songs in a contingent manner in response to Evelyn. By musically holding, affirming, enticing, and/or, containing Evelyn’s behaviours the MTR offered an Environment of Potential to maximise Evelyn’s Islands of Awareness.

Two possibilities of the Environment of Potential were explored in this study: (1) The inherent structure and predictable nature of the familiar song supported repeated responses when an Island of Awareness emerged, and (2) The contingent presentation of familiar songs had an excitatory effect and successfully stimulated an Island of Awareness as evident in Evelyn’s consistent responses at quintessential moments in the Abba songs. The use of familiar songs during music therapy interventions as either a supportive or excitatory strategy presented an Environment of Potential to maximise cognitive recovery during PTA in a child.
with an extremely severe TBI. This study has presented an initial discussion of this concept which warrants further investigation.

Clinically, active rehabilitation during PTA is frequently discouraged due to the potential for overstimulation that can adversely effect agitation. However, the global neural processing of music, and inherent temporality and structure present in familiar songs, potentially makes the contingent use of familiar music a suitable intervention to maximise cognitive recovery and impact on behaviour during coma emergence following extremely severe TBI in children.
REFERENCES


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APPENDIX A

Stance of the Researcher

Aigen (1996) argued that research is embedded in both professional and personal contexts, and to wholly understand research it is necessary to understand these contexts. Aigen (1996) further suggested a researcher include: group memberships, prior experiences and beliefs that have influenced the research, motivations for undertaking the research, and relationship with the participants when exploring the personal contexts of the research. These suggestions will form the foundation for my Stance of the Researcher. The professional and academic contexts of this study are explored in Chapter 3.

Group memberships

Political and social forces are embedded in every research project and should be explicated by the researcher so they can be openly considered by others who read the research (Aigen, 1996).

I am an Anglo-Saxon female. When I started this research I was in my late 20s, recently married, and did not have any children. As I came to editing this thesis for submission, this remains largely unchanged with the exception that I am now expecting my first child. I am fortunate that my husband is incredibly supportive of my dedication to this research and my passion for my work.

I am the youngest of three children, with both an older sister and brother in that order. I grew up in a two-parent family. My parents were, and still are, firm believers in the importance of family. In a sense I grew up in a ‘traditional’ household. My Mum was a stay at home mother until I started school. I also grew up living close to my maternal grandparents. I believe I have a wonderful, nurturing, loving, and supportive family, and would say that family is one of my core values.
I do not have strong political inclinations and I do not currently actively practice any organised religion, although I am baptised and confirmed in the Anglican (Church of England) faith.

Growing up I attended the local public primary and high schools. Throughout my childhood my parents encouraged and supported my interests. I have always been an avid reader and keen learner. I began electronic organ lessons at the age of five and at the completion of high school in 1998 moved interstate to attend university to complete a Bachelor of Music, with the intention of becoming a music therapist.

I am a Registered Music Therapist (RMT) with the Australian Music Therapy Association, a Neurologic Music Therapist (NMT), and am one of a team of five RMTs employed at RCH. I work within two large multidisciplinary teams within the Neuroscience and Rehabilitation Departments at RCH. I am one of a very small number of music therapists working in an acute medical setting for children with neurological conditions in Australia.

**Prior experiences and beliefs**

I completed my entry-level university training in 2002 and have been practicing as a music therapist since. I refer to myself as an early career clinician as I believe I have a long way to go in becoming the music therapist I one day hope to be. At this point in my career my ambition is to be a clinician and not a researcher, however, I believe it necessary to undertake research to develop my skills, knowledge, and insight as a clinician. Advanced clinical training is not currently offered in Australia.

My first job as a music therapist was in an aged care facility between 2002 – 2005. The majority of residents I worked with had some type of degenerative dementia. During my years at the aged care facility I observed many fascinating responses to music therapy; residents with severely impaired expressive language skills who were able to sing the entire lyrics of their favourite songs, residents who paced and wandered non-stop but would remain
seated in the music therapy session for over an hour, and a husband who walked with an
unsteady gait but could dance beautifully with his wife when ‘their song’ was played. At the
time of working at the aged care facility I did not spend a lot of time reflexively developing
my clinical practice. Only more recently, as I have developed skills as an NMT and
undertaken reading about the neural processes involving music, have I begun to consider the
responses of these residents in terms of their neurological processes and the impact of music
on these processes.

I worked for a community music therapy program called Music Together between
2003 - 2008. I began as a session leader and eventually went on to become the Program
Coordinator, directly managing all session leaders, and overseeing the operation and strategic
development of the program. Music Together offered weekly group sessions that were aimed
at creating community and social support networks between participating families, and
encouraging parents and children to use music to foster positive interactions and experiences
to contribute to the development of secure attachment relationships.

I worked with some families for five years during my time at Music Together and
shared much of the joy they experienced when making ‘music together’. Parents happily
reported that they, and their children, were singing the songs learned at Music Together in the
bathtub, during road trips, to distract from tantrums, and to cheer up Dad when he had a
stressful day at work. The beauty of a song for these families was that it could be taken
anywhere at anytime, it did not require anything more than a willing voice. I also observed
the innate musicality of infants who would kick their legs in time to the music, or dance in
their prams long before they could walk and talk. Sadly, I also shared a few sorrows, parents
divorcing, parent and child illness, and the sudden and unexpected loss of a child;
experiences that emphasised the ability of music to say what words cannot.
My work at Music Together offered insight into the processes of typical, or healthy, childhood development and the uses of music in fostering this development. I feel these insights are vital in my current work with children whose developmental trajectory has been suddenly, and often irreparably, interrupted by neurological injury or illness. Whilst not an easy decision, I left the Music Together program to undertake this research degree and focus on my work in paediatric neurosciences and rehabilitation.

In late 2003 I also began working at the Royal Children’s Hospital Melbourne. I am currently employed as the sole music therapist in the Neuroscience and Rehabilitation Music Therapy Program. I have at many times struggled to define music therapy’s role in the multidisciplinary teams, teams that could be described as functionally orientated. Initially viewing music therapy through a more interpersonal and psychodynamic lens I wondered why it was that the interpersonal potentials and coping abilities of the child seemed to take a colloquial ‘back seat’ to physical goals. After much reading, observing, thinking, talking to other professionals, and co-treating of patients with other allied health disciplines, I have come to recognise the ability to interact with another person as a functional goal of the most basic level. I believe that paediatric neurorehabilitation must address the physical, cognitive, psychological, social, communicative, and sensory aspects of a child to ensure the best possible quality of life. I am in this sense very eclectic in defining my theoretical orientation or model of care.

I find my work with children with neurologic conditions endlessly rewarding but most of all continuously challenging; I have observed non-verbal children sing, children with an ataxic gait walk in an even stride when accompanied by a strong rhythmic pulse, and have even experienced children later describe the music I sang to them when they were seemingly unresponsive in a coma. These experiences (and the many more that space does not permit me to report on) have lead to a set of beliefs that underpin this research:
• Human beings are intrinsically musical (Mithen, 2005; Trehub, 2001).

• Music is fundamentally a social medium and has the potential to offer an opportunity for interpersonal interaction at various levels of functioning or consciousness (Papousek, 2007; Tomaino, 2002; Trevarthen, 2001; Trevarthen & Aitken, 2001).

• Music is processed in a global neurological network and is a primitive neurologic function (Levitin & Tirovolas, 2009; Peretz, 2006; Peretz & Zatorre, 2005).

• A lack of an observed response from a patient doesn’t necessarily equate to a lack of neurological processing (Aldridge, Gustorff, & Hannich, 1990).

Motivation for undertaking this research

I work with children with a variety of neurological conditions including brain tumours, developmental delays, and degenerative neurological conditions. However, the majority of my clinical caseload is with children who have an ABI (including TBI). I have found myself saying many times that while research into the use of music therapy for adult patients with neurologic conditions is expanding, the use of music therapy for children with neurologic conditions remains underrepresented in the recent literature (see Chapter 2 for an exposition). This research represents an attempt to begin to rectify this by offering an early exploration of the use of music therapy for children experiencing agitation during PTA. As a music therapist in a leading medical facility I am acutely aware of the need for evidence. Whilst I am under no pretence that this research will go anywhere near offering evidence in the medical sense, I hope this research may offer a starting point for myself, and more importantly other music therapists, to develop the clinical work with these children. Ideally, this may ultimately lead to further research and theory building. This study is my first research undertaking.
I am choosing this one small phase in the recovery trajectory of a child with a severe TBI to study as nurses on the ward report that children experiencing agitation during PTA are among the most difficult to manage. I think music therapy offers a unique and low risk intervention for these children. Clinically, I have also observed some of the most remarkable responses to music therapy from these children; children who are severely agitated quickly drifting to sleep as I sang their favourite song and others remaining still and singing along to a favourite song despite impaired attention and significantly disorganised cognitive processes.

A very early interest in developing the theoretical aspects of my work spiked when working with a patient who didn’t seem to neatly ‘fit’ with any of the literature I had read. The patient had a severe ABI and was able to speak but did not appear to be able to formulate this speech with communicative intent. The speech pathologist and I jointly worked with this patient over a period of many months and successfully used music as a non-verbal medium for rehearsing interactive capabilities. I believe a pivotal moment in my development as a music therapist came when discussing this patient with my colleague and mentor (a neonatal and infant music therapist) who suggested I read an article by Colwyn Trevarthen. I often joke that it took me three hours and seemingly infinite visits to www.dictionary.com to read the abstract of Trevarthen’s article, however I am endlessly grateful for this reference. Trevarthen described the fundamental need of all humans for companionship, and that music is an intrinsic part of pre-verbal infants seeking companionship (Trevarthen, 2001). This article further outlined the idea of sympathetic and contingent musical interactions with an attuned partner that have the potential to regulate an infant’s cognitive and emotional state (Trevarthen, 2001). I have spent a lot of time considering this theory and its application for children, who as a result of neurologic damage are unable to seek companionship, the impact of this on their recovery and rehabilitation, and the potential for music to support
interpersonal interactions that may assist with regulation when a child is in a confused, disorganised, or agitated state. Further consideration of this remains a task for the future.

From reading this one Trevarthen article I have continued to seek literature both within the broader music therapy literature and outside of the music therapy literature. My understanding of the broader applications of music as a fundamentally social medium and the neurological processing of music continues to grow exponentially. Knowledge and evidence regarding the neural processing of music, music as pre-verbal communication, and music therapy for adult patients with neurologic conditions has since become a theoretical basis for my clinical work until more evidence is created in the paediatric population.

Perhaps, for me personally, the most significant reason for undertaking this research is to expand my own knowledge and understanding of my clinical practice. While it is daunting to open up my clinical practice for an in-depth exploration, I hope thorough description of the music therapy processes, coupled with interpretation and analysis, will afford me the insight required to develop my clinical skills. I also hope to develop the vocabulary that will allow me to clearly and succinctly explain my clinical practice with this population.

**Nature of the relationship between the investigator and the research participants**

I am faced with a dichotomy of roles as I undertake this research. I am both the researcher who will collect and analyse data and the music therapist who will facilitate the music therapy interventions that will be explored. I am conscious that I will be faced with finding a balance between seeking therapeutic outcomes for the participants and seeking research outcomes, and that these two may not always be the same. Further, at the completion of data collection, I will change roles from researcher to clinical music therapist as each participant will be offered music therapy as part of their ongoing standard clinical care.
There will be an inequality in the reporting of any results and interpretations in this study. I do not believe it is possible with this population to have the participants as equal partners in the research process. Children in PTA are in a reduced state of consciousness, and cognitive and physical deficits present in this stage may mean the children are not actually able to voice their experiences. Further, due to impaired memory many children may not remember their experiences of music therapy during PTA. I will not be exploring the participant’s experience of music therapy and mine will be the dominant voice throughout the research. I too am a participant in the music therapy process and measures will be taken to account for any bias. These measures are discussed elsewhere in the thesis.

References


APPENDIX B

RCH HREC Certificate

The Royal Children's Hospital, Melbourne

RCH HUMAN RESEARCH ETHICS COMMITTEE APPROVAL

HREC REF. No: 29084 A
PROJECT TITLE: Music therapy for patients experiencing agitation in posttraumatic amnesia
DOCUMENTS APPROVED: Agitated Behaviour Scale v1 dated 15 July 2009
PGIS & Consent Form v2 dated 14 August 2009
Clinical Photography Consent Form (RCH)
APPROVED PROTOCOL: Technical Protocol v2 dated 14 August 2009
PRINCIPAL INVESTIGATOR: C Catroppa
DATE OF ORIGINAL APPROVAL: 2 September 2009
DURATION: 24 months
DATE OF APPROVAL EXPIRY: 2 September 2011
SIGNED: COMMITTEE REPRESENTATIVE

APPROVED SUBJECT TO THE FOLLOWING CONDITIONS:

1. Any proposed change in protocol or any approved documents or the addition of any documents (including flyers, brochures, advertising material etc) and the reasons for that change or addition, together with an indication of ethical implications (if any), must be submitted to the Human Research Ethics Committee for Approval prior to implementation.
2. The Principal Investigator must notify the Secretary of the Human Research Ethics Committee of:
   • Any serious adverse effects of the study on participants and steps taken to deal with them.
   • Any unforeseen events (e.g. protocol violations).
   • Investigators withdrawing from or joining the project.
3. A progress report must be submitted annually and at the conclusion of the project, with special emphasis on ethical matters.
4. All research information collected whilst individual participants are children must be kept until the individual turns 25 (i.e. 7 years after their 18th birthday).

Please note that it is the investigators responsibility to ensure that the RCH HREC Approval remains current for the entire duration of the project. Investigators undertaking projects without current HREC approval risk their indemnity, funding and publication rights.

DRUG/DEVICE TRIALS
5. The Investigator(s) must report to the Sponsor and the Human Research Ethics Committee within 24 hours of becoming aware of any serious adverse event experienced by any subject during the trial.
6. The investigators must ensure that all externally sponsored Clinical Drug Studies have insurance coverage that is current for the duration of the study.
APPENDIX C

Eligibility for Recruitment

Music therapy for paediatric patients experiencing agitation during PTA

(HREC # 29084 A). Researchers: C. Catroppa, D. Grocke, J. Bower, H. Shoemark

UR sticker to be attached after receipt of referral

Eligibility for Recruitment

- Referral Information

  Referred by: ____________________________  Patient name: ____________________________

  Contact details: ____________________________  Patient age: ____________________________

  Date of referral: ____________________________  Diagnosis: ____________________________

  Date admit CNC: ____________________________  Other: ____________________________

  ☐ Receipt of referral confirmed.  Date: ____________________________

  ☐ Appropriate to approach family for consent. ____________________________

  Parent/guardian best contact: ____________________________

- Recruitment Eligibility

  Cause of TBI: ____________________________

  Diagnosis (scan results): ____________________________

  Other: ____________________________

  ☐ Non-accidental injury  ☐ YES  ☐ NO

  ☐ Pre-existing hearing loss  ☐ YES  ☐ NO

  Does the child meet criteria for recruitment?  ☐ YES  ☐ NO

  Comment: ____________________________
PARENT/GUARDIAN INFORMATION STATEMENT
AND CONSENT FORM

HREC Project Number: 29084 A

Research Project Title: Music therapy for children with agitation in the early stages of recovery from a traumatic brain injury

Thank you for taking the time to read this Information Statement. This Information Statement and Consent Form is 5 pages long. Please make sure you have all the pages.

Your child is invited to participate in a research project that is explained below.

What is an Information Statement?
These pages tell you about the research project. It explains to you clearly and openly all the steps and procedures of the project. The information is to help you to decide whether or not you would like your child to take part in the research.

Please read this Information Statement carefully. You can ask us questions about anything in it. You may want to talk about the project with your family, friends or health care worker.

Participation in this research project is voluntary. If you don't want your child to take part, you don’t have to. You can withdraw your child from the project at any time without explanation and this will not affect their access to the best available treatment options and care from The Royal Children's Hospital.

Once you have understood what the project is about, if you would like your child to take part please sign the consent form at the end of this information statement. You will be given a copy of this information and consent form to keep.

1. What is the research project about?
Many children who have a traumatic brain injury may be distressed, confused or restless when they wake up from being unconscious. This phase is called post-traumatic amnesia (PTA). Music therapy is used in the Children’s Neuroscience Centre for children in PTA. Music therapy is where a trained music therapist uses music to help a child while they are recovering from a brain injury. It is different from music education or entertainment and a child does not have to have had music lessons in the past to participate in music therapy.
This research project is the first to try to find out if participating in music therapy helps to calm a child in PTA during and straight after the music therapy session. We also want to measure how music
therapy works.
We hope this research project will provide an important starting point in understanding how music
therapy can work for children who have a brain injury as they wake up from being unconscious.
We hope 5 children will take part in this research project.

2. Who are the researchers?
- Associate Professor Cathy Catroppa is a senior researcher at the Murdoch Children's
  Research Institute
- Associate Professor Denise Grocke is the head of music therapy studies at the University of
  Melbourne
- Janeen Bower is the music therapist in the Children's Neuroscience Centre, at the Royal
  Children's Hospital Melbourne.
- Dr Helen Shoemark is the coordinator of clinical research for the music therapy department at
  the Royal Children's Hospital Melbourne.
  This research project is being undertaken for Janeen Bower's masters degree at the University
  of Melbourne.

3. Who is funding this research project?
No major funding is needed for this research project. The student researcher, as part of her masters
degree, will cover any small costs which may include purchase of blank DVDs. The University of
Melbourne will provide the video camera for recording the music therapy sessions.

4. Why is my child being asked to be in this research project?
We are asking your child to take part in this research project because he/she has sustained a
traumatic brain injury and is a patient in the Children's Neuroscience Centre.
Your child may not yet be in PTA or may not have any distress, confusion or restlessness. We are
telling you about the research project now because PTA can be short in some children (days or
weeks) and this means that we may only have a short time to include your child in the research
project. If your child does become distressed or restless during PTA and you choose for them to
participate, we want to be ready to start the research as soon as possible.
If your child does not become distressed or restless during PTA then he/she will not be able to take
part in the research project. We are very grateful that you took the time to consider taking part. Your
child can still receive regular clinical music therapy sessions as part of their care and treatment in the
hospital, if you would like that to happen.

5. What does my child need to do to be in this research project?
We would like your child to take part in daily music therapy sessions until the doctors and nurses
assess that he/she has emerged out of PTA or for the first two weeks of PTA (not including
weekends).
The music therapy sessions will take place at the same time every day in your child's hospital room.
We will sing your child's favourite songs and play the guitar. We may also play other instruments and
encourage your child to play or sing along if he/she is able to. The music therapy sessions will
generally last for between 10 minutes and 30 minutes.
We will video-record your child for 10 minutes before the music therapy session, during the music
therapy session and for 10 minutes immediately after the music therapy session. We will also take
notes of what happens during the music therapy session.
Before the music therapy sessions start, we will ask you what type of music your child likes and
currently listens to, what music he/she liked in the past, and whether he/she has any experiences with
learning music or activities that include music. It is important to note that your child does not have to
have had music lessons or previous music therapy sessions to take part in this research project.
We will collect the following information from the nurses looking after your child and from your child’s
medical records: age, gender, medical diagnosis, current medications, when and how he/she
sustained the injury, date of admission to the hospital, level of consciousness, general information
about how he/she has been throughout the nursing shift and other therapies that your child may have
participated in.

6. What are my child’s alternatives to taking part in this project?
Your child does not have to take part in this research project if you do not want him/her to. If your
child takes part and you later change your mind, you are free to withdraw him/her from the project at
any stage.
If your child does not take part in this research project, he/she will still be offered music therapy as part of his/her care during recovery and rehabilitation after a brain injury. If your child does not participate or withdraws from the research project it will not affect any care or treatment that he/she receives at the Royal Children’s Hospital.

7. What are the possible benefits for my child?
We cannot promise any benefit however, your child may become less distressed and restless after participating in music therapy.

8. What are the benefits for other people in the future?
The information gathered in this research project will provide an important starting point for understanding if and how music therapy is helpful for children after a brain injury.

9. What are the possible risks, side-effects and/or discomforts?
There is a very small chance that music therapy may increase your child’s level of distress or restlessness. We will do everything we can to make sure this does not happen. If your child does become more distressed or restless, the music therapy session will stop and your child will receive appropriate care and support.

10. What are the possible inconveniences?
We do not think there are any inconveniences. You are welcome to stay with your child while he/she participates in music therapy.

11. What will be done to make sure my child’s information is confidential?
We will use your child’s information only for this research project. Only the researchers involved with this project and the Royal Children’s Hospital Ethics Committee can have access to this information unless you give your permission, except as required by law. You have the right to look at, and ask correction of, your child’s information in accordance with the Freedom of Information Act 1982 (Vic). The information will be identifiable. This means that your child’s name or other personal details will stay on the information. All information will be stored securely in a locked filing cabinet in the Music Therapy Department at the Royal Children’s Hospital. Your child’s information will also be stored on a password-protected computer database. We will keep your child’s information until the youngest participant in this project turns 25 years old. After this time, we will destroy the information and delete video-recordings. When we write about the results of this project a pseudonym (false name) will be used to make sure your child is not identifiable. When we present the project at conferences or for teaching purposes, we would like to show DVD footage of your child participating in the music therapy sessions. It is not possible to hide your child’s face so we will ask you to fill in a separate consent form that gives us permission to film your child and show it at conferences or for teaching purposes. When we present or show footage from the music therapy sessions we will use a false name for your child to protect their identity.

12. Will we be informed of the results when the research project is finished?
We will send you a letter to tell you the overall results of the research project. Please note that the research will not be completed until mid to late 2010.

If you would like more information about the project or if you need to speak to a member of the research team in an emergency please contact:

Name: Janeen Bower
Contact telephone: (03) 9345 4126 / 0418 244 312
If you have any concerns about the project or the way it is being conducted, and would like to speak to someone independent of the project, please contact:

Head of Department
Ethics and Research Department
Human Research Ethics Committee
The Royal Children’s Hospital
Telephone: (03) 9345 5044
CONSENT FORM FOR PARENT/GUARDIAN TO GIVE INFORMED CONSENT FOR THEIR CHILD TO TAKE PART IN A RESEARCH PROJECT

HREC Project Number: 29084A

Research Project Title: Music therapy for children with agitation in the early stages of recovery from a traumatic brain injury

I (Parent/Guardian name) ____________________________________________________________

of (child’s name) ________________________________________________________________

voluntarily consent for my child to take part in the above research project

☐ I give consent for my child to be video recorded for the purposes of the above research project (please tick).

☐ I give consent for the video footage of my child taken during the above research project to be used for presentation and teaching purposes (please tick).

• I believe I understand the purpose, extent and possible effects of my child’s involvement in this project.
• I have had an opportunity to ask questions and I am satisfied with the answers I have received.
• I understand that this project has been approved by The Royal Children’s Hospital Human Research Ethics Committee and will be carried out in line with the National Statement on Ethical Conduct in Human Research (2007).
• I understand I will receive a copy of this Parent/Guardian Information Statement and Consent Form.

Parent/Guardian Signature ________________________________ Date __________

Print name of witness to parent/guardian’s signature ________________________________

Witness Signature ________________________________ Date __________

I have explained the project to the parent/guardian who has signed above, and believe that they understand the purpose, extent and possible effects of their child’s involvement in this project.

Researcher Signature ________________________________ Date __________

Note: All parties signing the Consent Form must date their own signature.
# APPENDIX E

RCH Clinical Photography Consent Form

## CLINICAL PHOTOGRAPHY CONSENT FORM

<table>
<thead>
<tr>
<th>Type of clinical photography:</th>
<th>☐ Prints</th>
<th>☐ Slides</th>
<th>☐ Digital</th>
<th>☐ Video</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of images taken (eg. 15 min video):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage location of image (eg. URO, Plastic dept):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Department:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## PATIENT CONSENT

Your health professional is required to provide you with information about the reasons for, and the uses of, the proposed clinical photography or video. It is your responsibility to raise concerns with or seek further information from your health professional prior to agreeing to clinical photography or video recording.

I, ___________________________ hereby consent to ________________

clinical photographs and/or video images to be made of me/my child. I agree that the images may be used for (Please tick as appropriate):

- ☐ Medical Record – the images will form part of the information collected for your or your child's care and treatment. This information is handled in accordance with the Health Records Act 2001.

- ☐ Education and Training – the images may be used for teaching purposes and viewed by health professionals outside of the Royal Children's Hospital. The images may be used for example in talks, conference presentations, posters or on the Internet to help train health professionals in the management of women's and children's health.

- ☐ Research – this may involve the images being used for example in medical publications, journals, textbooks, electronic publications and on the Internet. Images will be seen by health professionals, scientists and medical researchers who use these publications in their professional education. The images may therefore be seen by the general public. Images will not be used with identifying information, such as name, however full confidentiality is not guaranteed.

- ☐ Other – Health professional please specify, ___________________________

Signature of Patient: ___________________________  
(If they can understand this form)

Signature of Parent: ___________________________ Date: ___________________________

(Employee, guardian or person responsible for the patient)

Employee name: ___________________________  
Designation: ___________________________

Signature: ___________________________ Date: ___________________________
APPENDIX F

Participant Music Preferences

Music therapy for paediatric patients experiencing agitation during PTA

(HREC # 29084 A). Researchers: C. Catroppa, D. Grocke, J. Bower, H. Shoemark

Date:  ______________________

Information collected from:  ________________________ (parent/guardian)

- Favourite song/s

- Current listening preferences:  ________________________
  (incl. songs, band, solo artists)

- Past music preference (2 years)

- Meaningful family music

- Favourite TV shows/movies

- Music education/instrumental instruction

- Dance involvement

- Choir participation

- School music experiences  ________________________
  (incl. kindergarten, day-care)

- Other/comments

______________________________
APPENDIX G

Pre and Post MTI Video Data Randomisation Procedure

Software available at www.randomizer.org was used to generate a simple set of unsorted unique numbers ranging from 1-20. The first number from this set of unsorted unique numbers was allocated to the 10 minute pre-MTI One video segment, the second of these numbers to the post-MTI One video segment, the third to pre-MTI Two video segment, the fourth to post-MTI Two video segment, etc., and the final or twentieth number was allocated to the post-MTI segment of the last MTI (MTI Ten) as detailed below in Table A1.

Table A1.

Pre and Post MTI Video Segments Random Number Allocation

<table>
<thead>
<tr>
<th>Pre/Post Video Data Segment</th>
<th>Random Number Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-MTI One</td>
<td>16</td>
</tr>
<tr>
<td>Post-MTI One</td>
<td>7</td>
</tr>
<tr>
<td>Pre-MTI Two</td>
<td>15</td>
</tr>
<tr>
<td>Post-MTI Two</td>
<td>12</td>
</tr>
<tr>
<td>Pre-MTI Three</td>
<td>20</td>
</tr>
<tr>
<td>Post-MTI Three</td>
<td>13</td>
</tr>
<tr>
<td>Pre-MTI Four</td>
<td>10</td>
</tr>
<tr>
<td>Post-MTI Four</td>
<td>3</td>
</tr>
<tr>
<td>Pre-MTI Five</td>
<td>9</td>
</tr>
<tr>
<td>Post-MTI Five</td>
<td>17</td>
</tr>
<tr>
<td>Pre-MTI Six</td>
<td>11</td>
</tr>
<tr>
<td>Post-MTI Six</td>
<td>1</td>
</tr>
<tr>
<td>Pre-MTI Seven</td>
<td>19</td>
</tr>
<tr>
<td>Post-MTI Seven</td>
<td>4</td>
</tr>
<tr>
<td>Pre-MTI Eight</td>
<td>6</td>
</tr>
<tr>
<td>Post-MTI Eight</td>
<td>8</td>
</tr>
<tr>
<td>Pre-MTI Nine</td>
<td>2</td>
</tr>
<tr>
<td>Post-MTI Nine</td>
<td>14</td>
</tr>
<tr>
<td>Pre-MTI Ten</td>
<td>18</td>
</tr>
<tr>
<td>Post-MTI Ten</td>
<td>5</td>
</tr>
</tbody>
</table>
The set of unique unsorted numbers, and corresponding video data segments, were then consecutively ordered and allocated a consecutive alphabetical title, such that the number 1 and the corresponding video data segment (post-MTI Six) was titled Video Segment A, as detailed below in Table A2. The segments of pre and post MTI video data were burnt to DVD for viewing by the reviewers in this order.

Table A2.

*Order and Titles of the Pre and Post MTI Video Data for Rating of ABS by Independent Reviewers*

<table>
<thead>
<tr>
<th>Pre/Post Video Data Segment</th>
<th>Random Number Allocation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-MTI Six</td>
<td>1</td>
<td>Video segment A</td>
</tr>
<tr>
<td>Pre-MTI Nine</td>
<td>2</td>
<td>Video segment B</td>
</tr>
<tr>
<td>Post-MTI Four</td>
<td>3</td>
<td>Video segment C</td>
</tr>
<tr>
<td>Post-MTI Seven</td>
<td>4</td>
<td>Video segment D</td>
</tr>
<tr>
<td>Post-MTI Ten</td>
<td>5</td>
<td>Video segment E</td>
</tr>
<tr>
<td>Pre-MTI Eight</td>
<td>6</td>
<td>Video segment F</td>
</tr>
<tr>
<td>Post-MTI One</td>
<td>7</td>
<td>Video segment G</td>
</tr>
<tr>
<td>Post-MTI Eight</td>
<td>8</td>
<td>Video segment H</td>
</tr>
<tr>
<td>Pre-MTI Five</td>
<td>9</td>
<td>Video segment I</td>
</tr>
<tr>
<td>Pre-MTI Four</td>
<td>10</td>
<td>Video segment J</td>
</tr>
<tr>
<td>Pre-MTI Six</td>
<td>11</td>
<td>Video segment K</td>
</tr>
<tr>
<td>Post-MTI Two</td>
<td>12</td>
<td>Video segment L</td>
</tr>
<tr>
<td>Post-MTI Three</td>
<td>13</td>
<td>Video segment M</td>
</tr>
<tr>
<td>Post-MTI Nine</td>
<td>14</td>
<td>Video segment N</td>
</tr>
<tr>
<td>Pre-MTI Two</td>
<td>15</td>
<td>Video segment O</td>
</tr>
<tr>
<td>Pre-MTI One</td>
<td>16</td>
<td>Video segment P</td>
</tr>
<tr>
<td>Post-MTI Five</td>
<td>17</td>
<td>Video segment Q</td>
</tr>
<tr>
<td>Pre-MTI Ten</td>
<td>18</td>
<td>Video segment R</td>
</tr>
<tr>
<td>Pre-MTI Seven</td>
<td>19</td>
<td>Video segment S</td>
</tr>
<tr>
<td>Pre-MTI Three</td>
<td>20</td>
<td>Video segment T</td>
</tr>
</tbody>
</table>
APPENDIX H

During MTI Video Data Randomisation Procedure

Similar to the procedure used to randomise the pre and post MTI video data segments, software available at [www.randomizer.org](http://www.randomizer.org) was used to generate a simple set of unsorted unique numbers ranging from 1-10. The first number from this set of unsorted unique numbers was allocated to the during-MTI One video segment, the second of these numbers to the during-MTI Two video segment etc., and the final or tenth number was allocated to the during MTI Ten segment, as detailed below in Table A3.

Table A3.

**During MTI Video Segments Random Number Allocation**

<table>
<thead>
<tr>
<th>During MTI Video Data Segment</th>
<th>Random Number Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>During MTI 1</td>
<td>6</td>
</tr>
<tr>
<td>During MTI 2</td>
<td>7</td>
</tr>
<tr>
<td>During MTI 3</td>
<td>5</td>
</tr>
<tr>
<td>During MTI 4</td>
<td>1</td>
</tr>
<tr>
<td>During MTI 5</td>
<td>9</td>
</tr>
<tr>
<td>During MTI 6</td>
<td>2</td>
</tr>
<tr>
<td>During MTI 7</td>
<td>4</td>
</tr>
<tr>
<td>During MTI 8</td>
<td>3</td>
</tr>
<tr>
<td>During MTI 9</td>
<td>8</td>
</tr>
<tr>
<td>During MTI 10</td>
<td>10</td>
</tr>
</tbody>
</table>

The set of unique unsorted numbers, and corresponding video data segments, were then consecutively ordered and allocated a consecutive alphabetical title, such that the number 1 and the corresponding video data segment (during-MTI 4) was titled Video Segment A, as detailed below in Table A4. The segments of during-MTI video data were burnt to DVD for viewing by the reviewers in this order.
Table A4.

Order and Titles of the During MTI Video Data for Rating of ABS by Independent Reviewers

<table>
<thead>
<tr>
<th>During MTI Video Data Segment</th>
<th>Random Number Allocation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>During MTI 4</td>
<td>1</td>
<td>Video Segment A</td>
</tr>
<tr>
<td>During MTI 6</td>
<td>2</td>
<td>Video Segment B</td>
</tr>
<tr>
<td>During MTI 8</td>
<td>3</td>
<td>Video Segment C</td>
</tr>
<tr>
<td>During MTI 7</td>
<td>4</td>
<td>Video Segment D</td>
</tr>
<tr>
<td>During MTI 3</td>
<td>5</td>
<td>Video Segment E</td>
</tr>
<tr>
<td>During MTI 1</td>
<td>6</td>
<td>Video Segment F</td>
</tr>
<tr>
<td>During MTI 2</td>
<td>7</td>
<td>Video Segment G</td>
</tr>
<tr>
<td>During MTI 9</td>
<td>8</td>
<td>Video Segment H</td>
</tr>
<tr>
<td>During MTI 5</td>
<td>9</td>
<td>Video Segment I</td>
</tr>
<tr>
<td>During MTI 10</td>
<td>10</td>
<td>Video Segment J</td>
</tr>
</tbody>
</table>

The during MTI video data segments were 30 second segments selected from the midpoint of each of the ten MTIs where music was present. If there was no music present at the exact midpoint of the MTI, i.e. the midpoint fell at a gap in between songs, the 30 second segment was taken at the nearest point after the midpoint when music was present.
APPENDIX I

Agitated Behavior Scale (Corrigan, 1989)

Indicate the degree of the behaviors listed using the following numerical values.

1 = absent. The behavior is not present

2 = present to a slight degree. The behavior is present but does not prevent the conduct of other contextually appropriate behavior. The individual may spontaneously re-direct themselves or the continuation of the agitated behavior does not disrupt appropriate behavior.

3 = present to a moderate degree. The individual needs to be re-directed from an agitated to an appropriate behavior, but benefits form such cueing.

4 = present to an extreme degree. The individual is not able to engage in appropriate behavior due to the interference of the agitated behavior, even when external cuing or re-direction is provided.

DO NOT LEAVE BLANKS

1. Short attention span, easy distractibility, inability to concentrate
2. Impulsive, impatient, low tolerance for pain or frustration
3. Uncooperative, resistant to care, demanding
4. Violent and/or threatening violence toward people or property
5. Explosive and/or unpredictable anger
6. Rocking, rubbing, moaning or other self-stimulating behavior
7. Pulling at tubes, restraints, etc.
8. Wandering from treatment areas
9. Restlessness, pacing, excessive movement
10. Repetitive behaviors, motor and/or verbal
11. Rapid, loud or excessive talking
12. Sudden changes of mood
13. Easily initiated or excessive crying and/or laughter
14. Self-abusiveness, physical and/or verbal

Total Score
APPENDIX J

MTI Brief Session Notes Form (first page only)

Music therapy for paediatric patients experiencing agitation during PTA

(HREC # 29084 A). Researchers: C. Catroppa, D. Grocke, J. Bower, H. Shoemark

<table>
<thead>
<tr>
<th>MTI brief session notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Name:</td>
</tr>
<tr>
<td>Session Date:</td>
</tr>
<tr>
<td>Session Number:</td>
</tr>
<tr>
<td>Other:</td>
</tr>
</tbody>
</table>

Timeline

<table>
<thead>
<tr>
<th>Session Chronology (song title)</th>
<th>Significant Events</th>
</tr>
</thead>
</table>
APPENDIX K

Participant Medical History Form

Music therapy for paediatric patients experiencing agitation during PTA

(HREC # 29084 A). Researchers: C. Catroppa, D. Grocke, J. Bower, H. Shoemark

**Note:** This information is to be collected after parent/guardian consent is obtained

**Date:**

Date of injury/admit to RCH: ________________________________

GCS at scene: ____________________________________________

ICU treatments (incl surgery): _______________________________

________________________________________________________________________

Length of ICU admission: _______________________________________

Current neuro status: _________________________________________

Current meds/treatments: _______________________________________

________________________________________________________________________

Side effects meds/treatments: _________________________________

________________________________________________________________________

Pre-existing conditions: _____________________________________

Social/family: ______________________________________________

________________________________________________________________________

Other information: __________________________________________
APPENDIX L

Participant Daily pre-MTI Status Form

Music therapy for paediatric patients experiencing agitation during PTA

(HREC # 29084 A). Researchers: C. Catroppa, D. Grocke, J. Bower, H. Shoemark

Note: This information is to be collected from the participant’s bedside nurse and medical records, before the MTI, everyday for the duration of the data collection period.

Participant name: 

- Day ____________ Date: ____________ Time: ____________

Medical status:

Current neuro status:

Presentation last 24 hrs:

Medication (?side effects):

Time of last meds:

Treatments in last 24 hours:

Therapies:

Other information:

________________________________________

________________________________________

________________________________________
### APPENDIX M

**MTR and QR Micro-Descriptions MTI 4**

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00</td>
<td>Lying on back in bed</td>
<td>MTR off screen talking to Grandmother</td>
<td>Mother (Mo) is on phone</td>
<td></td>
</tr>
<tr>
<td>01:29</td>
<td>Some slight moving head to side</td>
<td></td>
<td>GMo moves away</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequent lip smacking (chewing movements), with mouth pulling to left side</td>
<td></td>
<td>0.15 – 0.21 Chewing: mouth action looks like chewing. R eye half open</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Some slight left arm movements. Left arm bent at elbow with hand at shoulder height</td>
<td></td>
<td>0.28 – 0.31 Then mouth pulls down (mpd): lefts side of mouth pulls down to the left mouth then moves gently</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Right eye open, left eye difficult to assess from video footage</td>
<td></td>
<td>0.32 – Mpd again and then chews</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Some quiet vocalisations with trachy speaking valve insitu</td>
<td></td>
<td>0.40 – Mpd and she pauses but moves her leg slightly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hospital room +++ noisy</td>
<td></td>
<td>0.47 Mpd – pause (baby crying loudly)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.51 Mpd – chews</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>01:30</td>
<td>Stands near the head of bed with guitar.</td>
<td>Lip smacking stops immediately as guitar starts playing</td>
<td>Guitar intro tempo is slower than verse</td>
<td>She stills- her mouth pauses, both her arms move slightly (within 1 sec of MTR starting, it is an obvious response to the guitar sound. Does her R eye fix on MTR? Or move at all in response to the guitar?)</td>
</tr>
<tr>
<td>– 01:39</td>
<td>1.30 I – V – I – V – I guitar chord introduction to song (D major)</td>
<td></td>
<td>MTR's voice is smooth and smiley</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Starts singing <em>Hello Song</em></td>
<td></td>
<td>‘Hello’</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sings in a legato style, voice light, with open facial expressions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sings; “ Hello Evelyn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hello Evelyn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hello Evelyn</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>It’s music time”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:40</td>
<td>Hello Evelyn</td>
<td>Some smaller lip movements</td>
<td>Steady plucked guitar accompaniment. Steady, smooth and smiley timbre in MTR voice</td>
<td>She is still</td>
</tr>
<tr>
<td>– 01:49</td>
<td>It’s music time”</td>
<td>Left arm begins to move slightly towards first repetition of <em>Hello Song</em></td>
<td></td>
<td>1.43 There is a sudden noise of a chair being dragged</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.44 She moves her L arm and ? her eye reopens a little (did she stir because of the chair, or is she anticipating the end of the verse?)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ends verse with I – V7 – I plucked chord</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.47 “It's music time” additional emphasis as MTR brings verse to close. MTR immediately speaks “Hello”</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Verse bought to a close with two deliberate (attack) chords</td>
<td>1.47 Mpd after a swallow. Mpd accompanied by some limb movement. Chewing recommences</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:50</td>
<td>Brief pause in guitar accompaniment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Speaks: “Hello, Hi”</td>
<td>Small but frequent lip smacking</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very brief pause in then repeats <em>Hello Song</em></td>
<td>Beeping alarm starts</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.52 “Hi” - same intonation – high register, bright timbre. MTR pauses momentarily</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.54 Verse 2 begins (repeat of <em>Hello Song</em>) – it is a little bit less smiley</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MTR maintains the same style throughout verse 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02:00</td>
<td></td>
<td>Chewing seems to increase pace</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.51 Does she vocalise?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.52 “Hi” - same intonation – high register, bright timbre. MTR pauses momentarily</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.54 Verse 2 begins (repeat of <em>Hello Song</em>) – it is a little bit less smiley</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MTR maintains the same style throughout verse 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.58 Chewing stops momentarily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02:00</td>
<td></td>
<td>2.00 Mpd, chewing continues without any real variation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.00 Mpd, chewing continues without any real variation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.08 MTR brings the last line of verse 2 to a close with a softer more breathy tone. The two concluding chords are less accented</td>
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<td>02:10</td>
<td>Single strum on guitar (slow)</td>
<td>2.10 MTR gentle strum on tonic chord and improvise <em>Hello</em> on the first interval of the song’s tune</td>
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<td></td>
<td>Sings descending “Hello” on I</td>
<td>Her legs come up as they have before</td>
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<td></td>
<td>Sings descending “Hello” on I</td>
<td>2.15 Is there a change in her breath just here? Her chest seems to rise and it is as if she is drawing in breath perhaps to vocalise</td>
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<td></td>
<td>Sings descending “Hello” on V7-I</td>
<td>2.16 – 2.17 Mpd x2, change in chewing, mouth more open</td>
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<td></td>
<td>Alternating guitar strum - lyric</td>
<td>2.18 MTR sings “Hello” again no accompaniment</td>
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<td>02:20</td>
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<td>2.21 Mouth movement stops and I feel</td>
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<td>02:29</td>
<td>Speaks, bright ascending pitch “Hi” acknowledging vocalisations from Evelyn</td>
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<td></td>
<td>Lips pull to left side</td>
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<td></td>
<td>Arm appears to tense slightly</td>
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<td>2.27 Vocalises (barely audible on footage – more recognisable from my response)</td>
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<td>Mouth movement and arm tensing appear to be a result of effort to vocalise</td>
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<td>2.22 MTR finishes verse 3 with a final “Hello” modified motif</td>
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<td>MTR still smiling and MTR obviously waiting</td>
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<td>2.28 “Hi” MTR acknowledges her vocalisation</td>
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<td></td>
<td>like she is going to vocalise. She is more still and her chest expands again</td>
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<td>2.27 She vocalises!</td>
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<td>2.28 Mpd immediately follows the vocalisation, she chews</td>
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<td>02:30</td>
<td>Comments “I heard you use your voice”</td>
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<td>02:39</td>
<td>Pauses to allow response from Evelyn</td>
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<td></td>
<td>Repeats</td>
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<td></td>
<td>Single strum on guitar (slow)</td>
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<td>Sings descending “Hello” on I</td>
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<td></td>
<td>2.31 Stills briefly</td>
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<td></td>
<td>MTR acknowledges her vocalisation with an affirming statement “I hear you…”</td>
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<td>MTR waits a couple of seconds before beginning to strum the tonic chord again (at 2.34). The chord is mp and the attack is gentle</td>
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<td>2.35 Over the chord MTR adds the Hello melodic motif from the Hello Song</td>
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<td>2.38 MTR changes the chord and sings Hello same pitch</td>
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<td>She chews a few times</td>
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<td>2.31 – 2.32 As MTR affirms her she stops chewing and her mouth is relaxed. She closes her R eye again</td>
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<td>2.36 As MTR sings Hello the R eye flicks open</td>
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<td>2.38 As MTR plays the second chord/sings Hello simultaneously she is moving all limbs slightly</td>
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<td>02:40</td>
<td>Sings descending “Hello” on I</td>
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<td>02:49</td>
<td>Sings descending “Hello” on V7-I</td>
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<td></td>
<td>Larger lip smacking movements with mouth pulling to left</td>
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<td>2.42 Again the chord played as at 2.34 and 2.38 and MTR delays the sung “Hello” until 2.43</td>
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<td>2.43 The final “Hello” – the first syllable is extended as a musician does in bringing a shared song to an end</td>
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<td>2.46 MTR rests her arms on top of her guitar for the first time in the session. That is the end of the song</td>
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<td>2.41 Mpd – no chewing follows</td>
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<td>2.43 Mpd - no chewing follows</td>
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<td></td>
<td>2.47 Mpd as part of chewing</td>
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<td></td>
<td>2.49 Mpd</td>
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<td>02:50–</td>
<td>Pauses</td>
<td>No obvious changes. Mouth pulling to left</td>
<td>It does seem like she is ‘gone’ again. The little bit of availability to MTR has ended</td>
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<td>02:59</td>
<td>Speaks “Good morning”</td>
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<td>2.51 Mpd. Does she vocalise here? Her chest expands noticeably</td>
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<td>2.54 Mpd (I notice her R eye is open)</td>
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<td>2.58 As MTR strums on the guitar again she has relaxed still and symmetrical mouth again. She settles. Does her eye close again?</td>
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<td>03:00–</td>
<td>Begins <strong>Hello Song</strong> (full version)</td>
<td>Stills Decreased mouth, arm and leg movements</td>
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<td>03:09</td>
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<td>3.02 MTR looks distracted by someone in her peripheral vision, but it is just a glance</td>
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<td>3.08 Her chest expands and her R arm moves slightly – almost like it was recruited in the task of breathing</td>
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<td>03:10–</td>
<td>Repeats simplified version of <strong>Hello Song</strong></td>
<td>Continues lip smacking/mouth movements</td>
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<td>03:19</td>
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<td>3.15 <strong>Hello Song</strong> ends – MTR is now sounding less animated again, voice is more breathy mp and guitar is p</td>
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<td></td>
<td>Sings descending “Hello” on I</td>
<td></td>
<td>3.12 Small chewing</td>
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<td>3.14 Small mpd</td>
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<td>3.15 Mpd and full chewing recommences</td>
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<td>3.18 Mpd</td>
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<td>Time</td>
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<td>03:20</td>
<td>Sings descending “Hello” on I</td>
<td>Stills very briefly, much smaller mouth movements, slight R arm movements</td>
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<td>MTR strums an isolated chord that belongs to song consistent with what has come before.</td>
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<td>3.23 And here’s the accompanying “Hello”</td>
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<td>3.26 The last dominant chord of this verse of the Hello Song</td>
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<td>3.29 MTR doesn’t add in the last sung “Hello” till here. It’s elongated as before Extended, rit to finish</td>
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<td>3.24 Her face settles it is a little mpdish but it is almost the relaxed, still, symmetrical face</td>
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<td>3.27 Her R arm flinches slightly but her face remains relaxed</td>
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<td>3.28 A gentle mpd</td>
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<td>03:30</td>
<td>Sings descending “Hello” on V7-I</td>
<td>Leaves space between each “Hello” to encourage and allow space for response from Evelyn</td>
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<td>03:37 quiet vocalisation</td>
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<td>Mouth moving then stills</td>
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<td>3.30 “Hello” MTR finished with a single strum. The energy of the first few renditions ha been abandoned. MTR now waits, her face is anticipatory – it seems MTR thinks she is about to vocalise</td>
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<td>3.31 Her R arm flinches slightly</td>
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<td>3.32 Mpd</td>
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<td>3.35 Open pre-vocalisation shape in mouth but slight chewing continues</td>
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<td>3.37 her chewing returns to the ongoing ‘gone’ style</td>
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<td>03:40</td>
<td>Affirms Evelyn’s vocalisation.</td>
<td>Stills</td>
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<td>As MTR is sitting down (takes till 3.46) she is talking to her about hearing her voice (Did Evelyn vocalise again or is MTR talking about earlier vocalisations?)</td>
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<td>3.48 MTR strums and adds the Hello melodic motif but uses “Hi” instead of “Hello”</td>
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<td>3.40 There is loud laughter in the room Evelyn stops chewing and has a relaxed, still, symmetrical mouth. Attending to MTR as MTR talks to her</td>
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<td>03:50</td>
<td></td>
<td>Small lip smacking movements</td>
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<td>3.50 Slight mpd</td>
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<td>Time</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
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<td>03:59</td>
<td>Repeats “Hi” as above</td>
<td>3.54 MTR strums the next chord of the sparse version of <em>Hello Song</em> but again sings “Hi”</td>
<td>3.53 Chewing begins again</td>
<td>3.58 Mpd</td>
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<tr>
<td>04:00</td>
<td>Quiet, open face, inviting/waiting for response</td>
<td>4.04 louder vocalisations</td>
<td>3.58 Penultimate chord strummed but MTR does not sing the companion “Hello” or “Hi” – MTR is waiting and anticipating her reply</td>
<td>4.00 Mpd – does not dissipate until 4.05</td>
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<td>04:09</td>
<td>Mirrors Evelyn’s vocalisation with single strum on guitar and descending vocal “Hi”</td>
<td>4.06 MTR repeats the penultimate chord and adds the “Hi” over it</td>
<td>4.04 Looks like her chest expands her in a pre-vocalisation way</td>
<td>4.06 Mpd – chewing is now at ‘gone’ size and pace</td>
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<td>04:10</td>
<td>Sings descending “Hello” with guitar V-1 to end phrase</td>
<td>MTR is still waiting</td>
<td>4.12 Chewing stops for a moment. Her legs pull up slightly. Does she vocalise</td>
<td>4.14 She re-commences chewing at ‘gone’ pace and size</td>
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<tr>
<td>04:16</td>
<td>Pauses</td>
<td>Small lip smacking</td>
<td>4.14 MTR says “Hi” as if she has vocalised and MTR is reflecting this</td>
<td>4.17 Some slow mouth ‘chewing’</td>
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<td>Time</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
<td>Observations about music/MT</td>
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<td>04:37</td>
<td>Comments to Evelyn “You can just have a rest for this song”</td>
<td>Lip smacking</td>
<td>4.18 MTR strums a chord in a different key and suggests that Evelyn may just like to rest</td>
<td>More like mouth opening and closing</td>
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<td>Mirrors and acknowledges Evelyn’s vocalisation saying “Yeah, Hi” Mirrors the descending pitch of Evelyn’s vocalisation</td>
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<td>4.21 Mpd ? Voice here – MTR’s responses suggests so</td>
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<td>4.25 vocalises then briefly stills</td>
<td>Returns to lip smacking movements and some slight arm movements</td>
<td>4.23 MTR turns to get book and I cannot hear what she says</td>
<td>4.22 Is that her voice? Open vowel sounds “er” nasal back of the throat sound</td>
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<td>4.25 As MTR flicks thru the music book looking for the song to play, she acknowledges Evelyn’s vocalisation “Yeah, Hi” in that slightly distracted, flattened tone</td>
<td>4.25 She inhales and the chewing recommences and it is ongoing</td>
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<td>04:38</td>
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<td>Stills</td>
<td>MTR sings this verse right through. There is no apparent change/variation in presentation i.e. it is kept consistent throughout</td>
<td>4.39 She lifts her legs and chewing stops – in response to the guitar commencing. She knows MTR is playing</td>
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<td>04:38 – 04:47</td>
<td>Starts song with guitar only introduction</td>
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<td>4.42 MTR begins Verse 1. MTR’s voice is a straight ‘cover’ of the originally in its register and timbre. The volume is moderate and attack is very smooth</td>
<td>4.42 Just before the MTR starts singing her left arm flinches</td>
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<td>Song paced quite quickly Voice clear and bright Vocal line legato, accents not strongly attacked</td>
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<td>4.45 Chewing recommences.</td>
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<td>04:48</td>
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<td>Small lip smacking movements</td>
<td>MTR sings this verse right through. There is no apparent change/variation in presentation i.e. it is kept consistent throughout</td>
<td>4.51 She closes her mouth and continues chewing</td>
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<td>04:48 – 04:57</td>
<td>Continues singing</td>
<td>Lips pull to the left Very slight left arm tremors</td>
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<td>4.54 It is almost as if she is going to smile as her mouth spreads symmetrically</td>
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<td>4.55 Mpd, left arm flinches x2</td>
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<td>04:58</td>
<td>Continues</td>
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<td>05:07</td>
<td>Intermittent small lip smacking/chewing movements</td>
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<td>Slight left arm movements</td>
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<td></td>
<td>Slight leg movements</td>
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<td>5.03</td>
<td>“Self” MTR holds this note as the customary primer/lead in to the chorus</td>
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<td>5.05</td>
<td>Chorus, no change in elements – attack, register, volume all maintained</td>
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<td>5.07</td>
<td>She stops chewing, mouth is closed for a moment and her legs come up</td>
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<td>05:08</td>
<td>Continues singing chorus</td>
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<td>Little variation in volume i.e. no significant crescendo or diminuendo</td>
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<td>5.09</td>
<td>Mpd occurs but is weak. Her mouth is open and there is a sense that she is about to vocalise. She looks attuned – she is still, her mouth is open</td>
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<td>5.11</td>
<td>Legs have moved up again</td>
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<td>05:15</td>
<td>Continues</td>
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<td>Less frequent mouth movements but some small lip smacking</td>
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<td>5.12</td>
<td>MTR checks the music</td>
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<td>5.21</td>
<td>Left arm tremors continues in an episodic manner</td>
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<td>5.24</td>
<td>Head twitch seems to abate the chewing</td>
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<td>5.26</td>
<td>Slight mpd, repeats but she looks more relaxed and attuned.</td>
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<td>05:28</td>
<td>Continues</td>
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<td>Continues</td>
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<td>Continues</td>
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<tr>
<td>5.29</td>
<td>mouth moves, left arm moves slights</td>
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<tr>
<td>5.30</td>
<td>legs come up again</td>
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<tr>
<td>5.31</td>
<td>left arm flinch</td>
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<tr>
<td>5.33</td>
<td>mpd</td>
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<tr>
<td>5.35</td>
<td>chewing recommences</td>
<td></td>
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<tr>
<td>05:38</td>
<td>Break in vocal line between chorus and verse with guitar accompaniment only</td>
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<tr>
<td></td>
<td>Stills briefly</td>
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<tr>
<td>5.41</td>
<td>Chewing stops, mouth closed</td>
<td></td>
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<tr>
<td>5.42</td>
<td>Left arm raises slowly</td>
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<tr>
<td>05:47</td>
<td>MTR plays a chord progression to transition from chorus to verse 2 with no singing</td>
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</tbody>
</table>

165
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>05:48</td>
<td>Begins singing second verse of song</td>
<td>5.46 MTR checks sheet music and begins singing of verse 2</td>
</tr>
<tr>
<td>05:57</td>
<td></td>
<td>5.46 right eye closes</td>
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<tr>
<td></td>
<td></td>
<td>Now very still – sleep?</td>
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<td></td>
<td></td>
<td>5.52 Eyes are closed, but the eyes flick like a twitch</td>
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<td>5.54 Left arm releases</td>
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<tr>
<td></td>
<td></td>
<td>5.54 Mpd x3 (slight)</td>
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<tr>
<td>05:58</td>
<td>Continue singing</td>
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<tr>
<td>06:07</td>
<td></td>
<td>5.58 Chewing recommences</td>
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<tr>
<td></td>
<td></td>
<td>6.06 Mpd</td>
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<tr>
<td></td>
<td></td>
<td>6.07 Legs pull up</td>
</tr>
<tr>
<td>06:08</td>
<td>Continue singing</td>
<td></td>
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<tr>
<td>06:17</td>
<td></td>
<td>Chewing</td>
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<tr>
<td></td>
<td></td>
<td>6.15 Legs pull up</td>
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<tr>
<td></td>
<td></td>
<td>6.15 Mouth open (slack)</td>
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<tr>
<td>06:18</td>
<td></td>
<td>6.20 Chewing</td>
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<tr>
<td>06:27</td>
<td></td>
<td>5.26 Mpd</td>
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<tr>
<td>06:28</td>
<td></td>
<td>6.30 MTR smiles</td>
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<tr>
<td>06:37</td>
<td></td>
<td>6.30 Grimace – does she vocalise?</td>
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<tr>
<td></td>
<td></td>
<td>Chewing recommences</td>
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<tr>
<td>06:38</td>
<td>Gap in vocal line between chorus with guitar accompaniment only</td>
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<tr>
<td>06:47</td>
<td>Repeats first verse of song</td>
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<tr>
<td></td>
<td></td>
<td>MTR strums 4 bars before next verse as above, quick tempo, light timbre, mf</td>
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<td></td>
<td></td>
<td>Chewing</td>
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<tr>
<td></td>
<td></td>
<td>6.44 Left arm movement</td>
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<tr>
<td></td>
<td></td>
<td>6.46 Very symmetrical, eyes closed, mouth slightly open, relaxed</td>
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<tr>
<td>06:48</td>
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<tr>
<td>06:57</td>
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<tr>
<td></td>
<td></td>
<td>6.51 Slight left arm twitch followed by mpd</td>
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<tr>
<td></td>
<td></td>
<td>Mouth is open, slack</td>
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<tr>
<td>06:58</td>
<td>Pauses between end of verse and beginning of chorus</td>
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<tr>
<td>07:07</td>
<td></td>
<td>7.04 Mpd followed by chewing</td>
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<td></td>
<td>7.06 MTR pauses at the penultimate moment before chorus</td>
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<tr>
<td>Time</td>
<td>Action Description</td>
<td>Notes</td>
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<td>------------------------------------------------------------------------------------</td>
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<tr>
<td>07:08</td>
<td>Slows tempo of chorus</td>
<td>MTR obviously slows tempo and slightly increase attack to give a more definite timbre</td>
</tr>
<tr>
<td>07:17</td>
<td></td>
<td>MTR is less smiley</td>
</tr>
<tr>
<td>07:18</td>
<td>Reduces frequency of guitar strumming then returns to previous strumming pattern</td>
<td>7.10 Mpd, light chewing</td>
</tr>
<tr>
<td>07:27</td>
<td>Less frequent and smaller mouth movements</td>
<td>7.20 Mpd</td>
</tr>
<tr>
<td>07:28</td>
<td>Acknowledges Evelyn’s vocalisation with a pause in the music i.e. “Waterloo . . . (Evelyn’s vocalises) . . . (pause) . . . Knowing my fate is to be with you”</td>
<td>7.29 her mouth open and slightly lifted at edges, her legs pull up and she vocalises and then chews</td>
</tr>
<tr>
<td>07:37</td>
<td>Slows tempo of phrase “Wah wah wah wah Waterloo”</td>
<td>7.37 She pauses chewing and inhales, slight mpd and it seems like she will vocalise</td>
</tr>
<tr>
<td>07:38</td>
<td>Pauses after final “Wah wah wah wah…. (pause). Waterloo”</td>
<td>At 7.40 MTR goes on and it is very sedate – attack is gentler, tempo is slower and MTR is watching Evelyn carefully</td>
</tr>
<tr>
<td>07:47</td>
<td>Continues with guitar accompaniment but allows space in lyrics for Evelyn’s vocalisations</td>
<td>7.46 Vocalises and then chews She is fairly still</td>
</tr>
<tr>
<td>07:48</td>
<td>Continues</td>
<td>MTR goes on as before</td>
</tr>
<tr>
<td>07:57</td>
<td>Lip smacking</td>
<td>Continues</td>
</tr>
<tr>
<td>07:58</td>
<td></td>
<td>Continues</td>
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<tr>
<td>Time</td>
<td>Observations about music/MT</td>
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<tr>
<td>08:08</td>
<td>Continues singing chorus at a slower pace</td>
<td>Stills</td>
</tr>
<tr>
<td>08:16</td>
<td>Rit. to end song</td>
<td>Returns to lip smacking</td>
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</tbody>
</table>

**MTR**

**Time**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>08:17</td>
<td>Leans closer to talk to Evelyn</td>
<td>Lip smacking</td>
<td>MTR talks about “singing along”</td>
<td></td>
</tr>
<tr>
<td>08:39</td>
<td>Acknowledge Evelyn’s previous vocalisation saying “Hey were you doing some singing along?”</td>
<td>8.21 Vocalises</td>
<td>8.23 MTR says ‘ahh’ in response to her</td>
<td>8.20 big mpd</td>
</tr>
<tr>
<td></td>
<td>Mirrors Evelyn’s vocalisation on “Ahh”</td>
<td>Stills and remains still</td>
<td></td>
<td>8.23 Is that her sound?</td>
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<td></td>
<td>Observes Evelyn quietly</td>
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<td></td>
<td>Leans back in the seat and prepares for</td>
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<tr>
<td></td>
<td>next song</td>
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**MAMMA MIA**

**Time**

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<thead>
<tr>
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<tbody>
<tr>
<td>08:40</td>
<td>Begins song with guitar only introduction</td>
<td>Some leg movements</td>
<td>With no explanation, MTR gently begins - very sedative, gently plucked and voice gentle, smooth timbre, mp and slowish</td>
<td></td>
</tr>
<tr>
<td>08:49</td>
<td>Singing in a legato style</td>
<td>Small mouth movements, some mouth pulling to left side</td>
<td>MTR is singing ‘for’ her now, MTR’s face shows no expectation of response and this is how it sounds too</td>
<td>8.44 Mpd</td>
</tr>
<tr>
<td></td>
<td>Song sung at slower tempo than original song</td>
<td></td>
<td></td>
<td>Chewing</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>08:50</td>
<td>Continues</td>
<td>Continues</td>
<td>Continues</td>
<td>5.50 Slight leg pull up</td>
</tr>
<tr>
<td>08:59</td>
<td></td>
<td></td>
<td></td>
<td>Chewing</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>8.59 Mpd while chewing</td>
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<td>continues</td>
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<tbody>
<tr>
<td>09:00</td>
<td>Looks over right shoulder at someone entering the room off camera</td>
<td>Continues</td>
<td>Someone distracts MTR’s attention.</td>
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<tr>
<td>09:09</td>
<td></td>
<td></td>
<td>MTR continues as above but now</td>
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168
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<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Observations</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>09:10</td>
<td>Pauses after “Just one look and I can hear a bell ring . . .”</td>
<td>Evelyn’s head moves slightly to her right</td>
<td>9.08 Flinch head/slight upper torso 9.09 Mpd</td>
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<tr>
<td>09:19</td>
<td></td>
<td>Mouth slightly open and pause in lip smacking movements</td>
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<tr>
<td></td>
<td></td>
<td>Legs move</td>
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<td></td>
<td></td>
<td>Appears to be making effort to vocalise however no audible vocalising.</td>
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<td></td>
<td></td>
<td>Exhales audibly</td>
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<td></td>
<td></td>
<td>(Alarm seems very loud)</td>
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<td></td>
<td></td>
<td>It is more active now, MTR is smiling and making the timbre more playful</td>
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<td></td>
<td></td>
<td>(bright) and the strummed accompaniment has a more definite attack</td>
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<td></td>
<td></td>
<td>9.17 MTR’s face is expectant of a response from her and MTR pauses</td>
<td></td>
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<tr>
<td>09:20</td>
<td>Pauses again after next lyric line “One more look and I forget everything . . .”</td>
<td>Returns to lip smacking</td>
<td>9.10 Mouth closes, before recommencing chewing</td>
</tr>
<tr>
<td>09:29</td>
<td></td>
<td>Right arm moves, legs move, chest rises slightly, again appears to be</td>
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<td></td>
<td></td>
<td>making effort to vocalize or response but no vocalisation heard on footage.</td>
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<tr>
<td>09:30</td>
<td>Continues singing</td>
<td>Some slight lip smacking</td>
<td></td>
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<tr>
<td>09:39</td>
<td></td>
<td>9.33 MTR relinquishes expectation and goes on with chorus</td>
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<td>9.39 MTR is visibly checking for a response again</td>
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<td>She is still for a moment as if listening – face relaxed, eyes closed, mouth</td>
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<td></td>
<td></td>
<td>slightly open and relaxed</td>
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<td></td>
<td>Chewing continues</td>
<td></td>
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<tr>
<td>09:40</td>
<td>Continues singing</td>
<td>Some slight movements in both arms and some small leg movements</td>
<td>9.41 As if she is turning to the MTR, with</td>
</tr>
<tr>
<td>09:49</td>
<td></td>
<td>MTR’s timbre/attack are gentle and tempo a little slower, guitar strumming</td>
<td>mouth open to sing, brows slightly raised</td>
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<td></td>
<td></td>
<td>gentle attack</td>
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<td>MTR sits back a little, not checking or expecting a response</td>
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<td></td>
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<td>9.46 Legs pull up slightly and left arm flinches</td>
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<td>09:50</td>
<td></td>
<td>Small lip smacking</td>
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<td>09:59</td>
<td></td>
<td>Continues</td>
<td>9.51 Lght mdp 9.51 Mpd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.56 Chewing recommences</td>
<td></td>
</tr>
<tr>
<td>10:00</td>
<td>Pauses in vocal line between end of chorus and next verse. Guitar</td>
<td>10.03 MTR dims her voice further at the end of the lyrics phrase “Let you</td>
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<tr>
<td>10:09</td>
<td></td>
<td>go” and stops singing at end of verse</td>
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<td></td>
<td>10:02 Leg pull up</td>
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<td>Time</td>
<td>Event Description</td>
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<td>10.42</td>
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<td>11.01</td>
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<tr>
<td>11:39</td>
<td>Repeats above phrase wordlessly singing phase on “ahh”. Same guitar accompaniment strumming on the beat</td>
<td>11.33 MTR stops singing and keeps strumming MTR changes to “la la”</td>
<td>1.37 Mouth closes, chewing continues</td>
</tr>
<tr>
<td>11:40 – 11:49</td>
<td>Rit. in music Leans closer to Evelyn</td>
<td>Continues</td>
<td>Continues</td>
</tr>
<tr>
<td>11:50 – 11:59</td>
<td>Slows tempo of singing, more legato, adds pauses in the melody line and accompaniment Rit. to end song</td>
<td>Intermittent mouth movements Some very slight left arm movements</td>
<td>11.51 ?? Does MTR sing the opening interval from the Hello Song 11.55 MTR changes key</td>
</tr>
<tr>
<td>12:00 – 12:09</td>
<td>Pauses</td>
<td>Stills</td>
<td>MTR is strumming lightly and singing without lyrics 12.05 MTR stops and watches her</td>
</tr>
<tr>
<td>12:10 – 12:11</td>
<td>Left arm relaxes</td>
<td></td>
<td>She chews lightly</td>
</tr>
</tbody>
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<tbody>
<tr>
<td>12:12 – 12:26</td>
<td>Quietly observing Evelyn Briefly and quietly talks to Evelyn – Evelyn appears relaxed so do not want to actively engage her</td>
<td>Body and face relaxed Some small mouth movements ? Eyes closed</td>
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</tbody>
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<tbody>
<tr>
<td>12:27 – 12:36</td>
<td>Begins strumming on the guitar while talking to Evelyn</td>
<td>Still</td>
</tr>
<tr>
<td>12:37 – 12:46</td>
<td>Begins singing lyrics of song Sings quietly with legate lyric line</td>
<td>Some small mouth movement</td>
</tr>
<tr>
<td>12:42</td>
<td>She ‘smiles’</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Observations about music/MT</td>
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<tr>
<td>12:47</td>
<td>Continues singing</td>
<td>? Eyes closed</td>
</tr>
<tr>
<td>12:56</td>
<td></td>
<td>Intermittent mouth movements</td>
</tr>
<tr>
<td>12:57</td>
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<td></td>
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<tr>
<td>13:06</td>
<td></td>
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<tr>
<td>13:07</td>
<td>Very little dynamic changes in singing</td>
<td>Face calm and still</td>
</tr>
<tr>
<td>13:16</td>
<td>– singing style is consistent</td>
<td>Eyes closed</td>
</tr>
<tr>
<td>13:17</td>
<td>Continues singing, legato, no accents</td>
<td>Still</td>
</tr>
<tr>
<td>13:26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:37</td>
<td>Leaves only very small space in lyrics</td>
<td>Remains still</td>
</tr>
<tr>
<td>13:46</td>
<td>between end of chorus and next verse</td>
<td></td>
</tr>
<tr>
<td>13:47</td>
<td>– not wanting to change or leave gap</td>
<td></td>
</tr>
<tr>
<td></td>
<td>in auditory stimulus</td>
<td></td>
</tr>
<tr>
<td>15:35</td>
<td>Continues singing, smooth vocal and</td>
<td>ASLEEP</td>
</tr>
<tr>
<td></td>
<td>accompaniment, mp, no accents</td>
<td></td>
</tr>
<tr>
<td>16:17</td>
<td></td>
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</tr>
</tbody>
</table>

**MTR**

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:35</td>
<td>Comments to Evelyn’s Mo that she is “beautifully relaxed”</td>
<td>Remains asleep</td>
</tr>
<tr>
<td></td>
<td>Comments that HR is stable at 75bpm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Packs up and leaves room</td>
<td></td>
</tr>
</tbody>
</table>

**QR**

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Remains asleep</td>
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</tbody>
</table>

Remains asleep
## APPENDIX N

### MTR and QR Micro-Descriptions MTI 10

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
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<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td>00:00</td>
<td>Lying on back in bed, vocalising crying out</td>
<td></td>
<td>Cushion is on Evelyn’s head</td>
<td></td>
</tr>
<tr>
<td>00:04</td>
<td>Arm thrashing – moving in circles from the shoulder</td>
<td></td>
<td>As it start Evelyn is ‘crying’ – plaintive sound. It is a complete sound – almost two tones (as if her vocal chords are damaged). It is a descending interval of a ?? 2nd and quite brief in duration. There is little force in the attack, more like a voice of exhale – a sad cry rather than an angry. Her face looks sad</td>
<td></td>
</tr>
<tr>
<td>00:07</td>
<td>Appears agitated</td>
<td></td>
<td>0.07 Plaintive cry</td>
<td></td>
</tr>
<tr>
<td>00:09</td>
<td>Vocalisations sound quite primitive and guttural.</td>
<td></td>
<td>0.09 Plaintive cry and rotating arm movement</td>
<td></td>
</tr>
<tr>
<td>00:12</td>
<td>Vocalisations are of varying intensity: louder/softer, longer/shorter</td>
<td></td>
<td>0.12 Plaintive cry has two beated sound</td>
<td></td>
</tr>
<tr>
<td>00:16</td>
<td></td>
<td></td>
<td>0.16 Cry less power</td>
<td></td>
</tr>
<tr>
<td>00:20</td>
<td></td>
<td></td>
<td>0.20 There is more attack and forced timbre in the plaintive sound</td>
<td></td>
</tr>
<tr>
<td>00:22</td>
<td></td>
<td></td>
<td>0.22 Her eyes open ?? briefly</td>
<td></td>
</tr>
<tr>
<td>00:25</td>
<td></td>
<td></td>
<td>0.25 Plaintive cry sounds more like a</td>
<td></td>
</tr>
</tbody>
</table>

Enters to left side of Evelyn’s bed
Moves chair closer to bed at about Evelyn’s chest level
Setting up for session including turning off tv
Adjusts Evelyn’s head supports as neck rest is displaced and is on top of Evelyn’s head – looks uncomfortable
Says “Hi” to Evelyn
Sits down on chair, guitar on lap and begins Hello Song

00:47
174

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:48 –</td>
<td>Plucks a short intro to song on the guitar I – V – I – V – I</td>
<td>Briefly stills as guitar starts, change in facial expression – eyebrows rise</td>
<td>Sister touches Evelyn’s hand just as MTR begins to play guitar. MTR plucks out notes and add three chords as intro to song</td>
<td></td>
</tr>
<tr>
<td>00:57</td>
<td>Sings phrase “Hello Evelyn” Mostly descending melody, legato melody line, simple bass note/chord guitar accompaniment</td>
<td>Vocalises only at the end of the phrase “Hello Evelyn”. Much quieter vocalisation than observed pre-song</td>
<td>MTR begins to sing “Hello Evelyn” MTR sings and plays in an mf, steady pulsed even tone way. No smiling, just steadying</td>
<td></td>
</tr>
<tr>
<td>00:58 –</td>
<td>Continues through Hello Song “Hello Evelyn Hello Evelyn It’s music time”</td>
<td>Again quieter vocalisation after each phrase but not during i.e. “Hello Evelyn”.... vocalisation</td>
<td>Continues</td>
<td></td>
</tr>
<tr>
<td>01:07</td>
<td></td>
<td>“Hello Evelyn”.... vocalisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:08 –</td>
<td>Brief pause in guitar accompaniment at the end of the phrase</td>
<td>Louder more sustained vocalisation at the end of the phrase “It’s music time”</td>
<td>1.09 End of verse 1 (of Hello Song) 1.10 “Hi” ⊃ MTR says in an affirming tone 1.11 MTR repeats “Hi” in same ⊃ downward affirmative</td>
<td>1.09 Significant bell shaped vocalisation different from before 1.12 A half smile expression on her face and then she maintains and open face expression with eyes open, brow slightly raised and seemingly a delay in the next plaintive cry</td>
</tr>
<tr>
<td>01:17</td>
<td></td>
<td>Arm continues to move but no vocalisations</td>
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</tbody>
</table>
mirroring no guitar accompaniment

<table>
<thead>
<tr>
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<th>Observations of participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:18</td>
<td>Repeats Hello Song in similar style as above</td>
<td>Different from plaintive cry as not really voiced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:27</td>
<td>“Hello Evelyn Hello Evelyn Hello Evelyn It’s music time”</td>
<td>Same as in first repetition of song; quieter vocalisations after each phrase “Hello Evelyn” is sung but no vocalisation during the phrases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:28</td>
<td>Mirrors Evelyn’s vocalisation pith increase then decrease on the word “Hi” with no guitar accompaniment</td>
<td>Loud vocalisation at the end of the phrase “It’s music time”. Pitch rises then falls and volume increase then decreases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:38</td>
<td>Continues singing Hello Song</td>
<td>Vocalises quietly after “Hello Evelyn” Again vocalises quietly after “Hello Evelyn” is sung Vocalises x3 during “Hello Evelyn It’s music time” but quieter more breathy vocalisations Face appears tense when vocalising but otherwise calm Arm movement continues but smaller less jerky circles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:48</td>
<td>Finishes song with I – V – I picked chord pattern on the guitar</td>
<td>Vocalises at the end of the phrase “It’s music time” but quieter with less pitch range than in previous 2x she vocalised at this point in the song</td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:52</td>
<td>Removes guitar strap and moves guitar off lap to pick up music from floor</td>
<td>Continues intermittent vocalisations</td>
<td>MTR does not pause and look for a Expected plaintive cry as at 1.54 but it did not occur</td>
<td></td>
</tr>
</tbody>
</table>
Talking to Evelyn.
Mirror’s Evelyn’s vocalisation on *Yeah* with ascending then long descending pitch
Acknowledges the cry like vocalisation saying “It’s okay”

2.07 vocalisation sounds like a cry – more disjointed ahh-ha-haa, more breathy with less voice
Vocalisations increase in frequency and intensity
Arm movement continues with no obvious pattern

1.57 She gives a small cry sound same as 0.56. It has a second tone which descends and has not been used in the repetitive plaintive cry. Rotating arm movement continues

2.00 The plaintive cry is lead into by the same tone as at the tail of 1.57

2.03 Plaintive cry

2.05 MTR vocally emulates Evelyn's plaintive cry using “Yeah”
2.08 “It’s okay” says MTR in response to her cry at 2.07. MTR looks up from music book to check on Evelyn
MTR’s face is earnest as she puts guitar strap on

2.16 (as first note plays) She stops the cry-cry

2.18 Quiet cry

2.20 She does a little chewing, but her face rests for a moment

2.24 Quiet cry

2.23 MTR begins to sing – it is neither enticing nor soothing, but very metered i.e. it is mf, attack is firm but not strong tempo is slow but not lullaby slow, timbre is strong if not slightly breathy

2.26 She brings her lips together

2.28 Her muscle tone seems to bring
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.30</td>
<td>Louder vocalisation</td>
<td>MTR ralls as she leads into the next line, allowing Evelyn’s vocalisation to occur</td>
</tr>
<tr>
<td>2.30</td>
<td></td>
<td>her a little forward toward the MTR. The rotating arm movement is repeated in quick succession. She seems to draw in a breath, ready</td>
</tr>
<tr>
<td>2.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>02:36</td>
<td>Continues singing.</td>
<td>Vocal timbre is bright, medium volume, slightly slower tempo than song would traditionally be sung at</td>
</tr>
<tr>
<td>02:34</td>
<td>Vocal timbre is bright, medium volume, slightly slower tempo than song would traditionally be sung at</td>
<td>Vocalisations continue Arm movements continue Neither appear to be in response to the music</td>
</tr>
<tr>
<td>02:46</td>
<td>Continues singing</td>
<td>Vocalisations continue Arm movements continue Neither appear to be in response to the music</td>
</tr>
<tr>
<td>02:46</td>
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<tr>
<td>02:46</td>
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<tr>
<td>02:56</td>
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<tr>
<td>02:56</td>
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<tr>
<td>03:06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>03:15</td>
<td>Increase in intensity and frequency of vocalisations</td>
<td>them and attention is returned to Evelyn</td>
</tr>
<tr>
<td>03:16</td>
<td>No guitar accompaniment during “Wah wah wah wah Waterloo”</td>
<td>Louder and more extended vocalisations</td>
</tr>
<tr>
<td>03:17</td>
<td>Plaintive cry is extended in duration with increased energy on “Wah wah . . .”</td>
<td>MTR remains metered/even throughout, very consistent</td>
</tr>
<tr>
<td>03:20</td>
<td>“Finally facing my Waterloo…” MTR has an odd look on her face</td>
<td></td>
</tr>
<tr>
<td>03:21</td>
<td>MTR pauses “facing …….. my Waterloo” to allow for Evelyn’s plaintive cry to conclude</td>
<td></td>
</tr>
<tr>
<td>03:24</td>
<td>She pauses to swallow</td>
<td></td>
</tr>
<tr>
<td>03:25</td>
<td>Begins second verse of song. Leaves space for Evelyn’s vocalisation at “My my . . .”</td>
<td>Continues vocalising intermittently however ? initial decrease in intensity of vocalisations</td>
</tr>
<tr>
<td>03:26</td>
<td>Change in guitar strumming pattern to single strum on the beat</td>
<td>“My my…” deliberate pause for Evelyn’s plaintive cry.</td>
</tr>
<tr>
<td>03:27</td>
<td>MTR simplifies the accompaniment to on the beat sing chords, with increased attack to emphasize the simplified rhythm</td>
<td>MTR simplifies the accompaniment to on the beat sing chords, with increased attack to emphasize the simplified rhythm</td>
</tr>
<tr>
<td>03:28</td>
<td>Tempo slower now</td>
<td></td>
</tr>
<tr>
<td>03:29</td>
<td>Plaintive cry continues but with original energy (preceding increased energy at 3.11…)</td>
<td></td>
</tr>
<tr>
<td>03:30</td>
<td>Teeth on lower lip</td>
<td></td>
</tr>
<tr>
<td>03:31</td>
<td>Pause then quiet cry</td>
<td></td>
</tr>
<tr>
<td>03:32</td>
<td>Rotating arm movement modified into elbow movement</td>
<td></td>
</tr>
<tr>
<td>03:33</td>
<td>Fingers now different formation (look in spasm as allows, just different)</td>
<td></td>
</tr>
<tr>
<td>03:34</td>
<td>3.37 Eyes seem more open between cries (continued)</td>
<td></td>
</tr>
<tr>
<td>03:36</td>
<td>Continues singing. More sparse song presentation with gaps between phrases and single strum on the beat accompaniment</td>
<td>Continues vocalising Arm movement continue</td>
</tr>
<tr>
<td>03:37</td>
<td>MTR is spacious in her rendition – grouping words together with more space between “and … I have met…”</td>
<td></td>
</tr>
<tr>
<td>03:38</td>
<td>3.35 Leans closer to Evelyn</td>
<td></td>
</tr>
<tr>
<td>03:46</td>
<td>Continues</td>
<td>Continues</td>
</tr>
<tr>
<td>03:56</td>
<td>Continues</td>
<td>MTR maintains spacious, simple defined style – steady</td>
</tr>
<tr>
<td>03:57</td>
<td>(Nursing interventions – syringe into NG tube)</td>
<td></td>
</tr>
<tr>
<td>04:05</td>
<td>4.02 More cry like, broken vocalisation</td>
<td>MTR steadily maintains simple rendition of chorus</td>
</tr>
<tr>
<td>Time</td>
<td>Action Description</td>
<td>MTR Response/Comment</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>04:06</td>
<td>Continues</td>
<td>Increased frequency of vocalisations</td>
</tr>
<tr>
<td>04:15</td>
<td></td>
<td>MTR seems a little distracted ad her pitch varies, but all else continues in style above</td>
</tr>
<tr>
<td>04:16</td>
<td></td>
<td>Continues</td>
</tr>
<tr>
<td>04:25</td>
<td>4.22 Slows during the phrase “Wah wah wah wah...(pause). Waterloo” allowing space for Evelyn's vocalisation</td>
<td>Slightly quieter vocalisations</td>
</tr>
<tr>
<td>04:29</td>
<td>4.29 Slows and pauses “Finally facing...(pause)…. my Waterloo” Attempting to allow space for Evelyn to respond. Change in pace and song and pauses to change musical stimulus to see if corresponding change in Evelyn’s presentation</td>
<td>Continues</td>
</tr>
<tr>
<td>04:35</td>
<td></td>
<td>MTR pauses allowing her/expecting her vocalisations</td>
</tr>
<tr>
<td>04:36</td>
<td></td>
<td>4.29 &quot;Facing…” MTR pauses expectantly</td>
</tr>
<tr>
<td>04:45</td>
<td></td>
<td>4.33 Rall on “Wah wah wah”</td>
</tr>
<tr>
<td>04:50</td>
<td></td>
<td>4.35 MTR pauses expectantly</td>
</tr>
<tr>
<td>04:55</td>
<td></td>
<td>4.37 Increase energy in plaintive cry</td>
</tr>
<tr>
<td>04:56</td>
<td>4.37 Much louder vocalisation</td>
<td>MTR repeats &quot;Wah wah wah …&quot; and pauses before &quot;Waterloo&quot;</td>
</tr>
<tr>
<td></td>
<td>4:38 Pulls support pillow/towel away from side of head. Face looks calmer</td>
<td>&quot;Finally facing…” much gentler in it's timbre</td>
</tr>
<tr>
<td>04:56</td>
<td>4:53 pulls support pillow/towel away from side of head. Face looks calmer</td>
<td>4.47 Expected plaintive cry does not occur as Evelyn is chewing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.49 Evelyn opens mouth for plaintive cry but abandons it and as her pillow dislodges from side of head at 4.50 her head tilts more towards the MTR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.52 Pause before “Finally facing”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.55 Silent plaintive cry – just tail end audible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&quot;Wah wah wah…”</td>
</tr>
</tbody>
</table>

179
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Vocalisations</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>05:05</td>
<td>Repeats phrase “Wah wah wah wah Waterloo”</td>
<td>Quieter less frequent vocalisations</td>
<td>4.57 Plaintive cry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Next rendition of chorus starts immediately</td>
<td>5.02 Plaintive cry with decreased energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Her face looks more relaxed</td>
<td></td>
</tr>
<tr>
<td>05:06</td>
<td>Begins repeat of chorus with slower tempo and strumming on the beat</td>
<td>Consistent, steady</td>
<td></td>
</tr>
<tr>
<td>05:15</td>
<td></td>
<td></td>
<td>5.15 Quiet cry</td>
</tr>
<tr>
<td>05:16</td>
<td>Continues singing</td>
<td>Couple of facial grimaces</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>One quieter vocalisation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Arm moving pillow away from face</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Head rolled to the left</td>
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<tr>
<td></td>
<td></td>
<td>MTR continues steady, metered, pulsed rendition</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>MTR is totally focused on Evelyn's face and takes no visible note when Evelyn dislodges the towel</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>The towel has now slipped and is impeding the rotating arm movement</td>
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<tr>
<td></td>
<td></td>
<td>5.18 Legs come up with quiet cry</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.22 More voice in cry again. Spasmed fingers drag towel out from its place and drops from her grasp as rotating arm movement circles back up toads face</td>
<td></td>
</tr>
<tr>
<td>05:26</td>
<td>Lowers head – looking more directly at Evelyn</td>
<td>Quieter vocalisations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Looking down, no apparent fix and follow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MTR notices the towel but makes decision to finish chorus</td>
<td>Evelyn is quiet and looking toward MTR because the absence of towel makes it possible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.30 Plaintive cry with increased energy</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>5.35 More ‘tuneful’ and synchronized plaintive cry</td>
<td></td>
</tr>
<tr>
<td>05:36</td>
<td>Leaning close to Evelyn, head down</td>
<td>Quieter vocalisation</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>5.36 As MTR pauses at “Wah wah wah …” she removes the towel from the place that is impeding her playing and places it where Evelyn’s arm will land but at the end of a rotating arm movement arc</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MTR then concludes the phrase</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.39 Plaintive cry with leg movement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5.43 Quiet cry</td>
</tr>
<tr>
<td>Time</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
<td>Observations about music/MT</td>
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<tr>
<td>05:46</td>
<td>Looks over shoulder as Evelyn’s sister is asking about the site of Evelyn’s craniotomy</td>
<td>Appears calmer, less intensity in vocalisations, less grimaces</td>
<td>Someone says something to MTR (off screen) and MTR nods then bring phrase to a close as she stands to reposition Evelyn and the towel next to her head</td>
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<tr>
<td>05:54</td>
<td>Removes guitar from lap and leans it against the cupboard but continues singing unaccompanied to the end of the song</td>
<td></td>
<td>5.53 Her quiet cry sound more like vocalisation</td>
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<tr>
<th>Time</th>
<th>Observations about music/MT</th>
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<tbody>
<tr>
<td>05:55</td>
<td>Stands up from chair and leans over Evelyn.</td>
<td>Quiet cry like vocalisation</td>
<td>MTR talks to Evelyn’s sister as she stands to adjust the position of Evelyn’s head and lodge the towel again</td>
<td>5.56 Quiet cry</td>
</tr>
<tr>
<td>06:21</td>
<td>Replaces towel/pillow next to left side of Evelyn's head</td>
<td>Loud extended vocalisation</td>
<td>5.60 She suddenly gives a plaintive cry</td>
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<td></td>
<td>Mirroring of vocalisation on “Yeah”</td>
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<td>6.06 She suddenly gives a plaintive cry</td>
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<td>Says “I think you were doing good listening”</td>
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<td>6.10 Her finger points towards her head as if to tell you, but probably just chance</td>
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<td>6.11 Plaintive cry (was she bothered by the touching?)</td>
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<td>6.17 A very long cry 6.17 – 19 sounds like a cry to MTR</td>
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<tr>
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<tr>
<td>06:22</td>
<td>Returns to sing “Wah wah wah wah Waterloo”</td>
<td>Vocalises in gap between “wah….Waterloo”</td>
<td>6.22 Picking up “Wah wah…”</td>
<td>6.23 The quiet cry was already ‘on its way’ as MTR started</td>
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<tr>
<td>06:31</td>
<td>Returned to this as Evelyn appeared calmer during this section of the song before her head position was re-adjusted</td>
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<td>6.26 It is a plaintive cry but with less power</td>
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<td>6.29 Semi plaintive cry (as at 6.26)</td>
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</table>
06:32 - 06:41  Repeats "Wah wah wah wah Waterloo" slowing the tempo

Quieter
Face calmer

Repeat of 2 times now seems more breathy ad supportive
While her left arm is in rotating arm movement she appears to be listening, her mouth is closed, eyes are open
6.36 Semi plaintive cry
6.41 Relaxed ‘attending’ face returns. Bottom lip is slightly protruding which gives a look of determination as is she will vocalise

06:42 – 06:51  Repeats “Wah wah wah wah Waterloo” again

Remains quieter

MTR is slowing the tempo right down (in a manner that suggests Evelyn is relaxing towards sleep) it is slower and smoother
6.46 Unvoiced sound – a vocalisation rather than a cry? Or is the cry running out of energy?

06:52 – 06:57  Slows tempo to end song. No gap between end of this song and beginning of the next

Grimaces as though going to vocalise at “Finally facing my Waterloo”
Much quieter, calmer

6.52 MTR leaves space for her emerging vocalisation
6.52 Vocalisation – not cry – face shapes/contorts different from cry? Pushing past the unvoiced sound to the end of a vocalisation
6.55 Little cry as rotating arm movement continues
5.56 A voiced inhale

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<tr>
<td>06:58 – 07:07</td>
<td>Sung with guitar accompaniment Four down strums on the tonic chord as an intro</td>
<td>Same</td>
<td>Simple strum of rhythm It seems like the tempo is emulating her pace of plaintive cry MTR is remarkably consistent in her rendition</td>
<td>Eyes are slightly open throughout, both close during ‘cry’ of any kind 6.58 Plaintive cry She sets up a regular pattern of plaintive cry which does not seem to change for/with the music. It is well matched in tempo by the music 7.02 semi plaintive cry 7.07 plaintive cry</td>
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<tr>
<td>07:08 – 07:17</td>
<td>Continues singing  (Crinkling sound in the background - ? nurse opening some sort of package) Arm continues circling Quieter vocalisations</td>
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<td>7.12 plaintive cry 7.17 Plaintive cry</td>
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<tr>
<td>Time</td>
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<td>07:18</td>
<td>Singing legato</td>
<td>Some vocalisations at the end of phrases and other mid-phrase. Vocalisations do not appear to be directly related to the music.</td>
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<td>07:27</td>
<td>Slow tempo</td>
<td>7.19 MTR’s “now” coincides with her cry. 7.25 “How” coincides with cry. 7.28 push through unvoiced air.</td>
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<td>07:28</td>
<td>Slowed song during the line “Just one look and I can hear a bell ring”</td>
<td>Louder vocalisation at the end of phrase “There’s a fire within my soul”. 7.35 MTR slows down “just one look…” 7.37 MTR delays lyric in anticipation of her cry.</td>
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<td>07:47</td>
<td>Mirror’s Evelyn’s inhale in posture i.e. shoulder rise and fall</td>
<td>Quieter vocalisations. Some cry like sounds, very breathy with little voice. 7.48 MTR is singing ‘with’ Evelyn. It is apparent the MTR sees some synchrony in her cries and the music. 7.50 Bottom lip juts slightly 7.51 Plaintive cry 7.53 Bottom lip pulled in 7.43 Mouthing (to swallow a pool of saliva?) is a precursor to the anticipated cry. 7.56 Unvoiced – push past to get tail end of vocalisation 7.57 She inhales again.</td>
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<td>07:58</td>
<td>Continues singing. Song paced slowly</td>
<td>Intermittent quieter vocalisations. 7.58 MTR inhaled visibly (almost a gestural communication). 7.58 left mar pauses. 7.59 She emits an unvoiced cry 8.03 Quiet cry 8.04 About here there is a subtle shift in her energy – is she tiring? 8.06 Quiet cry Rotating arm movement continued throughout.</td>
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<tr>
<td>08:08</td>
<td>–</td>
<td>Continues quieter vocalisation with one loud vocalisation</td>
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<td>08:17</td>
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<td>08:18</td>
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<td>08:27</td>
<td>Repeats chorus in steady fashion.</td>
<td>8.19  Feed alarm goes off</td>
<td>? eyes more open between cries</td>
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<td>08:28</td>
<td>–</td>
<td>Pauses briefly after “Mamma Mia” allowing space for Evelyn to respond</td>
<td>8.28 Her mouth closes evenly</td>
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<tr>
<td>08:37</td>
<td>–</td>
<td>Vocalising with no real breaks</td>
<td>8.31 Very quiet cry</td>
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<tr>
<td>08:47</td>
<td>Repeats “Mamma Mia here I go again” slowing the tempo</td>
<td>8.39 This time “Mamma Mia” is sung without emphasis</td>
<td>8.34 Plaintive cry</td>
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<tr>
<td>08:57</td>
<td>Four slow strums with no singing aiming to reduce intensity of song to see if matched by Evelyn</td>
<td>8.51 MTR moves into strumming accompaniment, MTR leans down a little and it feels like MTR is accompanying Evelyn or assessing her</td>
<td>8.51 Some chewing</td>
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<td>Repeats “Mamma Mia . . .” slowing</td>
<td>8.54 MTR begins chorus again with the encouraging more emphasised attack. MTR is watching Evelyn intently but still with an encouraging expression on her face</td>
<td>8.53  Plaintive cry</td>
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<td>8.55 Both eyes a little more open</td>
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<td>8.57 A long low vocalisation before the</td>
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<td>09:07</td>
<td>Looks over left shoulder talking to Evelyn’s sister</td>
<td>9.09 There is increased attack in the cry</td>
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<td>Takes hand off guitar and holds it in front of body so Evelyn does not bang her hand against the guitar</td>
<td>9.11 She is chewing for a moment. Her eyes are open and it looks like she is listening to your conversation – eyes open, no arm movements, mouth closed</td>
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<td>Sister is talking about Evelyn’s favourite Abba songs</td>
<td>9.17 Cry face just as nurse does something</td>
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<td>9.21 silent cry</td>
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<td>9.23 She begins the arc of the rotating arm movement but MTR’s outstretched arm is in the way</td>
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<td>9.24 MTR’s arm impedes Evelyn’s rotating arm movement but MTR holds there while talking to other person</td>
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<td>09:57</td>
<td>Gently pats and strokes Evelyn’s arm when she holds it straight out near the guitar</td>
<td>9.26 As her hand connects with the MTR her eyebrows seem a little higher and her face open to the contact. She is still and contented in this interaction</td>
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<td></td>
<td>Talks to Evelyn about Abba songs</td>
<td>9.36 A long low vocalisation before...</td>
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<td>9.38 Plaintive cry</td>
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<td>9.42 Plaintive cry</td>
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<td></td>
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<td>She is quiet but not relaxed</td>
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<td></td>
<td>KNOWING ME</td>
<td>KNOWING YOU</td>
<td>9.58 Plaintive cry as MTR strums the first chord</td>
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<tr>
<td>09:58</td>
<td>Strumming at the beginning of each</td>
<td>No change</td>
<td>10.04 MTR begins singing, same mf and moderate tempo as other</td>
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<tr>
<td>10:07</td>
<td>vocal line – sparse accompaniment</td>
<td></td>
<td>songs</td>
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<td>10:08</td>
<td>Continues to sing with guitar</td>
<td></td>
<td>MTR is less sure of the lyrics and looks down at book occasionally</td>
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<td></td>
<td>accompaniment</td>
<td></td>
<td>MTR is distracted by someone else in the room</td>
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<td>There doesn’t appear to be any parallel/match between</td>
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<td>It feels as though the MTR is singing ‘to’ Evelyn</td>
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<td></td>
<td>MTR/music and Evelyn’s presentation</td>
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<td>10.04 Quiet cry type vocalisation</td>
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<td></td>
<td>“ahh-ha-ha”</td>
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<td>10:16</td>
<td>Quiet cry type vocalisation</td>
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<td>10:20</td>
<td>Plaintive cry</td>
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<td>10:22</td>
<td>MTR is less sure of the lyrics</td>
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<td></td>
<td>Rotates arm movement continues</td>
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<tr>
<td>10:24</td>
<td>MTR is distracted by someone else in the room</td>
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<td></td>
<td>Quiet for a moment</td>
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<td>10:26</td>
<td>Inhales with mouth closed before plaintive cry</td>
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<td>10:27</td>
<td>Plaintive cry</td>
<td></td>
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<tr>
<td>10:28</td>
<td>Increased tempo and guitar strumming</td>
<td>No observed changes</td>
<td>Continues</td>
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<td>10:29</td>
<td>唱歌 song</td>
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<td></td>
<td>at chorus to authentically reflect song</td>
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<td>10:37</td>
<td>Increased tempo and guitar strumming</td>
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<td>Continues</td>
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<td></td>
<td>at chorus to authentically reflect song</td>
<td></td>
<td>Plaintive cry and rotating arm movement continues</td>
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<tr>
<td>10:38</td>
<td>Sings chorus</td>
<td>Continues</td>
<td>Continues</td>
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<td>10:47</td>
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<td>10.46 Mouth closes ahead of plaintive cry</td>
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<td></td>
<td></td>
<td></td>
<td>10.50 Cry</td>
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<td>10.53 Cry</td>
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<td>10.56 Cry</td>
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<td>10:48</td>
<td>Continues</td>
<td>10:57</td>
<td>Continues</td>
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<td>10:58</td>
<td>Continues</td>
<td>11:07</td>
<td>Increase in intensity of vocalisation with louder vocalisation at 11:00</td>
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<td></td>
<td>Rotating arm movement continues</td>
<td>10:59</td>
<td>Stronger plaintive cry – more attach</td>
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<td></td>
<td>11.00 MTR leans in slightly and seems to refocus on Evelyn</td>
<td>11.03</td>
<td>Inhale, eyes open</td>
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<td>11.06 As MTR begins second verse she gives lyrics more emphasis. There is less energy, softer attack in the rest of it</td>
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<td></td>
<td>11.08 MTR pauses for her plaintive cry</td>
<td>11.12</td>
<td>Plaintive cry</td>
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<td></td>
<td>11.13 Bites bottom lip</td>
<td>11.14</td>
<td>Inhalе</td>
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<td></td>
<td>11.15 Plaintive cry</td>
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<tr>
<td>11.08</td>
<td>Returns to slower tempo and more sparse strumming in second verse</td>
<td>11.17</td>
<td>More frequent vocalisation</td>
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<td></td>
<td>Offering space for Evelyn</td>
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<td>Arm movement continues</td>
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<td></td>
<td>MTR is making space by pausing between phrases for Evelyn</td>
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<td>MTR continues on in steady fashion.</td>
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<td>11.08 Plaintive cry with not quite enough air to finish it</td>
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<td></td>
<td>11.12 Plaintive cry</td>
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<td></td>
<td>11.13 Bites bottom lip</td>
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<td></td>
<td>11.14 Inhalе</td>
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<td></td>
<td>11.15 Plaintive cry</td>
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<td>11:18</td>
<td>Continues</td>
<td>11:27</td>
<td>Continues</td>
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<td>11:20 Pausing to synchronize with Evelyn’s vocal action</td>
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<td>11.20 Plaintive cry</td>
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<td>11.22 Plaintive cry</td>
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<td>11.26 Plaintive cry</td>
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<td>11:28</td>
<td>Pauses between end of verse and chorus</td>
<td>11:37</td>
<td>No response observed</td>
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<td></td>
<td>11.37 MTR pauses for her plaintive cry</td>
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<td>11.29 Plaintive cry</td>
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<td>1.36 Plaintive cry</td>
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<td>11:38</td>
<td>Chorus of song – increased tempo and guitar strumming</td>
<td>11:47</td>
<td>Continues intermittent vocalisations</td>
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<td></td>
<td>Attack and timbre more definite for the first phase of the chorus</td>
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<td>Rotating arm movement continues</td>
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<td></td>
<td>11.39 Quiet cry</td>
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<td></td>
<td>11.42 Plaintive cry</td>
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<td></td>
<td>11.45 Lips come together</td>
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<td></td>
<td>11.47 Very quiet cry</td>
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<td>11:48</td>
<td>Continues</td>
<td>11:57</td>
<td>Continues</td>
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<td>Attack softens but still moving along in the rendition &quot;... This time ... we’re through ...” attack still definite with a</td>
<td>11.50</td>
<td>Chewing</td>
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<td></td>
<td>11.52 Plaintive cry</td>
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<tr>
<td>Time</td>
<td>MTR</td>
<td>QR</td>
<td></td>
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</tr>
<tr>
<td>12:07</td>
<td>Continues</td>
<td>12.00 Very loud vocalisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.56</td>
<td>Very quiet cry</td>
<td>11.57</td>
<td>Inhale for cry</td>
<td></td>
</tr>
<tr>
<td>11.59</td>
<td>Plaintive cry with increased attack and duration</td>
<td>12.03</td>
<td>Plaintive cry</td>
<td></td>
</tr>
<tr>
<td>12.06</td>
<td>Sad cry followed by biting bottom lip and the quiet cry at 12.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:07</td>
<td>Continues vocalising but quieter</td>
<td>12.12</td>
<td>Quiet sad cry</td>
<td></td>
</tr>
<tr>
<td>12.12</td>
<td>MTR slows the tempo, simplifies to strum on the beat</td>
<td>12.15</td>
<td>Quiet sad cry</td>
<td></td>
</tr>
<tr>
<td>12:26</td>
<td>–</td>
<td>12:33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:26</td>
<td>Puts guitar down and leans it against the cupboard</td>
<td>12.22</td>
<td>Quiet cry followed by biting bottom lip</td>
<td></td>
</tr>
<tr>
<td>12:26</td>
<td>Leans in closer to Evelyn</td>
<td>12.25</td>
<td>Sad quiet cry</td>
<td></td>
</tr>
<tr>
<td>12:26</td>
<td>Briefly talks to Evelyn saying “I reckon everybody knows this song”</td>
<td>12:18</td>
<td>Quiet cry</td>
<td></td>
</tr>
<tr>
<td>12:26</td>
<td>Takes Evelyn’s left hand in right and helps it to tap on left hand. Holding Evelyn’s hand between own as claps</td>
<td>12:22</td>
<td>Quiet cry followed by biting bottom lip</td>
<td></td>
</tr>
<tr>
<td>12:26</td>
<td>Continues</td>
<td>12:25</td>
<td>Sad quiet cry</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
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</tr>
<tr>
<td>12:34</td>
<td>Singing unaccompanied</td>
<td>Stills</td>
<td>MTR has put guitar down</td>
<td>12:35 Silent cry (continued from previous sequence)</td>
</tr>
<tr>
<td>–</td>
<td></td>
<td></td>
<td>MTR leans forward and her elbows are on Evelyn’s bed</td>
<td>12.36 She is relaxed, her face is quite still, eyes open, mouth slightly opening moving slightly</td>
</tr>
<tr>
<td>12:43</td>
<td>Taps the beat holding Evelyn’s left hand between own right hand and left hand – taps into left hand</td>
<td>More relaxed face – some small mouth movement</td>
<td>MTR mentions to Evelyn that this is probably a familiar song</td>
<td>12.40 Mouth pulls to one side for a brief moment, looks almost like a smile</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not pull hand away</td>
<td>MTR takes rotating arm movement hand between her hands and enacts the shaking movement used for ringing bells</td>
<td>She is still and relaxed, face is open, eyes open, mouth slightly open, head still, acceptance of MTR’s manipulation of her hand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eyes open but no fix or follow</td>
<td>MTR taps her hand on own left hand using right hand to move Evelyn’s up and down</td>
<td></td>
</tr>
<tr>
<td>12:44</td>
<td>Continues singing with a steady beat. Voice is light and playful</td>
<td>Arm relaxed</td>
<td>Voice steady beat, mf volume, attack clear but not too strong.</td>
<td>12.47 Unvoiced cry – winces with “…one horse open sleigh, Hey” and I wonder if it is purposeful or remembered or just coincidence</td>
</tr>
<tr>
<td>–</td>
<td></td>
<td>One vocalisation</td>
<td>MTR is watching her intently</td>
<td>12.50 Plaintive cry</td>
</tr>
<tr>
<td>12:53</td>
<td></td>
<td>Face remains more relaxed.</td>
<td>MTR taps her hand down on own left hand which comes up to meet it</td>
<td></td>
</tr>
<tr>
<td>12:54</td>
<td>Continues singing, does not restrain Evelyn’s hand but moves with it, continuing to tap the rhythm on her hand</td>
<td>Begins to move arm</td>
<td>MTR continues</td>
<td>12.54 Unvoiced cry</td>
</tr>
<tr>
<td>–</td>
<td></td>
<td>Louder vocalisation</td>
<td>12:57 MTR changes to clap both sides of her hand with her hands</td>
<td>12.56 She pushes her left arm forward</td>
</tr>
<tr>
<td>13:03</td>
<td></td>
<td></td>
<td>12.57 MTR changes to clap both sides of her hand with her hands</td>
<td>12.57 Inhales</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13.02 Without delay MTR begins the verse</td>
<td>12.58 Plaintive cry with increased attack</td>
</tr>
<tr>
<td>13:04</td>
<td></td>
<td></td>
<td></td>
<td>13.01 She pushes her arm forward again, Plaintive cry</td>
</tr>
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<td>–</td>
<td></td>
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<tr>
<td>13:13</td>
<td></td>
<td></td>
<td>MTR voice appears less certain. Attack is less clipped, timbre slightly smoother with longer vowels</td>
<td>13.06 Quiet cry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very breathy quiet vocalisation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**JINGLE BELLS**
<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:14</td>
<td>Arm movement settles again briefly</td>
<td>13.12 MTR releases Evelyn’s hand lightly and receives it back when she moves back into that space. MTR does not look at it but keeping contact with her</td>
</tr>
<tr>
<td>13:14</td>
<td>Unvoiced cry</td>
<td>13.14 She pulls her arm away to recommence rotating arm movement</td>
</tr>
<tr>
<td>13:15</td>
<td>Moving arm</td>
<td>13.15 Plaintive cry</td>
</tr>
<tr>
<td>13:15</td>
<td>Loud vocalisation</td>
<td>13.18 Sad cry, upward intonation</td>
</tr>
<tr>
<td>13:18</td>
<td>She pulls her arm away to recommence rotating arm movement</td>
<td>13.20 Strong plaintive cry with increased attack and force</td>
</tr>
<tr>
<td>13:18</td>
<td>Plaintive cry</td>
<td>13.23 She recommences rotating arm movement thus removes her hand</td>
</tr>
<tr>
<td>13:19</td>
<td>Sad cry, upward intonation</td>
<td></td>
</tr>
<tr>
<td>13:21</td>
<td>Strong plaintive cry with increased attack and force</td>
<td></td>
</tr>
<tr>
<td>13:23</td>
<td>Strong plaintive cry with increased attack and force</td>
<td></td>
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<tr>
<td>13:23</td>
<td>She recommences rotating arm movement thus removes her hand</td>
<td></td>
</tr>
<tr>
<td>13:24</td>
<td>She recommences rotating arm movement thus removes her hand</td>
<td></td>
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<tr>
<td>13:24</td>
<td>Pauses on “Oh” at end of verse allowing space for Evelyn to respond</td>
<td></td>
</tr>
<tr>
<td>13:26</td>
<td>咲咲壁</td>
<td></td>
</tr>
<tr>
<td>13:26</td>
<td>プラントイヴルタル</td>
<td></td>
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<tr>
<td>13:26</td>
<td>プラントイヴルタル</td>
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<tr>
<td>13:28</td>
<td>プラントイヴルタル</td>
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<tr>
<td>13:29</td>
<td>プラントイヴルタル</td>
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<td>13:30</td>
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<td>13:33</td>
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<td>13:34</td>
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<td>13:35</td>
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<td>13:36</td>
<td>プラントイヴルタル</td>
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<td>13:37</td>
<td>プラントイヴルタル</td>
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<td>13:38</td>
<td>プラントイヴルタル</td>
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<td>13:39</td>
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<td>13:40</td>
<td>プラントイヴルタル</td>
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<td>13:41</td>
<td>プラントイヴルタル</td>
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<td>13:42</td>
<td>プラントイヴルタル</td>
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<tr>
<td>13:43</td>
<td>プラントイヴルタル</td>
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<td>13:44</td>
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<td>13:45</td>
<td>プラントイヴルタル</td>
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<td>13:46</td>
<td>プラントイヴルタル</td>
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<td>13:47</td>
<td>プラントイヴルタル</td>
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<td>13:48</td>
<td>プラントイヴルタル</td>
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<tr>
<td>13:49</td>
<td>プラントイヴルタル</td>
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<tr>
<td>13:50</td>
<td>プラントイヴルタル</td>
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<tr>
<td>13:51</td>
<td>プラントイヴルタル</td>
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<td>13:52</td>
<td>プラントイヴルタル</td>
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<tr>
<td>13:53</td>
<td>プラントイヴルタル</td>
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</tr>
<tr>
<td>Time</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
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</tr>
<tr>
<td><strong>13:54</strong></td>
<td>Continues singing and tapping beat on Evelyn’s left hand but not restraining this hand</td>
<td>Increased intensity of vocalisation towards the end of the song</td>
</tr>
<tr>
<td><strong>13:59</strong></td>
<td></td>
<td>Increased arm movement – holds still briefly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Much calmer in the first half of this song but increased vocalisations and arm movements in second half</td>
</tr>
</tbody>
</table>

**MTR**

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Commented to Evelyn “Hey I think you were doing great listening then”</td>
<td>Vocalising and arm moving</td>
<td>MTR commented “We don’t want to do too much”</td>
<td></td>
</tr>
<tr>
<td>14:29</td>
<td>Talks to Evelyn about one last song for the session</td>
<td></td>
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<tr>
<td></td>
<td>Talks to Evelyn’s sister about preferred Bob Dylan song</td>
<td></td>
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</tbody>
</table>

**QR**

<table>
<thead>
<tr>
<th>Time</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
<th>Observations about music/MT</th>
<th>Observations of participant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>14:30</strong></td>
<td>Strums intro</td>
<td>Intro strummed Quite slow</td>
<td>14.30 Bites lower lip</td>
<td>14.31 Plaintive cry</td>
</tr>
<tr>
<td><strong>14:39</strong></td>
<td>Song picked because it is stylistically simple. Finish session with decreased level of stimulation</td>
<td>Loud vocalisation as MTR begins singing</td>
<td>14.33 She has her ‘listening face’/attending face on, eyes little more open, mouth slightly open and relaxed, brows slightly raised</td>
<td>14.36 Plaintive cry</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14.38 Plaintive cry</td>
<td></td>
</tr>
<tr>
<td><strong>14:40</strong></td>
<td>Legato singing</td>
<td>Continues</td>
<td>14.40 Bends her elbow and retains this bent pattern for rotating arm movement</td>
<td></td>
</tr>
<tr>
<td><strong>14:49</strong></td>
<td>Simple guitar accompaniment with emphasis on the beat</td>
<td>Left arm bent and held up near her</td>
<td></td>
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</tr>
<tr>
<td>Time</td>
<td>Event Description</td>
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<tr>
<td>14:50</td>
<td>Continues singing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:59</td>
<td>Quieter vocalisations. Two quieter vocalisations during this time period</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arm circling again</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>14:55</td>
<td>Sense she is listening between cries.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:59</td>
<td>Continues singing, Quieter vocalisations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:00</td>
<td>As before – even and metered</td>
<td></td>
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</tr>
<tr>
<td>15:00</td>
<td>15.02 MTR softens the volume and smooths the timbre</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:01</td>
<td>15.07 Plaintive cry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:03</td>
<td>15.09 Slow the tempo ever so slightly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:05</td>
<td>15.07 Plaintive cry</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15:10</td>
<td>Looks towards the door and smiles as Evelyn’s brother enters the room</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:19</td>
<td>15.13 Loud vocalisation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:20</td>
<td>15.17 Sad cry</td>
<td></td>
<td></td>
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<tr>
<td>15:20</td>
<td>15.20 Quiet cry</td>
<td></td>
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</tr>
<tr>
<td>15:20</td>
<td>Continues intermittent vocalisation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:29</td>
<td>MTR strums chords between verses</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15:29</td>
<td>Next verse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:29</td>
<td>MTR is sedate in her pace, timbre, attack and tempo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:29</td>
<td>She continues plaintive cry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:40</td>
<td>Rotating arm movement continues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:40</td>
<td>15.40 Quiet cry</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Time</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
<td>Observations about music/MT</td>
<td>Observations of participant</td>
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<tr>
<td>15:49</td>
<td></td>
<td></td>
<td>15.43 Plaintive cry</td>
<td></td>
</tr>
<tr>
<td>15:50</td>
<td>Continues singing</td>
<td>No observed interaction between the music and Evelyn’s vocalisations</td>
<td>15.46 Plaintive cry with increased attack</td>
<td>15.50 She raises her eyebrows and opens her eyes</td>
</tr>
<tr>
<td>15:59</td>
<td>Arm continues moving</td>
<td>Face grimaces when vocalising</td>
<td></td>
<td>Rotating arm movement with bent elbow</td>
</tr>
<tr>
<td>16:00</td>
<td>Continues</td>
<td>Slower again</td>
<td></td>
<td>15.52 Quiet cry</td>
</tr>
<tr>
<td>16:09</td>
<td></td>
<td>Timbre smoother</td>
<td></td>
<td>15.56 Plaintive cry</td>
</tr>
<tr>
<td>16:10</td>
<td></td>
<td></td>
<td>16.01 Sad cry</td>
<td></td>
</tr>
<tr>
<td>16:19</td>
<td></td>
<td></td>
<td>16.12 Plaintive cry</td>
<td></td>
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<tr>
<td>16:20</td>
<td></td>
<td></td>
<td>16.15 Quiet cry followed by closed mouth – bottom lip slightly protruding</td>
<td></td>
</tr>
<tr>
<td>16:29</td>
<td></td>
<td></td>
<td>16.19 Unvoiced cry</td>
<td></td>
</tr>
<tr>
<td>16:30</td>
<td>Continues slow, gentle singing</td>
<td></td>
<td>16.21 She inhales deeply</td>
<td></td>
</tr>
<tr>
<td>16:39</td>
<td></td>
<td>Timbre smooth, tempo slow, volume quiet and attack very little</td>
<td>16.23 Plaintive cry</td>
<td></td>
</tr>
<tr>
<td>16:40</td>
<td></td>
<td></td>
<td>16.26 Strong plaintive cry</td>
<td></td>
</tr>
<tr>
<td>16:42</td>
<td></td>
<td></td>
<td>16.31 Plaintive cry</td>
<td></td>
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<td></td>
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<td></td>
<td>16.34 Quiet cry</td>
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<td>16.38 All – but unvoiced push cry</td>
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<td></td>
<td>16.41 Plaintive cry</td>
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<td></td>
<td></td>
<td></td>
<td>16.44 Plaintive cry</td>
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</tr>
</tbody>
</table>

**MTR**

**QR**

**NO MUSIC**
| 16:43 | Puts guitar down, takes Evelyn’s left hand in both hands and says “We’re going to finish music there” |
| 17:33 | Stands up and adjusts Evelyn’s head so that she is not resting on the decompressive craniotomy site |
|       | Arm still briefly |
|       | Whole body stills briefly – face calmer |
|       | Vocalisations increase after head adjusted |

17.07 She is listening
APPENDIX O

Transcription of MTR and QR Discourse MTI 4

Pre-MTI

- GCS 9: Withdraws to pain, localising to stimuli, non-verbal, eyes open spontaneously but no fix or follow.
- Dystonic arm movements (repetitive movements or abnormal postures caused by muscle contractures).
- Lip smacking.
- Trachy insitu – increased vocalisations.
- Increased HR and BP over weekend.
- HR pre session 100 – 120 beats per minute (bpm).
- Nil therapy pre-MTI.
- Nurse report – unsettled at times over weekend but now more settled.
- Mother and Grandmother present at bedside pre and post MTI but observing from other side of room during MTI.

No Music 00:00 – 01:29

Comparison MTI 4 & MTI 10
QR: Is the time between MTI 4 and MTI 10 six days or 8 days?
MTR: It’s 8 days because there is a weekend.

Noise level and busyness of the hospital environment
Hospital room noted to be very noisy.
There was a ward round pre-MTI.
QR: It’s so noisy. I know it is probably not that noisy but the way the microphone picks it up.

Evelyn vocalising before the music starts
MTR: I can hear her vocalising here (before the music starts).
QR: I didn’t hear her vocalise at all until we got well into the MTI. You know it (the MTI and responses from Evelyn because you were there as the MTR).

Discussion about Evelyn’s presentation before the music starts incl. mouth movement and eyes
Both MTR and QR observe lip smacking/chewing movements and a pattern of Evelyn’s mouth pulling down to the left side.
MTR: We are noting similar things (that Evelyn displays lip smacking/ repetitive chewing movements). I call it lip smacking because that’s what it is called on the Corrigan ABS, so that is what the two independent (quant) reviewers rated. But, they are very much chewing movements.
QR: For me, lip smacking is more of a lip action without the mouth. It’s more a chewing movement.
MTR: I agree it is more like chewing. I think the lip smacking comes under the repetitive movements so it is probably less about what we actually call the mouth...
movement than the fact that it is repetitive, as with the mouth pulling to the left (which is also a repetitive movement).

QR: Yes, an involuntary movement. I wondered if . . . there may be something in the frequency in which it (the mouth movement) occurred, during music as opposed to not during music, or the interval between certain incidents of it, because in MTI 10 that was one of the shifts . . . It is so repetitive that you expect to see it, it’s not that it stops but is delayed at certain points.

MTR: So this is a no music bit, and I am less interested in this but I think it is worth having a look at what her behaviours were like pre the music. And we both noted that there is frequent lip smacking, or lip chewing movements, and frequent mouth pulling to the left movements. I’ve got (noted) that her right eye is open (and that her left is closed).

QR: I didn’t know her right eye was open until you told me, but having been alerted to the fact that her eye was open and that’s how it looks when it’s open, I tried to pay attention to that.

**Evelyn more awake than in previous MTIs**

MTR: We’ve both noted that I comment, “She is awake” – 1.09. This is comparative to previous sessions because I think to look at her you wouldn’t walk in (to the room) and say, “That’s a very awake child” but compared to the previous MTIs she is very much awake.

QR: My interpretation of that comment is that I hear caution in your voice.

MTR: Yes, and that is partially because her mum was commenting “ooh she is very awake today” and there is a tendency for families, in that situation (with a child with a severe TBI in the early stages of recovery) to over-interpret what their child is actually able to do.

QR: Was the caution intended for mum?

MTR: No, I would say it was probably self-intended, with me assessing the situation thinking, “she is awake but… how awake is she going to be?”

QR: At 1.20 . . . I felt like she inhaled. She kind of took a breath. Which I don’t know if that is important . . .

MTR and QR watch video footage 1.17 – 1.22

QR: It is not a huge thing, it precedes the mouth pull down (to the left) and there seemed to be a little bit of a pattern in that and then off she goes (back into lip smacking/chewing)

**MTR’s presence beside Evelyn**

QR: Why are you standing (at the head of the bed next to Evelyn)? . . . To get the sound of what you were doing in the dominant field, or the visual presence?

MTR: The sound, because at this point she wasn’t visually fixing or following. I hadn’t observed it (fix and follow), nor had medical or nursing staff.

QR: Why is it useful to stand closer to her rather than sit back and sing more loudly?

MTR: To offer a closer presence.

QR: . . . The environment is so noisy that it almost benefits us (the music therapists) to be that much closer too.

MTR: Any changes in her presentation . . . are so small . . . that you want to be looking for them really closely.

**Hello Song 01:30 – 04:16**
**Comparison MTI 4 & MTI 10**

QR: Love the smile (in reference to MTR’s broad smile at 1.30). So different to the way you present yourself in MTI 10. In this session (MTI 4), particularly with this first time through the Hello Song . . . you have got this smile on your face and you sing with a smile, and it has got that kind of character to it and I wondered if it is because you had just come from this kind of social interaction with (Evelyn’s) Mum and Gran . . . Whereas in MTI 10 I notice that you are there with . . . her sister . . . but she (Evelyn) is so much more distressed and so . . . in response you are much more metered and there is no smile on your face, there is no smile in your singing therefore, and it is much more calculated. There is just less . . . relaxed joyful element to it and I feel the intention of what you are doing is much more calculated (in MTI 10) than it is in this one (MTI 4).

MTR: It is an interesting way to think of it as calculated . . . Consciously I know that I am very different in these MTIs. What I would say with that is that I am really matching where she is at knowing that she is far more awake (in MTI 4) than she has been in any of the previous MTIs as opposed to MTI 10 where she is far more agitated so I am presently very differently . . . (In MTI 10) not really wanting to arouse and stimulate her where as in MTI 4 it is a little more playful.

QR: It’s a little enticing?

MTR: It’s a little bit like . . . “Hi, are you going to come and sing with me?” (in MTI 4).

QR: So here (in MTI 4) it is, as you said, all about arousal. It is all about rousing her into interaction . . . Whereas in MTI 10 it is about containing. So you are really coming from a very different place, a very different basis.

MTR: This is interesting, because at a lot of points in the MTI and towards the end of the MTI I am trying to calm her, trying to relax her, knowing that I don’t think she had slept the night before . . . The intention of the research is to look at agitation reduction where as here (in MTI 4) I am not (trying to reduce agitation during the Hello Song in MTI 4).

QR: When I say the two are very different they are nonetheless very contained. To my eye they are both very contained and so what we are talking about is a variation . . . If the continuum is from 1 – 10 in terms of gay abandon being 10 and 1 being static, then you’re down here in 1, 2, and 3 and so what we are talking about is a variation between 1 and 3. So we are not talking about the full range of potential in terms of therapeutic interaction, we are talking about it in terms of it being very contained.

QR: Did she use her voice, you know how in MTI 10 she was agitated and she vocalised, did she do that at this point? Or was that new? When she got to around MTI 10 was the plaintive cry . . . was that new?

MTR: That was new in MTI 10. Here she has still got a trachy in . . . She has got a speaking valve, which is why we can hear her vocalising, but that kind of continuous plaintive cry was new.

QR: Did she cry at this point?

MTR: No.

QR: Isn’t that interesting. So in actual fact the plaintive cry is a development in the right direction.

MTR: Yes. Other people who have seen the footage have interpreted that (plaintive cry in MTI 10) as pain. I don’t see it as pain.
QR: I don’t see it as pain either.
MTR: It is a step in the progression of her waking up.
QR: Yes, once you have seen this and you know that . . . a lack of vocalisation is a lack of presence in the world. It is a lack of projecting yourself into the world.

Evelyn’s responses during the first rendition of the Hello Song
MTR: What I see there is that at the beginning when I do the I-V-I guitar introduction she just relaxes. (Relaxes) is how I would describe it in that the lip smacking stops . . . right away when the guitar starts playing. She really appears to relax.
QR: . . . She definitely stills, her mouth pauses, both her arms appear to move slightly I noticed within about a second of you starting. And to me it is an obvious response to the sound of the guitar before you start singing.
MTR: I agree. It is a little bit into it (the Hello Song) . . . in that segment that her arms move but then it looks as though it relaxes back . . .
1.37 Evelyn’s left arm seems to relax back onto the bed.
QR: Yes. We had exactly the same thing (noted). And I don’t know her so I didn’t know what the significance of that . . . It looks like a relaxation.
MTR: I think it’s a primitive relaxation, I think at this point (in her recovery,) I don’t know how intentional any of her responses are.
QR: Yes. I don’t know that she is consciously constructing them but she is certainly responding . . . So whether it is more of a sensory, a primitive level absolutely, but whether it is a social cognitive response I don’t think it matters. I think there is a response and that is really all you can hope for.
MTR: I’ve noted that towards the end of the first time through the Hello Song there are some smaller lip movements start again. So there was the brief initial stilling of everything.
QR: Yes. And I think that interestingly in MTI 10 she does the same thing (still initially at the guitar intro of the Hello Song.

MTR’s response to Evelyn during/after the first rendition of the Hello Song
MTR: At the end of the first time through the Hello Song I stop and I speak at 1.47. So I note that here is a brief pause in the guitar accompaniment and I stop and say “Hello, Hi”.
QR: Yes. (Then mirrors MTR’s descending intonations). Sounds like (you are saying) “Hello is anybody there?”
MTR: And it probably is a bit of that because . . . having thought . . . ooh she did something then it is “Hi, are you there with me?”
QR: It is a real question isn’t it? I thought it was interesting, and very minor, that nonetheless you say “Ev-lyn” with the emphasis on the first syllable but when you sing it you sing “Evel-yn” so it is a different emphasis.
MTR: I think that is a non-conscious thing.

Evelyn’s response during the second repetition of the Hello Song
QR: So I ask at 1.51 does she vocalise there?
MTR: I haven’t noted it.
MTR and QR watch video footage from 1.48
QR: I thought I heard . . . (Evelyn vocalise) but I can’t tell.
MTR: I don’t hear it.
QR: No, ok so that is me trying to pick out sound amidst . . . I find her as the figure ground very difficult to identify. You say there was a vocalisation before you even sat down and didn’t hear that at all.

MTR’s response to Evelyn during/after the second repetition of the Hello Song
MTR: And then I repeat the Hello Song.
QR: But it is a little less smiley. It has changed from the first rendition and I wondered what you were thinking because it seems like you were a little less certain now.
MTR: I think . . . that with a child with this level of head injury there is always the question “Am I seeing what I think I am seeing?”
QR: So you question your interpretation because there is nothing certain. So even when you . . . think it is something (a response) you can’t shut the door on the fact that it may not be or in fact that it may be something else. So interpretation is never certain is it?
MTR: No. And you are dealing with such minute details here.

QR: You maintain the same style (of singing and playing) through repetition 2 (of the Hello Song). You bring it to a close though with a softer more breathy tone and the two concluding chords are less accented than they were the first time. So the whole thing is less smiley, less enticing, just a little more supportive rather than enticing.
MTR: . . . start the song (the Hello Song) with the I-V-I and I finish each verse with a I-V-I because it is a very recognisable cadence.
QR: Stern (Daniel Stern) would tell you that it is part of a musical expectancy that happens from very early on.

Third repetition of the Hello Song - MTR sings simplified Hello Song
MTR and QR watch video footage from 2.07
MTR sings simplified version of Hello song i.e.
- Descending “Hello” on I on first interval of the song’s tune with single strum on guitar
- Descending “Hello” as above
- Descending and resolving “Hello” on V7 – I.
QR notes that it feels as though MTR is waiting for a response from Evelyn.
MTR: It is still the Hello Song.
QR: I thought you were going to go off and improvise. Did you have any sense that you might have gone off on something else if she had responded in such a ways . . . if she had vocalised at that point for instance would you have abandoned the Hello Song?
MTR: Possibly. I don’t know . . . because I wasn’t necessarily expecting a big response from her. There is one (a response) soon but I think what I was doing was simplifying it . . . It was a matter of I perhaps had a response to the Hello Song and the second time I sang the song there was not much change in her presentation and the third time (this time) let’s simplify it. It’s still the same chord pattern.
QR: Why simplify?
MTR: For her ability to process.
QR: Is that based on the fact that she did give a really obvious response the first time through so the sense is that she is processing it at some level, and the fact that she didn’t do anything in the second repetition means that perhaps it was too complicated?
MTR: Yes, because even though it is a very simple song there are still a lot of musical elements.
QR: I note that you strum the same chord at much the same tempo and attack it feels like you are waiting.
MTR: And then I was really offering space . . . for Evelyn to respond.
QR: It is an interesting assumption because I would do the same thing, but does it leave space? Do they recognize that as a space?
MTR and QR: Not sure.
QR: I asked if there was a change in her breathe just there (at 2.15) because her chest seems to rise as though she is drawing breathe in perhaps to vocalise, and I wondered if that is what you see?
MTR and QR watch video footage from 2.15
QR: It (the drawing in of breathe) doesn’t come to anything really.
MTR: But there is quite an obvious inhale. What I have noted at 2.27 is that she vocalises. So is she perhaps working up to that? Is it requiring effort? Because after I sing the simplified Hello Song, it is really obvious, her lips pull to the left, she appears to tense her arms and then she vocalises which is a release. Release is not the right word but it is an exhale.
QR: At 2.21 I noted that the mouth movement stops and I feel like she is going to vocalise, she is more still and her chest expands again, so it is like a step before and it is at 2.15, 2.21 and 2.27, it is roughly 5 seconds between. That makes sense . . . So perhaps there is a pattern of preparation that is needed before she can muster the effort to produce a sound at that point obviously. I am interested . . . that she has this increase in breathe and then another increase in breathe and then she vocalises . . . and my sense is that at 2.21 she is going to vocalise.
MTR: Yes, it really feels like it (like Evelyn is going to vocalise). And again, that is our interpretation but she really does, everything kind of tenses and it is like this effort to inhale.
QR: She has to recruit the effort.
MTR: Yes . . . You would not be arguing that anything here is intentional but there is still some real effort involved in her vocalising.
QR: It is not a cognitive intention . . . How do you define intention in this situation?
MTR: Intention in neuro terms actually suggests cognitive (higher cortical) involvement.
QR: So is there a pre-intention level? Is there a level that comes before that you could . . . say this taps into?
MTR: Not that I have read because when you are looking for signs of recovery in children with head injury you are looking for intentional responses because that shows the return of certain cognitive capacities.
QR: Can you call on anything here from the coma literature? . . . David Aldridge presented on somebody else’s work, where people were aware of the sound while they were in a coma and they (the music therapist) could see a response through the physiological aspects, and they (the patient) felt they were in contact with the music therapist but there was no demonstrable response.
MTR: I have just read the case study you are talking about and that patient likely had intact cognitive capabilities, was in a medical coma, and I think there is a difference . . . (Is this the case study) where they talked to nursing staff about not yelling at the patient and talking to him calmly . . . and he described that he thought he was in a battle field?
QR: Yes.
MTR: He was in a coma following a heart transplant so I think it is a different (form of coma).

QR: . . . Is there a primitive level of intention that responds . . . some kind of automatic, fairly primitive, social thing? You’re saying “Hello” to her and so she responds.

MTR: Yes, and I am using her name a lot. I haven’t seen anything, but I know it is common . . . five or six months after this (footage was taken), the speech pathologist and I are still using very similar songs, at a very different level. We are working on speech production and the beginning of trying to get her to talk intentionally is trying to get her to talk automatically.

At 2.27 Evelyn vocalises.

MTR: I acknowledge her vocalisation on the work “Hi”. I would say it (my response/verbal response) is quite excited very welcoming of . . . her contribution. I have also noted that she stills briefly after the vocalisation.

QR: Yes at 2.31/2.32 as you affirm her she stops chewing and her mouth is relaxed. Is that a pattern? Her mouth is relaxed, still and symmetrical when she is attending to you. There was a sense that, whatever part of her brain is paying attention to you, her visible behaviour alters or her muscle tone changes.

MTR: Which, when you are working with children who I would have been aiming to recruit for this study (children with a less severe brain injury) that is what you tend to observe happen. When they’re engaged with what you are doing the other things (agitated behaviours) stop. So it appears to give them a focus.

QR: A newborn baby, when they attend to something will still. So the normal range of limb movement that is evident in the baby, if they are in an active alert state, if you take their attention everything stops. They don’t necessarily fixate on you but the movement stops and their face becomes still, it is not relaxed, but it is attending. The brow isn’t completely relaxed, the muscle tone isn’t completely relaxed, the mouth isn’t completely relaxed, they are attending.

MTR: Is that because they (the infants) don’t yet have the abilities required for, not divided attention, alternating attention? Technically there isn’t divided attention it is very quickly alternating attention . . . They don’t have that so they can only focus on one.

QR: Yes.

MTR: Maybe that’s it.

QR: So it could be one of the very primitive kinds of skill levels.

MTR: Yes.

Fourth repetition of the Hello Song - MTR sings simplified Hello Song

MTR and QR watch video footage from 2.30

QR: She looks so relaxed. Then we see the leg raise and off she goes (lip smacking, increase in agitated behaviours).

MTR: I have noted that when I start this repetition of the Hello Song, after she has vocalised . . . that she does still, and she is still as this song starts again, but then her legs pull up and the larger lip smacking and larger chewing movements start with her mouth pulling to the left. So there is a sense that she did focus, give attention . . . and then it is gone.

QR: They are very brief windows. You delay the singing of the “Hello” just to give her some more time (to respond). You rall. on the final “Hello” just as a musician does to bring a shared song to an end . . .
MTR: (that is based on) the Schellenberg (theory) expectancy in music is so primitive that we know (what a rall. in the music means).

QR: I don’t know that you did that consciously. I think that is a habit that we would have as a music therapists to indicate the end (of a phrase or song) . . . I noted that it does seem like she is ‘gone’ again (at the end of this repetition of the Hello Song) at 2.43. The little bit of availability to you has ended and I wondered if that is what prompted you to think “I have finished that song”?

MTR: Except I didn’t finish the song there.

QR: I know, but my sense was that you thought you had.

MTR: . . . I put my arm on the guitar because I am going to slow it down and see if she is ‘gone’ or if . . . she is still available. Looking back at the MTI, I repeat the Hello Song and then I repeat the Simplified Hello Song in an attempt to see if we can replicate what I have just seen.

Fifth repetition of the Hello Song - original version of song – starts at 3.00

MTR and QR watch video footage from 2.46

MTR: She doesn’t actually vocalise there but it really looks like she is going to (at 2.51 Evelyn’s mouth pulls to the left, her left arm tenses slightly and her chest rises visibly as she inhales then she very briefly stills) so I acknowledge that by saying “Good morning”. She is quite still as I sing this repetition of the song until toward the end.

QR: Yes, up go the legs and there goes the mouth. She didn’t vocalise at 2.51 did she? I noted that I see her chest expand visibly.

MTR: No, I can’t hear it audibly (from the video footage) but my response is very much a response to her. So whether or not she vocalised, it very much looked as though she was really trying to.

QR: Would you respond to the perceived effort as if it (a vocalisation) had occurred?

MTR: Yes, well I did.

QR: So would I.

MTR: Knowing how hard, or how hard it looks, for her to vocalise I would acknowledge the effort). All of the cognitive components aside, it is actually really hard to vocalise through a speaking valve.

QR: I am thinking it would actually require more expiration of air than if you didn’t (have a trachy with a speaking valve). So it actually takes more effort.

MTR: Yes.

QR: Which could then explain the recruitment of the three breathes when she did the main vocalisation before (at 2.27) . . . Maybe she was vocalising but we couldn’t hear it because it wasn’t actually enough effort to get through the speaking valve.

MTR: Yes, could be.

QR: So, in that case it makes sense to respond to effort as if it (the vocalisation) had occurred.

MTR: She does seem to still again in this repetition of the Hello Song (at 2.58). She looks relaxed, her mouth is symmetrical again.

QR: Yes, at 2.58 as you strum on the guitar again she is relaxed, still, and has a symmetrical mouth again. She settles . . . I have noted that (when singing this repetition of the Hello Song) you are less smiley, your face is intent and it seems that you are perhaps more attuned now to where she really is. It goes with what we were just saying, that you sang the Hello Song and then the Simplified Hello song as an assessment and now you make a decision about where you are going with it next.
MTR: Is that explicating the implicit? Because I would say, yes, that is what I do but I don’t think all of these things went through my head. It’s not a conscious thing. I’ve done a form of assessment within the song, I have observed a response, a calming and a more active response and then I am less ‘perky’.

QR: Because you are coming down into her level. But I would venture to say that some people . . . after seeing the initial response would have moved on to another son and not repeated the Hello Song again. What is the benefit of staying in the Hello Song at this point?

MTR: I think it is the repetition and giving her time to respond. I think that you don’t want to move the session on too quickly because you would expect, that if there is any level of processing going on, it would be very much slowed. And she does respond again at 3.35 with another quiet vocalisation.

Sixth repetition of the Hello Song - simplified version of song – starts at 3.15
QR did not note vocalisation at 3.35 so MTR and QR watch video from 3.30.
QR: I had noted open pre-vocalisation shaped mouth. So what I as noting was that she looks like she was going to vocalise but I didn’t hear it (until now). So it looks the same (there is a consistent pattern in her response). So it is visible.
MTR: And then I affirm this vocalisation saying “I can hear your voice”. And I would say that at that point my voice is quite smiley again, it is quite excited. I’ve noted that after I affirm her vocalisation she stills.
QR: I’ve noted that she has a relaxed, stilled, symmetrical mouth.
MTR: . . . That seems to be her pattern that when she stills her mouth goes back to centre.
QR: I think her mouth is very important. The symmetry and relaxation of the mouth is pivotal, both there and later.

Seventh repetition of the Hello Song – simplified version, sung on “Hi” – starts at 3.48
QR: You sing “Hi” instead of “Hello”, why?
MTR: It is a more simplified version.
QR: Lyrically it is simpler. You strum the penultimate chord but do not sing the corresponding lyric. You are waiting and anticipating her response, (that) is my interpretation.
MTR: (Agrees) I’ve noted that I have a quiet, open face, inviting or waiting for a response. These are just standard music therapist behaviours aren’t they?
QR: They are very much therapist behaviours but I think that is useful to understand that what you are able to apply here is those things which you apply normally.
MTR: I’ve noted at 4.04 that there is a louder vocalisation (after MTR strums the penultimate chord of the song and waits before singing “Hi”).
QR: Yes, it does look like her chest expands here in a pre-vocalisation way. I didn’t hear a vocalisation, but clearly (from her behaviours) it is there.
MTR and QR watch video from 4.01.
QR: Is that her? How amazing. But you don’t respond in a way that tells me that is what she has done because that is part of how I know.
MTR: But if you look at my face . . . it’s nearly surprise. And then I do say “Hi”.
QR: Now . . . it is so obvious but it just didn’t sound like it had come from her because it is so entirely different.
MTR: It is a big vocalisation. And I’ve noted that pre-vocalisation there are these significantly increased mouth movements, arm movements they really appear to be that recruitment.

QR: The whole body talking, just like a baby.

MTR: (then) . . . I finish the Hello Song on a V7-1 which is again that very predictable finish but she has gone back to lips smacking, chewing, leg movements. I pause and wait for her response, but I think that is it so I make the decision to end the song.

QR: Yes, that is it, she is probably ‘gone’. Yes . . . I have noted that she recommences chewing at ‘gone’ pace and size.

No Music 04:17 – 04:37

MTR and QR watch video from 4.17 – 4.37

MTR: She vocalises at 4.25. Not much is happening (in this video segment).

QR: It took me listening four times (to hear her voice). I think this is a methodological issues in the video review, not to due with the content of the session . . . One of the inherent problems of video review is the limited nature, as a person who was not present, of being able to perceive, what was actually going on. Was there one vocalisation, or a series of short vocalisation in that time period?

MTR: I only heard one long one.

Waterloo – Abba 04:38 – 08:16

MTR and QR watch video from 4.38 – 5.05 first verse of the song

Comparison between MTI 4 and MTI 10

MTR: . . . Compared to MTI 10 she is just not able to do anywhere near as much, in terms of any kind of response (said in relation to an interpretation of a response at 4.39 when Evelyn stills).

QR: I had also noted on several occasions that she has an arm twitch but when you think about later (in MTI 10) when she has the rotating arm movement, it hadn’t occurred to me that what looks like a twitch . . . was actually the beginnings of that rotating arm movement. That it was actually a repetitive movement rather than an autonomic twitch.

MTR: It possibly is because at this point (in her recovery) she doesn’t have the motor capabilities. Isn’t it amazing though, this is MTI 4 and there is probably 8 days before MTI 10 but there is a massive change in her capability, in the transition through (PTA). My sense about the arm movements, not so much here but in MTI 10, when she is engaged and with you in the moment everything stops because you are holding her and then you lose her. I think when you lose her it is because she just doesn’t have the capacity to be able to be with you for any longer and may not actually be related to what is going on but just how the brain is firing.

QR: I realise now, that my sense is that she is not . . . very agitated here, that if she was really agitated I would have seen the rotating arm movement, but what you are saying is that . . . she is not (able to present with the same level of agitation because of her level of functioning). My sense is that she is not as agitated here as she is in MTI 10, is she?
MTR: She is not displaying it. She can’t display it but we don’t know what is going on neurologically.

QR: Does the autonomic functioning that shows up on the stats monitor show you that she is agitated in the same way she was in MTI 10? Do we get a comparative measure?

MTR: I have noted (in my session notes) that her HR was 100 – 120 bpm pre MTI which is a relatively high resting rate for a 10 year old child. And I comment at the end of MTI 4 that her HR is 70- 75. To me that is a significant indication that she is far more relaxed at the end of the MTI.

QR: But this isn’t necessarily portrayed in her behaviour.

MTR: Well, she is asleep at the end of MTI 4. However, in MTI 10 they (nursing staff) had taken the stats monitor off because she was moving so much the monitor could not pick up a trace and it kept buzzing all the time. When I am singing in MTI 4 her HR decreases which I am taking to mean she is less agitated on that incredibly primitive level.

QR: I am not privy to what the stats monitor is showing (because it is off screen) . . . and at a primitive level, the behaviour is not going to portray what is actually going on in terms of agitation.

MTR: Although, I would say it (her behaviour) does (portray her level of agitation) because we both commented that she just looks more relaxed. It is on such a micro level but then we are working with micro levels here because her brain injury is so severe what is can do is at a micro level. It is not case here of a child who can get up and walk around and is pacing the room, banging on the door, crying out who will sit down . . . and go to sleep during music therapy, which is the child that I developed this protocol for. She is never going to be able to present at that level at this stage of her recovery.

QR: . . . As a naïve person you get a sense of that in MTI 10 with the repetitive arm movement and the . . . (plaintive) crying.

MTR: With her, you can hold her for these brief moments and I guess there is some release in that.

QR: That goes back to the ‘islands’ doesn’t it? (islands refers to brief periods of awareness, organised processing that are frequently seen in children in PTA – as a child progresses through PTA these ‘islands’ become more frequent and longer in duration). The sense that there are islands of respite.

MTR: Yes, compared to a child with a less severe brain injury where you can hold them, hold them, hold them, move it (the energy/agitation) down, relax them.

QR: So with such a severe brain injury that doesn’t happen? You’ve not got that opportunity but perhaps with each . . . emerging episode of attending is there a shift? Which is then potentially maintained between the islands of attention?

MTR: Maybe yes.

QR: So we can’t actually look at how this (MTI 4) compares to MTI 10? Because she is not monitored.

MTR: No we can’t look at HR . . . but in MTI 10 she has the physical representations of agitation, here she has the physiological.

QR: I think that is really interesting because what it means is that you do have to pay attention to both (the physical and physiological).

MTR: Is there a possibility that, if in those moments (islands of availability), she was responding to the environment or over-stimulated that then there would be a negative response? As opposed to . . . very brief periods of relief as we see in MTI 10.
QR: But in MTI 10 you also get those times when we said “I think she is annoyed”. And so the island comes and you are there doing this thing and she is not liking it at all and so she responds more negatively because now she is here and she is attending to it (the music) and she is unable to cope with it. Is it about arousal and thus availability to be stimulated and if in that opening to the awareness it is not what she wants, likes, or can cope with (she responds negatively).

MTR: . . . Waterloo is a favourite song, and in MTI 10 is she more aware that it is a favourite song and on some level (could she be thinking) “I know this song, I love this song, I used to dance to this song and now I can’t do what I want to do”? 

QR: Or even just that last point – “I can’t do what I want to do” and is she therefore sad.

MTR: That is assuming a large amount of cognitive capacity that she probably doesn’t have.

Evelyn’s responses during singing of first verse of Waterloo
MTR: This is her favourite song (as reported by Evelyn’s mother and older sister). There was quite a period (at the beginning of the song) where she stilled - up to 4.57.
QR: We don’t get the same change in facial expression. She lifted her legs a little and the chewing stops.
MTR: Her face seems to relax.
QR: And I made a note, obviously of interpretation, but to me it seemed like she knew you were playing.
MTR: Yes, I think there was awareness on some level.
QR: At 4.54 I noted that it is almost as if she is going to smile as her mouth spread symmetrically.
MTR and QR watch video from 4.50
QR: I think it is just an incidental passing through chewing to the mouth pull down, the repetitive gesture, but there was just this moment of symmetry and to my naive view it looked as though she was about to smile.
MTR: I don’t see that but it is certainly a calm face, a symmetrical face.
QR: Just for a moment. The symmetry is probably the most identifiable feature of it.

MTR’s response to Evelyn during first verse of Waterloo
QR: I noted that your voice is a straight cover version of the original so . . . there is no sense that you are modifying it or doing anything purposely to be therapeutic in its rendition, so you are not playing around with the song in anyway . . .
MTR: This is a case where I am singing ‘to’ her. Later in the song that changes when she gives me something a bit more to work with . . . I was torn the whole time between, she is starting to engage, but the aim of the music therapy intervention is really to reduce agitation. And as we discussed, on a continuum, because of her level of function, she doesn’t look very agitated but she was.
QR: Yes, she was still in, what would be assessed as a phase of agitation.
MTR: I had said to her “You can just listen to this song” (before I started singing) indicating that she could lie back and relax.
QR: What is the intention in a comment like that?
MTR: It is thinking out loud. You wouldn’t expect her to be able to respond.
QR: There is no active ability to be able to respond to the request.
MTR: Not that we know of . . . but the assumption that we always work with when working with neuro children is, that you assume they can, until you know otherwise.
QR: When working with children with a disability, you would do the same thing. You would assume that there is the potential for something to be going in (cognitively processed).

MTR: Exactly. So we tell the patients what we are doing, so if they understand, they know (what we are intending to do).

QR: That is obviously a common therapeutic technique.

MTR: I am singing, it is as you say, a cover version, but it is quite light, it is still quite legato as I am not really attacking the accents.

QR: The attack is very smooth. It is very consistent in its rendition.

MTR: That is (because I do not want to) . . . startle her.

QR: As you said, you are singing ‘to’ her, and it is more of a performance than it is an invitation for active participation.

MTR and QR watch video from 5.02
QR: You hold the note on the word ‘self’ which is the customary primer (leading into the chorus).

MTR’s response to Evelyn during the chorus of Waterloo (first time through chorus)
QR: No changes in the (musical) elements, the attack, register, and volume are all maintained.

MTR: And she is relaxed (at 5.18) because she is just lying back listening compared to the Hello Song where I really actively tried to engage her . . . giving space for her and acknowledging her vocalisations . . . As opposed to being in the song together, here I am just singing it through.

QR: Is it the singing it through or the familiar song that you are singing (that has lead to an interpreted increase in relaxation)? Had you sung through the Hello Song with no expectation of her would she have responded the same way? I don’t think so.

MTR: I think it is the familiar song.

QR: We see at key moment in this song, which are the most identifiable moments, including the first line “My my . . .” which is a very identifiable phrase of the song Waterloo and the beginning of the chorus. And this is where we see what little response there is. We see it at those key moments. So I think it is about the familiarity of the song.

MTR: Which is what the whole premise for using familiar songs is

MTR: You say at times that I look distracted, but I was watching her stats monitor (off screen). There are times when she is bradycardic, her heart rate drops a bit low.

QR: Did that happen in this MTI?

MTR: Yes. It (the drop in HR) is also because she had dysautonomia, due to the severity of her head injury, which impacts on the autonomic nervous function.

QR: When you are starting the song you look a little distracted, and what you are doing is processing. So you look like somebody who is thinking and so your initial presentation is just slightly distracted. Because you are not thinking about the music it seems . . . you are thinking about her.

Evelyn’s responses during the chorus of Waterloo (first time through chorus)
QR: At 5.07, just as you start the chorus, again she stops chewing, the mouth is closed for a moment, the legs come up slightly.
MTR: I have noted there is less frequent mouth movements but some small lip smacking.
MTR and QR watch video from 5.07 – 5.12
MTR: She is chewing with her mouth closed.
QR: Yes, so it is different.
MTR: Her face is a bit calmer.
QR: It is very slight. I want to imbue it with something. I want it to be that sense that she has recognized the beginning of the chorus. Which, if she is going to recognize anything, that will be it.
MTR: And that is why you lean on that last note leading into the chorus.
QR: At 5.09 I’ve noted that there is a mouth pull down that occurs but it is weak and her mouth is open and there is a sense that she is about to vocalise. She looks attentive. She is still and her mouth is open. Her legs pull up again but we don’t actually get anything.
MTR: So these are the recruiting behaviours.
QR: It looks a little bit like that.
MTR and QR watch video from 5.08. On video MTR is singing “I was defeated you won the war, Waterloo, promise to love you forevermore”.
QR: There is a sort of calmness there for a moment. Again it is still in the chorus, the really really identifiable part (of the song). It is almost like a pre-response. It is like attention to what is going on.
MTR: Or even less (than attention), like an arousal to what is going on. I’ve noted that at 5.18 I just continue singing and there are no significant changes here.
QR: There is a little bit of twitching and tremor in her left arm, a head twitch . . . She still looks more relaxed and attentive, is my interpretation at that moment.
MTR: I agree, I think at this moment she is quite relaxed compared to what she was when we started.
MTR and QR watch video from 5.18
MTR: She is calm when I am singing “Wah, wah, wah, wah, Waterloo”
QR: And then she starts up (lip smacking, mouth movements) when you are finishing (singing the chorus).

MTR: In the really familiar bits of the song, she does look calmer
QR: Yes, but is like she can’t hold it (the periods of calm). She can’t attend for more than those passing seconds and then she returns to that repetitive self-stimulating type behaviour.

MTR: I’ve noted in my session notes that it is difficult to assess if they (her responses) are intentional. Which they are probably not, they are probably automatic. Also that she had periods of stilling during this song where her HR drops. When she is stilling her HR is dropping to 90.
QR: Would you classify that as an orienting response? . . . With babies there is a defensive response and an orienting response in HR. A defensive response escalates and the orienting response drops. It doesn’t last . . . if they are orienting to a stimulus it will initially drop and then settle back to where it was . . . If they are fearful and worried about what the stimulus is then it escalates with a fearful defensive response but if they are listening and they are curious they are more likely to be able to absorb
the stimulus into that pattern of expectation. The HR takes about a minute to settle back to where it was. It is a pretty rudimentary kind of response
MTR: I guess if I . . .(interpret) her relaxation or calming response, it is because she is ok with what is going on. Especially in this MTI because (her HR) drops and stays lower to a level that is more suitable for a ten year old child. So it doesn’t matter whether it is orienting or relaxing.
QR: If it was only orienting you would probably see it go back up.
MTR: It does initially.

MTR’s response to Evelyn during the second verse of Waterloo
MTR and QR watch video from 5.37
MTR: There is a pause in the melody line, with me just strumming the guitar, which is me stopping to take stock of what’s going on and reassess the situation again.

QR: (from 5.50) you just keep going (singing through) but you are checking the stats monitor.

MTR: Have I picked up the tempo (at 6.50)?
QR: Yes . . . (I have noted) quick tempo, light timbre and mf volume. You have definitely picked up pace.
MTR: I wonder if that is just because I am excited?
QR: After she has done the vocalisation, you smiled, and then you pick up the tempo.
MTR: I have switched from straight relaxing to arousing.
QR: Now there is a shift in your intention. You pause at the penultimate moment (in the second verse to wait for her to respond). You obviously slow the tempo and increase the attack to give her more definite timbre . . . it seems you have now swung into therapy modification. Now you are not singing ‘to’ her anymore.
MTR: Yes, she is responding . . . so the intention is not to relax her because she is responding. After the Hello Song where she was quite responsive, did she need a break? Is it possible that she needed a rest from being able to do that or is it that I didn’t give her the opportunity. I was singing ‘to’ her but she wasn’t giving me anything to respond to.
QR: What implication does this have? Should you have stopped and waited for a moment? With a baby I will do a little episode of work and then back off and give them a moments rest because they can’t sustain attention. We have talked about the ‘islands’ is there a slightly more macro level?
MTR: . . . perhaps, ultimately it is not going to matter what I am doing, if that island has come and gone, it has gone and there is nothing I can do.
QR: Yes, but if you are not there then there you are not maximizing the island either. The mother-infant psychiatrist said to me that I provide valuable opportunities for rehearsal in the developing infant. Perhaps your consistent presence provides the opportunity to use whatever is there in those moments. If you weren’t there and nobody was there attending to those moments then she wouldn’t get any greater feedback for them.

★ QR: I think that is important, here comes the episode of availability that might have arrived anyway, we are not suggesting that music therapy is actually providing the moments . . . but if you are there you can support them. You feed in a stimulus when she is available to it and if you get it right she has the opportunity express herself . . . One of the problems that we have when working with patients right at the
margins and beyond is that all of the models come from the mainstream healthy population and there is a huge gap . . . so if you have a model that is at the extreme that we can look at then you are closing the gap . . . and for all of those children who come in between, who are still beyond the normal healthy model you have something else to apply for now. You can stretch up rather than stretch back from the healthy models.

MTR: Yes, and for those children with a less severe brain injury, those moments (of availability) are longer so you can do more with them. When the moments are longer I can really slow down and reduce all of the musical elements and then get them to a place where they relax. Occasionally you lose them but you can bring them back, and because the moments are longer and the breaks in between shorter, you are not starting at the beginning each time. As opposed to Evelyn where you constantly have to go back to the beginning. I don’t tend to leave big gaps (in the music when working with children with a brain injury) because if you lose them (the child) they are so hard to get back. This is not healthy brain functioning.

QR: But with Evelyn, you don’t actually get the chance to leave it because she is so damaged that she can’t do it. So the islands are fewer and farther between, and there is no sustaining between, so you do have to start at the beginning every time.

Evelyn’s responses during second verse of Waterloo

MTR: I’ve noted that her eyes looked closed, she stills briefly and the left arm relaxes.

QR: She has an open mouth (at 5.50).

MTR: Her mouth is open but her face is relaxed.

QR: I noted she is very still and questioned if she is asleep.

MTR: And the song is back to the “My my” – the really recognisable part of the song.

QR: She very much looks like somebody who has gone to sleep . . . her mouth is kind of slack and relaxed. It is like everything relaxed.

MTR: I didn’t note sleep, but as the therapist running the MTI I know that she wakes up and starts the mouth pulling down again. But it is possible that she went to sleep for that instant.

QR: In that moment her left arm releases at 5.54. That arm which has been twitchy and tense settles and to me that looks like everything has settled, which is very sleep like. But then off she goes again presenting with mouth chewing, slight arm movements).

MTR: at 6.08 there is a big mouth pull down. That looked a bit like the recruiting behaviours that we have talked about.

MTR and QR re-watch video from 6.01

MTR: She is chewing, the arm tenses, the mouth pulls down, there is a big breathe in (as MTR is singing “I feel like I win when I lose . . . chorus” – on the footage).

QR: And the legs pull up. There we are, right up at “Waterloo” for the beginning of the chorus. I didn’t pick it (in my own micro-review) but now that we have identified those . . . as the set of recruiting behaviours we can see something new. (6.09).

MTR: It is interesting that neither of us picked it up in our own micro reviews but it is leading straight into the chorus.

QR: She is unable to actually act on it (there is no vocalisation only the pre-vocalisation behaviours).

MTR: She is still at 6.18.

QR: What is that at 6.30? . . . I call it a grimace. The top lip pulls back to show her teeth, does she vocalise? You smile. What did you see?
MTR and QR watch video from 6.25.
MTR: Yes she does. At 6.32 she vocalises. So she was recruiting behaviours. We have both noted that she looks a little more agitated, that the arm comes up, the mouth pulls down, and then I smile. There is a little vocalisation.
MTR and QR watch video from 6.33.
MTR: And then she is gone.
QR: Yes, but then at 6.46 we see this very symmetrical eyes closed, mouth slightly open look. It last up and until 6.51.

Evelyn’s responses during the chorus of Waterloo (second time through chorus)
MTR and QR watch video from 7.07 – 7.22
MTR: So she is gone here.

QR: At 7.40 she looks as though she is going to vocalise. She pauses chewing and she inhales.
MTR: Yes, and I wait for her in the music, but she just doesn’t quite get there.

MTR: She is still at 8.08.
QR: I have noted that she is fairly still through that whole section.

MTR’s responses to Evelyn during chorus of Waterloo (second time through chorus)
QR: I have noted that you are less smiley.
MTR: I pause because she looks like she is about to vocalise (7.29). And she does.
QR: Because we get all of those recruiting behaviours – her mouth opens and is slightly lifted on the edges, her legs pull up and she vocalises. If you know that a child in this state is likely to use motor behaviours that recruit for vocalisation you can look for them. It is not an intuitive process, it is something you can actually observe.
MTR and QR watch video from 7.20
QR: You pause and wait when singing “Couldn’t escape if I wanted to”.
MTR: I am waiting for her to vocalise.
QR: You pause and wait for her but when she begins chewing you go on because you know that chewing indicates that she is not going to sing. At 7.35 you rall. on “Wah, wah, wah, wah Waterloo” and you are very much looking for her vocalisation.
MTR: So I have shifted from I am singing ‘to’ you, because I am trying to calm you and am going to keep this (the music) steady, to you are giving me a response (and I will adapt the music in response to this).
QR: I notice a shift at 7.40, you pause and go on but it is very sedate; your attack is gentler, your tempo is a little bit slower, you are watching her carefully. So there is something here that changes.
MTR and QR watch video from 7.38
MTR: Oh, that is because there was a vocalisation at 7.46. So she recruited and I waited for it (her vocalisation). I think I am just trying to give her more space.

The song finishes at 8.16.

No Music 08:17 – 08:39

MTR: She is still.
QR: She looks like she has gone to sleep again.
MTR: She did look as though she was asleep.

**Mamma Mia 08:40 – 12:11**

MTR’s response to Evelyn during Mamma Mia
MTR and QR watch video from 8.40
MTR: It is a very sedate rendition of the song.
QR: Now you are singing ‘for’ her.
MTR: That is because she has dropped off to sleep and I am trying to support rather than engage.
QR: Your face shows no expectation of response and that is how it (your voice) sounds too.
MTR: She then starts chewing but she still looks quite relaxed. I have picked up the tempo a little bit because she looked a little more active with arm and mouth movements.
QR: At 9.15 it seems more active, you are smiling and making the timbre more playful and bright and the strummed accompaniment is more definite in attack (because Evelyn is now awake).
MTR: At 9.33 I am waiting for her. And she looks as though she does it again (recruits for a vocalisation). Right arm moves, legs move, chest rises slightly . . .
MTR: (At 9.48 when it looks like she is ‘gone’) I continue singing and do not leave space for her. At 10.12 I change the strumming pattern (on the guitar), which I do in MTI 10 and I think that is that intuitive, in the moment, attempting to make the beat more obvious to give her that to respond to; a stronger cue. I don’t think it works here. Also, what I was thinking is the rhythm is processed at a more basic level than melody and it is seeing if this will stimulate a response.
MTR: At 11.33 I am just carrying on. And I repeat the final phrase on “Ah” and that is really about ending the song. It is about reducing the level of stimulation, moving towards a lullaby-ish type song. I’ve noted that I lean in, there are more pauses in the melody and it is just a rit. to end the song because at 12.05 she looks asleep.

Evelyn’s responses during Mamma Mia
QR: Does she make a sound at 9.22?
MTR: I have noted that she appears to be making the effort to vocalise however there is no audible vocalisation.
QR: You have a look of anticipation, the gesture of anticipation.
MTR: . . . I was waiting for the vocalisation. I don’t think she does vocalise but it looked as though she was going to, she certainly tried to.
QR: . . . All of the recruiting behaviours are there. It takes until 9.33 for you to relinquish expectation and go on.
MTR: So I have shifted again from keeping her calm to responding to her.

QR: At 9.41 I have noted that it is as if she is turning to you with her mouth open to sing, her brows are slightly raised with anticipation. It so looks like (she has turned her head toward you).
MTR: At 9.48 she goes back, turns her head away and there are slight mouth movements.
MTR and QR watch video from 10.21
MTR: I have noted that from 10.20 she looks more relaxed. There isn’t a significant change in her presentation but she actually appears more relaxed, it is really at the micro level.
QR: She pauses at 10.21. She does look more relaxed. But it doesn’t come up to the level of a response.
MTR: Or down to the level of sleep.
QR: But it is not the constant mouth pull down, agitation.

QR: At 10.42 legs come up, chest goes up.
MTR: It does look as though she is going to vocalise.
QR: I’ve noted that her chewing changes slightly and then she stops, followed by a slight leg pull up and a grimace at 10.47.
MTR: And that is the key bit of the song (“Just one look and I can hear a bell ring”).
QR: It is the archetypal Mamma Mia bit.

MTR and QR watch video from 10.44
MTR: From 10.44 she is still
QR: Then her leg pulls up, breathe, bit of a grimace (right at “Mamma Mia here I go again”). She is responding to the familiar song.
MTR: She is responding to the familiar song.
QR: . . . She is responding to the song. She is definitely doing it. And then we get nothing.
MTR: (Then) there is intermittent mouth movement and there is not pattern between the two of us. At 11.09 I am using a very simple strum pattern.

(Side note QR to MTR – you need to systematically check those archetypal moments in the familiar songs and see check her for those moment of recognition. It would be worth it, now that we have identified this as a possible set of recruiting behaviours and responses).

QR: . . . She is asleep (at 12.05).
MTR: At 12.07 her arm just relaxed back so she is relaxed.

No Music 12:12 – 12:26

QR: (if she was asleep) why did you go on? Why did you not leave it there?
MTR: . . . Because a couple of times before she looked like she was asleep but she hadn’t maintained it. Can I then (help her) transition to the level of deeper sleep and keep her there? Knowing that the ward environment is so noisy.
QR: So you playing as an additional stimulus is better than the randomness of the ward?
MTR: This is not a random stimulus.
QR: And in a ward like that would it be true that you’re there playing music and people have a tendency to be a bit quieter?
MTR: Yes, I think so. She is in a four bed ward there and the other families tend to listen . . . The nurses frequently comment “it is good for the whole room”. Especially this . . . the high dependency unit, it just calms the whole room.

Love Story – Taylor Swift 12:27 – 15.34
MTR and QR watch video from 12.27

Evelyn’s responses during Love Story

MTR: She didn’t stay asleep (as indicated by some small mouth movements). Her mouth is chewing but it is closed, so it is calmer.
QR: To me, it looks like she smiles at 12.42 but it is one of those little grimace faces.
MTR: It is, but it is nearly a grin, not a smile.
QR: . . . It is kind if like she has done this before in those moments of recognition. She stills at the beginning of the song.
MTR: I have noted that as I begin strumming she stills. There is a consistent pattern.

MTR: I think her eyes are closed at 12.47
MTR and QR watch video from 13.09
MTR: She is relaxed there. A little bit of leg pulling up (is observed). At 13.19 it looks as though her left arm is sinking back (onto the pillow in a state of relaxation).
QR: Her mouth is relaxed (and she looks) asleep. And that is an archetypal moment (in the song – beginning of the chorus) and she doesn’t respond . . . she is asleep.
That is the longest episode we have seen.
MTR: Her breathing is calm and everything is still. At 14.05 I have noted “is she asleep?”
QR: . . . She is definitely asleep.

MTR’s responses to Evelyn during Love Story

MTR: My singing is back to what it was at the beginning of Mamma Mia, although softer and gentler again, but this song lends itself to that better than an Abba song.
QR: I’ve noted that you are light and smooth and the guitar is likewise and you have no expectation of her.
MTR: No, because this is attempting to get her to sleep.

MTR: I have noted at 13.07 as she looks still that I just continue singing, in a legato style with no accents . . . Is it just a coincidence or did I get a long enough phase of her being with me and I was able to move it (the music and her subsequent response). If she was responding earlier she is probably exhausted.
QR: I have no sense of how much to expect or how much is a lot. It is not as if she is just relaxed and enjoying what you are doing all the way through and she just has a little smile on her face once in a while. There is such a different level of activity going on . . .
MTR: She remains asleep at 14.30.
QR: You haven’t had any other episodes in this MTI when she has been like that for that long. It strikes me, that when you arrived (for the MTI) you said something about “I will probably put her to sleep” so it seems like she was already in that place where she would go to sleep.
MTR: That was because in previous sessions she had relaxed and the intention is to calm her down.

Song finishes at 15.32 and Evelyn stays asleep.

No Music 15:35 – 16:17
MTR: We finish there. I talk (to Evelyn's Mum) about how her HR is 70 – 75 and stable. Evelyn's Nan commented that Evelyn looked like she was trying to sing along. QR: Which is notable but may not be important because families often see things (that often aren't there) . . . If she was on her way to sleep anyway you would have to think that what you have done is helped. MTR: I don't think at the beginning (of the MTI) she was on her way to sleep. I did make a comment that “I will probably send her to sleep” because that is what the aim of the session is and in previous session we had observed these 'catnaps' where she would get to sleep but whatever would fire in her brain and she would wake up again. QR: Would you have said those brief periods (earlier in this MTI) were catnaps? MTR: They were longer in previous sessions. QR: Which also explains why you weren't trusting that she had gone to sleep at the end there because you were half expecting her to wake up again . . . So this is you knowing her over time and knowing the potential thus far.

Additional Comments on MTI 4

QR: It is interesting now to consider that we had that idea of the recruitment earlier, in the Hello Song. MTR: We didn't quite realise it was at such poignant moment in familiar songs – but we hadn't yet looked at familiar songs. QR: So the answer to the question of whether or not she is responding to the music, is in fact yes. MTR: And what is the cycle between the music and the response is that it is at those key moments, the recognisable . . . and deeply entrenched moments she responds. QR: These are the most recognisable moments and at those moments she demonstrates a response . . . Is this set of behaviours that we call recruitment behaviours, is it a recruitment to vocalise? . . . They are in and of themselves a response. They are a collection of behaviours that indicate a response . . . Even when she didn't vocalise, we expected it from her behaviours so she still responded. Without the vocalisation we still have a set of consistent behaviours that are a response.

Comparison between MTR 4 and MTI 10

QR: Does the recruitment behaviour develop? MTR: I think in MTI 10 it requires less effort for her to vocalise.
Pre-MTI

- GCS 10: eyes open but no fix and follow.
- Agitated + +.
- Vocalising/crying out (trachy removed after MTI 5).
- Non-purposeful thrashing left arm movements.
- Poor sleep overnight as agitated.
- Remains non-verbal, non-ambulant, and NG fed.
- Mother and older sister present at bedside pre-MTI.
- Nil therapies before MTI due to agitation.

No Music 00:00 – 00:47

MTR and QR watch video from 0.00 – 0.47

MTR: She is a very different child (compared) to MTI 4 . . . not related to the music therapy, that is just the progression through PTA. The really hard thing for families is that she is more awake, and that is a good thing . . . but she is more agitated.

QR: What is the distinction between distress and agitation? There is a difference. You never call it (this presentation) distress.

MTR: (Agitation) is not a conscious behaviour. It is about the brain re-organising itself.

QR: It looks like distress.

MTR: I think if you were working with a child who didn’t have a brain injury, or who was out of this semi-conscious phase, or the distress was in response to something (you may classify the presentation as distress not agitation).

QR: This has an automated . . . it has a function that is not under her control.

MTR: Yes, she can’t mediate these behaviours.

QR: Is there any sense that . . . (these behaviours) cause her any distress?

MTR: Who knows? The sense of PTA, or what I have read, is that (the behaviours) are not under conscious control, so sometimes you can distract the child from them, if they have enough cognitive capacity you may be able to distract them or re-direct them from that behaviour. But with her (Evelyn) you can’t. We don’t know if agitation causes them any distress because they are not in a phase where they can tell you.

QR: . . . Conscious effort won’t have any impact on in. So even if she was aware of it . . .

MTR: She probably couldn’t do anything about it.

QR: So it is a disturbed neurological function, which is pre-conscious.

MTR: And it is incongruous to the stimulation present in the environment, so it is not necessarily in response to anything. It might be, but it is more that she can’t process anything that is going on in the environment . . .

QR: It seems to me like later on in this MTI, in some of the later songs in this session that her behaviour is more distressed, so there is an element beyond this plaintive cry . . . which suggests maybe that she is not ‘enjoying’ what is going on.
MTR: . . . Having asked the (clinical) neuropsychologist (involved in Evelyn’s care), if she has got such a limited range of responses, is more response actually a bad thing?

QR: We don’t know and should we have any expectation that it is consistent? So that more response in one minute may not have the same value or meaning as more response in another minute, because there are such limited possibilities.

MTR: It might be that while she looks more agitated she is actually just more responsive . . . and saying somebody is more responsive doesn’t have the same negative connotation as saying she is more agitated.

QR: But it is not just an increase in activity that defines it, it is a change in the quality of it as well. So I think that is something to discern, I think . . . there is an opportunity here to see things in that way that other people perhaps don’t see them in that clinical context because you can’t be attuned to that level.

MTR: I think with so much going on, as a clinician (working with a child with this level of agitation) you start to take on some of the energy.

QR: Absolutely, and you see that shift in your stance. I see that shift in the way you sing and play. A lot of it has to do with the smiley-ness of what is going on you can see uncertainty coming to you . . . and you can see disengagement, you see the point at which you relinquish expectation. That is all evident in you, and largely in response to her. But that is not a musical process, that is an interpersonal process that is manifested in your musicality.

MTR: But, the music being presented by me is intrinsically linked to what is going on with me.

Hello Song 00:48 – 01:51

MTR and QR watch video 9.48 – 1.51.

QR: You have already changed (as MTR sings second line of Hello Song).

Evelyn’s responses during singing of Hello Song

MTR: I have changed as I get a different response from her. We both note at the beginning of the Hello Song Evelyn has a change in facial expression . . . Is it meaningful, can we read anything into it?

QR: I think we can. What value it has and how you interpret it is different. But there is a change.

MTR and QR watch video from 0.54.

MTR: Her eyebrows go up and there is a change in her facial expression.

QR: It is very subtle. And it doesn’t stay like that, but it is an alerting response, whether it is her brain, at a fundamental fight/flight level alerting to a new stimulus in the environment, there is nonetheless an alerting . . . There is a subtle pause in the repetitive behaviour. So, if nothing else there was a cessation of one action in response to a new stimulus.

MTR: We have both noted a change, that there is a quiet cry, which is a different vocalisation to what (the pre-music vocalisations were like). I see that it is at the end of the phrase.

QR: . . . I don’t know if it is. I don’t have it for sure, but it is definitely different at that point than it is during the phrase.

MTR: But she doesn’t vocalise at all during that first phrase (only at the end of it).

QR: No, not in that first phrase.
MTR and QR watching second rendition of Hello Song.

MTR: So watching this, she stops (during the lyric “Hello Evelyn”).

QR: And then we get this quiet vocalisation.

MTR: Another quiet (vocalisation) at the end of the phrase.

QR: Then louder. Yes (then a loud vocalisation at the end of the song/phrase “It’s music time”). You would have to think that there is a sense that something has happened, and that is the end of it, and then there is her response to the end of it. I don’t know what value it has more than that.

MTR: I don’t know if there is value more than that.

QR: But it changes, it changes her sense of what is going on and it changes her response to that.

MTR: . . . But having discussed what we did in MTI 4 about is she there with me or is she not/have I lost her, I would say that (response) indicates that she is there with me.

QR: Yes, she is with that experience. So taking out all of those assumptions about the social togetherness, but just questioning if she is aware of the stimulus in the environment, meaning you, then yes I think she is.

MTR: I think that is what the meaningfulness of the response is because I don’t think you can go beyond that (basic response) with a child who is in a state of reduced consciousness and with such disturbed functioning.

QR: Before that at 1.03 you see this lip biting behaviour, it one of the precursors to this (vocalisation). This comes back. It is part of her pattern of recruiting, . . . a response . . . Whether it is recruiting or anything more than that it is like this visual cue that something is going to happen and this is part of this pattern, and not the plaintive cry pattern. I think the quiet cry has a different value from the plaintive cry, and that is different again from that push cry tone which is at the end of the phrase.

MTR: Yes, it is a real pushed out (sound).

QR: That big push cry at 1.09 is significantly different in its shape . . . It is definitely a bell shaped tone. Which is different to the repetitive plaintive cry, which just pushes forward, and up slightly, a slightly ascending intonation. This push cry has a whole shape to it. It is quite different.

MTR: Yes, and I mirror the intonation of the loud push cry, and then I question if she responds to me mirroring it

QR: (at 1.14) This face . . . with the eyebrows slightly raised the eyes are wide open, the face is symmetrical, particularly the mouth, and relatively relaxed and you get the lower jaw slightly protruding. So this is a variation on the lip biting but to me this is attending, this is her attending face.

MTR: I hadn’t picked that up. I had picked up that there is a change but not that this is an attending face.

QR: For me, this (face) returns and it is always at a time when there is more of an attunement to what is going on than otherwise. I had noted at 1.12 that she has a half smile expression on her face and then maintains and open expression with her eyes. I am not saying it is a smile, just smile like.

MTR: Well it’s not a grimace. And this is in response to me just having mirrored her vocalisation.

QR: I wonder with her, what lag does she have in her response? It might be in response to you but I think that might be over attributing it because . . . I don’t know that she is capable of responding that quickly to you. It might still be part of what was coming anyway. There are times when you start singing and she gives a plaintive cry.
but you can see the plaintive cry in preparation before you start singing. I think it takes times for her to produce any observable response.

MTR: It possibly does but then when I started singing there was an immediate response.

QR: Yes, but the cessation (of behaviours) can be more immediate than recruitment to action.

MTR and QR watch video from 1.08.

MTR: The second time through the Hello Song is pretty similar to the first time.

QR: It is so evidently at the end of the phrase.

MTR: It’s a pattern; well it has happened twice, that’s a pattern.

QR: At this point I call it a significant, large, forced cry (at the end of the phrase “It’s music time” but what I mean is that it is the plaintive cry with increased force . . . I call them cries because there are very few that I consider to be vocalisations per se without any of that distressed sound to them. I had to characterise them by the vocabulary that I have and to me they are cries. Perhaps call them distressed vocalisations.

MTR and QR watch video from 1.35 – the 3rd repetition of the Hello Song

QR: we don’t quite get the same thing that time.

MTR: She vocalised more during the actual song, less at the actual end of phrases.

QR: We do get that kind of squeezing the sound out sensation though which gives that same sense as the push cry.

MTR’s responses to Evelyn during singing of Hello Song

MTR: (as Evelyn’s face is observed to change subtly) I think you can see a change in me. I go from (thinking) “I’m not sure what this session is going to bring” to “oh” (she may be responding).

QR: And it has taken all of about 4 seconds for you change your demeanor.

MTR: The timbre of my voice is brighter then, when I am smiling.

MTR: (at 1.14) When you look at my face on the (video), I have picked it up in the moment because my eyebrows are up and my face is open (in response to Evelyn’s ‘attuned’ face).

QR: You are very open to her responses.

QR: If you watch her at 1.34 she bites her lip, and there is no sound as might have been expected. You seem to acknowledge something in her around that time and I don’t know what it is. So we have go that lip biting behaviour again and you have a sense that she is attuned, you are saying “Hi” and then she continues to have that (facial expression where her) eyebrows are slightly up, eyebrows are slightly open, lip biting. Which is again, not the repetitive plaintive cry, it is this slightly different behaviour.

MTR: And that is what I am responding, and the big vocalisation from the end of the phrase. And then we repeat the Hello Song again.

QR: I wondered why you went straight on (from verse 2 to verse 3 of the Hello Song). Was there a sense that is what would work and if so why? You often did that (did not leave a delay in the music).
MTR: I often do not leave space . . . when I have the sense that they are there with me and I don’t want to lose that. So I keep it moving, keeping whatever they are responding to present.
QR: So there is a sense that attunement could dissipate so quickly?
MTR: Yes, in an instant.
QR: But the other layer of that is that you also have this lag in her ability to respond so that is a real dance of attunement.

No Music 01:52 – 02:15

MTR and QR watch video from 1.52 to 2.15

QR: Why aren’t you expecting her to respond when you are talking to her?
MTR: I didn’t want to actively engage her. I was really torn in this session between engaging her and not wanting to engage her actively with the change that . . . I may be arousing her and this may increase any responses, which are looking very much like agitation. So (would engaging her) exacerbate that and is it going to ask for things that she can’t do, even though she does clearly respond. There is a real dichotomy the whole time.
QR: I think that comes through . . . At 1.57 she gave a really small cry, does she notice the loss of music, the cessation of the stimulus, just as she had noticed the commencement of the stimulus?
MTR: Maybe . . . and at this level (of patient functioning) are we working on just a pure cause and effect? There is something (a stimulus) or there is not something. At 2.07 we have both noted, what I call, a cry.
QR: It is more air than voice.
MTR: It sounds like a child crying and I acknowledged her then saying, “It’s okay”.
QR: You look up from sorting your music to check on her. There is something in that child like cry that alerts you to pay attention.
MT: To me it is a more upset cry. That is how children cry.
QR: I note that your face is earnest and tight.
MTR: It is earnest . . . I am calling the other ‘cries’ vocalisations because she is using her voice and the word cry has such a negative connotation but this one (at 2.07) actually really sounded like a cry.
QR: (the word cry) has such a sociological overlay just as distress does. I have noted that as you start the next song she stops crying, I don’t know if this is in response to the music I think she was going to stop crying anyway.

Waterloo 02:16 – 06:57

QR: It is neither enticing nor soothing but very metered.
MTR: That is about trying to provide structure. In hindsight . . . this is not my best clinical work, because you constantly have the research protocol in your mind . . . clinically I probably would have gone with more improv (in response to her vocalisations). (In this session I was thinking that) I need to try and contain her agitation because the protocol was about reducing agitation . . . trying to provide a contained for that agitation.
QR: Within the vehicle of familiar song, you did produce that in a way that was containing in its musical features. Whether it served the purpose for her or not I think is questionable.
MTR: I think it is questionable in this MTI too.

MTR and QR watch video from 2.17

MTR’s response to Evelyn during first verse of Waterloo
QR: You can see concern on your face and that is conveyed in your singing.
MTR: . . . You can’t not pick up on the energy in that room, mum’s energy and her sister’s energy.
QR: There, she is aware of it (as MTR sings “at Waterloo Napoleon did surrender”).
MTR: Once have started singing (she is aware of the music, not just during the guitar intro). And then I acknowledge her (by slowing and pausing on “ooh yes”). I have noted that there doesn’t seem to be any pattern. She does seem to have that early awareness . . . the face (that indicates awareness).
QR: . . . I don’t feel . . . any attunement to you.
MTR: I have noted that there is some initial response, she has quieter cries but then there is that face but then she goes back into the (vocalising, arm thrashing behaviours).
QR: Yes I have noted that as well, at 2.20 she does a little chewing but her face rests for just a moment and that is when you start to sing.

MTR and QR watch video from 2.48
Evelyn’s mother adjusts the pillow next to Evelyn’s head and shifts Evelyn into a more upright position.

Evelyn’s responses to the chorus and second verse of Waterloo
MTR: I have noted her that there is an increase (in her agitation). Is that in response to the music or is that in response to that fact that she has just been handled? I don’t know.
QR: I don’t know either.
MTR: There is an increase in the intensity and the frequency of her vocalisations . . . Possibly, this is a far more upbeat song and there is a lot more to this song than the Hello Song . . . is she just mirroring what is going on in the music?
QR: I don’t get that. I understand why you would suggest it but it is not what I feel. I feel her being annoyed at this point. I have noted at 3.17, the plaintive cry is extended in duration with increased energy on the “Wah, wah . . . Waterloo”. Is the cry more deliberate? It is quite different.
MTR: It is a big vocalisation.
QR: And then we get a shift, a bent elbow repetitive arm movement for a while which is different.
MTR: I don’t know if that is anything other than muscle tone.

MTR: I have noted that I am continuing singing and she is continuing in the vocalising (between 3.27 – 3.58).
QR: (from 3.27) in between her cries, I have noted that her eyes seemed a little bit more open. You maintain that spacious simply defined style and it is very steadying but she has a little quiet cry at 3.46.
MTR: Here eyebrows go up a little bit.
QR: It is not big, it is just a subtle shift (at this point MTR is singing “always repeating itself. Waterloo” i.e. leading into chorus). You’ve pulled back, is that
enough? Has it been enough for her to be okay with it a little bit more? Therefore a little but more eyes open.
MTR: Earlier in this MTI we were attributing that open face to attending.

MTR’s response to Evelyn during chorus and second verse of Waterloo
QR: I have noted that you have an odd look on your face (at 3.18 as Evelyn does the loud extended cry at “Wah, wah . . . Waterloo”. I am wondering what you are thinking in response to that cry? . . . You pause and allow her plaintive cry to conclude before going on.
MTR: At 3.26 I have noted that I wondered if the song was too over stimulating.
QR: And you completely change the way you present the song.
MTR: Whether or not it was a response (from Evelyn) or . . . an escalation of agitation or she is not impressed, I have noted that I wondered if the song was too over stimulating and I change the guitar accompaniment to strumming on the beat, a much simpler accompaniment.
QR: You slightly increase the attack on the beat to emphasise the simplification, the simplified rhythm. The tempo is slower.

MTR and QR watch video from 3.27 – 3.58.
QR: I have noted that you are more spacious in your rendition.

MTR and QR watch video from 3.50
QR: She is just continuing on in that pattern now.
MTR: There is not any sense that we are in the same place together at this point. I feel as though I am carrying on (singing) and you can see the look on my face as though I am thinking ‘do I change the music, do I give her time to respond?’ and she is just continuing.
QR: But at 4.18 we get that lips coming together thing again. I don’t think she is far away I just don’t think that she is happy. We get that lip bite and then we get that really different sort of cry and you think that she is doing something there (because you pause and slow the phrase “finally facing my Waterloo”.
MTR: I think her vocalisations are less intense.
QR: The push cry recedes and we get the plaintive cry, it is not quite the quiet cry but it is somewhere in between there but we have got this lip biting, mouth comes together and this has been more indicative of more attunement and you pick up on it . . . This is a visual behaviour that you are picking up on.
MTR: I respond musically, I allow her space to respond. I have also noted that I change the pace of the song and pause, to change the musical stimulus, to see if there will be a corresponding change in her . . . I am waiting for her.
QR: Eyebrows up, eyes open, invoiced cry (at 4.35 during “Wah, wah . . . Waterloo”). But is it you or is it that the nurse has been doing something and now her position has changed.
MTR: The nurse is only working with Evelyn’s NG tube.
QR: Yes, but if the nurse has put a feed in, Evelyn has a completely different sensation.
MTR: True, it looks like the nurse is doing medications at that point.
QR: Babies notice (when something is put through there NG tube). I don’t know if there is anyway to determine if (the response is to) you, the nurse, or that she has
knocked her pillow out which has now shifted her position and she is aware of it. But at 4.45 she has her eyes wide open and we get a little bit of change.

MTR: I’ve noted at 4.53 she does look calmer as she has pulled the towel away from her head (where it was protecting the craniotomy site). It may be a relief as that (the towel) could have been really uncomfortable.

QR: I’ve noted that at 5.02 she had a plaintive cry with decreased energy and her face is more relaxed, to me it looks as though whatever the nurse had administered has become apparent to her.

MTR: Between 5.06 and 5.15 there are no vocalisations and rather than her arm circling it is just holding (the towel). Whether or not it is stuck but there doesn’t seem to be active attempts to move it (the arm).

QR: I don’t think it would matter what you were doing (at this point), I think it is the towel (that has caused a response incl. a decrease in arm movements and vocalisations). You continued in steady metered, pulsed rendition, and you are totally focused on her face and take no visible note when she dislodges the towel.

MTR: I was watching her thinking something has shifted in her . . . and she looks calmer, she looks much happier. It is possibly that if her brain is herniating through her skull, it may be comfortable to have some pressure on it (and that is why she is calmer lying on the side of her head).

QR: And if she has nerve damage does she have a hypersensitivity to anything touching her head.

MTR: At this point (5.49) Evelyn’s sister who was sitting behind me asks me to fix up the pillow/towel (because she was concerned about the site of Evelyn’s craniotomy). (After I replace the pillow/towel next to Evelyn’s head) I go back to singing Waterloo because I was thinking was (Evelyn responding) to the music or the towel because I wasn’t sure which it was.

MTR and QR watch video from 6.04 as MTR. Brief pause in music as MTR replaces pillow next to Evelyn’s head.

MTR: She give a bigger cry once the towel is back in.

QR: . . . You use beautiful infant-directed supportive tone when you say “I know” (in response to her loud cry). At 6.21 you start singing Waterloo again.

MTR: I wasn’t sure if she was responding to me, or the towel, or the combination of me and the towel.

QR: At 6.28 you see this little protruding lip . . . Is she attending? I’ve noted that her relaxed attending face returns, the bottom lip is slightly protruding which gives a look of determination, as if she will vocalise.

MTR: Yes, I’ve noted that she is quieter and her face is calmer.

QR: At 6.51 she has that unvoiced vocalisation. I note this as a vocalisation rather than a cry, or a cry just running out of energy. She doesn’t actually voice it.

MTR: But it looks as though she is trying to vocalise.

QR: Her face shape is different from the cry.

MTR: Yes and she has the more attending face. Thinking about should I have gone back to singing Waterloo, she is there with me for a moment. I spoke to the neuropsychologists yesterday and they explained that there are moments of availability. Is it something to do with these moments in her neural function that is suddenly when she is available and this happens to coincide with the music or does the music stimulate these available moments?
QR: I’ve noted at 6.58 that you’ve got that single strum rhythmic accompaniment and it seems like your tempo is emulating the pace of her plaintive cry. You are remarkably consistent in your rendition.

MTR: That is actually the start of the next song.

**Mamma Mia 06:58 – 09:06**

MTR: I have done what I talked about before, which is move straight into the next song, not leaving any gaps. In this moment I have assessed that she is actually there with me and I am wanting to keep her there with me.

QR: For me as a clinician, not a reviewer, I would let the air drop because I want to see what happens now without the music, because with a healthy brain there is usually a good opportunity to pick it up again.

MTR: In past experiences, if I sang a verse and then stopped I lost the child who in the gap went straight back to their repetitive verbalization, so I just kept the music going because it is much harder to get them back then it is to maintain them.

QR: . . . So it is a preemptive move rather than coming in and having to ameliorate the situation, you actually preempt it. You can see that there is the potential to lose her so you preempt that by keeping what you’re doing more present than that potential behaviour. I have noted that she sets up a regular pattern of plaintive crying, which does not seem to change for or with the music but it is well matched by the tempo of the music that you have set up obviously in response to her.

MTR: There is a fine line in this session between me responding to her and her responding to me, and it may not be evident a lot of the time.

MTR and QR watch video from 7.01.

MTR: I am playing with the same strumming pattern (as Waterloo), strumming on the beat.

QR: We do get a little bit of something (? a response) here, I have put that her eyes are slightly open throughout this, except they are closed during a cry of any kind, and her mouth is closed.

MTR: (From the beginning of Mamma Mia) up to 7.19 her vocalising is quieter.

QR: . . . So you’re wondering if she is responding (at 7.37 because you are leaving space for her to respond).

MTR: I think watching, if not that she isn’t responding to me.

QR: (at 7.37) You pause again and then you continue on in your consistent style with no further pauses. But, at 7.42, the cry changes, with a pitch that is a flatter intonation . . . and my sense was that she almost pauses for you.

MTR: I’ve noted that I mirror her inhale posture . . . and so together our shoulders rise as we inhale together.

QR: She does (seem to) pause for you. Then you are singing ‘with’ her. It is apparent that you see some synchrony in her cries and the music. You start to accommodate her cries in the way that you do things.

MTR and QR watch video from 7.48.

MTR: On the video you can see me really obviously mirror her inhale and exhale posture. Watching the video again, it does feel like we are in that moment together.
QR: Yes, not in a social or interpersonal way but on a musical level, if you can count breathing as part of the music. At 7.57 she inhales visibly and you inhale, almost as a gestural communication.

MTR: It is interesting that I do this, because she probably couldn’t see at this stage (because of damage to her occipital cortex and no evidence of a fix and follow). Whether or not she could feel it?

QR: It is a moving together, it is part of that synchrony. And in mother-infant terms it is part of that implicit communication, so it is the gestural aspects of the communication . . . I’ve noted here (at 8.04) there is a subtle shift in her energy, is she tiring? At 8.13 you incline your head and you are making a decision to change . . . you decrease the attack in your voice and make the timbre more breathy.

MTR: Which is mirroring what she is doing because her vocalisations are decreased and they are more breathy.

QR: And I assume that means you are thinking this is enough.

MTR: Having watched the session, I think I did too much and should have stopped it earlier . . . You think ‘I’ve done clinical sessions where I can get the child to sleep, I know I can get children who look like this to go to sleep, and then you keep trying and then you have moved beyond the point where you have done too much and you should have finished the session.

MTR and QR watch video from 8.00 - 8.38.

QR: From 8.18 I have noted that you are singing and playing consistently but you are accommodating her vocal activity. At 8.26 you lean in slightly as if you were singing along with her and you pause (MTR singing “My my I should not have let you go”).

MTR: I am not trying to stimulate a response but just incorporating her vocalisations into the musicality or into the structure of the music.

QR: What purpose does that serve, why are we doing that because we know that she is rolling with her plaintive cry there at 8.19, 8.23, 8.27, 8.41, 8.34, 8.37 and you are including it.

MTR: Perhaps it is trying to provide structure to the cry and trying to provide some sense of the cry fitting in with the structure (of the song), and if it does, then you can change it, you can move it. But, you have got to get that initial sense of it belonging.

QR: . . . You are there as a dyad and either she is part of it or she isn’t, so by letting the cries be part of what you are doing and not singing over it, it gives it a presence in the musical hole.

MTR: It is acknowledging her contribution, even though at this point I am not sure it is any kind of intentional response.

QR: I think it works at a more fundamental level of being together. She is just rolling (on with her cries) and you are accommodating or accompanying it. At 8.55 you begin the chorus again with the encouraging more emphasised attack, and you are watching her intently but still with the encouraging look on your face . . . and then you stop the song . . . because obviously you have made a decision that you don’t have her.

MTR: I think her cries are generally quieter in that song.

QR: My sense was that you may be thinking she was starting to settle, and perhaps she was because there was much less energy in her cries.

No Music 09:07 – 09:57

MTR and QR watch video from 9.07.
MTR: I have my hands out in front of me (as I am looking away talking to Evelyn’s sister) because I don’t want her to hit the guitar and hurt herself and I don’t want her to hit me. It is about protecting her. She really looks as though she reached out . . . her face is calm.

QR: She is aware of the touch (as MTR strokes her arm) . . . I note that you relinquish her hand.

MTR: Is her response to music that it is just a cause and effect, so touch is a stimulus, music is a stimulus and they are both sensory stimuli, and are they going to such a primitive location that there is a stimulus or there is not?

QR: Yes, I actually think that is where it is . . . To me there is an evident response to a shift in sensory stimuli . . . And given that it is the same face (Evelyn’s attuned face) is it pertinent to call the interplay Daniel Stern’s a-modal processing concept for newborn . . . He says that they are processed by vitality affects but what he means is that I sing with a particular force or touch you in a similar way it is the same. It is processed as a sensory experience, not of one modality but as an affect.

MTR: Perhaps yes, because she does respond to the touch, and it is the same face as when she is with me in the music and when I relinquish her hand she goes straight back into vocalising and arm thrashing.

Knowing Me Knowing You 09:58 – 12:25

MTR: (after talking to her sister about Evelyn’s favourite music) I made the decision to do another Abba song . . . and we actually really should have been thinking about bringing the session to a close at this point . . . but she has these moments and she was calmer as a whole, the cries were less intense towards the end of the last song.

QR: You begin singing in the same mf, moderate tempo as the other songs . . . and it feels like you are singing ‘to’ her, not ‘with’ her.

MTR: I think you are right, I am singing ‘to’ her, there is not a lot going on between her and me.

QR: That conversation over your shoulder (with her sister) seems to have distracted you, and now somebody else has come into the room and you have got that way of singing that is not entirely about the person in front of you, but more about the people who are in the environment with you.

MTR: I am not right there with her anymore.

QR: No, but she is not either. She is not giving you enough to pull you back in. Unlike at the very beginning . . . where initially you were standing back, as soon as you started and she responded you were right there (with her). But she hasn’t done anything to draw you back into the relationship . . . You have no need to draw the song back down into a slower pace or to punctuate it different in anyway . . . because you are performing it to her and she is not drawing you in.

QR: At 10.59 she gives a louder cry and you slow down, she has got you. So you lean in slightly and seem to re-focus on her.

MTR: Yes I am again leaving space in the music for her. I am not sure if it is looking for a response or just incorporating what she is already doing into the musical structure.

QR: On a sheer auditory environment, she is part of it, you are letting her be part of the fabric. At 11.20 you pause to synchronise with her vocal action. Your attack and
timbre are much more definite in the first phrase of the chorus . . . you are still giving it emphasis which is a kind of “I’m still here, are you?”. MTR: She is kind of continuing (with vocalising not in response to me) and I don’t think at that point I am sure . . . there is a more definite attack, I’m not sure that she is there with me. QR: I wonder if she is a bit annoyed at this point. Look at your face, you know (Evelyn continues with plaintive cries approx every 2-3 seconds, a loud cry at 11.59 and then several small sad cries). MTR: I know, and I quickly finish the song. I was thinking “have I got you? Have I got you? No I haven’t and now I just think I am annoying you”, so I finish the song.

No Music 12:26 – 12:33

MTR and QR watch video from 12.26 – 12.33.

MTR: I say “ I didn’t bring my bells today” because I am wondering with this hand movement, is there something we can do with it, because it is not responsive to anything at the moment, it is not purposeful but it is there and I was wondering if there was something we could do to make it purposeful. Like singing ‘with’ her as opposed to singing ‘for her’, can I incorporate this arm movement?

Jingle Bells 12:34 – 13:59

QR: . . . We talk about the different levels of engagement with a child, particularly with an infant . . . the first level is tolerance, my thought was she was tolerating it beautifully (when you took her hand and tapped the beat) . . . she is not pulling away. Acceptance would be that sense of at least some part effort, then there is enjoyment and after that initiative . . . at a graded level we at least got to acceptance.

MTR: There was never any sense of her helping me (with the tapping movements), bit I don’t think she could have ever got to a point of initiation (at this stage of her recovery).

QR: No she couldn’t have.

MTR: So I think that she was there with me.

QR: If we look at her face she has got that calm, attending face (at 12.41). It is consistent (face is quite still, eyes open, mouth slightly open).

MTR: After the end of Knowing Me Knowing You I wondered how could I repair the session. I’m in repair mode. I didn’t want to leave her in the state that she was in at the end of the previous song . . . We sing Jingle Bells because it was two days before Christmas.

QR: You can see it is appropriate (song choice) on her face.

MTR: . . . And everybody knows Jingle Bells. So, yes Abba songs are her favourite, I have had this experience with other clinical scenarios where the family tells you the child’s favourite songs but actually what has worked best with the 10 year old is Twinkle Twinkle Little Star because it is so familiar and so entrenched. My sense is that is what happens here.

MTR and QR watch video from 12.34

QR: Look at that, she stops that vocalisation. It can’t last, we know that.

MTR: And then at 12.50 we get the vocalisation. But that is from 12.34 to 12.50 that she is calm, quiet and still.
QR: That is a very long period (of her being still and quiet).
MTR: It looked a couple of times like she would vocalise
QR: But these were circumvented. At 12.40, her mouth pulls to one side for a brief moment and it looks almost like a smile. It was almost like a twitch.
MTR: A smile can be reflexive.
QR: Yes, when babies brains are developing you first have endogenous smiling before you have exogenous smiling. When babies’ brain are first developing and all of those neural pathways are firing, in their sleep when the do all of the REM, part of that is smiling . . . If you have got a repairing brain, albeit very disturbed, I don’t think it is surprising at some point you will get a smile like facial mouth shape.
MTR: We are really in that moment together.
QR: Yes, it’s glorious . . . After Knowing Me Knowing You, you had repaired the session with this.
MTR: Then she goes back off into vocalising and arm movements. Which you kind of expect in PTA because you get these ‘islands’ of availability.
QR: (when her arm movement starts again) You change the way you are clapping so that you are not really constraining her hand.
MTR: I was very cautious not to restrain her hand . . . because me sense was that restraining that arm would make her far more agitated. I have totally lost her by 13.37 so I finish there and don’t repeat the song. There are a couple of times in the song (e.g. leading into the chorus) where I allow space for her but she doesn’t give me anything.
QR: To me it is more protest.
MTR: Yes, I had her for the first third of that song, she was there with me . . . I had her in the Hello Song, little bit, little bit calmer, really lost her (in Knowing Me Knowing You), then got her back, so is she again more available. After the first third of Jingle Bells did her brain do what it needed to do, after being focused at whatever automatic level. I had that ‘island’ and made the most of it and then it went away.
QR: When you start the next song, she has her listening/attending face on, which is; her eyes are a little more open, her mouth is slightly open and relaxed and her brows are slightly raised.

No Music 14:00 – 14:29

MTR: I have said to her there that “we don’t what it to be too much” I am thinking I need to be careful not to over stimulate you. I think you are also aware that her brother and sister were watching so you want there to be something for them to see.

Blowin’ in the Wind 14:30 – 16:42

MTR: I picked this song because stylistically it is simpler than the Abba songs.
QR: Yes, Abba isn’t simple.
MTR: And this song is back to I, IV and V chords with a stepwise melody. There was a good response to the Hello Song which was stylistically simple and this is a book end to the MTI.
MTR and QR watch video from 14.30.
QR: At 14.35 there was a little bit of an attuned face . . . My sense is that she is listening between cries . . . At 14.52 her face opens briefly and her mouth opens as if to sing . . . She is listening while chewing and there is that kind of semi-attending.
MTR: These are behaviours that she can’t consciously inhibit, so is there in the semi-attending is she there with me, just not enough to be able to do anything about the behaviours.

QR: I wonder, if her arousal is primed and she is responding, nonetheless the body has to do something so it is a set of other behaviours, not ones that we would necessarily associate with attending but it is what her body is producing . . . In my view there is a pattern and consistency in those behaviours that it is something that the brain is doing.

MTR: They are quieter cries (at 15.08). I have noted that I continue singing at a steady pace, not actually wanting to engage her which could potentially increase that arousal and level of agitation. This is the last song so I want to sing ‘to’ her, hoping that it will have some effect in calming her.

QR: At 15.26 she settles for a few second but not with her listening face. You are sedate in your pace, timbre, and tempo. She gives a big cry and you slow down and then you are right into sedative mode . . . You still get those little moments (where she looks attuned). She is almost with you (at the end of the song).

No Music 16:43 – 17.33

MTR: I was trying to be in sedative mode and round off the session (with that last song).

QR: I think you did. The last minute or so of that song she has got a pattern of quiet plaintive cry but it is quieter . . . The cry here is very different to at the beginning of the session . . . At the beginning the cry is so much sadder.

MTR: Her cry is far less intense and her face doesn’t look like that agitated face.

QR: (At the beginning she) has a really grimace-y, agitated face, whereas, whilst she was crying at the end her face is quite relaxed, she has got much more of that listening/attending quality which is relaxed. With the edict of ‘do no harm’ you have left her in a better state than she started in. There were moments when I think there was an element of protest but (she is calmer at the end). I think the idea of an ‘island’ is very valid.

MTR: (before the last song) I was thinking out loud to her that I don’t want to over stimulate you, I don’t want to leave you in a worse state then what you were in, I don’t want this to be more than what you can currently process, so I go back to a really simple song.

QR: And the obvious question would be why not just stop? I think the answer would be that you don’t want to leave her in that state. Your responsibility to her is to leave her in a better state.

MTR: And she is in a better state . . . Both reviewers (independent quant reviewers) on the Corrigan Scale rate a one-point reduction in agitation – it is small but it is less.

QR Additional Comment to MTR

Compare the tempos and other musical elements, do a basic comparison across session, defined by your initial assessment of her. How did you think she was and how did you start playing e.g. how fast were you playing when you started and how fast were you playing when you stopped. Can you see that point where you thing “I see where she is at” and then how fast are you playing then? How did you assess her to
be and what was your musical response? In MTI 4 your rendition of Waterloo is so much more casual and sure. You are taking her into consideration but she is not yet nearly available to you and so your decisions about the rendition are yours. Whereas in MTI 10 your decisions are entirely about her and it shows very much. This portrays particularly in the musical attack, and the tempo, I think there is a discernable difference in the tempo. In MTI 10 there is a much more pronounced attack of the lyrics.
APPENDIX Q

Video Data MTI 4 and MTI 10
Author/s:
Bower, Janeen M.

Title:
Music therapy for a 10-year old child experiencing agitation during posttraumatic amnesia: an intrinsic mixed methods case study

Date:
2010

Citation:

Persistent Link:
http://hdl.handle.net/11343/35590

File Description:
Music therapy for a 10-year old child experiencing agitation during posttraumatic amnesia: An intrinsic mixed methods case study

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