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Giving a voice to the hard to reach: Song as an effective medium for communicating with PMLD children who have low social tolerance

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Giving a voice to the hard to reach
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Dedication

To Poppy:

Keep trying. Don't give up. There's always a way!

Abstract

A common practice in special schools is to sing rather than speak to children with Profound and Multiple Learning Difficulties (PMLD), in order to initiate and maintain interactions; however, there is little formal evidence to support this practice. This study explored the extent to which singing is effective with this 'hard to reach' cohort. Five pupils participated, who had PMLD and low social tolerance. These individuals do not like to be touched, talked to or to be in close proximity with other people. This research set out to explore the effectiveness of different sorts of interactive approaches, notably singing or speaking, as a starting point for building an evidence base to underpin practice.

The study used a single subject research methodology, with an adult as a communication partner who initiated interactions, and responded to the behavioural cues of the child. Interactions were video recorded. A system to code participants' responses to different interactions was developed, based on detailed descriptions of each individual's behaviour on three major dimensions: Attention Focus, Social Proximity, and Facial Expression. Pupils' vocalisations and coordinated actions were also recorded. Events were presented graphically; statistical analyses explored the effectiveness of different interaction approaches; sessions were described qualitatively.

The research revealed consistent communicative behaviours (and a means to identify these) in individuals with PMLD and poor social tolerance. Participants were able to express their internal states through consistent patterns in their eye gaze, social proximity, facial expression, and vocal behaviours. The communication partner played a critical role in structuring and directing the interactions; interactions were shaped and influenced by both environment and context.

Simple behavioural descriptors are insensitive to context. The research showed that, used on their own, they can lead to misinterpretations of events, and so must be complemented by qualitative descriptions. Nevertheless, the microanalysis of behaviours revealed 'moments of wonder' which overturned expectations about who was leading interactions; none of the participants was thought (by staff) to be capable of the secondary intersubjectivity and attention directing behaviours that were documented.

There were individual differences in response to singing: however, overall, singing was associated with more positive facial expressions (smiles), higher levels of social tolerance (to touch and proximity), and improved communicative responses (eye contact, vocalisations, and coordinated actions). This provides evidence to support current practices of singing to children with PMLD.

This thesis modelled a strategy for collating a profile of communicative behaviours. A practical outcome of the research was that details of the communicative behaviours of participants were circulated via a 'communication passport' for each participant, and shared with parents and

carers. The use of song became a more explicit part of the daily routine and a planned element in lessons.

Findings are related to research on mother-infant communication and infant development, and on the role of music in emotional regulation, and the psychology of music. Directions for future research are discussed.

Declaration

This thesis is my own original work and has not been offered previously in candidature at this or any other university.

Statement of copyright

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Giving a voice to the hard to reach: Song as an effective medium for communicating with PMLD children who have low social tolerance

Chapter 1: Introduction

This research was prompted by my observations working as a teacher in a special school. Many adults working in the school used song and music in daily activities as a matter of routine (Bunning, Smith, Kennedy, & Greenham, 2013), but there was no formal evidence to support its use as an interaction strategy. Nor was there any formal policy of using song as part of school practices. This prompted a question as to why song and music were used so much in school with neither evidence nor recognition of it as an effective practice. Teachers were using song routinely as a method to communicate, calm and play with pupils (Ware, 1996), but there was little awareness of why they were doing this; when asked, the most common response was that 'it works'. The issue of anecdote or personal experience as sufficient evidence to support teaching practice is a sensitive one; whilst personal validity is important, there is a component of professional criticality which is missing. Practitioners need to use the most effective approaches or have some idea what have been effective approaches in other settings (Carnaby, 2004). It is also important for practitioners to justify their activities with individual pupils in the current climate of high accountability (Department for Children, Schools and Families, 2009; Ofsted, 2006; Salt, 2010).

As teachers and academic researchers, we need to reflect critically on the kinds of evidence which are sufficient to support or promote particular practice, and share this widely with user groups. This will support teaching and development in the practice of special education that is as well evidenced and informed as in other branches of education.

In addition to those issues of effectiveness and accountability, there is a further issue in that the needs and interests of individuals with Profound and Multiple Learning Difficulties are under-represented in the educational research literature. This may be because research featuring individuals with Profound and Multiple Learning Difficulties (PMLD) is particularly challenging, because those identified with the PMLD label are an extremely heterogeneous group. Thus the aim of this thesis was to try to establish some evidential baseline for whether an existing practice in school was effective or not as an interactional approach with some individuals with PMLD.

Rationale for the research

The primary aim of this study was to try and establish an evidence base to support song being adopted as an interactional approach with children with PMLD as this group is typically underrepresented in the research literature (MENCAP, 2012), and this needs to be addressed (PMLDNetwork, 2012). It is recognised in the literature on working with individuals with PMLD that communication can be very difficult (Goldbart & Caton, 2010; Spiker, Boyce, & Boyce, 2002; Ware, 2003). Gathering evidence to support or discourage the use of a particular interactional approach with individuals with PMLD could, potentially, make a significant difference to such individuals (Carnaby, 2004) and their quality of life. The role of communication in the quality of

life of individuals with PMLD is discussed in more detail later in this chapter, but briefly the ability to interact, share and communicate one's choices, wants and needs can greatly enhance one's experience of life (Petry, Maes, & Vlaskamp, 2007a; Schalock *et al.*, 2002).Having more information about the kinds of communicative cues that individuals with PMLD respond to might make a difference to those trying to interact with them such as families, support workers and teachers, as well as offering more information about their communication competencies (Goldbart & Caton, 2010) to a wider range of interested parties, such as managers, care planners and academics. The lack of information sharing about good practice and communicative abilities is acknowledged to be problematic by Carnaby (2007) about literature in this field in general, and by direct support workers, given high staff turnover in Petry, Maes, and Vlaskamp (2007b).

Rationale for evidencing practice

The project developed by observing classes of pupils in a special school setting, particularly those with PMLD who were accessing (or being offered) a sensory curriculum within school. The selected participants were in large, inclusive and very mixed ability classes of approximately 14 pupils with one teacher and two support assistants. As the classes were already working with the teacher/researcher, it was possible to plan 10 minute teacher sessions of 1:1 time with pupils with PMLD as part of ordinary lesson planning. It is clear that this is not an 'optimal' setting to work with hard to reach students, but it was authentic (i.e. not in a laboratory setting, with few distractions) and based on the resources available in the school. This allowed observation and reflection as both an action researcher and as a teacher about the quality of interaction approaches and the responses they elicited. The idea was to create naturally occurring interaction 'opportunities', where interaction approaches varied, and effects could be observed. To be sure that the effect was not just an individual teacher effect, or just a habitual behaviour in that lesson (i.e. part of the routine), observations of the same pupils with other familiar staff members and in alternative naturalistic settings were arranged. It was hoped that by using multiple repetitions of observation over a long period with the selected pupils, a stable pattern of behaviours might be observed. However, as the research study occurred in a naturalistic environment (a real school with real children) this did not always follow a precise methodological procedure, and many of the recorded episodes had flaws from the viewpoint of research design. It was hoped that by documenting and exploring interaction features which were already a part of practice (e.g. spoken or sung interaction approaches by adults to individuals with PMLD), some evidentiary base which could either support or challenge existing practices might be established (De Bortoli, Arthur-Kelly, Mathisen, Foreman, & Balandin, 2010). The aim was to use this information to feed into practice, thereby improving the interaction and communication opportunities for individuals with PMLD in the school.

Key Terms

PMLD/ PIMD

There are some areas of disagreement in approaches to the definition and classification of what it means to have PMLD; these will be discussed in more depth in the literature review section. Bellamy, Croot, Bush, Berry, and Smith (2010) identified tensions in defining the PMLD population because of the different needs of the researcher or organization attempting to define the population and what carers thought it meant to have PMLD. After examining these tensions and consulting with a range of stakeholders about their responses to existing definitions, a mutually agreed definition was determined:

> "People with profound and multiple learning disability (PMLD):
>
> - Have extremely delayed intellectual and social functioning
> - May have limited ability to engage verbally, but respond to cues within their environment (e.g. familiar voice, touch, gestures)
> - Often require those who are familiar with them to interpret their communication intent
> - Frequently have an associated medical condition which may include neurological problems, and physical or sensory impairments.
> - They have the chance to engage and to achieve their optimum potential in a highly structured environment with constant support and an individualized relationship with a carer"
>
> (Bellamy *et al.*, 2010, p. 233).

This definition combines the requirements of different user groups: service providers (and planners) and service users (and their carers). Carers (the representatives of service users) wanted aspects identified in the definition of PMLD which they recognised as relevant to their experiences with individuals with PMLD given this group is extremely heterogeneous the personal accounts did not always agree. Existing definitions developed by academics and researchers in the field, sought something less personal and more definitive. Bellamy *et al.* (2010) combined different perspectives to meet the needs of both service providers with those of service users in their definition of PMLD. In doing so they identified functional abilities rather than deficit attributes, as well as physical and intellectual features of individuals identified as having PMLD. For these reasons, this is the preferred definition of PMLD in this thesis.

Social Tolerance

Social tolerance is a key element of the selection of participants in this study, hence its inclusion in the definitions of key terms. Those students in the school setting who had PMLD but were sociable and enjoyed the company of others and expressed pleasure in trying to interact with others were not included in the research. Social tolerance is a key concept in this study because for young people who already face significant communication challenges, the lack of social tolerance or a disinterest in social interaction are likely to become major obstacles in the development of communication skills. Practitioners and academics working with children with PMLD commonly use observation of physical behaviours as indicators of an individual's state

(Coupe O'Kane & Goldbart, 1998; Ware, 1996).The behavioural indicators below are an adaptation of their work and were informed by observations of individual behaviours in situ. Poor social tolerance and being 'hard to reach' are synonymous in this work. To clarify this term, the behaviours which were used to decide if participants were 'hard to reach' with traditional communicative approaches (or had poor tolerance for such approaches) were:

- Lack of interest in other persons (not lack of awareness)
- Where individuals had good control of eye direction, absence of eye gaze towards another's face (and often deliberate avoidance of eye contact)
- Lack of passive (relaxing) or positive response to the face, smiles, or social approach of another person
- Lack of passive (relaxing) or positive response to physical contact by another person (e.g. a touch on their hand)
- Social withdrawal when offered the opportunity to look at another person
- Active attempts to withdraw (e.g. head movement away, closing eyes), escape, move away, or hit out at other persons when in physical proximity

Participants who responded negatively to social approaches on a regular (more than daily) basis as a part of their characteristic behaviour as identified by a member of staff who had known the child for at least a year were identified as being 'hard to reach'. The reason that the behavioural indicators of poor social tolerance needed to be shown over such duration was that when tired or unwell, most even typically developing children are less able to cope with stimulation; and social withdrawal can be a healthy response. It follows that short term assessment can give a false indication of poor social tolerance.

Communication and Interaction

The terms interaction and communication are of central importance in this study. Interaction might be more properly termed social interaction, where the "behaviour of one acts as a stimulus for the behaviour of another, and vice versa." (Reber, Allen, & Reber, 2009, p. 141). In this thesis the term interaction approach is used when the adult (or sometimes the child) attempts to influence the behaviour of the other by speaking or singing to the other person.

Communication in this thesis means shared understanding:

"In order to have communication both the transmitter and the receiver must share a common code, so that the meaning or information contained in the message may be interpreted without error." (Reber *et al.*, 2009, p. 141).

When the interaction is successful, and the interaction partners begin turn taking and sharing some mutual understanding behaviours which can include mirroring facial expressions, movements, or vocalisations, not just language this will be identified as communication in this study.

A naturalistic approach to communication and interaction based on developmental appropriateness was adopted in this study. Social interactions where song and speech were used to approach individuals with PMLD who had difficulties tolerating social proximity do not have a clear observable 'aim' unlike the press of a switch (as in Augmentive and Alternative

Communication (AAC) or the indication of a symbol (as in TEACHH). Despite not having a clear and observable 'aim' (action, sign, vocalisation or symbol) purely social interactions are still beneficial (Barber, 2012; Hewett, 2007, 2009; Hewett & Nind, 1998). Playful social interactions, without a clear 'outcome' as in a traditional educational task are 'critical to emotional wellbeing and to the development of social understanding' (Barber, 2012, p. 94). This is because they encourage responsiveness (Ware, 1996) and an emotional connection between people (Goldbart, 1994; Zeedyk, 2006, 2008). The interaction between two individuals at play encourages shared attention, responsiveness to the other, and an awareness of the positive affective environment: it is hard to play if your partner is distressed. This intersubjective understanding (Trevarthen & Aitken, 2001) can only be developed by improving social tolerance, and fostering a genuine interest in communication for pleasure, rather than for a functional purpose. Communication based on meeting functional needs may well be perfunctory. However, Barber (2012) argued that purely social interactions are undervalued, and counter to the expectations of employers (Forster & Ianoco, 2008). Playful and purely social interactions can sometimes be of less priority in the special education environment (Hewett, 2007). Perhaps this is because it is difficult to demonstrate the success of playful social interactions, which are not straight forward to assess or evidence; unlike a physical response such as pressing a switch (e.g. AACs which are designed to foster functional skills). In this thesis, the careful observation of behaviours during a social interaction episode aims to support the identification of interactive turn taking and communicative moments of shared understanding. By documenting these social behaviours and exploring the relationship between the interaction approaches and the responses of the children participating in the study, it is hoped that the role of playful interaction can be valued and promoted within the practice setting, and hopefully more widely, regardless of which interaction approach proves to elicit the most positive responses.

Context: Special Schools in England

For children to attend a special school in England now (2013), they have to be assessed as having an area of difficulty which prevents them from accessing the national curriculum as would a typical child of their age (Pumfrey, 2010). The assessment and provision for pupils with special educational needs is a complex process with different levels of support and funding available to meet the child's needs. In different local authorities, the rates of assessment are very different, and some authorities make special provision within mainstream 'inclusive settings' rather than in special schools (Ainscow, 2007; Florian, 2007). The labelling of individual pupils in schools with a 'statement' is the most significant action which can be taken to support the child, and is the outcome of a statutory assessment by the local authority, medical and psychology professionals (Gold, 2003). The 'Statement of Special Educational Need' gives a description of the difficulties the child has (Frederickson & Cline, 2002) and makes recommendations for the best provision to

meet their needs. Accordingly, the local authority is bound by law (Chastey & Friel, 1991) to allocate additional funding for every child with a statement of special educational need (SSEN), so that they can be placed in a special school or can receive significant additional support (Hodkinson, 2010; Warnock & Norwich, 2010). According to Warnock (1978, Gold 2003) the children who would receive a statement of special educational need (SSEN), would only form about 2% of the population; those with very profound difficulties would form a smaller minority still.

Approaches to SEN and disability

The PMLD label and SSEN are used for an initial, functional classification in this study. This use is not intended to reduce a child to a mere 'diagnosis' (Bellamy *et al.*, 2010; Calhoun, 1994; Goodley, 2001; Oliver, 1989, 1996; Shakespeare, 2002; Shakespeare & Watson, 1997). A number of commentators reject the use of labelling to 'diagnose', and judge it to be inappropriate in an education setting. The role of the educator is not to give a global 'diagnosis' and then apply a 'cure' as in a medical model (Oliver, 1996; Shakespeare, 2002). Diagnostic labels can be useful to guarantee the allocation of funding at a local authority level (Bellamy *et al.*, 2010; Calhoun, 1994; Pumfrey, 2010), and after that are almost always too general to be of any helpful purpose (Ainscow, 2007; Florian, 2007; Hodkinson, 2010).

Labels and their use in this study

The selection of participants in this study is not diagnosis specific. In the case studies in chapters 4-9, pupils have a range of profound, multiple and learning difficulties (PMLD), and a range of health needs. Identifying participants by just one syndrome might be useful in some circumstances if all participants are progressing as expected or predicted by a particular diagnosis, and if all are typical of that syndrome it could certainly develop the understanding of that syndrome better. However most individuals with profound disabilities are just that - individual – despite having a SSEN 'PMLD', few perform in a 'typically expected' manner (Goodley, 2001; Parker, Georgaca, Harper, McLaughlin, & Stowell-Smith, 1995). For example, Diane in this study, who is diagnosed with Rett syndrome, has not developed through the typically expected 'stages' of Rett syndrome found in textbooks (Hagberg & Witt-Engerstrom, 1986). She has persisted in the antisocial and highly irritable phase for at least six years, which is five and a half years longer than would typically be expected in the pathology of Rett syndrome (World Health Organisation, 2010, ICD10, F84.) It is also difficult to justify grouping individuals by diagnosis only, given the pupils' similarities in functional skills (profound physical difficulties, lack of communication skills, cognitive delay) and assessed academic performance levels (using the P levels) (Nakken & Vlaskamp, 2007). It seemed a natural grouping to include pupils with these similarities and to exclude those pupils who are performing at different levels physically, cognitively and socially.

The SSEN was used in this study as a basic selection criterion. The SSEN is written by an educational psychologist, and describes in broad terms the level of impairment an individual has using a recognised assessment tool – such as the WISC- R test (Kauffman, 1994). This is not without its tensions: Oliver (1989, 1996) identified many aspects of approaches to disability which were disempowering and oppressive, from the role of 'professionals' in identification and decision making, to the idea of 'diagnosis' in effect situating inferiority and disability within the individual, rather than in the community response to these issues (Abberley, 1987; Barton, 1998; Barton & Oliver, 1997; Goodley, 2001). The SSEN is a blunt instrument, which does indeed categorise the individual (Gold, 2003; Warnock, 1978; Warnock & Norwich, 2010), and it is not used any further than as a basic selection criterion in this study. This study aims to be idiographic, attempting to understand the unique and complex nature of participants in their context and giving a finely grained description of each individual. However in order to select them for this study, some recognised procedures needed to be followed.

Quality of life

Quality of life is an important theme in the research literature on living with PMLD. This is in response to historical narratives around disability, such as the medicalised approach) where:

> "the first trend denies their personhood and, in its extreme form, consequently also denies the right to life. Less extreme aspects of such a view are reflected in denial of the right to realize their full developmental potential, or to a lesser degree still, to be included within provision and approaches that facilitate such realization" (Bailey, 1981; quoted in Hogg, 2007, p. 79).

The theme of identification of individuals with disabilities as equals is influenced by the social constructionist model (Clegg, 1993; Grenier, 2007; Koch, 2001; McClimens, 2005), and this shifts the focus towards equality of opportunity and quality of life (Goodley & Tregaskis, 2006). Early work focused on skill development, and choice making (Forster, 2011; Whitaker, 1989). Recently a broader approach to entitlement to a life of quality has been explored (Felce & Perry, 1996, 2005). Several domains have been identified, those of physical wellbeing, material wellbeing, social wellbeing, emotional wellbeing, and development and activity (Felce & Perry, 1996). Schalock and colleagues (Schalock *et al.*, 2002; Schalock & Verdugo, 2002) outlined the core quality of life domains as emotional wellbeing, interpersonal relations, material wellbeing, personal development, physical wellbeing, self-determination, social inclusion and rights. These domains are interrelated, and are connected to the generic domains developed for the typical population. The need to adapt the general concepts to fit the needs of the population of individuals with PMLD has been recognised (Ouellette-Kuntz & McCreary, 1996; Petry, Maes, & Vlaskamp, 2005; Petry *et al.*, 2007a, 2007b; Petry, Maes, & Vlaskamp, 2009). Several approaches have been employed to approach the issue of quality of life with PMLD via student well-being measures (Lyons, 2003, 2005) and operational guidelines (Petry *et al.*, 2005, 2007a). This literature argues that the quality of life construct has two components

(Schalock *et al.*, 2002; Vos, De Cock, Petry, Van den Noortgate, & Maes, 2010). The first is an objective component - features which can be observed and even measured. The second is a subjective component which reflects the experiences and views of the individual. It is the subjective component which poses difficulties when exploring the quality of life construct with individuals with PMLD (Petry *et al.*, 2005). Subjective quality of life can be broken down into two further elements, general life satisfaction, with elements of life and expression of emotions or 'hedonic level' (Schalock, 2004; Vos *et al.*, 2010) These elements have been explored in work on student well-being (Lyons, 2003, 2010; Lyons & Cassebohm, 2012) through the use of proxy reports by adults familiar to the individual with PMLD (Schalock, Bonham, & Verdugo, 2008; Vos *et al.*, 2010). This method of assessment has limitations (Cummins, 2002; Kane *et al.*, 2005; Perry & Felce, 2002), particularly that the subjective elements are based on estimates rather than self-report. Petry and Maes (2006) avoid this by using information provided by proxies to support the observation of affective behaviours of individuals with PMLD. This strategy is appealing because it uses the implicit relational knowledge of the familiar adult to inform the interpretation of the observed behaviours. It also contextualises estimates and allows subjective judgments to be supported or disputed based on observable data (Petry & Maes, 2006).

Interaction, communication and quality of life

A theme which recurs in the literature on quality of life for those individuals with profound and multiple disabilities is that of communication. Work by Petry, Maes and Vlaskamp (2007a) used a Delphi model which asked theory experts, practice experts and experience experts for their input in identifying quality of life concepts for individuals with PMLD They identified several factors relating to socio-economic well-being which were of importance- including communication, social relationships, social participation, and engagement in activities, as well as influence and choices (Bellamy *et al.*, 2010; Petry *et al.*, 2007a). These elements in particular are relevant to this study, as they speak directly to the primary focus on interaction, communication and social tolerance.

> "To be able to express oneself and be understood was of vital importance to them. It enabled the person to express feelings and wishes, to make choices and to influence and control their environment. People with profound and multiple disabilities communicate through idiosyncratic and often small and hard to notice behavioural signals. Consequently, parents and direct support staff felt that it was extremely important for these people that their communicative behaviour was observed, interpreted and answered adequately." (Petry *et al.*, 2005, p. 41).

A second theme in communication research was the importance of social interactions, closely connected to relationships with support staff. This is because staff assistance and support are necessary requirements for a good quality of life for individuals with PMLD, and these relationships and interactions are such a large part of daily life for such individuals (Petry *et al.*, 2007b). This is demonstrated by Reinders:

> "if community living is a human experience, we should expect that people with disabilities want to be included in the lives of others as John, Jack or Jody, i.e. we should expect them to want us not

only as bearers of institutional roles, but as friends and companions who have chosen to be part of their lives… to be included in these kinds of relationships is what makes life worth living for everybody, not just people with ID [intellectual disability]." (Reinders, 2002, p. 3)

Literature on development also highlights the importance of communication, interaction and social relationships with others. Zeedyk (2006) suggests that "intimacy is transformative. It is from emotional intimacy with another person that individualistic capacities derive, including self-awareness, representation, language, and even consciousness" (Zeedyk, 2006, p. 326). For this reason then, the focus on interaction and its development for the individuals featured in this study is underpinned by the theoretical assumptions around quality of life, as Petry and Maes (2009) suggest:

"the main purpose of measuring QOL (quality of life) must be to maintain and enhance the things that already, or could, add worth to people's lives and to take action to improve the things that currently detract from the quality of people's lives" (Petry *et al.*, 2009, pp. 25-26)

This study focuses on quality of social interaction, however, and not quality of life, so no explicit measurement of quality of life is used in this study. The theme is used as a foundation for the exploration in the study, not as an explicit outcome.

Summary

This chapter has outlined some contextual and conceptual issues which were important in the context of the study. The aim of the study was to identify whether the established practice of singing to individual pupils who have PMLD and poor social tolerance was an effective communicative approach. There was anecdotal evidence of its efficacy amongst staff, but there was no further evidence to justify this as a useful way to initiate interaction. Key terms have been defined to help frame later discussion. Some of the key theoretical issues relating to the problematic use of statutory assessment and the subsequent 'statement of special educational need' were discussed.

The significance of the social purpose of aided interaction was also highlighted, both for its value in terms of communication and in the improved quality of life it might offer. This study developed to address some of these issues: related to the development of effective, evidence based practice, and to encourage understanding of social interaction practices and their benefits to PMLD learners.

Structure of the thesis

This thesis continues with a review of the literature on a number of interrelated areas: interaction, with an exploration of research in infant development, communication literatures and a discussion of Vygotsky's Zone of Proximal Development (ZPD); music-based approaches with reference to Rett syndrome, and a critical analysis of music therapy and cognitive psychology of music based approaches.

In chapter 3 the literatures on research methodology are examined in relation to research with individuals with PMLD and a number of obstacles are identified, both methodological and ethical, before design responses are examined.

Following the literature reviews, in chapter four research methodology is explored and presented with a description of the participants, design, method of data collection, development of the analysis instrument as well as selection and analysis methods.

The chapters which follow focus on individual children and feature the analysis of an interaction episode recorded on video. These act as mini case-studies, where the purpose is to gather evidence about the practice of singing or speaking to individuals with PMLD who are hard to reach.

Chapters five to nine follow a similar structure, describing the participant, the recorded interaction, the data collected presented as an event figure, a statistical analysis of the responses to different interaction approaches and a discussion of the results, these are summarised and some conclusions are drawn.

Chapter ten reviews and collates the results of the individual case studies, so that the different responses to speech and song are identified across all the cases. The positive responses to song as a communicative approach are noted as a common theme.

Chapter eleven offers a discussion of findings relating the children's positive responses to song and music to themes which emerged in the review of literature. This chapter also includes reflections on the methodology, limitations of the study, a summary of the findings and implications for practice, theory and potential future research.

Chapter 2: Reviewing the Literature on Reaching the Hard to Reach

Introduction

This review establishes relevant theoretical and research based evidence to support this study. The areas of focus include work on individuals with PMLD and poor social tolerance, interaction, and working through song and music. An account of how the literature search was conducted is included in this section.

The first section explores work with individuals with PMLD and poor social tolerance. This is divided into subthemes: defining the group, what interaction with this group, and self-injurious behaviours. A second body of literature on interaction was explored focusing on a developmental model of interaction and the use of 'motherese'. This includes work on communicating with non-verbal partners and developing 'dialogue'. The work of Vygotsky is briefly visited to evaluate the concept of the zone of proximal development and to assess the role of the adult as a 'scaffolder' of interactions. A final strand of literature features song and music as a communicative device, including work on Rett syndrome and music, and music therapy approaches. The psychology of music based approaches is also briefly discussed, before an evaluation of the evidence in this area is conducted.

How the literature search was conducted

Key search terms for the study were identified in clusters where synonyms were identified and listed and a range of information sources consulted. These terms are listed in Table 2.1. Where a search using all the terms was unsuccessful, the searches were conducted again, using the key terms in order. The searches which had most success are listed, with number of references found. Abstracts were read and identified for inclusion on the basis of their relevance to this study if they contributed to the themes of interaction and/or communication with individuals with PMLD. Articles based on the use of technology for assistive and augmentive communication (AAC) were excluded as not being relevant for this study. In addition to this, after reading the full text of selected articles, additional searches were conducted using author names. This proved to be a useful strategy. The key search terms included truncations of key words as listed in the table (e.g. disab is a truncation of disabled and disability and disabilities- so its use in the search should gather all relevant words).

Table 2.1: search strategies

Key search terms :

profound disab, profound multiple, learning disab, intellectual disab, disabili, communi, intera, attenti.

Date	Database	Search string (most successful)	hits	relevant	Limits applied
February 2013	ERIC	+ profound disab: multiple + learning + intellectual + communic + interaction + attention	3351	28	2008 -2013
February 2013	PsycInfo	disability	9	1	2008 -2013
February 2013	Web of Knowledge	profound + intellectual	1586	57	2008 -2013
February 2013	Google Scholar	+ profound disab: multiple + learning + intellectual + communic + interaction + attention	17,100	30	2008 -2013
February 2013	Cochrane Library	communic	91	6	2008 -2013
February 2013	Campbell Collaboration	Multiple disab	124	4	2008-2013

Literature on individuals with PMLD and poor social tolerance

Defining individuals with PMLD

Characterising profound and multiple disability raises complex issues. Pumfrey (2010) pointed to problems of definition that confuse rather than illuminate. One set of definitions uses intelligence (IQ) assessed via standardised tests which is helpful to distinguish PMLD pupils from those with other types of learning difficulty. "Definitions of profound intellectual disability most often cited include having an IQ of below 20 (World Health Organisation, 1992), below 20-25 (DSM IV), or functioning with an IQ estimated to be five standard deviations from the norm."(Pumfrey, 2010, p. 4).However, the assessment of individuals' IQ in this range poses a significant challenge as gaining an accurate score is unlikely. This intellectual descriptor also fails to take into account other barriers faced by individuals who have PMLD, as noted by Nakken and Vlaskamp (2007):

> "the group consists of individuals with such profound intellectual disabilities that no existing standardized tests are applicable for a valid estimation of their level of intellectual capacity, and who possess profound neuromotor dysfunctions (such as spastic tetraplegia (Arvio & Sillanpaa, 2003; Nakken & Vlaskamp, 2002b). These individuals have little or no apparent understanding of verbal language, no apparent symbolic interactions with objects, and nearly no ability for self-support (Goldbart, 1997; Hogg & Sebba, 1986)" (Nakken & Vlaskamp, 2007, p. 85).

Ockelford, Welch and Zimmerman (2002) propose a working definition of PMLD: "pupils with PMLD have profound global developmental delay, such that cognitive, sensory, physical and emotional social development is in the very early stages of development (as in the first year of

typical development)". In the most recent version of the International Classification of Disease (ICD 10) the World Health Organisation (WHO, 2010) suggest people with PMLD are:

> "…severely limited in their ability to understand or comply with requests or instructions. Most such individuals are immobile or severely restricted in mobility, incontinent, and capable at most of only rudimentary forms of non-verbal communication."(WHO, 2010, *ICD10*).

The functional descriptors give us a better understanding of what it means to have PMLD than do purely intelligence quotient based descriptors. Salt (2010) created a definition for a non-expert audience with an interest in education, which offers a list of issues likely to be faced by individuals with PMLD as a mixture of functional, communicative and academic descriptors:

> "Pupils with profound and multiple learning difficulties have complex learning needs. In addition to very severe learning difficulties, pupils have other significant difficulties, such as physical disabilities, sensory impairment or a severe medical condition. Pupils require a high level of adult support, both for their learning needs and also for their personal care. They are likely to need sensory stimulation and a curriculum broken down into very small steps. Some pupils communicate by gesture, eye pointing or symbols, others by very simple language. Their attainments are likely to remain in the early P scale range (P1-P4) throughout their school careers (that is below level 1 of the National Curriculum)." (Salt, 2010, p. 14).

The work by Bellamy *et al*. (2010) is useful because it uses functional descriptors suitable for a range of audiences. Salt's (2010) definition is also helpful, particularly for this study as it adopts an education-focused descriptor, using attainment expectations. However, this is far less useful to a non-practitioner audience unfamiliar with UK education terminology and assessment systems. Nakken and Vlaskamp (2007) offer a clear description of the target group:

> "individuals with PIMD have two key defining characteristics: (a) profound intellectual disability and (b) profound motor disability. They also have a number of additional severe or profound secondary disabilities or impairments. We can describe these individuals only in terms of 'more or less' belonging to the core group or related groups."(Nakken & Vlaskamp, 2007, p. 85).

Their preferred phrase, Profound Intellectual and Multiple Disabilities (PIMD), can be applied to the group described in this work as having PMLD. Individuals with profound and multiple disabilities have recently been the focus of a growing body of research (Arthur-Kelly, Foreman, Bennett, & Pascoe, 2008; Munde, Vlaskamp, Ruijssenaars, & Nakken, 2009; Nakken & Vlaskamp, 2002b, 2007; Van der Putten, Vlaskamp, & Poppes, 2009) which has contributed greatly to our understanding. Yet, whilst there are some commonalities between definitions, the lack of a unified term (PMLD, PIMD, PMD, Complex support needs, high dependency) and clear criteria means that identification within a population is difficult (Bellamy *et al*., 2010; Emerson, 2009; Forster, 2011; Nakken & Vlaskamp, 2002b, 2007). It also means that the research literature in this area is harder to locate due to a multiplicity of terms used in titles and as key words.

> "The discussions are complicated because of differences or lack of clarity in the description of the variations and types of PIMD. A description of the core group is offered, but it is also argued that there cannot be an absolute separation of this specific target group from other adjoining groups."(Nakken & Vlaskamp, 2007, p. 83).

In this study, the label PMLD will be used as it is the preferred term used in UK education settings by practitioners. This term will be used while accepting that no label will adequately describe the complex barriers and difficulties faced by each individual in the study, and that the participants here are not 'typical' of all children with a PMLD Statement of Special Educational Need (SSEN). It is hoped that this will not make the work difficult for international readers to access.

Literature on interaction with individuals with PMLD

Individuals with PMLD face multiple barriers to successful interaction with the social world. They face enormous physical challenges such as severe multiple physical impairments and they commonly suffer from severe ill health which compounds their physical inability to interact and communicate in typical ways through, for example, speech, gesture, sign language. In addition to these physical barriers, individuals with PMLD are also profoundly intellectually impaired. The cognitive processes of these individuals associated with communication and interaction are likely to be immature, and may be restricted to pre-symbolic communication. Children in this study also displayed poor social tolerance, suggesting limited interest in communication and interaction. Poor social tolerance is described by Graham (2004) succinctly as:

> "Other pre-verbal and nonverbal service users have severe communication disabilities such as autism, and it is often extremely difficult to penetrate their isolation. Many appear to have developed no alternative means of communicating and seem determined to shut other people out as much as possible. Their evasive or defensive strategies might include shouting, rocking backwards and forwards and pushing away anyone who comes too close."(Graham, 2004, p. 25).

Some individuals with PMLD also participate in self-injurious behaviour (SIB) which poses major challenges to those caring for them, and effectively distracts and sometimes even drives away attempts at meaningful interaction. Some of the individuals involved in this study exhibit SIB, which is detailed in the behaviour classification table in each pupil's chapter.

Self-injurious behaviour (SIB) in individuals with PMLD

Several of the featured participants in this study exhibit SIB, defined as self-stimulatory repetitive and/or withdrawn behaviours. These behaviours are identified in research literature as features which have a negative impact on the individual with PMLD. Individuals who engage in challenging behaviours are more vulnerable to social isolation and negative responses from carers (Emerson, 1995); such behaviour places them at a higher risk of abuse by caregivers (Cambridge, 1999; Zirpoli, Snell, & Lloyd, 1987) and they are likely to be perceived more negatively by care staff and others (Hastings, 1997; Jones, Wint, & Ellis, 1990). Individuals displaying such behaviours are more likely to be placed into residential care, due to the challenges that managing behaviour poses (Hastings, 1997). They are also likely to be excluded from community activities and participation in the public arena, because of the risks associated with themselves and others (Myrbakk & von Tetzchner, 2008), which can be damaging:

"The presence of challenging behaviour is not only literally damaging to the person, it also influences the ability of individuals to engage in activities and to build meaningful relationships (Vlaskamp, Poppes, & Zijlstra, 2005), thus directly influencing their quality of life (Petry *et al*., 2005)." (in Poppes, van der Putten, & Vlaskamp, 2010, p. 1270).

Rojahn (1994) described common forms of self-injurious behaviour such as head banging, self-biting and self-scratching and these behaviours commonly feature in this study. Thompson and Caruso (2002) noted that these behaviours may occur in interrupted sessions which last for a few seconds, or in extended sessions which endure for hours at a time, both of which appear in the participant behaviour in this study. Self-injurious behaviour has a negative impact on relationships, and those caring for individuals with profound and multiple disabilities who display this type of behaviour find it stressful and challenging to manage (Emerson, 1995; Matson, Cooper, Malone, & Moskow, 2008; Matson & Mayville, 2001; Mossman, Hastings, & Brown, 2002). Withdrawn behaviour is also a characteristic of people in this population: "when a person abandons all attempts to make contact with his or her environment, this will influence his/her capacity to gain experience and develop."(Poppes *et al*., 2010, p. 1274; Vlaskamp *et al*., 2005) This also applies to the participants in this thesis, because the definition of lack of social tolerance included withdrawn behaviour as an inclusion category.

Heyvaert, Maes, Van den Noortgate, Kuppens, & Onghena (2012) conducted a meta-analysis of single case and small numbers research on challenging behaviour (including self-injury) in persons with intellectual disabilities and usefully compare the results of this meta-analysis with the findings of group studies. They suggest that where antecedents are manipulated as a part of an intervention, challenging behaviours are reduced. These antecedent behaviours may be environmental, instructional, psychological and social factors; this strongly suggests that even self-injurious behaviour is responsive to antecedent factors (Heyvaert *et al*., 2012; Matson *et al*., 2008; Matson & Mayville, 2001) Stress has been identified as a significant element in self-injurious behaviour in some studies (Janssen, Schuengel, & Stolk, 2002; Kemp *et al*., 2008), however the relationship is complex and requires further research. Many of the participants in this study exhibit self-injurious behaviour, so this feature is described in the classification and coding of each individual participant's behaviour. This is not, however, a study which is focused only on challenging or distress-related behaviour, so it will not be detailed extensively, rather it is the full range of behavioural responses to input which will be observed in this study - whether or not it is challenging to the adults or environment.

Nakken and Vlaskamp (2007) suggest that there are large sections of the population with PMLD who also face sensory disorders. These may impact on the information received about the surrounding environment (visual, auditory, tactile, olfactory and gustatory) or the processing, storing, retrieving, translation or expression of responses to this information (Arthur-Kelly *et al*., 2008; Bruce, 2011). These sensory difficulties pose significant barriers to the individual attempting

to interact in a social environment (Munde, Vlaskamp, Maes, & Ruijssenaars, 2012; Nakken & Vlaskamp, 2002b, 2007; Prain, 2012; van Dijk, 1986a).

Despite the multiple challenges facing the individual with PMLD, potentially communicative actions do occur (Bunning *et al.*, 2013; Green & Reid, 1996, 1999; Reid & Green, 2002). These behaviours are often non typical and communication attempts can take place in unexpected ways (Bruce, 2011; Bruce & Vargas, 2007). The communicative behaviours of individuals with PMLD are often expressed inconsistently (Hogg, Reeves, Roberts, & Mudford, 2001b; Munde *et al.*, 2012; Petry & Maes, 2006). They are also small behaviours, which are hard to identify (Guess, Roberts, & Guy, 1999; Mudford, Hogg, & Roberts, 1997) and these are influenced by the environment (Hogg *et al.*, 2001b; Munde *et al.*, 2012; Petry & Maes, 2006). "Persons with PIMD mostly communicate in a presymbolic way using idiosyncratic and subtle utterances that are person- and context- bound, such as vocalisations, facial expressions or changes in muscle tone (Stillman & Siegel-Causey, 1989)"(in Hostyn, Daelman, Janssen, & Maes, 2010, p. 679).

In order to support individuals with PMLD in overcoming barriers to interaction and communication, recent research has identified several relevant elements. The first involves getting to know the individual with PMLD. Direct support persons, whether they are family, teacher or support staff, become familiar with small and hard to notice communicative behaviours of an individual and may be able to identify these more consistently with practice (Bunning, 2009; Bunning *et al.*, 2013; Carnaby, 2007; Forster, 2011; Forster & Ianoco, 2008; Hogg, 2007; Hogg, Reeves, Roberts, & Mudford, 2001a; Maes, 2002).

The relationship between these individuals is very significant here because any individual with PMLD is dependent on support in daily situations (Vlaskamp, Hiemstra, & Wiersma, 2007; Vlaskamp & van der Putten, 2011), and this relationship might create a communicative 'push' which encourages and gives reasons to engage in an interaction (Felce, Jones, & Lowe, 2002).Interactions with direct support persons and individuals with PMLD are not always successful and this has been the subject of enquiry (Amaral, 2003; Basil, 1992; Vlaskamp *et al.*, 2007). However, issues of the exploitation of the vulnerable or unresponsive care are not the focus of this thesis despite their pressing importance so will not be discussed here any further. For a review of this issue see Cambridge, 1999; Zirpoli *et al.*, 1987.

A second element in approaching interaction with individuals with PMLD is to identify what is needed to support interaction - that is, to identify attention (or attentive behaviour) and its directedness during interactive episodes (Guess *et al.*, 1999; Munde, Vlaskamp, Ruijssenaars, & Nakken, 2009). Interaction in this thesis means the behaviour of one participant acts as a stimulus for the behaviour of another (Reber *et al.*, 2009); without attention this is unlikely. Again, there is a problem with the plurality of terms in the literature describing this attentive behaviour during

an interaction. It is called 'engaged' behaviour, or 'alert' behaviour. Regardless of the terminological issues, it is important to be able to identify that both participants are paying attention in order for an interaction to occur. For social interaction to develop into successful communication, that is, for shared understanding to be reached, attention is not the sole requirement. It can also be important for participants in the interaction to have some understanding of the feelings and emotional responses of the other. Work by Forster (2011), Green and Reid (1996), Green and Reid (1999), Lyons (2003), and Petry and Maes (2006) suggest that it is possible to identify and understand the expressions of emotion with individuals who have PMLD.

In order to find out more about interaction between individuals with PMLD and their communication partners, observation of the interaction dyad (or patterns of interaction) are useful. This helps to build accounts of individual interaction styles and preferences, but also to identify those interaction practices which appear to work for particular individuals. "It is possible and meaningful to draft an individual profile of the affective expressions of a person with profound intellectual and multiple disabilities" (Petry & Maes, 2006, p. 12). This supports meaningful social interaction and gives the opportunity for true communication and shared understanding.

Overview of literature on PMLD

Individuals with PMLD face multiple severe and complex difficulties which act as barriers to effective social interaction. These include physical disabilities, intellectual impairments, self-injurious behaviours, sensory disorders and personal disposition towards social tolerance. These barriers shape communicative behaviours which can be non-typical, inconsistent, small, difficult to identify and environmentally contingent. In response, research has identified some strategies which might support individuals in overcoming some of these issues, such as familiarity and building personal relationships with individuals with PMLD which facilitates the interpretation of communicative behaviours and gives communication a social 'push'. Identifying attentive behaviours which support successful interactions and their associated patterns could be beneficial in supporting effective communication for individuals with PMLD:

> "The transition to intentional communication may be supported by consistently over interpreting the client's behaviour as if it were intentional, by negotiating and taking turns on spontaneous gestures that arise in predictable daily routines and by referring to certain blended (bodily, emotional, cognitive) impression that the person had earlier (Nafstad & Rodbroe, 1999). This process requires intensive dyadic interactions including active participation and emotional involvement of the person with profound multiple disabilities (Nind & Hewett, 2001)."(in Petry & Maes, 2006, p. 4).

Literature on social interaction

The intervention activities involved in this thesis relied heavily on assumptions about the nature of social interaction and communication derived from literature on the development of typical

human infants. Key concepts explored are infant directed speech, the nature of dialogue, and essential elements in social interaction. These intersect with other areas of the literature review, and from the emerging understandings the work of the thesis will develop.

Communication, Interaction and insights from the Infant development literature

The role of interaction, roles in dialogue, and responsive communication between infant and caregiver are the subject of discussion in the psychology of early infancy; few have such relevance as Trevarthen and Daniel's (2005) discussion of 11 month old, monozygotic twin girls (one of whom is later diagnosed with ASD) and their differing interactions with their father. The authors assert that "all developmental brain disorders challenge the affections and hopes of parents, as well as the expectations all teachers have that a young child will be eager to share learning and the development of skills" (Trevarthen & Daniel, 2005, p. 25).

The study described the father-infants behaviours which indicated communicative intent and shared attention. Researchers focused on shared eye contact, anticipation, turn taking, and sensitivity to the behaviours of the communicative partner. By reporting the behaviours and development of shared understanding between each twin and her father during interaction, Trevarthen and Daniel were able to show that communicative initiation and response informs the interaction and the developing style of communication in future interactions. This developing pattern of anticipation, eye contact, turn taking and sensitive response to the communicative partner had a significant effect in shaping expectations and patterns of behaviour and the emotional attunement between partners. In the interactions between the twins and their father the developing dialogue was markedly different for each child. Trevarthen and Daniel assert that the adult speaking partner gave a high level of attention to the responses he received in his attempts to communicate with each girl. In one 'dialogue' there is shared anticipation, a sense of build up before being tickled, and a shared mutual understanding and excitement about the 'game'. In the other 'dialogue' failure to make shared eye contact and reach mutual understanding and anticipation, leads to an interaction where the adult acts upon the child in a way that surprises her, and it is the repeated sudden stimulation which comes to dominate the interaction rather than 'mutual communication'. This interaction is obviously very different from the giggle filled 'game' with her sister, and demonstrates that, although the father is a committed communication partner with the same goals for both children, interactions develop differently.

The latter interaction contains the seeds of future difficulties. The interaction will inform future communication patterns, and the unanticipated stimulation that resulted from the interaction may reduce the likelihood of this twin persisting with the laboured and difficult (for this infant)

communications which lead to shared understandings later. However, despite this dilemma, there is some evidence that:

> "…some voluntary expressions, desires and preferences can be elicited by carefully paced interrogation, and that the rhythms and prosody of speech, song, or music can excite facial expression of emotions and sympathetic rhythmic movements of the body and limbs" (Trevarthen & Daniel, 2005, p. 31).

This is a pertinent study for two reasons; firstly that the difficulty of communication between a committed and an uninterested partner is observed, and second that miscommunication develops into a reinforced pattern. This could dominate later interactions and create a problematic model of communication. Zeedyk (2008) highlights the problems of guilt and reproach associated with such issues: "we are creating the contexts that promote certain types of pathways, as opposed to others. This implies that we may be unintentionally exacerbating autistic tendencies and learning difficulties." (Zeedyk, 2008, p. 56). In developmental psychology the role of interaction in infant development has been the subject of much research, and the role of attachment to an adult caregiver and the neural strengthening which occurs in each interaction are significant in our understanding of the development of an individual. In addition to the development of brain functions, hormonal responses are also mapped at this early stage, and this too develops into a baseline position for the individual (Neumann & Landgraf, 2008). Zeedyk (2008) gives an example: a baby who grows up in an unpredictable (stressful) environment will produce cortisol which is useful for coping with acute stress whilst a baby who grows up in an environment where adult responses are predictable and warm (e.g. a baby who is cuddled regularly) will produce oxytocin more routinely which has a calming effect. These effects are known as epigenetic, because they involve an interaction between the physiology and environment of an individual (Neumann & Landgraf, 2008). That each of these interactions forms a pattern which maps future expectations and responses both physiological and psychological is a controversial element in discussions of infant development. Yet rather than this presenting a negative picture of blame and disablement, it offers evidence of the value of emotionally responsive interactive environments (Schore, 2003). In recognition that increasing our understanding of how interaction experiences affect our behaviour and development, we also have the potential to offer positive experiences to support the development of social interaction and communication (Zeedyk, 2008).

The implication of an epigenetic account is that not only are social, environmental interactions influential on the psychology and physiology of an individual (Neumann & Landgraf, 2008), but that they are also malleable (Schore, 2003; Trevarthen & Daniel, 2005). If by initiating interactions of a different kind, communicative partners can map alternative interactions and shape expectations and responses accordingly, there is potential to develop more positive interaction patterns (Tiergerman & Primavera, 1984) and change the psychological and physiological

responses an individual has. Whilst this might be more difficult for adults whose expectation and response patterns are more fixed, for infants and children their greater plasticity may offer opportunities for development which may not earlier have been realised.

> "However idiosyncratic, habitual and 'hard wired' an infant's learned behavioural responses seem to have become, there is always the potential for change due to the inherent adaptive plasticity of the brain. But this change needs to begin from the existing foundation of still vital motor and attentional capacities, which form a child-centred, person-sensitive 'zone of proximal development' for that child's brain." (Trevarthen & Daniel, 2005, p. 32).

The second issue that Trevarthen and Daniel (2005) raised was that with carefully paced approaches, and the use of music and song, more expression can be elicited from a less communicative child. This suggestion of a 'communicative musicality' is pertinent to this thesis. Whilst the child who struggles to communicate requires a more 'directive' approach from their communication partner the use of song and tonality in the voice promoted responsiveness, attention and emotional attunement. This strongly suggests that the elements at work in this 'communicative musicality' (Klempe, 2009; Malloch & Trevarthen, 2009; Trevarthen, 1977, 1996; Trevarthen & Aitken, 2001; Trevarthen & Daniel, 2005; Trevarthen & Hubley, 1978) are related to the 'motherese' of infant directed speech and yet are appropriate for a non 'typically developing' child, who is struggling with social interaction and communication.

'Motherese' as an effective medium for communicating with typically developing infants

The literature which focuses on social and communicative interactions with typically developing infants makes it clear that babies enter the world ready to engage and interact with those around them, and that infant reactions and interaction shape how others relate to them (Cooper & Aslin, 1989; Field, 1977; Nind, 1996; H. Papousek, 1969; Trevarthen & Aitken, 2001; Zeedyk, 2006). Infant directed speech is sometimes called motherese (Fernald & Kuhl, 1987). It is different from speech directed towards an adult or an older child. Motherese is distinct even across cultures and languages (H. Papousek, 1969; M. Papousek, 2007; M. Papousek, Papousek, & Symmes, 1991) and has a complex structure (Bergeson & Trehub, 2007; Miall & Dissanyake, 2003).

Writers on infant development have examined closely the features of infant directed speech in order to identify features that make it distinct and have suggested some functions it performs. Features which make infant directed speech distinct are speed, expression, prosody and melodic tone, making it more song-like than ordinary speech (Bergeson & Trehub, 2007; Lebedeva & Kuhl, 2010; Miall & Dissanyake, 2003; M. Papousek et al., 1991; Trevarthen & Aitken, 2001). Infant directed speech is slower than adult directed speech, and is simplified (Cooper & Aslin, 1989; Fernald, 1984; Fernald & Kuhl, 1987). Adults speaking to babies repeat things more, exaggerate, and vary their facial expressions (Field, 1977; M. Papousek, 2007;

Trevarthen & Aitken, 2001; Tronick & Weinberg, 1997; Zeedyk, 2006). The prosody or rhythm and sounds emphasised in speech to babies is different to adult speech, and the melodic contour (the sing-song tone) of the speech is distinct (Fernald & Kuhl, 1987; Lebedeva & Kuhl, 2010). The tonal features of melodic contour are recognisable in the songs we sing to babies and children such as lullabies and are used as a means to support emotional regulation (Levitin, 2006, 2008). Infant directed speech often sounds like singing - it follows tonal patterns which have recognisable features such as falling tones, bell shaped contours and rising tones (Bergeson & Trehub, 2007; Cooper & Aslin, 1989; Fernald & Kuhl, 1987). These tonal features perform different functions in communication regardless of the language being communicated.

For example, rising contours elicit infants' attention and stimulate and excite them, whereas falling speech tones soothe and calm infants (M. Papousek et al., 1991). Infant directed speech offers emotional scaffolding, supporting the infant to learn to regulate their emotional state by using melodic elements (Miall & Dissanyake, 2003; M. Papousek et al., 1991). The melody of infant directed speech, and its tonal shape - rising with excitement and falling as it calms appear to regulate emotional responses of the infant (M. Papousek et al., 1991) facilitating the emotional attunement of the participants. These tonal features also work as signals, indicating turn taking in the dialogue.

> "Mothers seem to mark their turn opening and turn closing interventions with rising versus falling / bell shaped patterns and, thus, seem to establish a basic pattern of discourse: turn taking. As long as the infant is not yet able to control his/her own communicative turns mothers provide a compensatory turn taking frame." (M. Papousek et al., 1991, p. 435).

The tonal elements support reciprocal interaction, by signalling turn taking opportunities and structuring the interaction between participants. This suggests that the sing-song tone of infant directed speech offers two elements central to successful interaction, namely emotional attunement and reciprocity. The melodic contour and acoustic properties of infant directed speech such as slow tempo, repetitiveness, contingency on infant behaviour also encourage infants to detect, categorise and abstract elementary holistic units in the flow of speech (M. Papousek et al., 1991). Infant directed speech promotes attention because it sounds interesting for the listener. It is repetitive, so rewards engagement and anticipation. Infant directed speech explores 'poetic' aspects of language such as cadence, rhythm, repetition and phonetics, so is varied and has novel features for the listener to identify. Infant directed speech is fun; it involves basic word play, nonsense, rhyme and song for the adult speaker and so is entertaining for both participants and is a valuable learning tool for this reason. Methtilde Papousek (2007) offers some telling insights in her discussion of what it means to communicate:

> "in its broadest sense, communication between two or more individuals means to transmit or share information of any kind by means of verbal or non-verbal behaviour. In this respect, any behaviour - above or in concert with other behaviours from other domains - may function as a means of

communication. Preverbal communication, in particular, is the realm of non-consciously regulated intuitive behaviour and implicit relational knowledge." (M. Papousek, 2007, p. 258).

This implies that early communication not only sounds different but operates differently than adult to adult speech. Early communicative meaning is co-constructed to overcome the gap in experiences and expertise between partners. Successful communication is shared understanding. This theme is echoed in the literature on interaction with individuals with PMLD.

The fundamental issue concerning the success of such co-constructed intersubjectivity is the relationship between partners. Having a tuned-in, emotionally responsive communicative partner is vital to the success of a preverbal infant developing intersubjective affect and this is also a familiar theme in the literature on interaction with individuals with PMLD. Effective communicative partner parents will:

> "intuitively adjust their multimodal communicative repertoire to the infant's level of perceptual, integrative and communicative competence and know how to read and attribute meaning to their infant's level of perceptual, integrative and communicative competence and know how to read and attribute meaning to their infant's behaviour. During preverbal interactions, which are the infant's earliest naturalistic learning contexts, parents provide a dynamically adjusted frame in which infants' communicative capacities unfold." (M. Papousek, 2007, p. 264)

This is an optimal communicative interaction between two invested 'dialogue' partners - the parallels for optimal interaction with other non-verbal partners are clear: observation and identification of behaviours which hold communicative intent, attention and response behaviours towards one's partner, multimodal communicative approaches and enjoyment of the social interaction. The interactions where infants and caregivers enjoy each other's company (Stern, 1974) create a safe and stimulating learning environment, where infants can learn, observe, mimic, and rehearse communication behaviour (M. Papousek, 2007). Where the parent-infant and adult-child with PMLD differ is in the relationship between communication partners and the level of emotional investment in the dialogue as well as in the clarity of communicative behaviours by the nonspeaking partner. These can be idiosyncratic and hard to identify for individuals with PMLD, but more predictable and gradually improving in the case of the typically developing infant.

Literature on dialogue

Williams and Grove (1989) highlighted the differing roles of speaking and non-speaking partner in dialogue in relation to the aided communication process. The observation of differences in roles is useful in the assessment of critical elements of successful interaction in the research conducted here. "Aided communication is characteristically slow and often effortful" (Williams & Grove, 1989, p. 64). They highlight the 'initiation' role taken by the speaking partner, and emphasise that this is often a labour intensive process for both partners, plagued by fatigue and attentional drift (Calculator & Dollaghan, 1982) in the non-speaking partner. There is also the ease with which a speaking partner can dominate 'conversations' due to their role as initiator, the potential for

ambiguity, and because long, laboured silences may be unsatisfying and uncomfortable for both partners in a communication exchange. They also argue that a significant obstacle is a lack of tacit social knowledge between partners (a shared cultural understanding of non-verbal behaviours such as gesture, posture, nodding expression, turn taking) which make management of conversation easier in adult to adult interactions (Markova, Graumann, & Foppa, 1995). This means that the 'natural' (here meaning socialised in early infancy during typical development) bi-directional (Kraat, 1985) behaviours which flow between partners, ensuing conversation follows an orderly balanced fashion, is missing in conversations between a speaker and non-speaker. This imbalance implies that the role of the speaker needs to be modified in order to ensure all meanings intended are understood, by summarising what has been said and requesting further information to encourage further communication. The verbal partner is in a position to dominate any interaction almost entirely, and without feedback present in traditional communication this is likely to happen (Light, 1984). Focus needs to be co-constructed within this type of interaction, and the importance of being interested and invested in communication which is this difficult cannot be underestimated. "Communication is no longer seen as a monologue, a "from-to process" (Linell, 1998, p. 24) but is considered to be a dialogue or a "between' process" (Linell, 1998, p. 24).'(Hostyn *et al.*, 2010, p. 680).

Williams and Grove (1989) emphasised the importance of social aspects such as turn taking (reciprocity), joint attention, mutuality, attunement, and understanding between communication partners. They argue that to develop social interaction skills we need to "avoid teaching frameworks which ignore the important social aspects of communication" (Williams & Grove, 1989, p. 67). The aspects of interaction highlighted by Williams and Grove (1989) echo themes identified in other literatures on interaction where reciprocity, mutuality, joint attention, and attunement are emphasised. These commonalities highlight the value of emotionally attuned and responsive communication partners in fostering 'dialogue' with a non-speaking partner (Jones & Williams, 2005; Kennedy & Sked, 2008; Light, 1984; Nind, 1996; Williams & Grove, 1989). "As Olsson (2004) states, thinking about meaning making as something that must be created between partners can overcome concerns about communicating with persons with PIMD"
(Hostyn *et al.*, 2010, p. 680).

In reviewing some of the literature on interaction, themes which arose from analysis of dialogue between a speaking and non-speaking partner (Forster & Ianoco, 2008; Jones & Williams, 2005; Kennedy & Sked, 2008; Light, 1984; Nind, 1996; Nind & Hewett, 1994; Spiker *et al.*, 2002; Ware & Evans, 1986; Williams & Grove, 1989; Zeedyk, 2008) were closely related to themes identified in studies of infant development and early interaction experiences (M. Papousek, 2007; Trevarthen & Aitken, 2001; Tronick & Weinberg, 1997; Zeedyk, 2006). There are some similarities and distinctions to be made between these interaction experiences. The roles of participants in

communication between a speaker and non-speaker with severe or profound disabilities are different than in traditional dialogue (Ware, 1996, 1994; Ware & Evans, 1986; Williams & Grove, 1989). The interaction between a non-speaking infant and a speaking carer is more similar to dialogue with a non-speaking partner than traditional dialogue between adult speaking partners. The pattern of turn taking in interaction between a speaker and non-speaker, without necessarily the shared tacit knowledge of language and gesture to aid the communicative process is similar in infant- carer and speaker-non speaker interactions. They are also similar because this type of interaction requires commitment and focus and has certain identifiable traits which are less visible in dialogue between conventional speaker - speaker partners. These traits are less visible in traditional dialogue because the rules of language, gesture and intercultural social norms are shared. Traditional dialogue is less reliant on generic physical cues such as eye gaze, pauses, and orientation of the face towards or away from the partner to indicate attention (Goldbart, 1994; Ware, 2006; Zeedyk, 2008a). This is not intended to be a patronising reduction of the non-speaking partner in this type of communication to effectively a 'disabled' 'helpless babe' being 'cared for' by an 'able' speaking 'parent' figure. That would be offensive and less than useful. The issues are explored in order to emphasise qualitative similarities and differences between the forms of dialogue between traditional speaking partners and dialogue with a non-speaking partner. It is clear that the roles in these dialogues are qualitatively different, and joint attention, mutual participation, reciprocity, attunement and responsiveness are significant elements in this difference. Implicit in this argument is the case that traditional understandings of "dialogue" need to be amended when considering communication in this field of study; and that a re-calibration needs to take place, focusing on the non-linguistic, non-gestural aspects of social interaction which are of greater value and utility in this environment.

In a typical dialogue, one person initiates communication by making an interaction approach, to which their partner responds; turn taking behaviour and a variety of maintenance activities verbal and non-verbal work as a framework to support this dyad (Linell, 1998; Markova *et al.*, 1995). Butterfield and Arthur (1995) argue that in interactions with individuals with PMLD, these features are emerging and are shaped by both partners.

> "Successful communication involved reciprocity and mutual negotiation… preverbal turn taking provides the foundation for later conversational abilities (Wetherby & Prizant, 1992)." (in Arthur-Kelly, Bochner, Center, & Mok, 2007, p. 164).

Literature on the Zone of Proximal Development (ZPD) and scaffolded communicative interaction

Vygotsky's (1978) 'Zone of Proximal Development' refers to:

"the distance between the actual developmental level as determined through independent problem solving and the level of potential development as determined through problems solving under adult guidance or in collaboration with more capable peers." (Vygotsky, 1978, p. 86).

The speaking partner in these learning dialogues acts as the guide, or as Bruner (1983) describes it, the 'scaffolder' of the learning experience. The concept of scaffolding exemplifies the role of the speaking partner as an 'initiator' needed in dialogue with a non-speaking partner (Williams & Grove, 1989). However, for this role to be successful, the scaffolder also needs to be extremely responsive (Nind & Thomas, 2005). The critical skill of the speaking partner is to create (Hewett & Nind, 1998; Nind & Hewett, 2001; Nind & Thomas, 2005) a 'communicative interaction' which does not rely on words, gesture or generic social norms. Interaction of this kind develops a communicative environment based on the dialogue of joint attention, mutuality, reciprocity, responsiveness to physical behaviours, and attunement to the social, emotional and cognitive state of their partner. "Adoption of a sensitive, responding approach to interaction helps teachers to engage students in reciprocal exchanges, which are enjoyable and which scaffold further communicative development" (Bunning *et al.*, 2013, p. 41)

This may include a named intervention style such as intensive interaction or reciprocal imitation but what is most significant is that an effective social intervention even if that is unique to that communicative partnership promotes shared understanding in a zone of proximal development. Bunning *et al.* (2013) explored the interactions between teachers and individuals with PMLD; different roles were identified, and teachers took on a more directive role. However, rather than this being a negative pattern of dysfunctional dialogue, Bunning *et al.* note that "scaffolding by teachers appears to be relevant to the communicative contributions of individual functioning at the earliest stages of communication" (Bunning *et al.*, 2013, p. 40). Rather than the dialogue being 'dominated' by the adult, the role of communication partner in this context requires a directive role to create and sustain interactive behaviours in a scaffolded social interaction with an individual with PMLD.

The themes detailed in the literature on infant development, and infant directed speech identified particular skills and attributes in carers which promoted intersubjectivity. This literature clearly defined key elements in interaction which have been adopted in some of the literature on interaction with individuals with PMLD:

> "Teaching through intensive interaction involves staff in extreme sensitivity, 'tuning in' to the non-verbal behaviour of the learner to negotiate their presence and the activity. Through subjective, highly participative observation of learners, staff gain a feel for the kinds of interactive sequences which might attract the learner's attention and achieve moments of mutual pleasure." (Nind, 1996, p. 50).

The process of developing communicative skills and creating a relationship for dialogue to take place is the fundamental goal of this kind of interaction and there is generally no 'task' or

'intervention' being delivered in socially responsive interaction. This is appropriate for the participants and the stage of development of communicative skills involved in this type of interaction. It requires the speaking partner to take responsibility for initiating and developing the interaction, to recognise the non-speaking partner as an 'active participant', and to be responsive to feedback (Nind, 1996).

Williams, Petersson and Brooks (2007) concur "if a carer or more capable peer believes the person to be a non-communicator then this opportunity to create a zone of proximal development or to allow a person to enter a zone of proximal development is missing and therefore crucial learning opportunities can also be missed." (Williams *et al.*, 2007, p. 106). This socially responsive interaction is valuable to both partners in the dialogue, but of particular importance for the non-speaking partner, because it allows them an opportunity to really be 'heard' even if their communication is a silent change in their facial expressions (Hewett & Nind, 1998).

The work of Melanie Nind and Dave Hewett (Hewett, 2007; Hewett & Nind, 1998; Nind, 1996; Nind & Hewett, 1994; Nind & Hewett, 2001) on 'Intensive Interaction' explored communication and interaction with a non-speaking partner with a similar developmental approach. Firth, Elford, Leeming, and Crabbe (2008) describe Intensive Interaction as 'a socially interactive approach to developing the preverbal communication and sociability of people with severe or profound intellectual disabilities.' (Firth *et al.*, 2008, p. 58). However, Intensive Interaction is not the only approach to interaction with this audience. Zeedyk (2008) prompts us to ask if, in essence, all of these approaches are different names for the same process?

> "Other approaches include co-creative communication (Nafstad & Rodbroe, 1999), floortime (Greenspan, Wieder, & Simons, 1998), reciprocal imitation training (Ingersoll & Schreibman, 2006), video interactive guidance (Kennedy & Sked, 2008) dance therapy, and music therapy. The core contention of all these approaches is that communication occurs by drawing on joint bodily rhythms, actions and movements, and by turning them into a dialogue." (Zeedyk, 2008, p. 63).

Individuals with PMLD are often described in terms of being pre-contingency aware (Ware, 1996), pre-intentional, pre-symbolic and pre-communicative (Coupe O'Kane & Goldbart, 1998; Goldbart, 1994). In this thesis pre-intentional communicative behaviours are interpreted as having meaning in a methodology described as behaviour-state observation. Behaviour state observation relies heavily on identifying and interpreting the behaviours of an individual. Here, a seemingly simple methodology belies a more complex construction of what communicative behaviour is.

The approach used in the thesis involves watching and listening closely for any signals from pupils that can be construed as potentially communicative. This may result in over interpreting or misinterpreting some of these signals. "It is characteristic for high quality interaction that communication partners use over-interpretation while constantly checking the potential meaning of a person's behaviour."(Grove, Bunning, Porter, & Olsson, 1999; Hostyn *et al.*, 2010, p. 689).

This is a potential weakness worth risking, because the patterns detected can always be reviewed and re checked: missing an individual's communicative signals because we deem them to be 'pre communicative' is a more significant failure.

Indeed the difficulty with over generalising normative categorisations which describe the majority of communicative behaviours is that we miss unique individual differences. In this study an ipsative approach was adopted, recording the observations and replaying them so as little as possible was missed.

> "In summary communication is a dynamic process which cannot be divided into its component parts for the purposes of teaching, but must be supported within fluid and learner-led sequences of action learning. Whatever their contribution, the responses and adjustments that the learner makes within social encounters are seen as the visible signs of cognitive engagement in the communicative process." (Barber, 2012, p. 95).

These themes are also reflected in the language of interaction which describes the duet-like (Trevarthen & Aitken, 2001) quality of dialogue (Light, 1984). The interaction literatures also highlight joint attention (Coupe O'Kane & Goldbart, 1998), co-regulation (Westwood, 2009), mutuality (Trevarthen & Daniel, 2005; Westwood, 2009) , reciprocity, mutual participation (Fernald & Kuhl, 1987), turn taking (Cooper & Aslin, 1989), attunement of the partners (H. Papousek, 1969; M. Papousek, 2007) and the emotional quality of the interaction (Zeedyk, 2006) as significant qualities in interaction.

Ware's (1996, 1994; Ware & Evans, 1986) work on responsive classroom environments where adults are interested, attuned and responsive to children's efforts at interaction and communication was highly influential on classroom practice in the school where the research was conducted, and on the approach taken in the study. A warm responsive environment (Ware, 1996) is similar to that advocated in Intensive Interaction and shares the theme of emotionally attuned dialogue with Zeedyk's (2006) work with infants and children with a range of Special Educational Needs (Davies, Zeedyk, Walls, Betts, & Parry, 2008). This engaged and emotionally responsive orientation towards interaction and communication shapes the approach of the research, in that interaction and dialogue is seen as more than linguistic, and the environment, participants and their turn taking behaviours are viewed as being of central significance in shaping interactions.

Literature on music

Rett syndrome and Music

Some descriptions of Rett Syndrome describe behavioural characteristics and lack of social interest and tolerance as 'Autism like'. This aspect of social tolerance will not be explored in any depth here, because it confuses rather than illuminates the discussion (there is no room here for discussions on what constitutes Autism or theories about 'mind blindness'). Whether or not low social tolerance is an 'autism like' aspect it is common to the participants in this study. Only one pupil in the study had Rett syndrome, but the literature on Rett syndrome highlights issues which are relevant for this study.

Elefant and Wigram (2005) emphasised an issue for girls who have Rett syndrome: it is difficult to adequately assess their level of intellectual functioning, given that they are severely developmentally disabled. This is due to their often limited interest in the people around them, giving them little incentive to put effort into potentially communicative acts. This also pertains to the challenge of communication with PMLD children who have low social tolerance who do not have Rett syndrome.

However, because Rett syndrome is a neurodevelopmental disorder it is believed that if individuals are given appropriate opportunities to learn new skills, they will have the capacity to do so even as adults (Elefant & Wigram, 2005; Sigafoos *et al.*, 2009; Trevarthen & Daniel, 2005; Wigram & Lawrence, 2005; Yasuhara & Sugiyama, 2001). Rett (1982) identified music as a means of evoking a positive response in individuals with Rett syndrome and this observation is echoed in other literatures. Therefore it seems reasonable to suppose that using a highly motivating factor such as song and or music with individuals with Rett syndrome would increase their motivation to interact and to achieve 'optimal educational potential' (Elefant & Wigram, 2005). A significant observation here is that the successful educator /researcher would also need to ensure a relationship develops between the participants and researcher to maximise the motivation to communicate (Wigram & Lawrence, 2005).

Rett syndrome is a progressive disorder, which is linked to genetic mutation on the X chromosome, and found in 1 in 10,000 females. The condition is characterized by fairly typical development up to around 6-18 months of age where upon regression and severe decline of skills in all areas (motor, cognitive, social, and communication) takes place. The deterioration of functioning takes place in several stages: early onset deceleration where head growth, play, and sociability cease. Later she suffers from a rapid destructive loss of speech and loss of purposeful hand control. She becomes highly irritable, develops autistic like symptoms and pseudo stationary effects - such as seizures, ataxia and late motor deterioration. After this her scoliosis worsens and she loses mobility almost entirely (Burford & Trevarthen, 1996; Dunn, 2001; Elefant & Wigram,

2005; Hagberg & Witt-Engerstrom, 1986). A girl with Rett syndrome will eventually be unable to walk, unable to talk and unable to use her hands for any purposeful activity, her behaviours and her responses to the environment around her will be extremely limited.

"Because of the profound and wide ranging impairments associated with Rett syndrome, effective education would seem to require the prioritization of treatment goals followed by skilled use of the best available interventions. In terms of prioritization, enhancement of communications skills would

seem highly relevant because the condition is associated with early loss of speech and language and extremely limited residual communication ability" (Sigafoos *et al.*, 2009, p305).

 In a review of the literature on Rett syndrome Sigafoos (2009) observed that the research in this area is somewhat weak, lacking methodological rigour, meaning studies do not include details of their procedures, do not explore treatment integrity or reliability and have limited generalizability and so findings were inconclusive. However, given the level of disability of the participants in these studies, and the nature of 'small steps' of progress, the evaluative tools they used in their exclusion criteria were perhaps too cumbersome. Rather than focusing on a 'communication intervention' the close level assessments which they excluded were more likely to be a useful measure of genuine participant progress as they were tailored to individual need. Even without this minor criticism of the review, the literature in this area is certainly weak, populated by over generalized claims (Yasuhara and Sugiyama 2001), and studies without proper methodology (Wigram and Lawrence 2005), and remains underdeveloped.

However, whilst limited in terms of methodology, we can draw some cautious suggestions from the literature on Rett syndrome. The initial implication from this literature is that developing highly motivating approaches to interaction with children who have low social tolerance and PMLD (in this context they mean individuals with Rett syndrome) is an appropriate goal. The early work by Rett also suggests that music and song might be a suitable interaction approach to use in developing communication with children who have this syndrome and, while later studies are of limited usefulness it seems plausible that other young people who have similar characteristics might also benefit from this approach.

Is all music *therapy*?

There is a claim that 'music therapy' is an effective intervention with children with SEN which is becoming increasingly pervasive in literature on PMLD (Carnaby, 2004; PMLDNetwork, 2012) and this is problematic. One might consider that given such agreement about its effectiveness a broad literature evidencing this might be available, however this is not the case: "There are mountains of data on the effectiveness of music on illness, but not all reliable or reputable" (Levitin, 2008, p. 97) There has been very little systematic research in this area, and more evidence is needed (Levitin, 2008).

The 'music therapy approach' of Pavlicevic, Ansdell, Procter and Hickey (2009) argues that the use of randomised control trials would not be appropriate in the context of arts based therapies, such as music therapy (Gilroy, 2006; Pavlicevic *et al*., 2009). The difficulty with this is that while the personal experiences of individuals receiving therapy and the high quality reporting of these is valuable as a source of information about personal experience, it fails to account for other reasons why the individuals might be responding positively. It offers little more than a personal account, and while emotionally engaging it is insufficient. As Hattie (2009, p. 251) argues, there is

a significant effect size for any educational intervention, so demonstrating that music therapy is of more impact than any other intervention is necessary: "When undertaking an intervention there is a heightened attention to its effects, to feedback to the teacher about the effects of the innovation, and to a focus on the learning intentions and success criteria". Therefore it is necessary to demonstrate that the therapy is of more impact than any other intervention, because increased focus changes the outcomes for learners, a comparison is needed, to demonstrate it is the music therapy and not the additional focus on the practice which is having an effect.

A common style of research in the field of music therapy is a self-report of therapeutic activities performed over a particular duration with a particular individual with SEN, and then a reflection on its efficacy (Bull, 2008; Bunt, 1994; Davies, 2008; Flower, 2008; Horvat & O'Neill, 2008; Howden, 2008; Oldfield & Flower, 2008). This kind of study is not controlled and is not valuable as evidence of music therapy's efficacy. In an uncontrolled study, there are no comparators (or not sufficiently similar comparators) to see which variable had the effect (Bull, 2008; Bunt, 1994; Davies, 2008; Drake, 2008; Flower, 2008; Horvat & O'Neill, 2008; Howden, 2008; Jeong & Kim, 2007; Oldfield & Flower, 2008; Yasuhara & Sugiyama, 2001). It might be argued (in a Foucault style analysis) that the value of such therapeutic interactions is clear for the therapist, but for the individual with SEN is less obvious. Music therapy research commonly gives a vague overview of activities performed with a particular individual or group with SEN (Warner, 2007), and then a discussion using the responses of participants as well as practitioner reflections as evidence of its effect (Aigen, 2008 ; Bull, 2008; Bunt, 1994; Davies, 2008; Drake, 2008; Flower, 2008; Horvat & O'Neill, 2008; Howden, 2008; Oldfield & Flower, 2008; Warner, 2007). This type of work is extremely subjective, and compelling examples are used to exemplify trends within the case which heightens its emotive power It is also subjective, using questionnaires and interviews by the therapist with the child and/ or their parents about the quality and effects of the therapy (Drake, 2008; Flower, 2008; Horvat & O'Neill, 2008). This design aims to deepen the insights offered by the case study, but is inherently compromised.

Given the flexibility of the approaches to 'music therapy' (Aigen, 2008) one might also question the need for a specialist to perform this kind of activity. The claim that 'music therapy' is a different and defined realm and that it is distinct from education, a role that can only be performed by a 'therapist' is deeply problematic from this viewpoint. Graham (2004) observes that the spontaneous vocal responses she uses and instinctive strategies used by parents interacting with infants share many similarities, and suggests that "Music therapy can be an effective medium for establishing an interpersonal relationship with nonverbal clients, but I believe that many other staff, also, could tap into the intuitive and spontaneous ways of relating which exist in us all."(Graham, 2004, p. 28)

Ockelford, Welch, and Zimmerman (2002) argue that music therapy's aims are different from those of music, yet it is unclear whether what a teacher and a music therapist are doing when they are doing 'therapy' or 'teaching' are actually different (Kellett, 2005).

Ockelford et al. (2002) argue that music education with PMLD children has two distinct themes: activities focusing on their intrinsic musical value, and activities using music to promote wider learning and development. These might include:

- "the use of music and other structured auditory input to enhance the sensory information obtained from the environment;
- through the direct transfer of perceptual and cognitive skills from musical contexts to other spheres of activity;
- by isolating selected qualities of sound and treating them as concepts to be manipulated in pursuit of extra musical educational goals;
- Through regarding music as a potential source of information about the cultures in which it was created." Ockelford (1998, p24)

Music can also be used to "promote body awareness and movement, to foster communication and social interaction; and to enhance pupils' growing awareness of personal identity" (Ockelford *et al*., 2002). It is not clear whether these 'differences' in focus of activity are accepted or respected by practitioners of music education or therapy. Can these defined 'differences' be separated from a shared enjoyment of music, and if they can, what is the value of this extraction, is one 'teaching' and another therapy? It is not evident that these differences are observed in the literature on music therapy, which excludes research done by non- therapists from its reviews, not due to their research being irrelevant or for a different purpose, but because it is research done by non-therapists (Aigen 2008). Bunt (1994) claims that "music therapy is the use of organised sounds and music within an evolving relationship between client and therapist to support and encourage physical, mental, social and emotional wellbeing." (Bunt, 1994, p. 8) This definition is also problematic, the concept of a 'client-therapist' relationship is unclear, the activities are poorly defined and how this is 'therapy' as opposed to 'interaction' or 'teaching' is not explained.

> "Music therapy lies in a field between healthcare and humanistic science. It is essential for our profession that we develop methods that document our clinical work; a documentation that can be applied in evidence based practice."(Plahl, 2007, p. 64)

 It seems appropriate that given the poor theorisation of what the 'therapy' is, the lack of experimental rigour in the research literature on music therapy, and the need for more evidence of its efficacy (Bunt, 1994; Bunt & Pavlicevic, 2001) more work needs to be done in this area before conclusions can be drawn about its usefulness.

The description of interaction in music therapy studies is reminiscent of the interaction literature in typically developing infants. Music therapy descriptions where a 'positive affect' is identified has strong similarities with communicative relationships described in the interaction literature

(Aigen, 2008; Pavlicevic *et al.*, 2009). The focus of attention, improved body control and an improved interplay with the responsive environment is also familiar (Graham, 2004).

Exploring the psychology of music based approaches

Sloboda (2005) argued that much psychological research and theory around individual responses to music adopt an overly simplistic 'pharmaceutical model' where: "listeners are construed as passive recipients of musical stimuli which have the psychological effect they do, because of the way the human brain is constructed on the one hand, and the way music is structured on the other." (Sloboda, 2005, p. 219; 1989). He highlights that most studies of music 'listening' present music not of the participants choosing in a contrived laboratory setting. This criticism is one which could be levelled at the present study, given that the participants are fairly passive, and that the 'effect' of the inputs are observed in direct and immediate way. However, the aim of the study was to offer participants choice, and the ecological validity of the study was an important concern. If the interpretation of the responses is rather basic as Sloboda argued that may be because other circumstances in the study are very complex, so observing more complex features of responses might be still more difficult. The present study does not aim to simplify the concept of 'music' or reduce it to its basic structure, but to evidence one specific practice in a particular setting with a specific audience for a particular purpose. In order to do so some simplification was necessary,

Gabrielsson and Lindstrom (1996) and Sloboda (1992) studied the mood altering (emotional) functions of music that could generally be classed as therapeutic. The additional component of affective change compounds the difficulty of defining therapy rather than resolving it. Waterman (1996) and Sloboda (1991) identified structural features in music which acted as emotional 'hot-spots' where listeners registered their emotional patterns in response to music. This confirmed that to some extent engagement with music offered valuable psychological outcomes in emotional arousal and regulation for adult listeners. Further, Sloboda (2005, p. 338) argues that "These outcomes can be traced in part to the powerful emotions engendered when we listen to music, emotions which are enhanced by the structural expectations that we acquire within a musical genre or culture." In relation to work with infants on infant directed speech Sloboda concludes "shared characteristics of the signal relating to overall pitch, speed, repetition, etc. underpin potentially universal arousal and mood outcomes, whilst individually idiosyncratic characteristics assist with person recognition and differentiation." (Sloboda, 2005, p. 388). This is in strong agreement with work by Maier (1978b) who argued that 'rhythmicity' is a vital component in the interactions between adult and infant (Brazelton, 1973; Bruner, 1977; Condon, 1975; Lewis & Rosenblum, 1974; Maier, 1978a, 1978b, 1987; Schaffer, 1977, 1984; Stern, 1974; Trevarthen, 1977). Later in the child's life, rhythm still forms an important component of interaction "when adults while caring for children can become part of the joint rhythm, they have

the possibility of finding themselves momentarily in tune with the children. Children and adults share moments of moving ahead together."(Maier, 1987, p. 116) Psychological analysis of music and early infant development highlight themes of rhythm to support turn taking(Maier, 1978b, 1987), familiarity (Maier, 1978b) and shared experience(Maier, 1987), and melodic tone to support emotional arousal (H. Papousek, 1996; M. Papousek, 2007; M. Papousek & Papousek, 1981; M. Papousek, Papousek, & Symmes, 1991; Sloboda, 1991).

Overview of literature on music
The literature on Rett Syndrome suggests that use of music based approaches may be useful in promoting communication. This suggestion is supported by limited evidence, which is by no means conclusive. It seems reasonable to suggest that music and songs offer a playful social interaction approach which may be motivating to children with Rett syndrome or other similar characteristics. "Music is known to have a good potential for initiating emotional and social communication (Blacking & Byron, 1995; H. Papousek, 1996; M. Papousek & Papousek, 1981)". (Plahl, 2007, p. 41)

The literature on Music Therapy is characterized by the case study without any element of control. While these accounts seem persuasive at a shallow level, deeper methodological and conceptual flaws limit the plausibility of such narratives. Work by cognitive psychologists such as Sloboda (1989, 1991, 1992, 2005) on music based approaches are much better researched. These studies offer compelling arguments about the efficacy of music as a tool to arouse and regulate emotion in infants and adults. This suggests that using song as an interaction approach with individuals with PMLD might have some support in the literature on cognitive psychology, but further evidence is needed.

Overview of emergent themes from the literatures reviewed

Different bodies of literature which contributed to the theoretical approach of the thesis have been reviewed. The literature on the development of social interaction in typically developing infants suggested that the body language (face turning, head orientation) and attention behaviours (eye gaze) of infants was of significance to communicative interaction. These infant behaviours act as 'signals' to the care giver, and shape the interaction bi-directionally. The adult caregiver responds to these behaviours and accepts them as communicative. This is significant for work with children who have PMLD, as it suggests that even in very early development, observable behaviours indicate the infant's participation in social interaction and communication. As the literature on individuals with PMLD suggests that the cognitive development and physical control level is similarly developed, these cues, which are widely recognised in much younger children may be suitable to apply to chronologically older children who may have similar levels of early cognitive development.

A second theme of significance in this literature was the relationship between the carer and the infant in the interactions. The carer shaped the interactions by responding to the body language, eye gaze and expression of the infant as well as to their vocalisations. The adult used 'motherese' to communicate turn taking in the interaction. The rhythmic structure of motherese scaffolded the pace of turns between those interacting. The melodic tone of voice in 'motherese' infant directed speech, functioned to regulate the emotional arousal of the infant during the interaction. This 'scaffolding' by the carer promoted expressive and receptive communication, and successful interaction (turn taking, pace, emotional modulation) in this dyad. This connects with the themes in the literature on interaction with individuals who have PMLD. The theme of responsiveness of the communication partner was highlighted in literature on successful dialogue with individuals with PMLD. This literature on communicating with individuals with PMLD discussed the role of attention and identifying alert behaviours and the role of the communication partner in understanding idiosyncratic communicative behaviours.

> "An implicit feature of this developmental model is the recognition that all individuals communicate at some level. In their discussion of approaches designed to promote the non-symbolic communication skills of students with severe disabilities, (Siegel-Causey & Wetherby, 1993) emphasised the importance of recognising existing student abilities as a starting point for intervention. For example, a student may be observed using highly idiosyncratic communication forms (such as particular facial expressions and vocal tones) to convey particular messages, or functions (e.g. request for interaction, protest). The communication partner facilitates the successful transmission of information by the student and continues the exchange, thereby building on the current skills of the individual."(Arthur-Kelly *et al.*, 2007, p. 175)

The work on music based approaches suggested that song and music could be effective in supporting emotional regulation (H. Papousek, 1996; Sloboda, 2005). Trevarthen's work on

communicative musicality supported this concept (Malloch & Trevarthen, 2009; Trevarthen, 1977; Trevarthen & Hubley, 1978). The music therapy literature offered some moving accounts of working through music to develop communicative interaction with a range of hard to reach clients (Davies, 2008; Drake, 2008; Flower, 2008; Graham, 2004; Kellett, 2005; Warner, 2007). While the evidence base in this field is somewhat limited, it suggests more work might be necessary with a group underrepresented in literature more widely. The literature on working through music for individuals with Rett's syndrome suggested that music and song might be effective communicative approaches with this group. Given that the profile of some individuals with Rett syndrome can be similar to those individuals with PMLD and poor social tolerance, it seemed appropriate to trial the use of song as a highly motivating interaction approach.

Chapter 3: Methodological issues in the literature

Developing an appropriate research design for the thesis was challenging, due to multilevel barriers, both theoretical and practical. At a macro level ethical issues relating to the nature of consent from participants who could not offer verbal agreement to take part in quasi-experimental research was a real concern (Vlaskamp & van der Putten, 2011). The imbalance in the power relationship between the participant and practitioner-researcher might also pose a concern in this study. At a meso level, consideration of the research environment, tools and the use of information artefacts required some thought. Labels and terminology employed in this field were problematic- not only is there disagreement in the field about correct terminology but the normative nature of the label PMLD wasn't particularly well suited to the heterogeneity of the participants and the individual and ipsative orientation of the research. The literature reviewed contributed to the design of the methodology of this study, and helped to resolve (to some extent) some of these issues.

Classroom based research involving children with PMLD raises ethical dilemmas (many of which are particularly problematic for researchers who are unfamiliar with the child and their normal environment and routines. Research involving children raises questions about the ways in which they are being used, and the vulnerability of children with special educational needs - particularly those who cannot communicate - is even more concerning. Kellett and Nind (2001) worried that "in Kiernan and Reid's (1987) terms this is research on rather than research with people with learning disabilities." (Kellett & Nind, 2001, p. 52) This poses a dilemma for all researchers; Barton (1998) and Barton and Oliver (1997) offer some focal questions about the purpose and likely benefits of the research to help clarify the ethical issues. Barton (1998) prompts us to ask if the research is worth doing and who benefits from this research. Here, the purpose of the study is to understand whether an existing practice is suitable as an interaction approach with individuals facing significant barriers to successful communication. The value of successful communication and interaction in terms of quality of life for this group of pupils is high, and this suggests that this study could make a valuable contribution to the individual participants, and also more widely to the school and practitioners and carers outside the school setting.

Research setting

Research conducted by a teacher familiar with students and working with pupils in class, poses fewer ethical problems than research conducted by than an external 'researcher' coming in to school and changing the dynamics of the classroom. The participants in this study were all pupils in the school where the researcher was teaching, as such her role with the pupils did not change, nor did usual classroom or school practice. The children in this study experienced minimal changes to their usual lessons or routines in school, and video recording is common practice in

the school. For a cost of minimal disruption, the potential outcomes of the research seem to be worthwhile for all stakeholders (not just the practitioner researcher).

 "Research shows that there is no guarantee that programs which have been proven to be effective and efficient will produce the same results in daily practice (Bero *et al.*, 1998; Emerson & Emerson, 1987; Grimshaw *et al.*, 1998; Grol, 1996; Sigafoos *et al.*, 1993; Van der Putten *et al.*, 2009; Vlaskamp, 1997)."(Vlaskamp & van der Putten, 2011, p. 875) This suggests that in addition to other methodological challenges of working with individuals with PMLD, the distance between the research and daily practice is critical. In this study, the generalisation distance is short, which will hopefully ameliorate this problem.

Protection and permission

The parents, head teacher and governors of the school gave consent for the teacher to video record the teaching and natural setting interactions for analysis and these recordings were seen only by the teacher researcher. Special permission was sought for the examiners to view the recordings in order to verify the content of the analysis. The recordings would be safely stored, and not available to the wider public.

The pupil participants in this research experienced no disruption to their usual teaching timetable, and all recordings featured natural school practices, which had no external interruption or change to usual routines. The purpose of the study was to evidence if what was common practice in the school was effective or not as an approach to interaction with pupils who had PMLD and were hard to reach. The teacher researcher conducting the recordings and analysis was very familiar to all the participants and knew them well, there was low risk of a white lab coat effect, and the inputs were carefully and sensitively arranged in the interactions to avoid distressing or upsetting pupils.

Age appropriate communicative approaches

An issue of concern when developing the design for this study was the vulnerability of the pupils involved. The activities which adults and children with special educational needs engage in (in a special school context) are by their nature, adult led (teacher or therapist). This is viewed as a means of 'scaffolding' interactions and activities appropriately. Some criticism around age appropriateness of interaction approaches might also question the relevance of the existing practices according to the chronological age of the participants (Nind, 1996; Samuel & Maggs, 1998; Smith, 1996). The developmental approach of the interactions featured in this research aimed to develop a successful social interaction with the individual where they are, and using what they might respond to- the individually tailored nature of this renders more normative approaches inappropriate. "Placing an emphasis on chronological age over and above an appreciation of an individual's developmental level of functioning can lead to an overestimation

of their abilities and the provision of inappropriate support as a consequence (Bartlett & Bunning, 1997). Indeed other authors suggest that acknowledging and working with an individual developmental level of functioning is the only way to work with respect and dignity (Nind & Hewett, 1996)."(Carnaby, 2007, p. 89)

Generalisation of research with individual children with PMLD

Tacit issues like the effect of physical environment (Senior & Croall, 1993) or psychological and social dynamics of the learning environment may have a significant impact on findings of research or therapeutic effects (Ellis, 1996).

In this study the aim is to develop a child focused teaching intervention, which is as naturalistic as possible. This implies that whilst the learning environment may (or may not) be optimal or preferred by the child, it is a part of their everyday school routine, and hasn't been altered for the purpose of participating in research. This gives the study ecological validity and supports the generalisation of findings to other teachers in similar settings. It also uses the expertise of staff, who are familiar to the participants and have established relationships with pupil participants. The significance of this design reflects an ethnographic approach in that participant observers learn more about dynamic social interactions, than those who just read the literature.

Further, the insights of the participant observer and their interpretations are informed by their knowledge and experience and don't require 'translation' for the 'researcher' (see Brooks, Camurri, Canagarajah and Hasselblad, (2002) for a bad example of this). This reduces the likelihood that findings are influenced by a 'white lab coat' effect, of having strangers or unfamiliar 'official' looking persons altering the natural dynamics of the learning environment.

The risk associated with the close involvement in such a projects is researcher bias. This means that because the interactions are videoed and coded by the action researcher/ participant there is some likelihood that results could be subjectively skewed. In particular the editing of video materials to create a 'layered analysis' in the style of Ellis (1996) seems particularly vulnerable to this type of criticism. Because of the nature of digital video recordings, the data from these recorded observations is stored and is available to be viewed by others- to ensure the reliability of the coding, (and the video itself cannot be 'subjectively biased').

The video could potentially be shared very widely, (by uploading to the internet, or presenting the videos at conferences). In this study the data are extremely sensitive and this would not be appropriate. It is an important part of the role of the researcher to protect the privacy and identity of project participants. It would be a significant ethical lapse if the vulnerable children in the videos were exposed to public viewing in an unrestricted environment. It would significantly breach the trust of the parents and professionals who agreed to the recording of interactions.

Sharing videos of interactions too widely, would betray the close affectionate relationships developed between the researcher and participants in the course of the study. It might also have the undesirable consequence of distancing the audience from the participants, creating a 'voyeurism' towards individuals as 'participants' which is highly distasteful and should be avoided.

In this study a mixed approach was taken to create a baseline assessment. Pupils generic 'P levels' were used as a means of describing the typical functional level of a participant. These P levels were assessed by at least two teachers, and were stable across participants, if there was variation between P level in different areas, the expressive and receptive communication P level was taken as representative of communicative ability. The participants were closely observed on a large number of occasions in different settings, and these observations were recorded in a digital video recording. The recorded observations were analysed with a given structure and focus, which was specifically developed for this study. The focus of the observational analysis was on the behaviours of the individual as indicators of attention focus, social proximity, and emotional state (through observing facial expression) of their response to the stimulus of the adult input, and some description of the setting and events of the observations was given. There was no recognised scale of analysis which was available to measure these factors, given the nature of their individual differences, and also their level of disabilities. As a teacher/researcher who was familiar with the participants and experienced at observing and identifying small perceptible behavioural differences in the individuals; it seemed appropriate to develop an assessment scale based on this existing expertise. This is explained in more detail in the methods section.

Approaches to communication: belief and meaning

In order to deconstruct what we 'know' about music, language and learning we must accept that our understandings of music and language as separate entities are informed by our cultural background and personal knowledge and understanding. It may well be that the tacit assumption that singing to profoundly disabled pupils will be an effective intervention is the result of cultural or personal bias and experiences. It is very difficult to escape this kind of subjectivity when conducting research, however, I hope to dampen the subjective 'feel' and sharpen the objective 'know' by looking for repeated patterns of behaviour, and by trying to isolate the causes through repeated observation.   To explain the subjectivity concept more effectively, we can use a brief version of Geertz' notions of the web of culture: "believing with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning." (Geertz, 1973, p. 5).

This study aims to be an idiographic exploration of the detail, with an awareness that the bias or subjectivity the researcher has is both a weakness (the study won't be controlled in a laboratory

sense) and a strength, because it will have the personal knowledge of pupils behaviours, attitudes and personalities at the centre of the study and be responsive to these. In order to dampen the weaker elements of the subjective judgment, the analysis of the videos will also be repeated after a suitable period in order to detect whether the scores and patterns were reliable, and if the subjective judgment of them changed. If there were dramatic differences in the interpretations and coding of the behaviours, it would indicate that the judgments were indeed weak and subjective, and somewhat prone to inaccuracy. This would be a reasonable suggestion of researcher bias or inaccuracy.

In designing the study it seemed desirable to have measures of pupil behaviour which were not mono- dimensional, or generic. It was important to look at a spectrum of behaviours and what they might indicate about an individual person's state. Given that few of the children in the study can speak, and many of them have low tolerance for the proximity of others, observing behaviours closely is critical in order to tell us about the impact of interventions on the individual's behaviour.

Phenomenological and ethnographic approaches to behaviour observation

Both phenomenological psychology and behaviourism focus initially on observation and description. These approaches stress the importance of environmental stimuli as catalysts to action, where there is disagreement is in behaviourism's claims that we are but passive reactors to directly experienced stimuli. Phenomenological psychology's stance is that we are active interpreters of the stimuli in that our response to them is intentionally determined through both innate invariants and individual experience. Medcof, Roth, and Emslie (1979) outline some unsolved problems for cognitive psychology, one of which is the failure to give proper consideration to the emotional content underlying human decision making. This study aims to use both thick description, and a close observation of the behavioural responses of individuals. Participant's behaviours were observed as indicators of attention focus, social proximity and emotional response, in situations involving an adult singing and speaking to them alone or with their peers. The aim of this study was to systematically observe individuals with PMLD who were categorised as being hard to reach, in their responses to song as an interactive approach.

To establish whether participants' responses were positive to this approach to communicative interactions, observable evidence was required, which could be analysed (post hoc) to see if other potential claims could be made about the hard to reach pupils' communicative preferences. The study could also help to establish whether some common practices in school could be substantiated as effective practice under more critical conditions.

For the purposes of this study eye gaze was selected as a measure of attention focus (this is described in the methods section). Firstly, eye gaze is used because it indicates the individuals area of focus, and secondly because it sends bidirectional (implicit) messages to the communication partner facilitating joint attention in the interaction. Direct eye gaze appears to hold the observer's attention onto the face whereas averted eyes are capable of rapidly shifting an observer's visual attention' away (Bindemann, Burton, & Langton, 2008; Driver & al., 1999; Friesen & Kingstone, 1998; Jonides, 1981; Kingstone & al., 2000; Langton & Bruce, 1999; Posner, 1980). This suggests that eye direction has a bearing on social interaction and engagement- not only in indicating the participant's engaged and/or attention behaviour but also encouraging or discouraging the communication partner's interaction and attention (Baron-Cohen, Wheelwright, & Joliffe, 1997; Driver & al., 1999; Friesen & Kingstone, 1998; Jonides, 1981; Kingstone & al. 2000; Posner, 1980). Work by Langton, Watt, and Bruce (2000) with children, adults and non-human primates strongly suggests that head orientation has an important effect on another's direction of attention and should be taken into consideration in future work. "There have also been several investigations looking into the combined influence of facial expression and gaze direction on attention" (Yiend, 2010) Attention is important in interaction (as discussed in the literature review on attention), and "one hypothesis is that people with PIMD do not use attention –directing behaviours to a great extent, as the literature reports that people with multiple disabilities initiate little and communicate mostly in response to partners' cues in a very subtle way (Bruce & Vargas, 2007; Rowland & Schweigert, 1993; Wilder, 2008)". (Hostyn, Neerinckx, & Maes, 2011, p. 496) Work in developmental psychology relates that the capacity for joint attention to appear between 9 and 18 months of age and to be fully established by 24 months of age (Eilan, Hoerl, McCormack, & Roessler, 2005; Tasker & Schmidt, 2008; Trevarthen & Hubley, 1978). As joint attention develops in the first 2 years of life and as it is acknowledged that "the general developmental level of people with profound intellectual and multiple disabilities (PIMD) is below 24 months (Nakken & Vlaskamp, 2002) it can be expected to be an important milestone for people with PIMD as well."(Neerinckx, Vos, Van den Noortgate, & Maes, 2013, p. 492).

"Darwin (1872) suggested that since the expression of basic emotions, particularly facial expressions, are similar in humans around the world, they must have a hereditary basis. Turner (2000) has expanded upon this work, suggesting that behavioural and facial expressions are critical to group harmony as they effectively communicate emotions, feelings and intent."(Adams & Oliver, 2011, p. 294; Consedine, Magai, & Bonnano, 2002) Research on expression of emotion by individuals with PMLD suggests that behaviour observation is a frequently used measure (Adams & Oliver, 2011; Hogg *et al.*, 2001; Petry & Maes, 2006). Several authors combined traditional affective measures with idiosyncratic ones to create more individual profiles which would better suit their participant (Green & Reid, 1996; Lyons, 2005; Petry & Maes, 2006). Hogg

et al. (2001) express some reservations about relying on these measures too much in case the interpretation is wrong (Hogg *et al.*, 2001, p. 20) , in case context or social contingency are having more of an impact than are being realised (Hogg *et al.*, 2001, p. 19) and also the difficulty of reliably identifying expressive behaviours and getting inter-observer agreement (though Green and Reid (1996) and Petry and Maes (2006) report positively on this).

Physical proximity is also an element of behaviour which is observed in this study, this is because it can indicate the social tolerance the participant has for the interaction; it is also one of the elements which allows the participant to independently shape the interaction without need for interpretation by the communication partner (Arthur-Kelly *et al.*, 2007). This is related not only to measuring the opportunities to interact and become socially involved or not (as observed by Richards and Sternberg (1992) and (Carpenter, Nagell, & Tomasello, 1998); Guess *et al.* (1993); M. Papousek, 2007), or turn their body towards non preferred or preferred stimulus(Brazelton, 1984; Zeedyk, 2008), and it is those similar responses (detailed in the methods section)(Basil, 1992; Campbell & Wilcox, 1986; Nind & Hewett, 1994) which are observed in this thesis.

"A behaviour's directedness towards the partner is apparent in the persons bodily proximity, body or head orientation, eye gaze direction, hand contact and voice direction, or by the actor's alternating their gaze or body between the interaction partner and the goal (Carpenter *et al.*, 1998; Ianoco, Carter, & Hook, 1998; Wetherby & Prizant, 1992)."(Hostyn *et al.*, 2011, p. 494; Munde *et al.*, 2009).

The use of video observation in classrooms is well established as a way of recording what goes on in classrooms in educational literature (Goldman, Pea, Barron, & Derry, 2009). There are a number of ways of using these videos- either through discourse analysis, body movement or physical analysis, layered analysis and transcription (Goldman *et al.*, 2009; Jacobs, Kawanaka, & Stigler, 1999).

Observing communication: video based methods

The specific requirements of this study necessitated the development of a different methodological approach, than has been used in studies of this kind before. The areas of departure would be in the analysis of the videos on a micro genetic scale, and presenting them in a way that was vivid enough to show interactions but would protect students' anonymity and privacy. The presentation of the data as a figure portraying adult input and pupil attention focus, social proximity and facial expression responses, developing over time (on the x axis) was developed to offer a window into the interaction events.

The video observations were conducted in two settings, in a 1:1 optimal teaching setting, where traditional theories of pupil communication, interaction and learning experiences would be

optimized, and in naturalistic settings- where pupils would be taking part in school routines, in amongst their peers, to assess if there was a real 'song' effect upon them (in a range of authentic settings). The interesting thing about doing these naturalistic observations were that we could also record input from familiar and unfamiliar adults, use song and music from different instruments and compare songs and music which ranged from very rhythmic to less rhythmic. We could also watch and see how the responses of other pupils compared with PMLD hard to reach pupils (with the expectation of differential effects).

The meso level issues involving research design and methodology shape the choice of research tools, (the means of collecting data) and the treatment of information artefacts (what we do with the data). In this study the focus of information gathering is by close observation of behaviour. Observation methods and analytic methods are discussed later (see methods section p74).

The use of video recorded observation in the present study, aimed to move away from a limited narrative approach and move towards a style of observation and interpretation that can be challenged by other researchers. Goldman (2009b) asserts that "representations are not things… but processes" (Goldman, 2009b, p. 18). Clearly, many representations (such as graphical displays of events) are things, but the act of representation involves processes. The choice of representation carries (at least implicitly) a theory about the phenomena of interest, and colours the sorts of interpretations that can be made. Video based research offers an opportunity to interpret, discuss and challenge the process of representation. Interpretations will not naturally form a direct correspondence between object and referent; different individuals will offer different interpretations of the same events. With video based observation it is possible to re-view and check the reliability of coding, challenge interpretations and change the focus of the observation in each viewing, and this is not possible with other methods of observation. In traditional classroom observation, the observer's attention is limited, and things which are missed are irretrievably lost from the record of observation. In video recorded observation these items are still available to review, and may be discovered later. In video observation it is possible to review and re-interpret behaviours to see if different explanations offer a better answer, in ways that are impossible with traditional observation approaches.

Video based research is a newer discipline than ethnography; however it is an increasingly popular one. Significantly, since the 1980s the affordability and popularity of video recording equipment has allowed much wider access to this medium as a form of recording and reporting, so that it is no longer an 'expert' medium, but one that has much wider access (Goldman, 2009a). YouTube is a good example of the popularity of digital video as a medium, and the wide variety of expert, novice, instructional, entertaining, autobiographical and commercial uses which it can be put to. Given its widespread popularity in the general population, the general use of digital video

data as a recording and reporting device in school, and the research literature supporting its use, it seemed a tool which could be useful in this study. There is a reasonable concern that the use of recording technology might distort the phenomena of interest. In the early days of video recording, cameras were bulky, and visually intrusive, and often required a camera operator. Now, (thirty years later) the emergence of very small video recorders, and the pervasive use of video means that video recording is now a familiar classroom activity. It is most unlikely to alter typical classroom routines in a way which might influence the outcome of the study. Anderson (2006) emphasised the use of non-intrusive methodology like classroom based videoing with pre-verbal participants because even moderate behavioural changes can be significant in their effects on participants.

Anderson (2006) also emphasised the importance of knowing the participants, so a clear interpretive lens (direct subjectivity) is present in the research (rather than second sources of information interpreted by the researcher, indirect possibly multiple subjectivity). The study by Brooks, Camurri, Canagarajah and Hasselblad (2002) failed to incorporate this consideration into their study of pupils' responses to a novel sensory environment, and relied on 'helper staff' interpretations of vocalisations and movements, which significantly weakened the reliability of the study. It also limited how responsive the researchers were to the participants' communicative attempts. The adoption of such a design meant that the intervention was not well suited to the participants (An adult familiar with children with PMLD would realise that the wearing of Virtual Reality glasses would be unsuitable with this group of participants). This study highlighted several areas of research design which were to be avoided, namely researcher unfamiliarity with students (reliability of interpretation, ecological validity, adult responsiveness issues) and the use of cumbersome and unsuitable equipment (in this case, glasses which were impractical and discomforting – clearly, there are serious questions about ecological validity if participants are distressed by the equipment). In the present study, the interpretation of behaviours was informed by practitioner knowledge of participants (Anderson, 2006) to create an observation scale (Coupe O'Kane & Goldbart, 1998; Ware, 1994) of ipsative behaviours which could be observed in the recorded sessions. In addition, video based methodology provides a record of interaction approaches (Anderson, 2006; Booth & Booth, 1996; Trevarthen & Daniel, 2005), which could be analysed (Trevarthen & Daniel, 2005; Zeedyk, 2008), reflected on, and used as a basis   to develop future interaction patterns (Kennedy & Sked, 2008). Video based methodology was also deemed useful to record the behaviours associated with interaction, as an ipsative record of responses (Anderson, 2006; Booth & Booth, 1996). The advantages of using digital video are numerous, the first and obvious advantage being that it gives us a tremendously detailed observation to analyse, which can be viewed in a variety of ways - at high speed, slowed down, with the volume turned up or down, which can help develop an understanding of each aspect of

the interaction. A thick description of a human behaviour is one that explains not just the behaviour, but its context as well, such that the behaviour becomes meaningful to an outsider, and this is possible using video in this way, as a basis for further exploration. For example, classroom contexts can be judged by background sounds, layouts and displays that were not the direct focus of the study. Plahl (2007) recommends video based micro-analysis of complex interactions for just this reason: "A detailed microanalysis of the music therapist's and child's communicative contributions allows the assessment of whether the music therapist's intervention leads to the intended treatment effect, the process by which that occurs and to what extent it is effective. Using the method of video microanalysis it is possible to both describe and analyse what works and understand how an intervention succeeds or fails."(Plahl, 2007, p. 41) Unfortunately this discipline is in its infancy in the field of music therapy and more work in this area is needed.

The usage of video recording as an observation tool is not without risk and the limitations of using video recording need careful consideration. The first and most difficult to assess is the framing of the recording. It is difficult for the observer to see what is happening outside the frame of the recorded events, and the period before recording is started and after it is stopped is also lost to the observer. This 'framing' can be the subject of conscious or unconscious editing bias and is under the control of the video maker. Even the positioning of the camera to capture a classroom might tell us about the interests of the video maker- is the activity focused on a class, a group, the individual or the teacher? In this study the focus was on the observable behaviours of the individual, which meant that the focus of the videoing was somewhat clearer. The sessions recorded, and the reasons for stopping recording were varied, and the potential risk of editing bias must be acknowledged. The use of video recording equipment also risks changing the environment being studied; so that activities and events recorded are a 'performance' before the camera, rather than authentic activities. In this study, the pupils and teachers used video cameras regularly, so this type of bias was somewhat less of a risk. Despite developments in technologies, reducing the size, cost and ease of use of video recording equipment a significant risk is technical failure. If the technology fails, or the recording is damaged in some way the information required for the study is lost. In this study, many recordings were taken over a long period of time, which reduced the risks of loss of data; however, technical problems did occur and some of the recorded sessions were not used in the detailed analysis.

In some video based studies, compilations of video records are made to create a 'layered analysis'. This approach seems highly susceptible to editing bias, and not useful for the purpose of this study. In the present study the video clips were analysed in unedited 'raw' form. This meant that the quality of the video is variable; some videos more useful for analysis and some less

useful. A focused approach to analysis and selection of videos would be needed, but by using raw unedited footage, editing bias could be avoided.

It is necessary to take precautions with the video data, to protect the participants in a study and to ensure their rights are not violated. The storage and future use of data must also be planned for, and data need to be kept securely. In this study, given the participants were children with PMLD who were extremely vulnerable, the video recordings needed to be kept confidential and anonymous, and stored securely. In order to protect anonymity, but present information in a way which would be available and accessible to other observers, a graphic representation of the data was created. In order to do so, the behavioural responses of the participant and the adult's interaction approaches (called inputs in this study) were carefully coded and recorded as a figure. This visual representation of events, interaction and behaviour aimed to present interaction episodes in an anonymous but vivid way, while still allowing for discussion of the events and interpretation offered.

The use of video recorded observations in the classroom fits in well with single participant research design, which influenced the methodology of this study. The recording of individual behaviours using digital video seems an appropriate methodology (Anderson, 2006; Goldman, 2009b; Jacobs *et al.*, 1999). The recorded behaviours were analysed using a specially developed behaviour scale which was unique to each individual participant. The scores on this scale were presented as a figure of interaction patterns (adult and participant behaviours and vocalisations as indicators of cognitive, social and emotional responses) developing over time (on the x axis). Single participant research methodology often uses visual means to convey a pattern of individual behaviour over time, but the presentation method in this study is original. The presentation of an interaction episode as a figure developing over time, also offered a way to present and share complex interaction for a wider audience (than would be ethically sound with a non-anonymised video recording of the interaction). The repeated observation and analysis of interaction episodes in this manner, supports the identification of repeated patterns, and a better understanding of participants' individual behaviours. In a null hypothesis that a participant is not responding to the inputs at all and that her cognitive social and emotional behaviours are not contingent on the inputs at all, but are completely separate and isolated behaviours which have little to do with the environmental stimuli- if this null hypothesis were true, then the participant would have random responses across the inputs and the findings would be very inconsistent. It would be much more difficult to make a causal argument as there would be no pattern to see. The event figures seem to link the inputs to response quite clearly, we see that there is a pattern between the stimulus input and response. The presentation of data in graphic form promotes discussion about different interaction inputs and responses with a range of stakeholders. The results of this study

represent the development of a more extensive evidence base for the use of different interactive approaches with participants who have PMLDs and low social tolerance.

Identifying attention focus behaviours

The observable behaviours selected for observation aimed to isolate different elements of response of the individual to social interaction attempts. There follows a review of the literature in this area, this will be explored more fully in relation to the development of the instrument in the main body of the methods section in chapter 4. Eye gaze was selected as a measure of attention focus (this is described in the methods section).Firstly, eye gaze is used because it indicates the individuals area of focus, and secondly because it sends bidirectional (implicit) messages to the communication partner facilitating joint attention in the interaction. Direct eye gaze appears to hold the observer's attention onto the face whereas averted eyes are capable of rapidly shifting an observer's visual attention' away (Bindemann *et al*., 2008; Driver & al., 1999; Friesen & Kingstone, 1998; Jonides, 1981; Kingstone & al., 2000 Langton & Bruce, 1999; Posner, 1980). This suggests that eye direction has a bearing on social interaction and engagement- not only in indicating the participant's engaged and/or attention behaviour but also encouraging or discouraging the communication partner's interaction and attention also(Baron-Cohen *et al*., 1997; Driver & al., 1999; Friesen & Kingstone, 1998; Jonides, 1981; Kingstone & al., 2000; Posner, 1980). Work by Langton *et al*. (2000) with children, adults and non-human primates strongly suggests that head orientation has an important effect on another's direction of attention and should be taken into consideration in future work. "There have also been several investigations looking into the combined influence of facial expression and gaze direction on attention" (Yiend, 2010) Attention is important in interaction (as discussed in the literature review on attention), and "one hypothesis is that people with PIMD do not use attention –directing behaviours to a great extent, as the literature reports that people with multiple disabilities initiate little and communicate mostly in response to partner's cues in a very subtle way (Bruce & Vargas, 2007; Rowland & Schweigert, 1993; Wilder, 2008)". (Hostyn *et al*., 2011, p. 496) Work in developmental psychology relates the capacity for joint attention to appear between 9 and 18 months of age and to be fully established by 24 months of age (Eilan *et al*., 2005; Tasker & Schmidt, 2008; Trevarthen & Hubley, 1978). As joint attention develops in the first 2 years of life and as it is acknowledged that "the general developmental level of people with profound intellectual and multiple disabilities (PIMD) is below 24 months (Nakken & Vlaskamp, 2002) it can be expected to be an important milestone for people with PIMD as well."(Neerinckx *et al*., 2013, p. 492).

Identifying facial expressions

Facial expression was selected as a measure of emotional response to the interaction approaches because it can be clearly identified, and because emotional response to the interaction is key to

its success (again communication partners are receptive to these signals and they support the shaping of the interaction).

> "Darwin (1872) suggested that since the expression of basic emotions, particularly facial expressions, are similar in humans around the world, they must have a hereditary basis. He proposed that emotions serve as a function and therefore should be seen as adaptive and, arguably, essential to the survival and reproduction of species. Turner (2000) has expanded upon this work, suggesting that behavioural and facial expressions are critical to group harmony as they effectively communicate emotions, feelings and intent."(Adams & Oliver, 2011, p. 294; see also Consedine *et al.*, 2002)

Research on expression of emotion by individuals with PMLD suggests that behaviour observation is a frequently used measure (Adams & Oliver, 2011; Hogg *et al.*, 2001; Petry & Maes, 2006). Several authors combined traditional affective measures with idiosyncratic ones to create more individual profiles which would better suit their participant (Green & Reid, 1996; Lyons, 2005; Petry & Maes, 2006). Hogg *et al.* (2001) express some reservations about relying on these measures too much in case the interpretation is wrong (Hogg *et al.*, 2001, p. 20) , in case context or social contingency are having more of an impact than are being realised (Hogg *et al.*, 2001, p. 19) and also the difficulty of reliably identifying expressive behaviours and getting inter-observer agreement (though Green and Reid (1996) and Petry and Maes (2006) report positively on this).

Identifying social proximity behaviours

Physical proximity is also an element of behaviour which is observed in this study, this is because it can indicate the social tolerance the participant has for the interaction, it is also one of the elements which allows the participant to independently shape the interaction without need for interpretation by the communication partner (Arthur-Kelly *et al.*, 2007). This is related not only to measuring the opportunities to interact and become socially involved or not (as observed by Richards and Sternberg (1992) and Guess *et al.* (1993)). It also relates to the level of choice and control individuals with PMLD can exercise over interactions. If something is not enjoyable the individual with PMLD cannot ask to change topic, or get up and move away (much like those infants in the development literature). Instead they use their bodies to control their level of engagement through proximity, position and orientation. These behaviours are familiar to those who have seen an infant move their face away (Carpenter *et al.*, 1998; M. Papousek, 2007), or turn their body towards non preferred or preferred stimulus (Brazelton, 1984; Zeedyk, 2008), and it is those similar responses (detailed in the methods section)(Basil, 1992; Campbell & Wilcox, 1986; Nind & Hewett, 1994) which are observed in this thesis.

"A behaviour's directedness towards the partner is apparent in the person's bodily proximity, body or head orientation, eye gaze direction, hand contact and voice direction, or by the actor's alternating their gaze or body between the interaction partner and the goal (Carpenter *et al.*, 1998; Ianoco *et al.*, 1998; Wetherby & Prizant, 1992)."(Hostyn *et al.*, 2011, p. 494) All of these are observable non-invasive naturally occurring human behaviours which tell us about the

individual's response to interaction approaches. This is far from a perfect strategy with weaknesses around inter-observer reliability, lack of the participant voice and a question as to the appropriateness of assumptions that facial expressions are not contingently affected by social norms. However, despite these limitations, there seems to be some consensus about using the strategy of behaviour observation with this group of participants (Munde *et al.*, 2009).

The use of video observation in classrooms is well established as a way of recording what goes on in classrooms in educational literature (Goldman *et al.*, 2009). There are a number of ways of using these videos- either through discourse analysis, body movement or physical analysis, layered analysis and transcription (Goldman *et al.*, 2009; Jacobs *et al.*, 1999). These methods were unsuitable for this study because: relying on discourse would not give enough detail about events, especially non-verbal communication which is important in this study because participants cannot speak. Use of physical analysis in the video would not give enough information about the interaction approaches, the learner responses, and the communicative value of them in the interaction. Video clip compilation in the style of 'layered analysis' is too open to editing bias, it could easily miss out important (but hard to detect signals), and the outcomes presented may be unrepresentative of the actual event. Video transcription would not reveal enough about the deeper context of the interaction, and would be difficult to share widely with other practitioners, as reading through pages of transcription is almost as labour intensive as the transcription itself.

The process of describing behaviours in detail and interpreting them is, admittedly an 'artificial' separation of responses that for all humans are embedded, intertwined and complex. The attention focus, social proximity and facial expressions of individual participants with PMLD in response to interaction approaches by the communication partner are important dimensions of interactive behaviour, but do not represent a full account of an individual's inner state. In this sense we are simplifying a complex picture by looking at behaviours and what we suggest that these represent. All analysis of data involves some level of simplification and loss, however, the aim is to focus on salient information about the learner's response, not to lose all the complexity. This means of presenting information about pupils' behaviour is subjective, and might be hard to replicate by a researcher who had less knowledge of these students, or experience working with PMLD individuals. This is the advantage of the teacher researcher, that in knowing the students and understanding their level of need and behaviour, one can make an educated (though subjective) guess about the meaning of behaviours without asking for a translation, by someone else. In using clearly described physical indicators about participants' physical responses to interaction approaches, a less subjective, context dependent interpretive approach was taken. The risk in doing so is that the nuances of context and individual responses may be lost in the analysis.

Single case methods

A single study research design was adopted, in order to identify which intervention procedure was most effective (S.B. Richards, Taylor, Ramasamy, & Richards, 1999). The value of single - participant research design is that one examines the performance of an individual during differing conditions which provide a behavioural baseline, and then contrasts this pattern with performance under an intervention condition (or conditions). The comparison of performance across conditions requires measurement during and between conditions; detailed description allows replication of the condition by other researchers (Gresham, Gansle, & Kurtz, 1993; Horner *et al.*, 2005). The use of detailed observation of an individual's behaviour is already a common practice among teachers of children who have PMLD (Goldbart, 1994; Ware, 1996, 1994; Ware & Evans, 1986), and this research method uses this professional practice as a strength.

The use of single participant research is becoming more widely used in special education because it offers several benefits (Horner *et al.*, 2005).(Cakiroglu, 2012, p. 21) argues "The freedom to conduct investigations with low-incidence student populations (such as autism), the ability to measure individual performance, and ... the design includes methods appropriate for dealing with important ethical considerations." This is supported in work by both Cakiroglu (2012) and Kazdin (1982).

The practice of comparing a control group with an intervention group can lead to some misinterpretations. A positive overall treatment effect can mask important features of the data, such as participant*treatment effects, because data are averaged across participants. So a positive overall effect could mask evidence that some participants did not benefit from the intervention at all (Hersen & Barlow, 1976). In a single participant design, each participant acts as their own 'control' and so multiple baselines, input conditions and order of input can be used (Neuman & McCormick, 1995). This alternating treatment design had several benefits. It allows for multiple 'mini' interventions, exploring different communicative approaches. It allows for the natural behavioural shifts which all individuals have, to take place without it having a significant impact on the outcome of the study. Given that several observations could be made (direct replication), with alternating treatment conditions, and in a variety of different contexts (systematic replication) the patterns of behaviour documented can provide evidence of responses to a family of related interventions. The single - participant design also meant that the individual participant was central to the study, and that the interventions and activities in the study were focused on and responsive to each individual. (Cakiroglu, 2012) stated that "single-participant research can be used for teacher initiated research in schools. Teachers can collect data on students' performance, evaluate collected data, and make decisions about planning instruction" (Cakiroglu, 2012, p. 26) which summarizes some practical and pedagogical reasons why this was a suitable research design to adopt for this study. In addition, the design of single participant methodology allows for highly flexible approaches which are responsive and sensitive to individual needs and communicative attempts, and are contingent on participant engagement. As well as being highly

responsive to participants, the use of repeated single participant observation and comparison of the individual's responses to different (or no) stimuli over an extended period of time allows for the development of a baseline profile where more stable patterns of behaviour and response can be observed, which would be far more reliable than a pre-test, post –test model.

Chapter 4: Methodology

This chapter provides an explanation of how the research was conducted. It starts with a detailed discussion of the aims and related ethical considerations associated with conducting research of this nature. The chapter then provides a detailed account of how the data were collected, coded and analysed, together with information about the specific equipment used and the contexts and settings. Brief descriptions of the participants are presented in this chapter; more detail about each participant is provided in the individual case chapters. Data analysis methods are detailed in steps and an explanation of the statistical methods used in this study is provided.

Aims

An initial aim of the thesis was to establish if sung and spoken inputs elicited different responses from hard to reach pupils (given song was an existing practice in school). The primary aim was to establish whether song or speech was more effective as an intervention with hard to reach students with profound and multiple learning difficulties. "People with high individual communication needs do not use formal methods of communication such as speech, writing or symbols. They communicate in their own way through their bodies, facial expressions, sounds, eye gaze or pointing" (Thurman, Jones, & Tarleton, 2005, p. 83).

The study conducted micro analysis of episodes with students in natural school settings. These episodes included both classroom settings with an individual pupil and a teacher interacting (taught optimal settings), and settings where the teacher interaction was with a larger group such as in a school assembly (naturalistic observation).

The focus of the episodes was on the nature of the responses to adults as they used different interaction approaches, analysed in terms of pupils' attention focus, social proximity and facial expression.

Participants

All participants attended a special school between the years 2008 - 2011, where the researcher was a teacher. All participants were white and British by ethnic origin. They all lived in the north east of England, and attended school in a locality which was socially deprived. **Five young people (four female and one male)** aged between six and twelve years old were selected on the following basis:

- their level of functioning (assessed by at least two teachers using the p scales) was between p1-p4
- their statement of special educational need included the words profound and multiple learning difficulties
- they could be described as 'hard to reach'.

This final criterion meant that many pupils in the participants' school were excluded from the project, and only those who had significant obstacles to social communication such as low social tolerance, extreme passivity, or self - injurious negative behaviours were included. Every pupil in the school who met these criteria was included in the study.

One participant had Rett syndrome, one had a multiple sensory impairment, one had cerebral palsy and five exhibited self-injurious behaviour. None of these pupils had expressive vocabulary of above six words, so could be described as pre-verbal (Lock, 2000). The participants in the study not only lacked expressive language skills, but presented little tolerance for, or interest in receptive language (i.e. attending to the language of others).

Each child was given a **pseudonym**, to preserve their anonymity.

Angela was twelve years old when the project began, and was fourteen when the last recording took place. She is female and was functioning at level P2i in most subjects. Angela has cerebral palsy (PMLD) and epilepsy. She strongly dislikes social contact and often hits, scratches and grabs adults and peers who come into proximity. She could speak with a limited vocabulary until multiple major seizures (around age 5 years) left her with a very restricted vocabulary (of up to 3 words) and visual impairment in one eye. She needs support with toileting and feeding, though she can drink from a cup with support. Angela is in a wheelchair and requires regular physiotherapy, which she dislikes.

Vanessa was aged twelve years at the time the project began and was fourteen when the last recording took place. She is female and was functioning at level P1ii in receptive and expressive communication. She has PMLD (including multiple sensory impairment) and an unclassified genetic disorder which affects her growth and organ development. Vanessa is a diminutive girl, the same size physically as a typically developing two year old child. She needs high levels of support due to her blindness, hearing impairment and physical difficulties. Vanessa is extremely withdrawn and passive; she often chooses not to participate socially when touched or approached (typically turning away and holding her own hands to avoid contact).

Diane was aged eleven years when the project began and was thirteen when the last recording took place. She is female and was functioning at level P1ii in most subjects. She has PMLD and Rett syndrome. She did not learn to speak before the regressive phase of the syndrome began at age twenty four months. Diane becomes extremely distressed when social approaches are made to her, she screams and often hurts herself when she is upset, and her loud vocalisations are a feature by which she is recognised around the whole school. Diane can be described as very hard

to reach. She finds social proximity unpleasant, and touch, eye contact and personal interaction distressing. She screams and cries when people attempt to communicate with her.

Colin was aged eight years when the project began and was ten when the last recording took place. He is male and was functioning at level P1i. He is pre-verbal and vocalises rarely. He has PMLD and strongly dislikes social contact. He often hits out at adults and peers when they come into proximity, as well as being extremely self-aggressive - often punching, hitting, and kneeing himself in the face and head, as well as head banging. He is ambulatory and wears a helmet to prevent self-harm through head butting. He requires support with feeding and toileting. His self-stimulatory behaviours are challenging, and include regurgitation, saliva exploration, head shaking, head banging, punching self, and biting self.

Jessica is the youngest participant, and was aged six years at the time the project began, and was eight when the last recording took place. She is female and was functioning at level P3ii in receptive and expressive communication, and has PMLD and epilepsy. She can walk with the aid of leg callipers and a walking frame, but does not have functional speech (at best, a 5 word vocabulary). Jessica can hold her own bottle to drink from, but requires support with feeding and toileting. Jessica does not like to be approached or spoken to. She cries and screams when people talk to her, and often hurts herself by banging her head or face when social approaches are maintained.

Table 4.1 shows the number of occasions on which each pupil was recorded, and the number of minutes of analysis that have been completed.

Table 4.1: Participants featured in analysis

Participant	Angela	Vanessa	Diane	Colin	Jessica
Videoed occasions	4	3	4	2	3
Minutes analysed	6	5	20	13	18

Settings

The study took place in a state maintained special school for pupils with learning difficulties, sensory impairments, Autism Spectrum Disorders, Behavioural Emotional and Social Difficulties and a range of other needs. The school offered nursery placements for children aged two to four years, a primary department for children aged five to eleven years, a secondary department for twelve to sixteen year olds, and a post sixteen life skills unit for young adults up to the age of nineteen. The school is situated in the north east of England, in an area of severe social deprivation. The research used two natural settings within the school to record interactions between the adult and pupil participant. The first was a 'taught' setting, where an adult worked

directly with the participant on a 1:1 basis, in the classroom. This was called the 'optimal taught setting'. On the basis of the literature on intensive interaction, it was thought that the classroom setting would be the 'optimal' experimental setting, and pupils would be most responsive in this setting and that the findings from these video segments would be the most telling in terms of exploring the relationships between different patterns of stimulation and the responses elicited.

The second group of recordings was less dependent on an individual adult. These, essentially, were observations in school settings where relevant 'natural experiments' occurred.

'Optimal' taught setting

The first setting was an ordinary classroom interaction which was part of the typical lesson routine. The classes had up to fourteen pupils, of a wide ability range. The classes had pupils with a cognitive ability range from P2 to National Curriculum level 4. The lesson was on information and communication technologies (ICT) in the computer room of the school. The typical format of this lesson was followed. After an introduction to the learning objectives and aims for the rest of the class (whilst the teaching assistant positioned and supported the PMLD students), the rest of the pupils would get started on their computers and the teacher would ensure they had the tasks underway. In this time the teaching assistant and teacher would change groups, and the teaching assistant would supervise the students in their individual or paired work on the computers and the teacher would have some direct taught time in the lesson for up to ten minutes with the PMLD student.

The video recording began when the teacher sat with the PMLD students and started to engage in different patterns of interaction with them. Each session was finely tuned to the participants' needs and was responsive to them, to ensure that there was a minimal level of distress for the participants. The participants in this study had been selected because they were hard to reach, so not all attempts to communicate were successful. Unsuccessful (and distressing) communication was a typical experience of interaction for the participants.

'Naturalistic' group setting

The second setting was a school assembly. The assemblies were held in the assembly hall and all pupils in the school were present. The assembly hall was a large room, but when all pupils and staff were inside it became quite full, and full of atmospheric noise, movement, and sights. For the target pupils in this study it was expected that this would be a challenging environment, because of their low social tolerance and the close proximity of their peers.

The setting was selected in order to observe responses to common musical and non-musical stimuli in the presence of unfamiliar adults, and in an authentic noisy and crowded location.

Ethical Considerations

The practitioner researcher submitted a two page outline of the project and a standard ethics form was submitted prior to the research (following standard university procedure). Approval for this study was obtained from Durham University School of Education Ethics Committee (Chair Professor Richard Smith). The Head Teacher and Board of Governors of Anon Special School gave permission for the teacher to conduct this research with pupils in the school. The children were not able to give informed consent to participate in this study, so the parents' permission was sought. The parents of all participants were sent an information letter about the study with a permission form (see Appendix A). They were then telephoned or contacted face to face for a conversation about the study, where they could ask questions and/or refuse consent to participate. All parents verbally consented to the terms in the consent form (Sime, 2008). All the parents were asked again if they still consented to their child continuing to take part in the study at the end of the first term. All parents agreed and most were interested in the findings of the research. The information about communication preferences of participants was included in school documentation, including pupils' communication passports. An information afternoon is planned to take place in the school as a way to share the evidence about the practice of singing as an interaction approach in school, and as a way to thank parents, staff and participants for their support and involvement. This will happen in school at an open day event in the summer term 2014, where final conclusions can be presented.

Any of the interactions with pupils could have been part of a special needs teacher's professional repertoire. The protocol adopted in every interaction was that any intervention that appeared to cause distress to the pupil was to be terminated immediately. Participants were highly sensitive and disliked social contact and sometimes did become distressed in school. Therefore attempts to comfort and console participants who were upset were made immediately and in the same way as they would be in a caring classroom environment (regardless of the research taking place).

Observing behaviour

The use of close observation has been recognised in the field of Anthropology for a long time (Blacking, 1973, 1987). This in turn has had an influence on the disciplines of Sociology (Geertz, 1973, 1983) and Psychology (Medcof *et al*., 1979; Reynell, 1970). Here, participants are too withdrawn to participate in formal testing, have a profound level of intellectual and physical disability, and have severely limited communication ability, and so observation seemed the only sensible option (Anderson, 2006; Coupe O'Kane & Goldbart, 1998; Goldbart, 1994; Goldbart & Caton, 2010). This study is ipsative, and the focus is on the individual's unique responses to different inputs. These responses are relative to the individual's other responses, so where a passive response might indicate progress for a child who is showing improved social tolerance by responding passively (rather than negatively), for another individual this passive response could

indicate a lack of responsiveness or attention.

This work acknowledges the importance of individual and person centred approaches which respect and respond to each individual's methods of communication. "When we fail to take a person's differences into account, we lose the context to understand that person in a realistic way" (Lovett, 1996, p. 32).

Lyons (2005) observed the behaviour of individuals with PMLD in a naturalistic setting. Arthur, Hook, and Butterfield (1995) and Guess, Roberts, and Rues (2002) also used the observation of behaviour as an approach to better understanding individuals with PMLD. Thurman *et al.* (2005) and Rodgers *et al.* (2004) suggest that individually focused profiles of behaviour are the most useful method to develop a meaningful understanding of an individual's communicative behaviour. This thesis uses tailor made measures of ipsative performance, based on the observation of behaviours of the individual in response to a variety of interaction approaches.

Digital video recording of interaction sequences allows close observation and analysis of behaviours. The advantages of such an approach are made clear in the discussion of video based research. An advantage of the use of video recorded observation which is particularly relevant, is the ability to check and re check the behavioural codings (analysis of the interaction sequence) in order to make it as reliable as possible (Wosch & Wigram, 2007). Here, the individualised coding was used to create a graphical display of each session, with stimuli and attentional, social and emotional responses shown on a common timeline. These figures facilitate the identification of patterns in pupil responses (if they exist). The displays and data are presented in a form that can be viewed (and critiqued) by others. A further advantage of this approach is that the anonymity of the participants is preserved.

Interaction Approaches (Stimuli)

Interventions were carefully designed to isolate and combine stimuli. The role of the teacher as communication partner was central to the design of this study, and stimuli were chosen to be appropriate to a school setting: adult voice speaking, adult voice singing, touch with hand, and touch with tactile object (optic torch) in a variety of combinations in taught sessions. These were complemented by observations of spontaneous pupil behaviour in natural settings with stimuli such as: instrument playing, instrument playing and adult singing, adult speaking. More complex (uncontrolled) stimuli in the natural setting were environmental factors such as lighting and room temperature, and peer responses to the researcher's inputs, such as shouting, clapping and singing along. Some stimuli were hard to control in a school environment, such as peer noise. These are documented in the transcriptions. T4.2 shows the range of stimuli recorded in each setting.

Table 4.2: Stimuli to be considered in each setting

Setting	Stimuli	Additional stimuli (environmental)
Optimal	Song	Peer noise
	Song (familiar, unfamiliar)	Computer noise
	Silence	Adult proximity (familiar adult)
	Speech	Bright lighting
	Touch with hand	Room temperature
	Touch with object	Physical positioning
	Object noise (musical teddy)	
Naturalistic	Song (familiar, unfamiliar)	Adult distant (familiar/unfamiliar)
	Silence	Peer proximity
	Speech	Peer noises/environmental noise
	Acoustic instrument (music)	Lighting level variation
	Peer song	Room temperature
	Peer silence	Physical positioning
	Peer speech	
	Peer noise (applause, clapping along)	

Stimuli

The number of recorded sessions analysed (n=11) and the repeated and varied introduction of stimuli allowed each pupil to act as their own control, thus ameliorating the difficulty of 'matching' these unique children. The repeated use of stimuli with familiar and unfamiliar songs also allowed examination of participant preference and choice making. The repetition of sessions also generated data on a number of other issues which have yet to be explored - such as rhythmic versus arrhythmic speech and song.

The adult inputs and the responses of participants were recorded. One expectation based on the literature is that, when the adult acts as a 'communication partner' by responding to pupils immediately and establishing a partnership, the pupil responses will show a greater improvement in the 'optimal' taught setting. What was less clear was how stimuli would affect the participants, how different the individual responses would be to the stimuli, or how the stimuli would work in a naturalistic setting given less direct interaction.

Development of classifying and coding scales

Developing a coding scheme

Bakeman and Quera (2011) offer three reasons for using observational methods in social research. The first is that when participants cannot tell us what they think, or read and respond to

a questionnaire (as is the case in this study), then other methods must be used. The second is that spontaneous behaviour sequences seem more natural (and are less at risk of social desirability bias, or lab coat effects) than elicited behaviours. Even when recorded on video camera, humans rapidly habituate to the presence of recording equipment and return quickly to typical behaviours. The third reason they offer is that researchers in this area are interested in process - how things work and not just the outcomes. Only by studying behaviour as a process can investigators address these questions (see Bakeman & Gottman, 1997; Bakeman & Quera, 2011).

In this study where complex obstacles to social communication exist, the sequence of behaviours in an interaction offers important information to help further our understanding. In particular, sequential analysis of behaviour as it unfolds facilitates the identification of patterns and the generation of hypotheses about the relationship between input and behavioural response in these interactions.

Development of unique coding schemes

Some coding schemes are developed by using existing schemes and adapting them, but this wasn't the approach adopted in this study. The assumptions implicit in many coding schemes about physical and cognitive ability, conscious control and typical behaviour are at odds with the character and profile of the participants in this study.

In addition, the theoretical approach of this study - exploring individual behaviours and responses to different interaction approaches to gain insight about their effects -had at its base the theoretical orientation of a practitioner- researcher. That is to say, of someone enculturated in a school setting, with knowledge of, and pre-existing relationships with, the participants, and a desire to improve practice on the basis of evidence gathered *in situ*. A fundamental assumption underlying this study is that those who have profound and multiple disabilities can communicate and interact, despite the obstacles they face (physical, social and intellectual) and that while an adult speaking partner may 'lead' the interaction, both people play important roles as communication partners participating in the joint endeavour of social interaction and communication. These factors meant that the coding scheme had to be tailored to the specific setting and participants unique to the study. Bakeman and Gottman (1997) argued that using someone else's coding scheme was "like wearing someone else's underwear" (p. 15). This simile makes the (colourful) point that coding schemes and the underlying theoretical framework need to be connected in order to work effectively, otherwise there is an uncomfortable 'fit'.

The coding scheme was developed *de novo* by repeatedly watching and re-watching the interaction footage. This meant that the development of the codes was necessarily an iterative process, with gradual changes being made at each phase to improve the specificity of the codes. Initially, behaviour was classified under the headings of social, emotional, and cognitive

responses. This encountered two major problems: one was the subjective nature of the judgements; the other was associated with the problem of co-occurrence - when looking at behaviours which are indicators of (say) social responses, some indictors (such as smiling) clearly are also indicators of a positive emotional response.To resolve these problems, the next iteration defined new, more fine grained factors based on clear descriptions of behaviour, namely attention focus (AF), social proximity (SP), and facial expression (FE). All the data were recoded, using the final iteration of the coding system.

It is assumed that patterns of response indicating high levels on each of these factors indicate more successful communicative interactions, and that patterns of inattention, disengagement and distress indicate less successful interactions between the communication partners.

The categories of behaviour are the same for all participants. However, the same code can refer to different behaviours by different children. Illustrations of typical AF, SP and FE behaviours are presented in Figures 4.3, 4.4, 4.5, 4.6. For each individual participant, the unique mappings between behaviours and codes are given in a Table in the appropriate chapter.

Coding Responses
Participants' behaviours were coded at very short intervals (every second) in terms of the behavioural state of the respondent in terms of AF, SP and FE. The coding also included vocal expressions, vocalisations and coordinated actions.

Vocalisations are any deliberate vocal expression made by target pupils during recording. They may not be recognisable words or speech but are expressive. For example: a scream is counted as a negative vocalisation (voluntary and controlled), a laugh is counted as a positive vocalisation (voluntary and controlled), a cough is not included because it is not a deliberate vocalisation (it is a reflex action).

Coordinated actions are actions which require concerted effort to perform (deliberate actions). For example: moving the head to face something of interest would be counted as a coordinated action, blinking the eyes would not be counted as a coordinated action because it is not the product of deliberate effort (it is a reflex action).

It is not the central focus of this study to discuss the concept of consciousness. However, all the pupils in this study are more than peripherally aware of their surroundings - they can interact with the world and act on what is around them, which is what I deem to be conscious action.

Classification of Attention Focus Behaviours
Attention is an element of engagement (where there is inattention, engagement is very difficult). Attention is made up of two parts, selecting (where to focus), and the capacity to attend (the cognitive resources required to process information being attended to). In this coding scheme,

the focus of attention is assessed via the eye gaze of the young person participating in the interaction (see example in Table 4.3). This measure could have been called eye gaze. However, because one of the young people featured in the project (Vanessa) has a severe visual impairment, observations based on eye gaze would be an inappropriate measure, and a misnomer. For this reason, attention focus is assessed based upon eye gaze alone or on hand movement (see Table 4.4). To avoid overlap and double counting of one type of behaviour in two categories, head orientation and positioning are not included in the attention focus category. This is an artificial exclusion, because it is clear that the head and face do need to be oriented towards the subject of attention focus in order to view it. However, because posture and positioning are included in the social proximity measure they are excluded from this category.

Attention focus is counted as being very positive if the participant directs their attention (eye gaze or hand reaching) towards the face or upper torso of their communication partner. It is counted as very positive in terms of engagement because it reflects the alert, engaged behaviour we might observe in a typical interaction (Stern, 1974; Trevarthen & Aitken, 2001; Zeedyk, 2006) or in a successful communicative interaction with an individual with PMLD (Bakeman & Adamson, 1984; Carpenter *et al.*, 1998; Foreman & Arthur-Kelly, 2005; Foreman, Arthur-Kelly, Bennett, Neilands, & Colyvas, 2013; Hostyn *et al.*, 2011; Munde *et al.*, 2009; 2012).

Attention directed at the hands of the communication partner or an object are counted as positive. They reflect positive engagement with the environment, but are less successful communicative interaction behaviours, given that most participants in this thesis were not yet at a developmental stage where they can employ joint attention (Neerinckx *et al.*, 2013).

When the participant looks around or searches the environment with hands or eyes to find something of interest, this is counted as a neutral attention focus. When the participant gazes into the distance, the ceiling or floor where there is no obvious object or activity to focus on, this is coded as a negative attention focus because it has a negative impact on the interaction with the communication partner. In the case of Vanessa, attention focus is identified by looking at hand movement (Adelson & Fraiberg, 1974; Goode, 1990; Prain, 2012; Siegel-Causey, Sims, Ernst, & Guess, 1986; van Dijk, 1986). When Vanessa actively reaches out and explores by touching and manipulating the object of her attention (a hand, face, body of another person) this is coded as very positive. When Vanessa holds without manipulating, or further exploring the object of her attention, this is coded as positive. When Vanessa sits passively and completely still, this is coded as neutral attention focus. When Vanessa is holding her own hands and exploring them, she is disengaged with the environment, and so this is coded as negative attention. This is because in terms of the interaction, if her attention is focused on her own hands, the interaction with the communication partner will be limited. When Vanessa holds her own hands and leans

down to feel these with her face she is immersed in her own sensory exploration, and while this is not negative in itself, and is clearly a source of enjoyment for her, its effect on interaction with others is very negative because she is completely withdrawn from interactions with a communication partner. For this reason this behaviour is coded as very negative attention focus.

Sustained attention is also related to engagement (D. Baldwin, 1995; R. Baldwin & Adamson, 1984; Carpenter *et al.*, 1998; Hostyn *et al.*, 2011). Where attention is fleeting and brief (a scanning glance) the participant is less engaged than when they direct their gaze for a longer period (a sustained look). So the duration of attention focus towards object, hands or communication partner hands or face is taken into account in the coding. Sustained attention is deemed to be very positive, and passing brief attention being counted as positive.

Table 4.3: Behavioural indicators of attention focus, coding and classification

Examples	Indicators	Classification	Coding
	closed eyes (Face orientation NOT included in this indicator)	Attention Focus	Very negative 1
	eyes looking past adult/ persons in room, unfocused eyes not directed at object, person or activity in room (Face orientation NOT included in this indicator)		Negative 2
	brief attention, eyes looking towards adult body or an object for -1s scanning (Face orientation NOT included in this indicator)		Passive 3
	eye pointing to adult hands, or object for more sustained period before moving onto look at other item or activity, eyes directed at face briefly (1 or 2 seconds) (Face orientation NOT included in this indicator)		Positive 4
	sustained eye gaze toward adult face, lasting attention to object/hands/adult, purposeful control of body to sustain eye contact (Face orientation NOT included in this indicator)		Very Positive 5

Table 4.4: Vanessa's attention focus behaviour coding and classification

Vanessa	Indicators	Classification	Coding
	sustained (more than 2s) exploration with hands, reaching out, searching, holding, manipulating, stroking patting (not own hands)	Attention Focus	Very Positive 5
	reaching out with hands and scanning area with fingertips, searching environment (around 1s)		Positive 4
No image	hands not exploring environment or self, may be still or inactive		Passive 3
	Holding own hands and or moderate self-stimulation		Negative 2
	withdrawing hands, may be leaning over hands to feel movement of self-stimulating hand exploration		Very negative 1

Classification of Social Proximity Behaviours

This category uses the posture and positioning of the body, the head and the orientation of the face as an indicator of social proximity. This is observed by noting the distance between the participant and other people (particularly the interaction partner), but also the tolerance for the proximity (indicated by remaining still), and whether the participant increases or reduces this by shifting their posture or position, moving, reaching (except in the case of Vanessa where this is purely based on head orientation and posture) or leaning towards another person. These gross movements associated with increasing or reducing proximity are similar to those described in the

literature on infants (Stern, 1974; Trevarthen, 1977; Trevarthen & Aitken, 2001; Zeedyk, 2006). Also counted in social proximity is the face orientation towards or away from others, as a part of deliberate gross motor control. For some participants who are less mobile than others, smaller movements are considered significant, depending on their profile. This is indicative of different levels of social engagement (though this is just one element). The orientation of the head relative to the body is also significant in this measure. Head position describes where the head is situated, and where the face is directed. If the participant's head is positioned face-to-face with the interaction partner this is coded as very positive. If the participant's head is positioned to face away from the interaction partner at a 45° angle - it is still possible for some engagement to occur, but this needs to be judged alongside posture of body and the relative position of head to body (the participant may be leaning towards or away from the interaction partner). If the participant's head is positioned to face away from the interaction partner at 90° the social interaction is likely to be less successful because facial expression, eye gaze and other non-verbal behaviour cues used in interaction sequences are harder to detect. If the participant's head is positioned to face away from the social interaction at more than 90° the posture of the participant will also have shifted, moving the shoulder towards the medial line of the torso to allow the body and neck to turn away - twisting the body away from the interaction. This means that the face is barely visible and the shoulder now faces the interaction partner. This is taken as a very negative indicator of social proximity, because communicating with a person's shoulder is likely to be unsuccessful. Head position in relation to the rest of the body is also a significant element in this coding category, so where the head is elevated and the face is raised to the ceiling - this is taken to indicate some level of disengagement from the social interaction (and so would be coded negatively, when considered in conjunction with the angle of face-to-face engagement (the behaviour would be coded as either negative or very negative). The orientation of the participant's head when it is depressed (so it is closer to the torso, and the chin is pulled close to the chest) also indicates some disengagement from the social interaction; again the category score would be negative, but the magnitude of the negative social proximity score would take account of the angle of the face. Table 4.5 illustrates this on the following page.

Table 4.5: Behavioural indicators of social proximity, coding and classification

Examples	Indicators	Classification	Coding
	movement or control of body away from adult, or shoulder moved toward adult to shift body orientation away from interaction (create a barrier), or withdrawing hands or arms, moving head to face away, orientation of head to face away	Social Proximity	Very Negative 1
	movement or control to increase distance from adult, slight movement of arm away from adult, or leaning body away		Negative 2
	head positioning still or movement or body control maintaining posture or position in relation to other people/adult		Passive 3
	movement or control of body to remain close to adult (around 30cm) tolerance of proximity without distress or withdrawal, may lean toward adult/other		Positive 4
	movement or control of body to increase proximity to adult to move closer, (20 cm or less), may reach out toward adult, may move to face adult, may maintain face to face posture		Very Positive 5

Classification of Facial Expression

Ekman and Friesen (1971, 1978) demonstrated the recognition of basic emotions (happy, sad, angry, afraid, surprise and disgust) revealing that symptoms of inner mental states were observable in the face across cultures. Work by Baron-Cohen and colleagues (Baron-Cohen, Campbell, Karmiloff-Smith, Grant, & Walker, 1995) developed this further, to include a number of other mental states which can be read from direction of gaze (which included desire, refer to someone, and indicating a goal). Further work in this area (Baron-Cohen *et al*., 1996; Baron-Cohen *et al*., 1997) found that typically developing adults and children across different cultures recognised a range of mental states from facial expressions. They explored states such as scheme, revenge, guilt, recognize, threaten, regret and distrust as well as basic emotions, such as those documented by Ekman (Ekman & Friesen, 1971, 1978). This body of research suggests that many facial expressions (and cues such as gaze) allow an observer to infer something about the mental state of the participant being observed. Caution is required however, because it is not possible to infer from the outwardly observable behaviours precisely what that person is thinking (Hogg *et al*., 2001). It is possible that a person does not reveal any outward sign of their internal mental state and that the observer cannot observe any clues about their cognitive state. While accepting this note of caution, it remains appropriate to adopt a methodology which systematically observes the eye gaze, head orientation, face position and facial expression of a participant to make inferences about their focus of attention, social proximity and emotional response. This is similar to the approach taken in other work on associated themes (Munde *et al*., 2012; Vlaskamp & van der Putten, 2011; Vos *et al*., 2013; Vos *et al*., 2012). The coding system developed to identify and classify the facial expressions of the participants in this study was developed on the basis of repeated observations of interactions with the participants. It seemed inappropriate to base the assessment on a pre-existing measure such as Ekman's Facial Action Coding System (Ekman & Friesen, 1978) because that system presumes neurotypical and physiological functioning and does not take into account the non-typical expressions of the participants in this study. Even similar work in this field, on attention measures (Munde *et al*., 2012) or pain assessment (Vlaskamp & van der Putten, 2011) were not appropriate in that they weren't individually tailored, they explored only a single construct rather than several elements of one broader theme (as is attempted in this study). As the coding system developed, however, it seems that broadly recognizable characteristics were present in facial expressions, and that even with the exceptional participants in this study- some broader categories were possible (see illustration in Table 4.6). This may mean that the FACS might have been used after all as the basis for the coding system, however, given that the other measures were also developed de novo from observation of the interactions with the participants it would mean using a coding measure which does not necessarily have the same theoretical underpinnings. It would also mean re-analysing all the data from the interactions once again, with a measure which might not be as
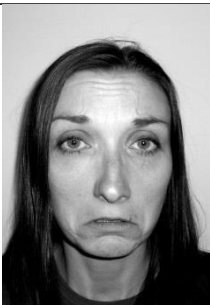
well suited to these participants as the original coding approach.

Facial expressions are outwardly observable behaviours which communicate internal emotional state to ourselves and others. They have definable characteristics which are used in this classification system to identify the emotional responses of the participants to the interaction with the communication partner. The most difficult category to define is a neutral facial expression, where the features seem 'blank' – eyebrows are neither elevated nor depressed, cheeks are not moving nor are chin or muscles around the jaw, the mouth is not obviously smiling nor frowning, and the eyes are not wide open, squinting, drooping or shut. This neutral facial expression is coded as passive because it is neither expressing positive nor negative emotional states.

Facial expressions where the cheeks are compressed, and the mouth curves upwards at the ends are defined as positive facial expressions. These smiles may be of varying magnitude, a broad smile (mouth opened or closed) with raised eyebrows, compressed cheeks and eye openness is coded as very positive. A less broad smile with only slight impact on cheek shape and eyebrow movement is coded as positive.

Facial expressions where the muscles around the mouth and jaw are lowered and the mouth curves downwards into a frown are coded as negative facial expressions. These frowns may be of varying magnitude, a broad frown or grimace (mouth opened or closed) with furrowed eyebrows, tense muscles in the forehead, and downward contracted mouth and jaw muscles would be coded as very negative. A narrower frown, with less impact on the eye area, and less obvious contraction of the forehead would be coded as negative. This is illustrated in table 4.6 on the following page.

Table 4.6: Behavioural indicators of Facial Expression, coding and classification

Examples	Indicators	Classification	Coding
	Grimacing (extreme distress, broad frown, closed or open mouth), tense forehead, eyebrows depressed, muscles around mouth and on jawline depressed, eyes may droop or appear half closed, and/or head banging, and/or face hitting, and/or hair pulling and/or occurs with negative vocalisations screams, or roars, or wails, may be tearful, unsettled and sob or cry	Facial Expression	Very Negative 1
	Frowning moderate/slight, forehead may be tense, eyebrows may be lowered, eyes may seem droopy or half closed, bottom lip may protrude and or may quiver or pucker, may be close to tears, unsettled and upset appearance may sob or gasp and/or face rubbing, and /or rocking head, and/or flapping, and/or face stroking, and/or thumb sucking, attempts to self -comfort unsuccessful- remains upset		Negative 2
	May be watchful, neutral expression- neither smiling nor frowning, facial muscles appear relaxed eyebrow not notably raised or depressed, jawline relaxed, cheeks relaxed, not sobbing or gasping, self -stimulation may still be intense but emotions of distress or enjoyment not apparent on face and/ or face stroking and/or thumb sucking with neutral affect		Passive 3
	Slight smile- mouth slight curve upwards (may be asymmetric), mouth may open, slight /moderate compression of cheeks, eyes may appear narrower, eyebrow may be slightly raised, self-stimulating activities may continue, head may bob slightly,		Positive 4
	Broad smile- compressed cheeks, raised eyebrows, upper eyelid raised, lower lid narrows eye, mouth may be closed or open, mouth curves upwards (may be asymmetric) tongue may protrude or not and/or no self-harm, and/or whole body coordinated movements may indicate enjoyment- such as hand flapping or clapping hands or rocking body with broad smile		Very positive 5

Developing the Coding of Adult Interaction Approaches

Adult input into the interaction was also coded in this study. The reason for doing so is to chart the interaction between the communication partners and plot the pattern of behaviours and responses between the initiator (in most cases the adult) and the responder (in most cases the participant). In order to glean as much information as possible from the interactions between the communication partners, it was necessary to code the adult input as well as the participant behaviours.

A necessary part of this coding process was to decide on the focus of the coding system- in this case it was important to identify the communication approach (adult input) through the adult's vocalisations, but also to chart whether the adult touched the participant or not as a part of this interaction. Other features of the interaction such as adult proximity to the child were not included, this was because it was not deemed to be as central to the focus of the study, (and to some extent this information would be available through the participant responses in the social proximity strand of coding).

The adult vocalisations were coded as

silent when the adult neither spoke, nor sang nor made non-verbal vocalisations

speech when they were using their usual speaking voice to talk to the participant (flattened melodic contours, often erratic rhythmically) this included sing-song speech where the adult uses more melodic tones in their speaking voice- such as those adopted when speaking to a young infant (called motherese or infant directed speech in the literature on this phenomena)

song when they voiced their words or non -words to use a wider melodic range without flattened tones of typical speech, and followed a recognisable melody with their voice when interacting with the participant. If music was playing, or an object was making noise this was also included in the coding scheme, so that environmental contextual information could support the analysis of potential interaction patterns.

Classifying additional Stimuli: Touch by Adult

A separate but still significant issue is that of the other adult inputs to be coded in this scheme. When the adult communication partner is speaking, silent, or singing to the participant the inputs are fairly simple to define (though speech with a sing song tone was more complex.) The interactions also featured touch between the communication partners. In order to code this, two types of touch by the adult were defined: active and passive. Active touch involved the adult actively holding and moving the child's hand, or patting or stroking the child on the hand or face (the rare occurrences of other sorts of active touch are described in detail in the video descriptions). This active type of touch is coded (active touch occurs when there is motion or an

interactive or sensory stimulation intention associated with the touch). Passive touch occurs when the adult uses their hand or arm to physically support the child and there was no movement, or interactive or sensory stimulation intended. Where the adult is supporting the child's body or positioning, without moving, the adult is effectively acting as a piece of furniture (such as a chair or a back rest) This passive type of touch was not coded in this scheme, because this input was constant throughout the interaction and would not have a bearing on it (c.f. the touch of sitting in a chair which does not move). Where the adult was supporting the child with one hand (passive touch) but actively holding or moving the child's hand with the other hand, this was coded as an active touch. Figure 4.7.1 Shows an adult holding a child. The adult hand is touching the child's back to enable the child to sit upright - this would be coded as a passive touch because the adult is not moving the hand. Figure4.7.2 Shows an adult hand holding a child's hand.   The adult is squeezing one of the child's fingers, rolling it between the thumb and forefinger, and   pressing gently on it, the fingertips of each hand are touching, and is part of a sequence of stimulatory interactive touches between the adult and child where movement and changes of pressure are interchanged. This would be coded as an active touch. Figure 4.7.3 shows the adult   holding the child's hand, where the adult is moving the hand and varying the position of, and pressure on, the child's hand, or may be manipulating the palm or fingers using her whole hand rather than just fingertips. This is much more adult led, and less interactive because the child may   respond quite passively to this kind of touch. This is coded as an active touch.

Figure 4.7: Illustrative figures of touch by adult classification of passive or active touch

| Figure 4.7.1 Passive Touch | Figure 4.7.2 Active Touch | Figure 4.7.3 Active Touch |

Equipment

Sessions were recorded on a Vado (Creative Labs) digital video camera. The Vado is a small flat grey cuboid, which measures 3.9" (H) x 2.2" (W) x 0.6" (D) (about the size of a small mobile phone), and weighs 84g. It needs no additional equipment, wires or lenses (an image can be viewed in Appendix B).

The Vado was hand held by a familiar adult, or was used on a miniature tripod on the desk while the lesson was carried out as usual.

The recordings took place over two academic years. The number of repetitions in video recording meant that findings were likely to be more robust than if they were taken from a single short period of observation. Seventy nine interactions were recorded in all. These included recordings during a preliminary phase of the work that investigated pupil responses to music across a wide variety of pupils and settings. Many of these episodes were excluded from analysis later, once the inclusion criteria were established; all recordings are stored securely.

The interaction episodes were often scripted, but the teacher was responsive to the participants. If a child became distressed, or there was disruption in the environment, recording stopped. As a result, some of the interaction episodes were longer than others, and some were more useful sources of data than others.

Information sharing

In line with conventional action research paradigms (Arthur, Waring, Coe & Hedges, 2012; Munn-Giddings, 2012) throughout the period of data collection, feedback and emergent themes were used to shape the development of the project (McNiff, 1995). The videos were not shared directly, but emergent themes, critical incidents (such as recognising vocal communication other than screams) and the development of the event figure format were discussed, and shaped the project via a cycle of feedback from practitioners and academics over the course of the project.

Table 4.8: Information Sharing and project development cycle

Date	Who involved	Information shared	Feedback/outcome
September 2008	Parents, governors, head teacher (HT) and researcher (RR)	Description of the aims of the study, consent required, forms sent home, discussion with parents and follow up by telephone by RR	Verbal consent from all parents received. Written consent by 3 sets of parents, (some parents indicated consent by initialling the letter rather than filling in the form) governors and HT gave consent for this study to take place
January 2009	All staff at whole staff briefing	General aims and outline of study, methods used and permission for data to be recorded required from staff	Staff agreed verbally to be recorded after the briefing meeting. Terms of the data storage, confidentiality of their recorded images explained again by RR and verbal consent given by staff member to RR in each session prior to recording
May 2009	RR, SK, SL (Staff in School, participating in project and familiar with pupil)	Event graph for Diane (video 33)	Practice for RR in sharing information about pupils confidentially. Staff feedback very positive, leading to useful conversations about identifying communicative behaviour (other than screaming) and informally 'listening for' these in following sessions
August 2009	RR round table Earli JURE Conference (Amsterdam)	Event graph for Diane (video 33)	Positive feedback, but some confusion about use of duration on X axis - not clear enough
August 2010	RR paper presentation Earli JURE Conference (Frankfurt)	Event graph (Diane video 33) and method description hand-out	Positive feedback about graph, some discussion of overlap or independence of 'constructs' being measured e.g. cognitive, emotional, social
September 2011	RR, SK, SL	Behaviour coding and graph with clearer duration line	Staff didn't notice difference between old and new version, positive feedback for both to RR. Discussion about 'word of mouth' and anecdotal effects of song in school across support staff
September 2011	Teaching Staff and RR	New format 'pupil passports'	New format of pupil passports discussed, importance of family views in this agreed, and communication preferences to be detailed in the passports discussed. All participants in study to have 'likes songs and singing along' to this section suggested and agreed.

Video inclusion and exclusion criteria

The episodes of interaction and daily routines were videoed on a small hand held camera in the academic year of 2009. During this period, the focus group of participants included some pupils who were on the Autism Spectrum continuum, later in the study this focus shifted to explore more deeply the communication challenges facing individuals with PMLD. As the nature of the study shifted, so too did the inclusion criteria for the recorded interaction episodes. Those episodes which were included in analysis met several criteria:

- participants (who met the requirements listed in 'participants' section of the methodology) could be seen, clearly (important for the recordings done during school assembly)
- the video had good audio and visual qualities, suitable for microanalysis
- the session featured more than one type of interaction approach (or was recorded adjacent to an episode where different stimuli featured).

Table 4.9 shows episodes included in the analysis; recorded episodes which did not meet these criteria are described in Appendix C.

Table 4.9: Recorded episodes included in analysis

Participant	Video Number	Date	Duration	Setting	Adult present
Diane	vid00033	06/06/2009	11.58	one to one	SR
Diane	vid00038	16/10/2009	0.26	one to one	SK
Diane	vid00039	16/10/2009	0.31	one to one	SK
Jessica	vid00013	25/03/2009	3.19	large group	MA (MB SL SB)
Jessica	vid00022	25/03/2009	7.24	large group	MA (MB SL SB)
Angela	vid00007	09/07/2009	0.47	one to one	SK (SW)
Angela	vid00008	09/07/2009	1.18	one to one	SK (SW)
Angela (V)	vid00030	25/06/2009	2.19	two to one	SK (SR)
Angela (V)	vid00031	25/06/2009	1.39	two to one	SK (SR)
Vanessa (A)	vid00030	25/06/2009	2.19	two to one	SK (SR)
Vanessa (A)	vid00031	25/06/2009	1.39	two to one	SK (SR)
Colin	vid00044	23/11/2009	5.5	large group	SM (SJ SW)

Reliability data: for the rating of participant responses

The coding system was updated to improve the behaviour observation descriptors in 2013, and all the videos were re-analysed using the updated coding system. Four months after these codings, videos 13, 38 39, 30 and 31 were recoded (video 30 and 31 were re analysed twice with a different participant as the focus of analysis), with no reference to the original codings. Four months was deemed an appropriate delay to ensure that the coder had forgotten details of the original codings. This re-analysis comprised 730s out of a total of 2566s of video data, which was 28% of the total video content. The videos reanalysed included four of the five pupils (Jessica, Diane, Angela and Vanessa) included in the study. Scoring reliabilities were calculated by correlating the codes allocated in the two coding sessions devoted to each video. The correlations are shown in table 4.10.

Table 4.10: Reliability data

Video Episode	13	38 39	30 31 A	30 31 V
Adult input	0.84	1.00	1.00	1.00
Attention Focus (AF)	1.00	0.90	0.96	1.00
Social Proximity (SP)	0.99	0.98	0.99	0.99
Facial Expression (FE)	1.00	0.99	1.00	0.99
Vocalisation	0.67		1.00	

It can be seen that the scoring reliability is very high – so high as to be worth exploring. There is a number of reasons why scoring can have such a high reliability. Here, the coding system was very specific about the types of behaviour to be observed and the coding score to be allocated. Further, many pupil states remained stable (the same) for 10s or so duration in the videoed interactions, so this led to high coding reliability.

The exception to these high levels of reliability occurs in the vocalisation recoding done for video 13.– In an investigation of this low reliability, data were checked by subtracting one set of values from another to see where disagreements lay. Essentially, codes were displaced at the start and end of some vocalisation events (i.e. different decisions had been made about exactly when a vocalisation occurred in the coding and recording sessions). In the analyses that follow, the vocalisation records are based on the first coding.

Procedure

The camera was hand held or mounted on a mini tripod, and switched on when the teacher was about to begin the taught session (or was switched on and held to observe target pupil and peers in a naturalistic setting).

Data Analysis

Selection of Data

The camera's internal USB cable was used to transfer the digital video data to computer. When the episode had been watched at least once, it was added to video list 1 (see Appendix C) along with some descriptions of basic features. Simple inclusion criteria were applied to select videos appropriate for analysis. The criteria were: that it included suitable participant(s), that some interaction was occurring (i.e. recordings where there was no response to any inputs were not included) and that the quality of the recording was adequate for analysis. If it looked as though a complex interaction was taking place that might be useful for inclusion in the study, the session was then described in rough terms: who is featured, where they were positioned, what the inputs

and responses were, and the interaction sequence. Ten videos satisfied all the criteria, and all were analysed.

Step 1: Classifying and Coding

First, the behaviours of the individual participants were coded in terms of attention focus, social proximity facial expression, and vocal or action categories, every second (AF, SP and FE are not fully independent, but do reflect different aspects of behaviour. A common 5-point numerical scale was used to describe the responses of all pupils; however, the mapping between specific behaviours and the numerical codes was unique to each pupil. The aspects are colour coded in table 4.11 to match the data series in event figure 4.14, to support interpretation by the reader.

The coding scheme is illustrated in Table 4.11 (on following page)

Table 4.11 Angela's behaviour: classifying and coding (Exemplar)

Classification	Behavioural Indicators	Coding
Attention Focus	closed eyes (not blinking)	Very negative (11)
	eyes looking past adult, unfocused eyes not directed at object, person or activity in room e.g. looking at ceiling or blank wall for +2s	Negative (12)
	brief attention, eyes looking towards adult body, hands or an object for around 1s- scanning	Passive (13)
	eye pointing to adult hands, or object for a more sustained period before moving onto look at other item or activity, eyes directed at face briefly (1 or 2s)	Positive (14)
	sustained eye gaze toward adult face (>2s) lasting attention to object/hands/adult, purposeful control of body to sustain eye contact	Very Positive (15)
Social proximity	major movement or control of body away from adult/other person withdrawing hands or arms and/or moving head to face away, turning to face away and/or shifting body to turn shoulder to other person	Very Negative (6)
	minor withdrawal movement of arm away from adult and/or slight lean away, but maintaining some engagement through posture of head/face direction	Negative (7)
	head position still or movement or body control to sustain a neutral position, passive tolerance to social approaches	Passive (8)
	movement or control of body to remain close to adult (around 30cm) tolerance of proximity without distress or withdrawal, may lean toward adult/ other person	Positive (9)
	movement or control of body to increase proximity to adult to move closer (20 cm or less), may reach out toward adult, may move to face adult, may maintain face to face posture, may attempt to communicate	Very positive (10)
Facial Expression	grimacing (extreme distress, big frown, closed or open mouth), and/or face punching, or head banging and/or occurs with negative vocalisations; screams, or roars, or wails and/or aggressive to others hitting, clawing, nipping, head butting	Very Negative (1)
	Frowning, and/or moderate self-hitting of hands or face, banging head, hands and/or face with moderate force against hard objects or self, and/or may growl, sob, or moan	Negative (2)
	May be watchful, neutral expression - neither smiling nor frowning, not sobbing or gasping, self-stimulation may still be intense but emotions of distress or enjoyment not apparent on face	Passive (3)
	smile, self-stimulating activities may continue	Positive (4)
	Laughing and/or broad smile-noticeable across whole face in eyes and eyebrow area and cheeks, no self-harm	Very positive (5)
Vocalisation	Scream, distress wail	Negative (0.5)
	Sing, shout, yell	Positive (6.5)
Action	Holds object	6

Adult behaviours were also given a code - to support the next step in the analysis process.

Table 4.12 Adult's Behaviour: classifying and coding (Exemplar)

Adult interaction Approach	Coding number
Adult song	18
Adult song + Teddy song	18.7
Adult song + Hand touch	18.5
Adult speech + Teddy song	17.7
Adult speech	17
Adult speech + Hand touch	17.5
Adult silent + Teddy song	16.7
Adult silent + Hand touch	16.5
Adult silent	16

Step 2: Analysis of Video Data

Step two involved using a spread sheet (Microsoft Excel©) to create a table for the second by second analysis of the video. This comprised: the timeline itself; the adult input (and where appropriate peer input or peer response); the pupil Attention Focus (AF) response score; pupil Social Proximity (SP) response score; Pupil Facial Expression (FE) response score;

Vocalisation (coded 6 if this is positive, and 0.5 if it is negative); and pupil Coordinated action (code 6). Table 4.13 provides an example.

The video was watched repeatedly, paused and replayed at half speed until the second by second analyses had data for every pupil response to the input which occurred in the video.

Some of the videos (e.g. video 22) missed some data (where the focus of the camera shifted away from the participant). These seconds of film were excluded from the analysis to create an edited timeline. Where this method was used, it is clearly indicated in the analysis.

Some videoed interactions were recorded consecutively; where this occurred the analysis appears in an edited timeline. This was done to promote a clearer interpretation of the event sequences from the recordings. Where this has taken place both video recordings are named with a space in between (for example video 38 39), and it is also indicated in the analysis.

Table 4.13: Video analysis coding (Exemplar)

video time	0	1	2	3	4	5	6	7	8	9	10	…	20
adult input	16	16	16	17	17	16	16	17	17	17	17	…	17
A Attention Focus	12	12	13	13	13	12	11	11	11	13	14	⋯	15
A Social Proximity	7	7	8	8	8	7	6	6	6	8	8	⋯	9
A Facial Expression	3	3	3	3	3	3	3	3	3	3	3	⋯	4
Vocal													

Step 3: Segmenting the Data and Creating Figures

The third stage was the creation of a graphical display of the session. Scores on each component were presented on the same figure, using a common timeline. This is illustrated in Event Figure 4.15. The session timeline was divided into interaction episodes with a vertical line. The divisions were made according to the dominant interaction initiated by the adult. This segmentation of the interaction aimed to ease the interpretation of the event figure. Each is labelled and numbered to indicate order of events and dominant interaction type. Analyses and interpretations of the interactions are based on these segments. Where data is missing (for example where a child covers their face, or the picture becomes obscured because the camera moves or changes focus) this is indicated with a vertical dotted line indicating when during the interaction this data is missing. The dotted line intersects the responses where data was not available, so the dotted line may intersect one axis (as in Event Figure 6.3) or all three response axes (as in Event Figure 9.3).

In all of the event figures, the codes on the Y axis are presented uniformly. This is to facilitate interpretation by the reader. The response codes on the event figure should be interpreted as follows in Table 4.14.

Table 4.14 Response coding scores in event figure and classification

Behaviour Coding	Event Figure	Attention Focus	Social Proximity	Facial Expression
Very Positive	+2	15	10	5
Positive	+1	14	9	4
Passive	0	13	8	3
Negative	-1	12	7	2
Very Negative	-2	11	6	1

Event Figure 4.15: (exemplar)
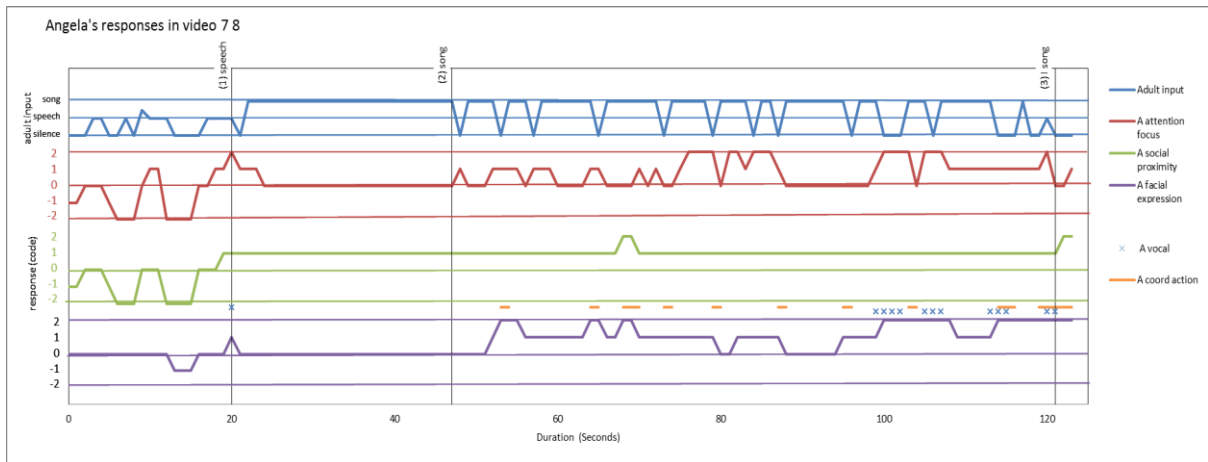
Step 4: Multiple Analyses of Data

In each session recorded, there were a number of discrete episodes, such as speech and song. The response scores of participants to each particular interaction type were aggregated across the video as a whole. For example, in a video which comprised 20 seconds of speech, 30 seconds of song, a further 20 seconds of speech, and a further 20 seconds of song, responses to the speech interactions would be aggregated (so there would be 40 codes (i.e. one per second) for each of AF, SP, and FE together with vocalisation and coordinated action data), as would the responses to song (here 50 codes for each variable). These aggregated scores were then analysed, statistically. All the seconds in the recorded episode where the pupil responded to a particular input (e.g. where the adult input episode is 17 speech) were examined, and an average of the cognitive, social and emotional responses was calculated. The majority of the adult input in this episode was adult speech, so even though there are some adult inputs of 16 silent, the majority stimulus is used. This is illustrated in a table. Then the number of seconds of vocalisation which occurred during that input was counted, and how many seconds of coordinated action occurred during that input were counted.

Deriving the Compiled Response Score (exemplar)

Adult input speech = 17 (for 20 s*)

A Attention Focus responses = 12.47 where 12 is a negative score and 13 is a neutral score)

A Social Proximity responses= 7.29 (where 7 is a very negative score)

A Facial Expression responses= 2.90 (where 3 is a passive response score and 2 is a negative score)

These were only calculated where 10s or more of responses to the input was available, to ensure the stability of the response behaviour. The purpose of this compiled response score was to allow analyses of patterns that occurred across recordings with generalised episodes of stimuli.

The use of the multiple events timeline, and the compiled response scores, meant that there was

a clear means of presenting the events on the video which could be shared without compromising pupil anonymity, and which could answer the research questions.

Step five: the response scores were used to calculate mean and standard deviations, so that a test could be performed. This is explained in detail in the section on statistical analysis.

Statistical analysis

The data were presented in event figures which plot the adult input, and pupil behavioural responses in terms of attention focus, social proximity and facial expression as the interaction unfolds. Event lines mark the end of major input segments within the event figures, to ease interpretation of the interaction sequence. It is important to note that these create broad segments and simplify the interaction somewhat, and that the behaviours observable in any social proximity interaction are more complex and multifaceted than is portrayed here. Social proximity interactions cannot easily be translated into still, two dimensional figures without necessarily missing some of the nuances inherent within it. Despite this limitation, the event figures attempt to portray the unfolding interaction (albeit simplistically) in order to analyse patterns which might emerge and which otherwise would be difficult to communicate. The data from analysing the videoed interaction sequences was also analysed statistically, to provide information on the significance and effect size of the findings. One caveat herein is that because the data were sequential (and not categorical), many would argue that the use of statistical tools for this analysis is inappropriate. However, here, these tools are used as an indication of size of effects, and the robustness of the findings – in particular, to offer some quantitative support for qualitative judgments made via visual inspection of the graphs, and so are secondary to the analysis of interactions using the event figures.

Hostyn *et al*. (2011) observed the attention behaviours of individuals with PMLD, and analysed the sequential data gathered through frequency measures and using correlation; Forster (2011) also used a similar approach to explore interaction. The two videos feature in the analysis together, because they occurred immediately after one another. This allows easier comparison of the interaction sequences in the event figures. One limitation of this that the episodes occurred in separate video clips of an interaction, so a critical reader might be suspicious of the reasons for this, because less than five seconds passed between recording of video 38 and 39, it is treated as if it were a continuous recording. The analysis was presented in this way to enable more effective comparison of figures from shorter interaction sequences to longer recorded interaction sequences. This avoided the greater limitation of comparing 30s of interaction events (as in video 7) with 13 minute duration event figures (as in video 33), which would make the interpretation of the event figures much more difficult and also much less useful.

Interpreting statistical results

The thesis follows the guidelines set out in the Publication Manual of the American Psychological Association (APA) (2010) for conducting and reporting the results of statistical analyses. In particular, the thesis reports effect sizes and confidence intervals, as well as the statistical significance of results. For example 'Angela's facial expression scores mean difference (adult song versus adult silence + singing teddy) was 0.62 [0.50, 0.74], the effect size was 1.05, and reached statistical significance'. This section explains and justifies the analyses used in the thesis.

Statistical Significance: A major focus of this thesis is pupils' responses to different teaching conditions (most commonly: song, speech, or silence). Pupil responses have been coded under 3 different categories; Attention Focus, Social Proximity, and Facial Expression. Each is judged on a 5-point scale. For every recording of each pupil, the means and standard deviations of scores on each category have been calculated for each condition, so that they can be compared using a *t*-test. If a condition is repeated (for example, the teacher, sings, then talks, then sings) the score includes all responses to the same condition in the recording (in this example, a single 'song' score would be calculated, based on the responses to the two episodes where singing occurred).

Statistical significance is an indicator of how often a particular result (here, a difference in mean scores on each rating scale) would occur in 100 repetitions of the study if, in reality, all the scores are drawn from the same pool of scores. The APA Manual (2010) advises "when reporting *p* values, report exact p values (e.g., *p* = 0.31)" (The American Psychological Association, 2010, p. 114). It does permit the use of relative values (e.g., *p* < .05) or asterisks, to make Tables easier to read.

There are two problems with the analysis of rating scales via a *t*-test. The *t*-test makes the assumption that the population of measures is bell-shaped, and also that every measure is independent of every other measure. However, here, both of these assumptions are likely to be violated. Scores often do not have a Normal distribution. In observations of a pupil, adjacent measures are likely to be correlated – for example, a negative Facial Expression recorded at 45 seconds is more likely to be followed by a negative Facial Expression at 46 seconds than by a positive Facial Expression at 46 seconds. It follows that interpretations of the data need to be made with some caution. However, the *t*-test is useful because it provides a necessary (but not sufficient) condition for conclusions to be drawn. If the results of the *t*-test show no statistically significant difference between conditions, it must be concluded that no differences have been observed; if there is a statistically reliable difference, this provides evidence for a difference, although the size of the observed difference should be treated with caution.

When conducting *t*-tests, it is common to assume that the variances of both sets of scores are identical, and to use a simple method to calculate the pooled variance. Degrees of freedom are also commonly calculated in a straight forward way ($n_1 + n_2 - 2$, where n_1 and n_2 are the sizes of

the two samples). Here, the assumption that variances are identical cannot always be made, and so all calculations are based on the assumption that the variances are different. The calculation of the pooled variance allocates roughly equal weights to each sample (rather than including all the data points from both samples in the calculation). This results in more conservative *t*-tests (i.e. larger differences have to be found before results are judged to be statistically significant), and to wider confidence intervals on the mean differences. There are also direct implications for the degrees of freedom, which here have been calculated using Welch's approximation (See Cumming, 2012, p. 165; Utts & Heckard, 2007, p. 468). Welch's approximation takes account of the variances of each sample, and can give rise to some seemingly paradoxical results. For example in looking at the results of 2 different *t*-tests where the sample sizes are identical (say, comparing a group of 20 scores and a group of 40 scores in both tests), the degrees of freedom can be quite different). The apparent anomaly arises whenever there are large differences between the variances of the samples in one test but not in the other. As before, the use of Welch's approximation leads to more conservative *t*-tests.

Effect Size: effect size is a measure of mean difference divided by the standard deviation of the scores. Cohen (1988, cited in Cumming, 2012) argued that researchers should make a judgment about the practical implications of a study based on the magnitude of the effect size they found. He suggested that an effect size of 0.2 should be considered to be small, one of 0.5 should be considered to be medium, and an effect size of 0.8 should be considered to be large, in the context of educational research. (Note, however, that for any decision about practice, the relative costs of different interventions should also be taken into account – so a change in practice associated with a small effect, but which costs almost nothing to implement, might be preferred over a change in practice associated with a larger effect that would cost a great deal of money (e.g. reducing class size) to implement).

In this thesis, all the effect sizes relate to differences in mean scores between two conditions, such as the mean ratings of Social Proximity when the teacher is singing or when the teacher is speaking to the pupil. Here, there is no fixed standard deviation against which the observed mean difference can be judged. Instead, the pooled within-groups standard deviation has been used (see Cumming (2012) p288). The overall importance of the results can be judged by relating the mean differences found to the behavioural descriptors on which the measures are based.

Confidence Intervals: suppose there is a difference in the Social Proximity scores when the teacher is singing or when the teacher is speaking to a pupil. A confidence interval shows the margin of error associated with the difference. Essentially, for a 95% confidence interval, if the study were repeated 100 times, the observed difference in the Social Proximity scores would be expected to fall within the confidence interval 95 times. The thesis follows the APA (2010) guidelines and

reports confidence intervals in square brackets. When confidence intervals are presented, they are always 95% confidence intervals. Here, the confidence interval (CI) is given as a two-sample *t*-interval. That is to say, the confidence interval is

CI = [mean difference – *t** x standard error, mean difference + t* x standard error]

Where *t** is the value of *t* for the given degrees of freedom that encompasses 95% of the t-distribution.

Summary

The study used digital video to record interactions with participants with PMLD who had poor social tolerance. All of the digitally video recorded interactions which satisfied basic criteria were selected for analysis. The unique behaviours of participants were classified and coded second by second on three primary dimensions: attention focus, social proximity and facial expression, Adult interactions were recorded, along with pupil vocalisations and actions. The analysis was performed by an individual observer, who reanalysed several recorded episodes (13, 38 39, 30 31A, 30 31V) four months after the original coding, to investigate scoring reliability. Intra rater reliability was found to be very high in this project.

Inter rater reliability was not assessed in this study due to the limitations of practitioner research. Within the context of working in a school alongside support staff, it was inappropriate to request further support from them (through asking them to do research training in behaviour coding and video behaviour analysis which would involve committing even more time to the project) which they had already been kind enough to support. Their tolerance and generosity allowed the project to be conducted alongside everyday practice successfully, but asking them to do more would not have complemented their skills or interests in practice.

The coded data were presented in two ways. Firstly, the data were presented as a figure relating the interaction between the adult to participant responses, with duration of the interaction on the *x* axis. The interaction was divided into episodes using vertical lines, which corresponded to changes in the interaction approach of the adult. The interaction which dominated the episodes (between the dividing lines) was used to label the episodes.

Secondly, the data was analysed as compiled response scores, where the responses to particular inputs during the episodes were aggregated and compared. This facilitated analyses of the patterns of pupil to behaviour associated with different interactions, which allowed some simple statistical analysis to be performed to support the drawing of conclusions about the impact of different interaction approaches.

Structure of the chapters

The following chapters feature detailed case studies about individual children. A large amount of information was collected through multiple observations of them in different settings and

contexts, to see if consistent patterns of responses to specific inputs emerged. The chapters are structured as follows: details of the setting, activity and participant(s) are given (including the unique mapping of pupil behaviour to cognitive social and emotional codes), and then a detailed analysis of the interaction sequence is presented. Each sequence episode was divided into and analysed in one minute segments. The interactions in each segment are described briefly, presented as a segment event figure and summarised. The data were also collated and averaged so a compiled response score is aggregated from the interaction episode as a whole, and this was presented in the analysis section in each chapter. The results of the analysis of the data as presented in the segment event figures, and the compiled response score for the whole episode are summarised and discussed at the end of each chapter.

Chapter 5: Angela

Introducing Angela

The impact of song on the communication and interactional abilities of Angela, a 14 year old girl with PMLD, is explored. The chapter presents the analysis of four digital video recorded interactions involving Angela, and other staff members and pupils. Videos 7 8 and 30 31 will be analysed in detail. The chapter then goes on to provide a discussion of the significance of the data with respect to Angela's communicative abilities and the kinds of communicative stimuli that evoke interaction responses from her.

Vignette

The following interaction episode features both Angela and Vanessa. The description of the participants and the setting is the same, but the focus of the chapter (being individual case focused) is different. To avoid duplication in later chapters, the relevant information will not be repeated, but will be cross referenced.

Angela features in interaction episodes which occurred during formal, taught settings. One of the sequences features her peer Vanessa and this is the episode recorded in video 30 and 31. This study compared Angela's responses to speech and song in a variety of combinations and with the additional stimulus of a sound making toy. Angela showed some preferences for song and an intersubjective awareness which had not previously been detected. This is explored in the interaction sequence which followed, and was recorded in episode video 7 8.

Video 30 31

Participants and relationships between participants: the participants in this episode were Angela, Vanessa, staff member SK who was interacting with the pupils and staff member SR who did the video recording. Angela has very limited speech, and has low social tolerance, hitting and nipping adults, peers and herself. She is doubly incontinent and needs support with feeding, though she can drink from a cup with support. She is in a wheelchair and suffers from regular epileptic fits. Vanessa is also 14, but is the same size physically as a two year old child. She has PMLD, and multiple sensory impairments. She needs high levels of support due to her blindness, hearing impairment and physical difficulties. She is in a wheelchair, but can be 'walked' in a standing position if supported by an adult holding her. She is hard to reach due to the difficulties she faces in communicating her needs with others, and when interacting with the world she is very passive. Staff member SK is female, approximately 30 years old. She is a familiar adult to the pupils, and has been working in their class for two years. Staff member SR is female, approximately 25 years old. She is a teacher who has had many interactions with Vanessa and Angela. She is holding a video camera and is seated at the front of the classroom, visible to all staff and children.

Setting and activity: observations were conducted during a lesson with familiar members of staff. Angela and Vanessa have been in this setting many times. The classroom has computers around the wall, and the peers in the classroom have been working on them; they are finishing their work and getting ready to line up before leaving the classroom. There is some noise as pupils they talk amongst themselves. Angela is seated in her wheelchair, facing SK, and Vanessa is seated on SK's lap. There is a box at SK's feet containing toys including an interactive teddy bear which talks and sings. Vanessa's wheelchair is behind Angela, and SR is seated close to Angela. This session was an unscripted interaction that happened spontaneously. The adults were familiar to both children, as was the toy. The inputs were spoken, sung, teddy bear spoken, teddy bear sung, adult spoken/hand touch, sung/ hand touch.

Recording: Video 30 is two minutes and fourteen seconds long. It was shot from the front of the classroom, next to the pupils; all pupils and staff could see the camera being held by a familiar member of staff. Video 31 is nearly two minutes long. Again, it was shot from the front of the classroom, next to the pupils; all pupils and staff could see the camera being held by a familiar member of staff. The episode recorded in video 30 31 was captured in two separate, consecutive videos which had less than 5s between the recordings.

The method used to classify and code Angela's behaviours was the same in both videos. These are set out in Table 5.1. This details Angela's observed behaviours and classifies them according to the analytic constructs of attention focus, social proximity and facial expression. These classifications and codings were used in the microanalysis of the interaction, which is presented in event figure 5.3 (on the following page).

Table 5.1: Angela's behaviour: classifying and coding

Classification	Behavioural Indicators	Coding
Attention Focus	closed eyes (not blinking)	Very negative (11)
	eyes looking past adult, unfocused eyes not directed at object, person or activity in room e.g. looking at ceiling or blank wall for +2s	Negative (12)
	brief attention, eyes looking towards adult body, hands or an object for around 1s- scanning	Passive (13)
	eye pointing to adult hands, or object for more sustained period before moving onto look at other item or activity, eyes directed at face briefly (1 or 2 seconds)	Positive (14)
	sustained eye gaze toward adult face (+2s) lasting attention to object/hands/adult, purposeful control of body to sustain eye contact	Very Positive (15)
Social Proximity	major movement or control of body away from adult/other person withdrawing hands or arms and/or moving head to face away, turning to face away and/or shifting body to turn shoulder to other person	Very Negative (6)
	minor withdrawal movement of arm away from adult and/or slight lean away, but maintaining some engagement through posture of head/ face direction	Negative (7)
	head positioning still or movement or body control to sustain a neutral position, passive tolerance to social approaches	Passive (8)
	movement or control of body to remain close to adult (around 30cm) tolerance of proximity without distress or withdrawal, may lean toward adult/ other person	Positive (9)
	movement or control of body to increase proximity to adult to move closer, (20 cm or less), may reach out toward adult, may move to face adult, may maintain face to face posture, may attempt to communicate,	Very positive (10)
Facial Expression	grimacing (extreme distress, big frown, closed or open mouth), and /or face punching, or head banging and/ or occurs with negative vocalisations screams, or roars, or wails and/or aggressive to others hitting, clawing, nipping, head butting	Very Negative (1)
	Frowning, and /or moderate self-hitting of hands or face, banging head, hands and/or face with moderate force against hard objects or self, and/or may growl, sob, or moan	Negative (2)
	May be watchful, neutral expression- neither smiling nor frowning, not sobbing or gasping, self-stimulation may still be intense but emotions of distress or enjoyment not apparent on face	Passive (3)
	smile, self-stimulating activities may continue	Positive (4)
	Laughing and/or broad smile-noticeable across whole face in eyes and eyebrow area and cheeks, no self-harm	Very positive (5)
Vocalisation	Scream, distress wail	Negative (0.5)
	Sing, shout, yell	Positive (6.5)
Action	Holds object	6

Adult interaction Approach	Coding number
Adult song	18
Adult song + Teddy song	18.7
Adult song + Hand touch	18.5
Adult speech + Teddy song	17.7
Adult speech	17
Adult speech + Hand touch	17.5
Adult silent + Teddy song	16.7
Adult silent + Hand touch	16.5
Adult silent	16

Detailed Description of Interaction with Angela in Video 30 31

Episode 1: Song

Angela is seated in her wheelchair with her head slumped to one side, her hands are floppy and she is unresponsive. Vanessa is seated on SK's knee and is touching her own hands and face; she is slumped forward with closed eyes. SK is touching Angela's hand and begins to sing. 'If you're happy and you know it, clap your hands.' Angela is unresponsive, and Vanessa holds her hand out to touch SK. SK and Vanessa touch hands. Angela is unresponsive. SK sings 'if you're happy and you know it clap your hands. If you're happy and you know it clap your hands. If you're happy and you know it and you really want to show it, if you're happy and you know it clap your hands.'

In this early stage of the interaction episode, Angela's responses are passive in terms of her attention focus, social proximity and facial expression.

 SK reaches and touches Angela's hand, and Angela claps her hands. SK says 'good girl' to Angela as she pats Vanessa's hand. SK sings 'if you're happy and you know it stamp your feet, if you're happy and you know it stamp your feet.' and moves Vanessa's hand in hers. Angela stamps her feet with the song, smiling at SK. Angela points at Vanessa, and SK continues to sing 'if you're happy and you know it and you really want to show it if you're happy and you know it stamp your feet.'

This pointing action of Angela's is really intriguing, because we haven't witnessed this type of communicative ability from her before. It hints at strong intersubjective awareness, and an ability to control her body to send clear communicative messages that we simply were not aware of previously. The attention focus and social proximity scores are very positive here, and her facial expression is positive.

SK moves Vanessa's foot with her hand in a stamping motion (36s) and Angela also stamps. SK continues to sing 'if you're happy and you know it nod your head. if you're happy and you know it nod your head. If you're happy and you know it and you really want to show it if you're happy and you know it nod your head.' Angela nods her head with the song, and points to Vanessa; Vanessa moves to face SK and smiles. SK continues singing the song, and Angela makes lasting eye contact. Angela points to Vanessa again, Vanessa is facing SK and smiling. SK is singing 'If you're happy and you know it, say 'we are' and Angela and Vanessa are happy and responsive.

In this part of the song input episode we see very positive attention focus, social proximity and positive facial expression behaviours. Again we see interaction attempts by Angela in her finger pointing and turn taking in the song. We also see Vanessa is remarkably responsive, for a child who ordinarily crouches over her self-stimulating hand rubbing, the moment of turning to the adult and smiling is very positive.

Angela shouts 'we are' and looks directly at SK, and SK continues to sing 'if you're happy and you know it say 'we are,' Angela shouts 'we are'. SK sings 'if you're happy and you know it and you really want to show it, if you're happy and you know it say 'we are' Angela shouts 'we are'. Vanessa is exploring her hands, and touching her mouth. Angela points at Vanessa and Angela speaks 'oh no, oh no'.

Angela's responses to the song at the end of this episode are very positive across attention focus, social proximity and facial expression scales, her speech and attempts to communicate are clear, and very positive.

Episode 2: Speech
SK asks Angela 'are you pointing to Vanessa? Is Vanessa singing too?' and Angela responds vocally 'eh'. SK repeats her 'yes?' she pauses, 'what else shall we sing?' SK pauses again, 'what about…?'

Angela's responses to speech remain very positive in terms of attention focus and social proximity, but in facial expression shifts from very positive to passive.

Episode 3: Song
SK begins to sing a different song, also familiar, namely the action rhyme 'Miss Polly had a Dolly'. Vanessa moves her hand, to reach out and touch SK's as she motions with the song, her head is down and she faces the floor. SK sings 'Miss Polly had a dolly who was sick, sick, sick'. Angela makes a cradle with her arms, and SK says 'good girl'.

Angela's responses are very positive in terms of attention focus, social proximity and in terms of facial expression shifts from passive (a neutral expression) to a small smile, which is positive.

SK sings again 'so she phoned for the doctor to come quick, quick, quick'. Vanessa leans closer to SK and rests her head on SK's throat, so her right temple rests on SK's collar bone and her face is nestled under her chin; one hand is touching SK's arm and the other is touching her own mouth. 'The doctor came with his bag and his hat and he knocked on the door with a rat-a- tat- tat'. SK motions that she will knock in time with the song, and Angela joins in, at the correct time. SK says 'good girl.' SK sings 'he looked at the dolly and he shook his head' and shakes her head from side to side, Angela shakes her head also.

Angela's responses are very positive in terms of attention focus, social proximity and are positive in terms of facial expression.

Vanessa puts her ear and cheek onto SK's chest and moves her arm to rest her right hand on SK's back just below her shoulder blade; with her left hand she places her open palm on her own chest, so her neck is between her thumb and forefinger and she can feel herself breathing as her chest rises up and down. The back of her fingers are touching SK's chest.

In terms of her social proximity this is very positive. Vanessa is typically wary of touching others. For Vanessa to actively reach out and touch and explore and move to be in closer proximity to the adult is very positive in terms of her interaction and engagement with the social world.

SK continues to sing 'he said, Miss Polly put her straight to bed,' Angela puts her hand to her face in the sign for 'bed'. SK sings 'he wrote on the paper for a pill, pill, pill,' and Angela continues to sit with her head in her hand (in the sign for bed) with her eyes closed.

This section of the interaction poses an interesting problem for any behavioural analysis. It is clear that Angela's behaviours are a direct response to the meaning of the song - she puts her hand to her face (signing 'bed') and pretends to sleep, slumping forward a little and with her eyes closed - which shows that she understands and shares an understanding of the meaning of the song with the adult, communicating this through her actions. In terms of the current method of analysis, however, this behaviour is coded in the completely opposite way - because Angela looks away and slumps over pretending to sleep - like the dolly in the song so her behaviour is coded as being very negative.SK sings 'I'll be back in the morning yes I will, will, will' Angela turns to face SK, and SK says 'bye bye doctor' as she waves, Angela sits up and waves her hand.

This immediate and positive response from Angela supports the suggestion that her earlier responses which were coded as negative were actually her 'acting the part' in the action rhyme, rather than a disengagement from the communication attempts.

Episode 4: Silence
Then Angela returns to the slumped posture, resting her head on her hand. SK says 'good girl' to Angela. Vanessa is cuddled very closely into SK, feeling the vibrations from SK's throat and chest

with her cheek, body, arm and hand. As the song and speech finishes, Angela looks away from SK and stops smiling.

This is coded as negative in terms of her facial expression and social proximity, and very negative in terms of her attention focus.

SR speaks to the class, telling them to log off from their computers. Vanessa is seated on SK's knee slumped towards the adult, and is touching her own hands in a self-stimulatory way. She is passive, and is not interacting with those around her.

Episode 5: Speech
 SK speaks to Angela 'Can you touch her nose? Angela touches her own nose, 'That's Angela's nose, can you point to the bear's nose?' the adult asks repeatedly. Angela watches the adult do it. The bear begins to speak 'this is my nose, kiss me' and the adult holds the bear up to Angela's face and says 'kiss kiss kiss' and makes the teddy kiss Angela. Angela does not respond. Vanessa is leaning against the adult, intent in self-stimulation- manipulating her hands and touching her face with them, her face is downward towards her hands

This response from Angela continues to be very positive in terms of attention focus, positive in terms of social proximity and passive in terms of her neutral facial expression.

The adult asks Angela to put her finger on her nose, as the teddy sings 'put your finger on your nose, on your nose, put your finger on your nose, on your nose, put your finger on your nose, that's where the cold wind blows, put your finger on your nose, on your nose'. Angela does not respond.

Episode 6: Silence + Singing Teddy
 The adult is quiet while the teddy sings and Angela does not respond.

Angela's responses in terms of attention focus are mostly positive, her social proximity is positive, and her facial expression is passive.

Episode 7: Song + Singing Teddy
The adult joins in singing with the teddy during the last chorus of 'put your finger on your nose, on your nose' and Angela puts her finger on her nose, and smiles at SK.

This is a very positive response in terms of attention focus, social proximity and facial expression.

 SK says 'good girl.' The adult talks to Angela 'shall we touch his foot?' and offers the teddy bear for Angela to touch. 'Let's see what happens when we touch his foot' SK says and presses the teddy bear's foot, and then holds the bear up to Angela and pretends to tickle her.

This remains a very positive interaction episode in terms of attention focus, social proximity and facial expression.

Vanessa continues to sit leaning down facing her hands as she manipulates them, rubbing her fingers against her mouth and cheeks. The classroom has become noisy and the dialogue is indistinct because of the sound of loud pupil voices. The adult is quiet while the teddy talks, then asks 'can you hold him?' about the teddy bear, Angela does not respond. SK joins in speaking with the teddy bear 'wee wee wee all the way home' but Angela does not respond. Vanessa has responded minimally to the environment, she continues facing downwards, touching her hands together, and touching her face.

This interaction episode was quite complex with distinct phases within it, early in this episode the teddy bear is singing, and this elicits little response from Angela, her responses continue unchanged, when the teddy stops singing again, there is little change, though Angela does make direct eye contact. In the later stage of this episode the teddy sings again and Angela's responses shift from broadly positive to passive across attention focus, social proximity and facial expression scales.

Episode 8: Silence + Singing Teddy
SK lifts Angela's arm and places the bear there saying 'can you hold him?' The bear is singing 'round and round the garden' and Angela looks at the bear.

Angela's responses are positive in terms of attention focus, positive becoming neutral in terms of social proximity and neutral in terms of her facial expression

Episode 9: Song + Singing Teddy
When SK joins in singing 'like a teddy bear', Angela looks at her immediately and maintains eye contact with her. SK sings with the teddy bear 'one step, two step, tickle you under there' then tickles Angela, who giggles and smiles at SK. SK asks 'was that good?' and touches the teddy bear 'shall we do that one again?' The class are talking loudly, and SR says 'settle down' loudly. The teddy sings again 'round and round the garden like a teddy bear', and Angela looks at it, she continues to watch the teddy bear.

Angela's responses continue to be positive in terms of attention focus, neutral in terms of social proximity and facial expression.

SK is singing along with the bear and touching Vanessa's hand. Vanessa responds with smiles, and some arm control- reaching with both arms to cuddle around SK's neck.

Episode 10: Speech

When the Teddy bear stops singing, Angela gives the teddy to SK, looking at her directly, SK asks 'are you finished with it now? Thank you. Shall I put it back in the box?' Angela responds by smiling slightly and watches it being put away.

Angela's responses are very positive in terms of attention focus, very positive becoming positive in terms of social proximity, and passive with some positive facial expressions.

The event figure shows the adult's interaction approaches during video 30 31, and Angela's responses in terms of attention focus, social proximity and facial expression behaviours as well as her vocalisations and coordinated actions. It can be seen in this episode that all of Angela's positive vocalisations occur during a song episode. All but one of the many coordinated actions occur during and episode where there is singing (including the singing teddy which is indicated by ST in the figure), and never during speech.

Event Figure 5.3 Angela's responses in video 30 31

The event figure details the interaction captured in Video 30 31, it presents the adult interaction approaches, and Angela's attention focus, social proximity, facial expression behaviours in response.

5.3 Adult input and Angela's responses in Video 30 31
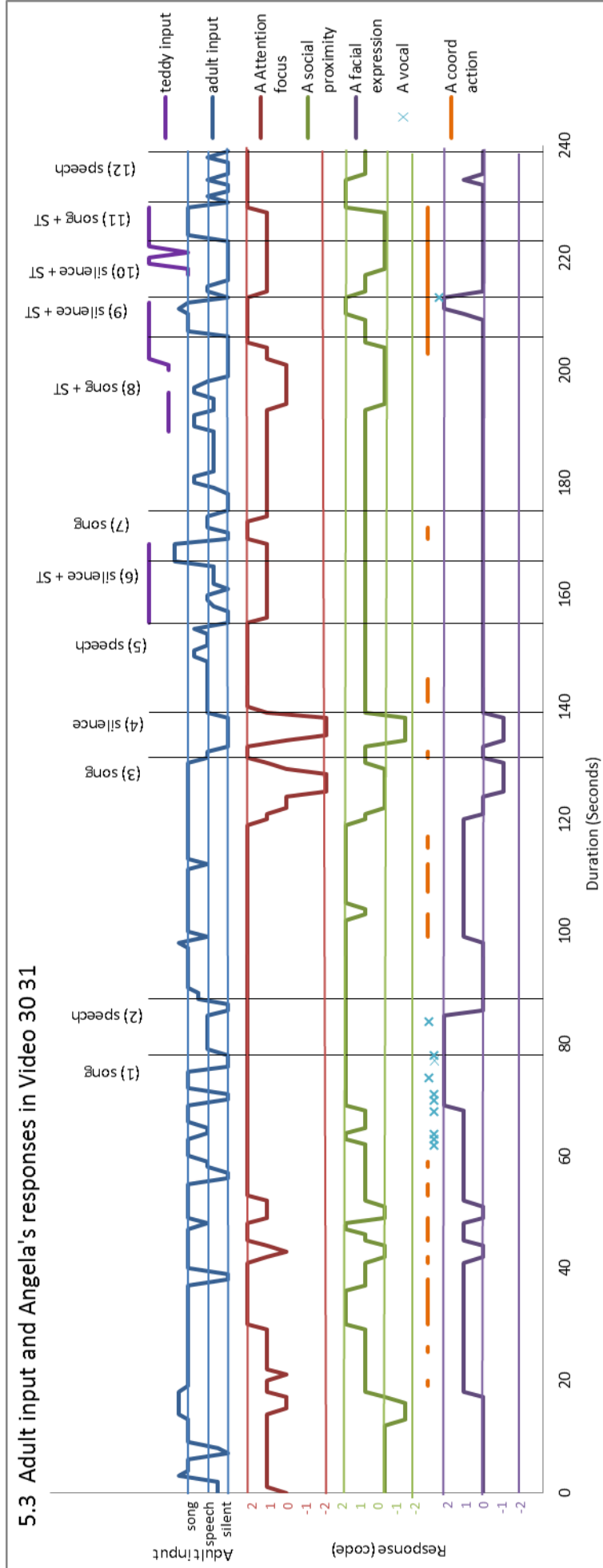
Statistical comparisons of Angela's responses to different stimuli in video 30 31

Codes for Angela's responses in different conditions were compared. Several conditions had to be excluded from this analysis because there was insufficient data to draw reasonable conclusions (10s or less of input and response data was the exclusion criteria).

Table 5.4 offers a comparison between adult song versus adult song + singing teddy inputs in terms of the behavioural response scores elicited. None of the differences were statistically significant.

Table 5.4: Angela's Responses to Song versus Song + Singing Teddy – means, confidence intervals and effect sizes

	Song (n = 131)	Song + ST (n = 14)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	14.43 (0.88)	14.64 (0.50)	-0.22 [-0.53, 0.10]	-1.40	22	-0.25
Social Proximity	9.11 (0.84)	9.07 (0.92)	0.04 [-0.51, 0.58]	0.14	15	0.04
Facial Expression	3.62 (0.70)	3.50 (0.85)	0.12 [-0.39, 0.63]	0.50	14	0.17

*$p < .05$, two-tailed. **$p < .01$, two-tailed. ¹$p < .05$, one-tailed. #$p < .01$, one-tailed

Table 5.5 offers a comparison between adult song versus adult speech inputs in terms of Angela's behavioural response scores. For the attention focus scores the mean difference between adult song versus adult speech was-0.57 [-0.72, -0.42], the effect size was -0.73, and reached statistical significance.

On social proximity the mean difference was -0.29 [-0.52, -0.07], the effect size was -0.37, and reached statistical significance.

On facial expression score, the difference was not statistically significant.

Table 5.5: Angela's Responses to Song versus Speech – means, confidence intervals and effect sizes

	Song (n = 131)	Speech (n = 35)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	14.43 (0.88)	15.00 (0.00)	-0.57 [-0.72, -0.42]	-7.47	130	-0.73**
Social Proximity	9.11 (0.84)	9.40 (0.50)	-0.29 [-0.52, -0.07]	-2.62	92	-0.37**
Facial Expression	3.62 (0.70)	3.43 (0.81)	0.19 [-0.11,0.49]	1.26	48	0.26

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. ⁺p < .01, one-tailed

Table 5.6 offers a comparison between adult song versus adult silence + singing teddy inputs in terms of Angela's behavioural response scores elicited. For the attention focus scores the mean difference between adult song versus adult silence + singing teddy was 0.54 [0.35, 0.73], the effect size was 0.70, and was statistically significant.

On social proximity, the mean difference between adult song versus adult silence + singing teddy was 0.43 [0.24, 0.63], the effect size was 0.57, and was statistically significant.

On facial expression, the mean difference was 0.62 [0.50, 0.74], the effect size was 1.05, and was statistically significant.

Table 5.6: Angela's Responses to Song versus Silence + Singing Teddy – means, confidence intervals and effect sizes

	Song	Silence + ST	Analysis			
	(n = 131)	(n = 52)				
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	14.43 (0.88)	13.88 (0.43)	0.54 [0.35, 0.73]	5.60	173	0.70**
Social Proximity	9.11 (0.84)	8.67 (0.47)	0.43 [0.24, 0.63]	4.39	160	0.57**
Facial Expression	3.62 (0.70)	3.00 (0.00)	0.62 [0.50,0.74]	10.17	130	1.05**

$*p < .05$, two-tailed. $**p < .01$, two-tailed. $^{1}p < .05$, one-tailed. $^{11}p < .01$, one-tailed

Table 5.7 offers a comparison between adult song + singing teddy versus adult speech inputs in terms of Angela's behavioural response scores. For the attention focus scores the mean difference between adult song + singing teddy versus adult speech was -0.36 [-0.64, -0.07], the effect size was -1.37, and was statistically significant.

On social proximity, the mean difference was not statistically significant.

On facial expression, the mean was not statistically significant.

Table 5.7: Angela's Responses to Song + Singing Teddy versus Speech – means, confidence intervals and effect sizes

	Song +ST (n = 14)	Speech (n = 35)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	14.64 (0.50)	15.00 (0.00)	-0.36 [-0.64, -0.07]	-2.69	13	-1.37*
Social Proximity	9.07 (0.92)	9.40 (0.50)	-0.33 [-0.88, 0.22]	-1.27	16	-0.51
Facial Expression	3.50 (0.85)	3.43 (0.81)	0.07 [-0.48, 0.62]	0.27	23	0.09

*$p < .05$, two-tailed. **$p < .01$, two-tailed. [1]$p < .05$, one-tailed. [11]$p < .01$, one-tailed

Table 5.8 offers a comparison between adult song + singing teddy versus adult silence + singing teddy inputs in terms of Angela's behavioural response scores. For the attention focus scores the mean difference between adult song + singing teddy versus adult silence + singing teddy was 0.76 [0.45, 1.06], the effect size was 1.71, and was statistically significant.

On social proximity the mean was not statistically significant.

On facial expression the mean difference was 0.50 [0.01, 0.99], the effect size was 1.30, and was statistically significant.

Table 5.8: Angela's Responses to Song + Singing Teddy versus Silence + Singing Teddy – means, confidence intervals and effect sizes

	Song + ST (n = 14)	Silence + ST (n = 52)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	14.64 (0.50)	13.88 (0.43)	0.76 [0.45, 1.06]	5.21	18	1.71**
Social Proximity	9.07 (0.92)	8.67 (0.47)	0.40 [-0.15, 0.94]	1.57	14	0.67
Facial Expression	3.50 (0.85)	3.00 (0.00)	0.50 [0.01, 0.99]	2.19	13	1.30*

*$p < .05$, two-tailed. **$p < .01$, two-tailed. ¹$p < .05$, one-tailed. #$p < .01$, one-tailed

Table 5.9 offers a comparison between adult speech versus adult silence + singing teddy inputs in terms of Angela's behavioural response scores. For the attention focus scores the mean difference between adult speech versus adult silence + singing teddy was 1.12 [1.00, 1.23], the effect size was 3.37, and was statistically significant.

On social proximity the mean difference between adult speech versus adult silence + singing teddy was 0.73 [0.51, 0.94], the effect size was 1.50, and was statistically significant.

On f facial expression, the mean difference (between adult speech versus adult silence + singing teddy) was 0.43 [0.15, 0.71], the effect size was 0.83, and was statistically significant.

Table 5.9: Angela's Responses to Speech versus Silence + Singing Teddy – means, confidence intervals and effect sizes

	Speech (n = 35)	Silence + ST (n = 52)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	15.00 (0.00)	13.88 (0.43)	1.12 [1.00, 1.23]	18.83	51	3.37**
Social Proximity	9.40 (0.50)	8.67 (0.47)	0.73 [0.51, 0.94]	6.82	70	1.50**
Facial Expression	3.43 (0.81)	3.00 (0.00)	0.43 [0.15, 0.71]	3.11	34	0.83**

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. ͏p < .01, one-tailed

Table 5.10 compares Angela's attention focus behaviours associated with different interaction approaches by the adult. Song is associated with more positive attention focus than silence + singing teddy. Song + singing teddy is also associated with more positive attention focus than silence + singing teddy. A paradoxical result is that speech is associated with more positive attention focus than song, song + singing teddy, silence + singing teddy, and silence . Possible reasons for this are discussed later. Results for silence are highlighted in yellow as there were less than 10s response, so these results are less robust than for the other larger sample sizes.

Table 5.10: Angela's Attention Focus During Song, Song + Singing Teddy, Speech, and Silence + Singing Teddy in Video 33 - effect sizes

					Condition		
Condition	*M (SD)*	*n*	Song	Song + ST	Speech	Silence + ST	Silence
Song	14.43 (0.88)	131	−	-0.25	-0.73**	0.70**	1.90*
Song + ST	14.64 (0.50)	14		−	-1.37*	1.71**	1.73*
Speech	15.00 (0.00)	35			−	3.37**	3.11**
Silence + ST	13.88 (0.43)	52				−	1.67$^{\text{I}}$
Silence	12.63 (1.85)	8					−

*p < .05, two-tailed. **p < .01, two-tailed. $^{\text{I}}$p < .05, one-tailed. $^{\text{II}}$p < .01, one-tailed

Table 5.11 compares Angela's social proximity behaviours associated with different interaction approaches by the adult. Song is associated with greater social proximity than silence + singing teddy. Again, speech is associated with more positive social proximity scores than song and silence + singing teddy.

Table 5.11: Angela's Social Proximity During Song, Song + Singing Teddy, Speech, and Silence + Singing Teddy in Video 33 - effect sizes

			Condition				
Condition	*M (SD)*	*n*	Song	Song + ST	Speech	Silence + ST	Silence
Song	9.11 (0.84)	131	−	0.04	-0.37**	0.57**	1.59**
Song + ST	9.07 (0.92)	14		−	-0.51	0.67	1.38**
Speech	9.40 (0.50)	35			−	1.50**	2.65**
Silence + ST	8.67 (0.47)	52				−	1.62*
Silence	7.75 (1.04)	8					−

$*p < .05$, two-tailed. $**p < .01$, two-tailed. $^1p < .05$, one-tailed. $^\#p < .01$, one-tailed

Table 5.12 compares Angela's facial expression behaviours to different interaction approaches by the adult. Both song and song + singing teddy elicited more positive facial expression responses than silence + singing teddy, as did speech. However, speech was associated with less positive facial expressions than song, and song and singing teddy (these differences are not statistically reliable).

Table 5.12: Angela's Facial Expression During Song, Song + Singing Teddy, Speech, and Silence + Singing Teddy in Video 33 - effect sizes

Condition	M (SD)	n	Song	Song + ST	Speech	Silence + ST	Silence
Song	3.62 (0.70)	131	–	0.17	0.26	1.05**	1.81**
Song + ST	3.50 (0.85)	14		–	0.09	1.30*	1.49**
Speech	3.43 (0.81)	35			–	0.83**	1.36**
Silence + ST	3.00 (0.00)	52				–	3.48**
Silence	2.38 (0.52)	8					–

$*p < .05$, two-tailed. $**p < .01$, two-tailed. $^1p < .05$, one-tailed. $^\#p < .01$, one-tailed

Discussion of results in Video 30 31

The data presented in this chapter show that Angela responded differently to adult speech, and adult song. This was evident from the videos, in the graphic presentation of the interaction in the videos and in the coded response scores of Angela to the different inputs.

Angela demonstrated interpersonal skills during the recorded episode and used pointing to indicate intersubjective understanding. Angela also communicated her understanding of the song by performing actions which went with the song in the case of the 'Miss Polly had a dolly' song, and by joining in coordinated actions and vocalisations in the case of the 'if you're happy and you know it' song.

The results for Angela highlight an important issue, discussed in chapter 10, about the importance of knowledge of the participant and the need to see behaviours in context. The coding and classification system operated independently of the context, limiting the scores which were given during song input, and shaping all of the findings. This means that even when Angela was participating in the song by pretending to sleep like the dolly, the scores allocated were

based on her closed eyes, slumped posture, and passive expression, rather than the context of participating in the song. By viewing the recorded episode it is clear that these behaviours were not negative, but in fact positive communicative actions, but the scoring system does not allow for this, and the analysis of scores was affected by this limitation.

Based on Angela's behaviour during the different interactional contexts it appears that Angela responds differently to each adult input in the interaction as shown by the event figure and statistical analysis.

Angela vocalised more positively during sung input than other interaction approaches (event figure 5.3). Compiled scores illustrate individual pupil responses to the different inputs and there were several surprising results. One is that Angela seems to respond more positively to speech than to song in this video.

The analysis of these episodes demonstrates repeatedly that as an interaction approach, song elicits a more positive response in comparison with speech and silence amongst other input approaches. Song elicits a positive response from Angela, though the finding in this episode is not conclusive for the limiting factors outlined above.

There were differences in the responses from Angela to adult speech and adult song. This was evident in viewing the videos, in the graphic presentation of the interaction in the videos, and in the coded response scores of Angela to the different inputs.

Angela demonstrated surprising interpersonal skills during the recorded episode and used pointing to indicate intersubjective understanding. Angela also communicated her understanding of the song by performing actions which went with the song in the case of the 'Miss Polly had a dolly' song, and by joining in coordinated actions and vocalisations in the case of the 'if you're happy and you know it' song.

The results for this episode were heavily influenced by the coding and classification system which operated independently of the context, limiting the scores which were given during the song input, and shaping all of the findings. This meant that even when Angela was participating in the song by pretending to sleep like the dolly, the scores allocated were based on her closed eyes, slumped posture, and passive expression, rather than the context of participating in the song. When viewing the recorded episode it is clear that these behaviours were not negative, but in fact positive communicative actions, but the scoring system would not allow for this, and the statistical analysis of the scores reflects the insensitivity of the coding system to the context in which the behaviours occur.

Summary of findings in Video 30 31
Angela responds differently to each adult input in the interaction.

Positive vocalisations and coordinated actions occur in episodes where singing occurs, and not during speech.

Overall, human singing is associated with more positive behaviours than is the singing teddy.

The analysis highlights the limitations of descriptions of behaviour that take no account of context as ways to study interactions with pupils with PMLD.

Video 7 8

Participants and relationships between participants: The following interactions feature Angela with a Staff member SK a female member of staff who is approximately 30 years old. She is a familiar adult to the pupils, and has been working in their class for two years. She has set the camera up on a small tripod on the desk beside her, while she addresses Angela. Staff member SF is a female member of staff who is approximately 50 years old. She is a teacher who has had many interactions with Angela and the class; she is working with the rest of the class.

Setting and Activity: Angela is videoed in class, in a typical classroom scenario; the class are at work with the teacher (SF). Angela is seated opposite a familiar support assistant SK, who begins by speaking to her, and then begins to sing. The song is a familiar one. In video 7 the adult speaks and then sings a familiar song (the hello song) and this is part of the daily routine. Angela has a negative response to adult speech, moving her face away and avoiding eye contact when she is spoken to. Angela shows an improvement in attention (cognitive) and eye contact (social) to adult song, but is still passive. Video 8 was recorded one minute later (almost continuously), in the same setting. SK sings a different song, which is an action song (if you're happy and you know it) which Angela responds to very positively.

Recording: The interaction is digitally video recorded via a video mounted on a small tripod on the desk next to the adult and participant.

Coding and classification as tables 5.1 and 5.2 at beginning of chapter. This example shows Angela and her responses to adult input in an optimal classroom setting.

Detailed Description of Interaction with Angela in Video 7 8

Episode 1: Speech

Angela is seated in class with a support assistant. The adult (SK) speaks 'Hi Angela' (3s) Angela closes her eyes and moves her head so she faces the ceiling then looks back at the adult. SK says 'Hello' (7s) Angela closes her eyes and moves her head so she faces the ceiling, then looks back at the adult. 'Hi Angela, can you wave, hello?' (10-14s) Angela closes her eyes and moves her head

so she faces the ceiling. Angela makes brief eye contact when spoken to, but avoids eye contact and actively moves her face away when asked to wave and say 'hello'.

This is a negative response to adult speech in terms of attention focus and a passive response which becomes negative when she moves her head in terms of social proximity

The adult touches Angela's hand and waves at her. The adult waves and says 'Hi' in a very sing song pitch, then in a much lower tone, 'how about singing a song?'(17s). Angela makes eye contact. 'Shall we sing a song?'(19s). Angela makes eye contact, and twitches her mouth as a smile, and makes an affirmative sound. She makes eye contact when asked about a song, and she indicates that she wants a song by smiling; this is clearly a positive response in terms of facial expression.

Angela shows little social interest when spoken to by an adult. The adult uses different forms of her name- full first name and shortened name, but receives no eye contact. When the adult prompts Angela to wave and say 'Hi', Angela tilts her head, and faces the ceiling, avoiding social interaction. When the adult asks her if she would like a song, Angela immediately re-engages with the adult making direct eye contact, and when the adult asks again 'shall we sing a song?' Angela looks directly at the adult and twitches the side of her mouth into a smile, communicating that she would like a song.

This is a very positive social response, showing that Angela can communicate with others what she wants to happen, in a socially appropriate way using eye contact and facial expression. This episode shows us that Angela does understand what is being said to her. This is evident in her appropriate and positive response to the question 'shall we sing a song?'

Episode 2: Song
SK sings (23s) 'Hello Angela, how are you? Hello Angela, how are you? Hello Angela, how are you? How are you today?' Angela shows an improvement in attention and eye contact, but is still passive and has a neutral facial expression. The adult sings (40s) 'Hello everyone, I'm alright. Hello everyone, I'm alright. Hello everyone, I'm alright. I'm alright today.' Angela stops looking at the adult and scans the room with her eyes her face is neutral, she sits passively and looks directly at the adult for the first verse of the song, and this positive eye contact lasts for 15 seconds, a very positive attention focus. Angela begins to look around her, sitting passively for the next verse, keeping her body still.

This is a more passive attention focus, as she indicates through this behaviour that she is less engaged in the interaction.

Episode 3: Interactive Song
 SK begins to sing 'If you're happy and you know it, clap your hands' (at 51s); Angela claps her

hands six times. SK sings 'If you're happy and you know it, clap your hands' (at 55s) Angela makes direct eye contact, but does not move. SK sings 'If you're happy and you know it and you really want to show it, if you're happy and you know it clap your hands' (at 52s). Angela makes direct eye contact, smiles and claps five times.

Angela shows positive attention focus behaviours here, positive facial expression and body control to clap her hands.

The adult sings 'if you're happy and you know it nod your head' (at 67s). Angela smiles, and nods her head four times then makes direct eye contact with SK. SK sings 'if you're happy and you know it nod your head' (at 71s). Angela nods her head three times then makes direct eye contact. SK sings 'if you're happy and you know it and you really want to show it, if you're happy and you know it nod your head' (76s). Angela maintains direct eye contact, then nods her head three times, and makes direct eye contact again.

Angela shows positive attention focus behaviours here, positive facial expression and body control to move her head to nod to the song.

SK sings 'if you're happy and you know it stamp your feet' (81s). Angela maintains direct eye contact, and stamps her foot three times. SK sings 'if you're happy and you know it stamp your feet' (84s). Angela maintains eye contact, but does not move. SK sings 'if you're happy and you know it and you really want to show it, if you're happy and you know it stamp your feet.' Angela looks at the adult then away, then she stamps her foot three times, and smiles while stamping. The adult sings 'if you're happy and you know it say 'we are' (96s). Angela maintains direct eye contact, screams 'we are' and smiles. The adult sings 'if you're happy and you know it say 'we are' (100s). Angela maintains direct eye contact, screams 'we are' and smiles.

SK sings 'if you're happy and you know it and you really want to show it, if you're happy and you know it say 'we are'. Angela stops smiling, moves her eyes away from the adult and speaks as clearly as she can 'we are', then smiles and makes eye contact again. The other adult in the room says 'hey that was good Angela!' The adult sings 'if you're happy and you know it do all four' then Angela says 'we are' and the adult sings 'clap your hands, nod your head stamp your feet, say 'we are' then Angela laughs and the adult laughs.

Video 8 shows an episode of unusual communicative clarity with a pupil who is ordinarily hard to reach. Angela, who in video 7 (videoed one minute earlier) refuses to make eye contact, or look at an adult who speaks to her, shares a song, and participates in partnership with the adult, making great efforts to control her body and voice in order to communicate.

Angela maintains eye contact, and directs her gaze at the adult for the duration of the song, and

manages to coordinate her body in time with the song, in order to take turns. Not only does she demonstrate good eye contact, an ability to clap her hands together, ability to stamp her foot and ability to nod her head, but she also controls her actions and their duration. This is very positive in terms of attention focus and social proximity but is also surprisingly accomplished interaction and complex behaviour for a child with a statement of PMLD.

Angela maintains good eye contact throughout the song, and participates with the singer, 'taking turns' to do her part of the song. This is an inherently social activity and is positive. At the end of the song, Angela and the adult laugh together, a shared moment where both enjoy the mutual activity.

Angela smiles throughout this song, which is a positive facial expression and expresses pleasure in the interaction She also vocalises during the song, taking her turn to sing 'we are' and she ends the song laughing with the adult. This episode demonstrates the positive response of a pupil to a preferred song, and her ability to interact with others, despite being hard to reach in other circumstances. This is evidence that not only does Angela respond more positively to song than speech, but has preferences for different songs and can communicate these preferences in her response to them.

The event figure details the interaction captured in Videos 7 8, it presents the adult interaction approaches, and Angela's attention focus, social proximity, facial expression behaviours in response as well as her coordinated actions and vocalisations.

Event figure 5.13 details the interaction captured in Video 7 8, it presents the adult interaction approaches, and Angela's attention focus, social proximity, facial expression behaviours in response as well as her coordinated actions and vocalisations.

Event figure 5.13: Angela's responses in video 7 8

5.13 Angela's responses in video 7 8
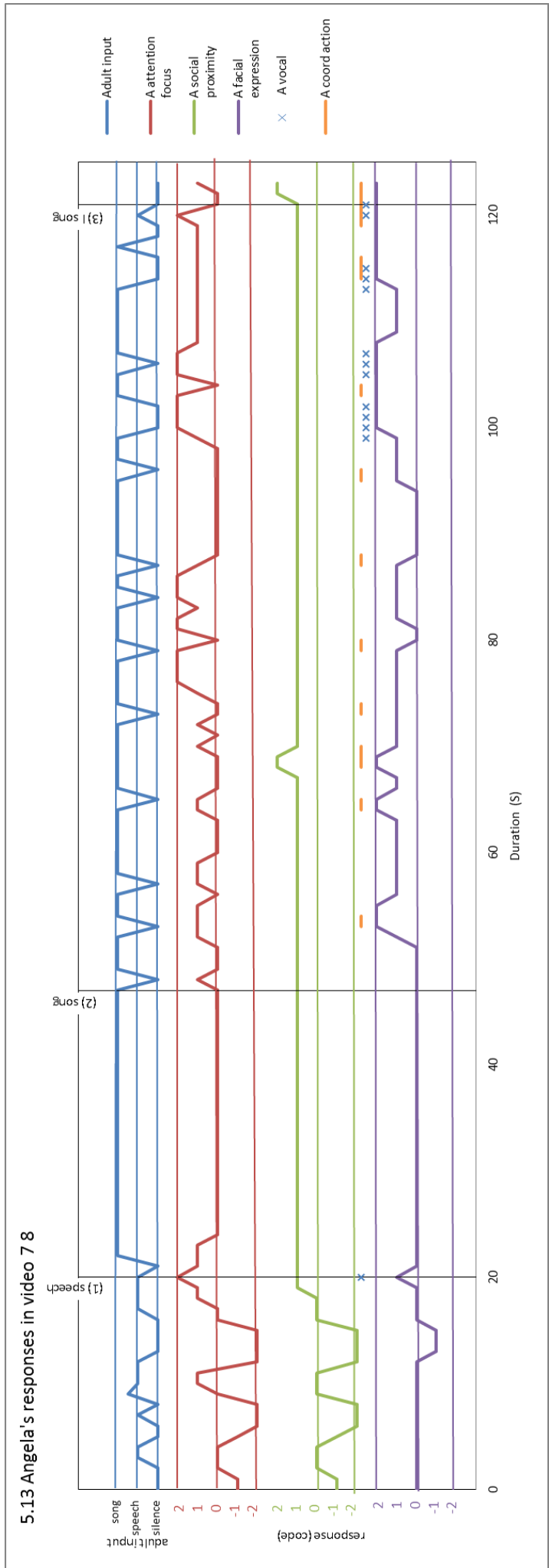
Statistical comparisons of Angela's responses to different stimuli in video 7 8
Codes for Angela's responses in different conditions were compared.

Song was analysed in two different ways to explore the behavioural responses in more depth: the first analysis adopted the event segments of 'song' and 'interactive song' to compare the differences in response to these two songs, in order to better explore the idea of 'preference' of one over the other. The second analysis grouped both types of song together as 'total song' in order to compare it with the other inputs, which will better complement the analysis of other interaction episodes, and will make it simpler to draw 'broad brush' conclusions.

Table 5.14 offers a comparison between Interactive song (I song) versus song inputs in terms of the behavioural response scores elicited. For the attention focus scores the mean difference between I song and song was 0.73 [0.51, 0.94], the effect size was 1.06, and was statistically significant. On social proximity the mean difference between I song and song was 0.03 [-0.01, 0.06], the effect size was 0.19, and did not reach statistical significance. For Angela's facial expression scores, the mean difference was 1.15 [0.99, 1.31], the effect size was 1.92, and was statistically significant.

Table 5.14: Angela's Responses to Interactive Song versus Song – means, confidence intervals and effect sizes

	I Song (n = 74)	Song (n = 27)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.84 (0.78)	13.11 (0.32)	0.73 [0.51, 0.94]	6.65	97	1.06**
Social Proximity	9.03 (0.16)	9.00 (0.00)	0.03 [-0.01, 0.06]	1.42	73	0.19
Facial Expression	4.15 (0.70)	3.00 (0.00)	1.15 [0.99, 1.31]	14.20	73	1.92**

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. #p < .01, one-tailed

Table 5.15 offers a comparison between Interactive (I) song versus adult speech inputs in terms of Angela's behavioural response scores. For the attention focus scores the mean difference between I song versus adult speech was 1.36 [0.75, 1.97], the effect size was 1.49, was statistically significant. On social proximity the mean difference between I song versus adult speech was -1.74 [1.26, 2.22], the effect size was 3.41, and was statistically significant. For Angela's facial expression scores the mean difference was 1.24 [0.99, 1.49], the effect size was 1.92, and was statistically significant.

Table 5.15: Angela's Responses to Interactive Song versus Speech – means, confidence intervals and effect sizes

	I Song (n = 74)	Speech (n = 21)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.84 (0.78)	12.48 (1.29)	1.36 [0.75, 1.97]	4.61	24	1.49**
Social Proximity	9.03 (0.16)	7.29 (1.06)	1.74 [1.26, 2.22]	7.53	20	3.41**
Facial Expression	4.15 (0.70)	2.90 (0.44)	1.24 [0.99, 1.49]	9.95	51	1.92**

*p < .05, two-tailed. **p < .01, two-tailed. ⁱp < .05, one-tailed. ⁿp < .01, one-tailed

Table 5.16 offers a comparison between adult song versus adult speech inputs in terms of Angela's behavioural response. For the attention focus scores the mean difference between adult song versus adult speech was 0.63 [0.04, 1.23], the effect size was 0.72, and was statistically significant.

On social proximity the mean difference between adult song versus adult speech was 1.71[0.04, 1.23], the effect size was 0.72, and was statistically significant.

For Angela's facial expression scores the mean difference (between adult song versus adult speech) was 0.10 [-0.10, 0.29], the effect size was 0.33, and was not statistically significant.

Table 5.16: Angela's Responses to Song versus Speech – means, confidence intervals and effect sizes

| | Song (n = 27) | Speech (n = 21) | Analysis | | |
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*T*	*df*	*d*
Attention Focus	13.11 (0.32)	12.48 (1.29)	0.63 [0.04, 1.23]	2.20	21	0.72*
Social Proximity	9.09 (0.00)	7.29 (1.06)	1.71 [1.23, 2.19]	7.44	20	2.46**
Facial Expression	3.00 (0.00)	2.90 (0.44)	0.10 [-0.10, 0.29]	1.00	20	0.33

*$p < .05$, two-tailed. **$p < .01$, two-tailed. $^1 p < .05$, one-tailed. $^{\#}p < .01$, one-tailed

Table 5.17 offers a comparison between total song (this is interactive song and song combined as described earlier) versus adult speech inputs in terms of Angela's behavioural response scores. For the attention focus scores the mean difference between Total song (T song) versus adult speech was 1.17 [0.56, 1.77], the effect size was 1.34, and was statistically significant.

For social proximity the mean difference between T song versus adult speech was 1.73 [1.25, 2.22], the effect size was 3.86, and was statistically significant.

On Angela's facial expression scores the mean difference (between T song versus adult speech) was 0.94 [0.69, 1.18], the effect size was 1.27, and was statistically significant.

Table 5.17: Angela's Responses to Total Song versus Speech – means, confidence intervals and effect sizes

	T Song (n = 101)	Speech (n = 21)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.64 (0.76)	12.48 (1.29)	1.17 [0.56, 1.77]	4.01	22	1.34**
Social Proximity	9.02 (0.14)	7.29 (1.06)	1.73 [1.25, 2.22]	7.51	20	3.86**
Facial Expression	3.84 (0.78)	2.90 (0.44)	0.94 [0.69, 1.18]	7.61	51	1.27**

*$p < .05$, two-tailed. **$p < .01$, two-tailed. ¹$p < .05$, one-tailed. ª$p < .01$, one-tailed

Table 5.18 compares Angela's attention focus behaviours corresponding to different interaction approaches by the adult, in terms of effect sizes. Interactive song elicited more positive responses than both song and speech; song elicited more positive responses than speech.

Table 5.18: Angela's Attention Focus during Interactive Song, Song and Speech in Video 7 and 8 - effect sizes

			Condition		
Condition	*M (SD)*	*n*	I Song	Song	Speech
I Song	13.84 (0.78)	74	−	1.06**	1.49**
Song	13.11 (0.32)	27		−	0.72*
Speech	12.48 (1.29)	21			−

*p < .05, two-tailed. **p < .01, two-tailed. ^{1}p < .05, one-tailed. $^{\#}$p < .01, one-tailed

Table 5.19 compares Angela's social proximity behaviours corresponding to the interaction approaches taken by the adult. Both interactive song and song were associated with more positive social proximity scores than was speech.

Table 5.19: Angela's Social Proximity during Interactive Song, Song and Speech in Video 7 and 8 - effect sizes

			Condition		
Condition	*M (SD)*	*n*	I Song	Song	Speech
I Song	9.03 (0.16)	74	−	0.19	3.41**
Song	9.00 (0.00)	27		−	2.46**
Speech	7.29 (1.06)	21			−

*p < .05, two-tailed. **p < .01, two-tailed. ^{1}p < .05, one-tailed. $^{\#}$p < .01, one-tailed

Table 5.20 compares Angela's facial expression behaviours associated with the interaction approaches taken by the adult. Interactive song was associated with more positive facial expressions than was either song or speech.

Table 5.20: Angela's Facial Expression during Interactive Song, Song and Speech in Video 7 and 8 - effect sizes

			Condition		
Condition	*M (SD)*	*n*	I Song	Song	Speech
I Song	4.15 (0.70)	74	–	1.92**	1.92**
Song	3.00 (0.00)	27		–	0.33
Speech	2.90 (0.44)	21			–

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. ⁿp < .01, one-tailed

Table 5.21 compares Angela's attention focus behaviours associated with the different interaction approaches taken by the adult; here the different types of song are combined. Total song elicited more focused attention than speech, and the effect is large and statistically significant.

Table 5.21: Angela's Attention Focus During Total Song and Speech in Video 7 and 8 - effect sizes

			Condition	
Condition	*M (SD)*	*n*	T Song	Speech
T Song	13.64 (0.76)	101	–	1.34**
Speech	12.48 (1.29)	21		–

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. ⁿp < .01, one-tailed

Table 5.22 compares Angela's Social Proximity behaviours that correspond to the different interaction approaches taken by the adult, when the different types of song were combined. Total song elicited far higher levels of social proximity than did speech; the effect is large and statistically significant.

Table 5.22: Angela's Social Proximity During Total Song and Speech in Video 7 and 8 - effect sizes

			Condition	
Condition	*M (SD)*	*n*	T Song	Speech
T Song	9.02 (0.14)	101	−	3.86**
Speech	7.29 (1.06)	21		−

*p < .05, two-tailed. **p < .01, two-tailed. ⁱp < .05, one-tailed. #p < .01, one-tailed

Table 5.23 compares Angela's facial Attention focus behaviours that correspond to the different interaction approaches taken by the adult, where the different types of song were combined. Total song elicited more positive facial expressions than did speech; the effect is large and statistically significant.

Table 5.23: Angela's Facial Expression During Total Song and Speech in Video 7 and 8 - effect sizes

			Condition	
Condition	*M (SD)*	*n*	T Song	Speech
T Song	3.84 (0.78)	101	−	1.27**
Speech	2.90 (0.44)	21		−

*p < .05, two-tailed. **p < .01, two-tailed. ⁱp < .05, one-tailed. #p < .01, one-tailed

Vocalisations and coordinated actions
All Angela's vocalisations were positive; all but one vocalisation occurred during interactive song.

All coordinated actions occurred during interactive song.

Discussion of results in Video 7 8

The interaction in video 7 8 shows Angela controlling her body in order to perform coordinated actions, to vocalise and form recognisable sounds to join in with the song, and it also shows her turn taking and anticipating another's response in the sung interaction. This is unusual behaviour for a pupil with her level of difficulties. That she laughs and shares enjoyment with the adult gives us a surprising insight into Angela as a person, especially given how socially isolated she is typically. It is surprising because this interaction is with a pupil with profound and multiple disabilities who was selected to participate in the study because she was usually hard to reach and aggressively antisocial - yet in this interaction we see previously unknown potential to communicate, participate and share. This is remarkable, and the statistical analysis show us the positive responses to both inputs of silence and types of song on the different behaviour observation scales of attention focus, social proximity and facial expression.

In video 7 and 8 we see Angela interacting with a familiar adult (SK), in her classroom. Video 7 and 8 were recorded with a minute between them, and the inputs in the video were similar: adult silence, adult speech, adult singing a familiar song, (song 1- the hello song) and adult singing a familiar song (song 2 if you're happy and you know it). The two songs included are both participatory songs where adult and pupil join in, one by singing their name, and responding to the adult, and one where the participants perform a range of actions during the song. Angela demonstrates a clear preference for one song over another in these episodes. The difference in response to the songs suggests a strong preference by this pupil, which is communicated clearly in the analysis of the videos. The communication of choice and preferences is particularly difficult for this group, so this theme will be explored further.

The statistical comparisons in the results table show that inputs offered by the adult - song, interactive song and speech are responded to quite differently by Angela in video 7 and video 8.

It is interesting that Angela has a song preference and can express her preference through her responses. In video 7 it can be seen that Angela withdraws her attention from the adult (SK) when she is speaking, until the adult asks her a question about what she prefers. This indicates that Angela has primary intersubjectivity and can communicate choice to others. Her ability to communicate through her body language can also be seen in video 7 when she appears to 'lose interest' in the song, after the first verse.   In video 8 we see that Angela can anticipate events, and shows enjoyment in the sung interaction, the skill of anticipation would suggest that her cognitive ability is above that of her p level assessment at school. We also see Angela participate in the song, and that she can control her actions not only demonstrating procedural knowledge that had not been seen before, but also by waiting to do so, and timing her participation. We also

see that Angela can vocalise with control, making utterances which are recognisable words, and showing declarative skill we were unaware of.

In the interaction in video 7 and 8 we see that for a pupil who is hard to reach and has low social tolerance, Angela is remarkable in that she can share and interact with another person. We see her take turns in event figure 5.13 and also see that she can make eye contact and maintain it as well as laugh with an adult.

Angela's responses in the recorded episode in video 7 8 showed Angela's attention focus to be more positive during T song than speech. Angela's social proximity behaviours were more positive during T song than during speech. Angela's facial expression was more positive during T song than during speech, Angela vocalised positively more during I song than during speech input. Angela showed her ability to coordinate her actions and control her body, during this episode, but only did so during the interactive song input. This revealed that Angela has physical abilities and understanding of social interaction that staff in school had not seen before. This also strongly suggests that she had a preference for this song.

Conclusions

The interaction captured in video 30 31 suggests a number of conclusions can be drawn in relation to Angela's communicative abilities and the kinds of communicative inputs that evoke communicative acts from her. She demonstrated surprising interpersonal skills during the recorded episode and used pointing to communicate implying that she has some level of intersubjective understanding. Angela also communicated her understanding of the song by performing actions which went with the song in the case of the 'Miss Polly had a dolly' song, and by joining in coordinated actions and vocalisations in the case of the 'if you're happy and you know it' song.

One conclusion at this point in the analysis would be that Angela responds differently to each adult input in the interaction (see event figure 5.3 and statistical analysis).

Angela vocalised more positively during sung input than other interaction approaches. There were differences in responses from Angela to adult speech and adult song. This was evident in viewing the videos, their detailed description, in the graphic presentation of the interaction in the videos and in the coded response scores of Angela to the different inputs. The scoring and statistical analysis of responses in this episode were severely hampered by the behaviour state observation method which derived scores independent of the context, meaning that behaviours which were in fact participatory and pro-social were coded negatively. This limited the usefulness of the statistical analysis of this episode.

Angela showed a variety of social interaction and communication skills and awareness that had not been identified in school previously, and this was very surprising. She showed her willingness and enjoyment of participating in shared action songs, and could take turns, perform actions and vocalise during these inputs in an appropriate and timely way. Angela showed more positive pro-social interaction behaviours (in terms of attention focus, social proximity and facial expression) during song in video 7 8, this was evident in the detailed description of the interaction, the event figure 5.13 and the statistical analysis. Angela vocalised more positively during song than other inputs. Angela performed coordinated actions more during song than other inputs.

Overall the analysis of the interactions suggests some overarching themes in Angela's responses to interaction approaches. Angela responded differently to song, speech, silence and other input approaches, which suggests that the interaction inputs are processed or experienced differently by her.

Angela vocalised more positively during adult song than during the other interaction approaches. Angela performed more coordinated actions during song than during other interaction inputs by the adult. Angela's facial expressions were more positive during song than during other interaction inputs by the adult, indicating her pleasure during this approach.

In the detailed description of the interaction episodes, we can see that Angela is more engaged in the social interaction during song than during other interaction approaches. However the limitation of the methodology meant that the only statistically significant effects to support this were to be found in the episode using video 7 8, not during video 30 31 for reasons discussed earlier in the chapter. It does seem reasonable, on the analysis of the findings in the chapter to suggest that Angela responds positively to song as an interaction approach and to suggest that it is a worthwhile method to develop interaction and communication with her in future.

Chapter 6: Vanessa

Introducing Vanessa

In the previous chapter Angela's responses to different interaction stimuli recorded in video 30 31 were analysed. In this the focus is on Vanessa's responses to different interaction stimuli in the same videos (30 31). The analysis is performed separately, as the stimuli towards the participants were different, particularly where the adult touched the participant. This is very important in the analysis of the interaction with Vanessa, 14, with a profound learning difficulty and multisensory impairments. In this chapter her responses to different stimuli during the interaction are examined and compared using simple statistical analysis, to draw some conclusions about the nature of the interaction inputs and the responses they elicit.

Vignette

This episode featured both Angela and Vanessa, but Vanessa is the focus of this analysis of the episode. The description of the participants and the classification and coding of the behaviours of these participants will be the same in the interaction sequence described in Angela's chapter. The interaction event segments are different as Vanessa and Angela were touched, held and interacted with differently during the interaction episode.

Video 30 31

Participants and relationships between participants: the participants in this episode were Angela, Vanessa, staff member SK who was interacting with the pupils and staff member SR who did the video recording. Vanessa is a diminutive girl who is 14 years old, but is the same size physically as a two year old child. She has PMLD, and multiple sensory impairments. She needs high levels of support because of her blindness, hearing impairment and physical difficulties. She is in a wheelchair, but can be 'walked' in a standing position if supported by an adult holding her. She is hard to reach because of the difficulties she faces in communicating her needs with others; when interacting with the world she is very passive. Staff member SK is a female member of staff who is approximately 30 years old. She is a familiar adult to the pupils, and has been working in their class for two years. Staff member SR is a female and approximately 25 years old. She is a teacher who has had many interactions with Vanessa and Angela. She is holding a video camera and is seated at the front of the classroom, visible to all staff and children

Setting and activity: The observations were conducted as described in Chapter 5, Video 30 31. The analysis focuses on Vanessa in this instance.

Recording: The details of Video 30 31 are set out in Chapter 5.

Table 6.1 details Vanessa's observed behaviours and classifies them according to the analytic constructs of attention focus, social proximity and facial expression. These classifications and codings were used in the microanalysis of the interaction, which is presented in event figure 6.3.

Table 6.1: Vanessa's behaviour: classifying and coding

Classification	Behavioural Indicators	Coding
Attention Focus	withdrawing hands, may be leaning over hands to feel movement of self-stimulation hand exploration	Very negative (11)
	holding own hands or arms, and/or moderate self-stimulation, holding own hands or arms, and/or moderate self-stimulation	Negative (12)
	passive- hands not exploring environment or self, may be still or inactive	Passive (13)
	reaching out with hands and scanning area with fingertips, searching environment)	Positive (14)
	sustained exploration with hands, holding, manipulating, touching, reaching, patting, stroking (not of own hands)	Very Positive (15)
Social proximity	major movement or control of body away from adult/other person withdrawing hands or arms and/or moving head to face away, turning to face away and/or shifting body to turn shoulder to other person	Very Negative (6)
	minor withdrawal movement of arm away from adult and/or slight lean away, but maintaining some engagement through posture of head/ face direction	Negative (7)
	head positioning still or movement or body control to sustain a neutral position, passive tolerance to social approaches	Passive (8)
	movement or control of face/ head to position facing other person	Positive (9)
	movement or control of face/head towards other person to close proximity and/or reaching out to touch (proximity of less than 10cm)	Very positive (10)
Facial Expression	grimacing (extreme distress, big frown, closed or open mouth) and/or gasping, sobbing, may be tearful	Very Negative (1)
	frowning	Negative (2)
	neutral expression- neither smiling nor frowning, self-stimulation may still be intense but emotions of distress or enjoyment not apparent on face	Passive (3)
	smile, self-stimulating activities may continue	Positive (4)
	giggling and/or broad smile-noticeable across whole face in eyes and eyebrow area and cheeks,	Very positive (5)

Table 6.2 : Adult behaviour: classifying and coding

Adult interaction Approach	Coding number
Adult song	18
Adult song + Teddy song	18.7
Adult song + Hand touch	18.5
Adult speech + Teddy song	17.7
Adult speech	17
Adult speech + Hand touch	17.5
Adult silent + Teddy song	16.7
Adult silent + Hand touch	16.5
Adult silent	16

Detailed Description of Interaction with Vanessa in Video 30 31

Episode 1: Song

Vanessa is seated on SK's knee and is touching her own hands and face, she is slumped forward with closed eyes and a neutral expression. Angela is seated next to them in her wheelchair. SK is touching Angela's hand and begins to sing.' If you're happy and you know it, clap your hands.' Vanessa holds her hand out, reaching to touch SK. SK and Vanessa touch hands. Vanessa's attention focus here has become more positive as she reaches out to the adult. SK sings 'if you're happy and you know it clap your hands. If you're happy and you know it clap your hands. If you're happy and you know it and you really want to show it, if you're happy and you know it clap your hands.'

In this early stage of the interaction episode, Vanessa responds positively in terms of her attention focus, initially she reacts negatively in terms of her social proximity but then becomes passive, and her facial expression is passive.

Episode 2: Song + Hand touch

SK reaches and briefly touches Angela's hand, and Angela claps her hands. SK says 'good girl' to Angela as she pats Vanessa's hand. SK sings 'if you're happy and you know it stamp your feet, if you're happy and you know it stamp your feet' and moves Vanessa's hand in hers. Vanessa's facial expression is neutral, until SK touches both of her hands, when Vanessa smiles towards Angela. Angela stamps her feet with the song, smiling at SK. Angela points at Vanessa, and SK continues to sing 'if you're happy and you know it and you really want to show it if you're happy and you know it stamp your feet'. SK moves Vanessa's foot with her hand in a stamping motion (36s) and Angela also stamps. Vanessa moves her hands back together when SK releases them.

Vanessa's responses during this segment of interaction are positive in terms of attention focus and social proximity

Episode 3: Song

SK continues to sing 'if you're happy and you know it nod your head. If you're happy and you know it nod your head. If you're happy and you know it and you really want to show it if you're happy and you know it nod your head'. Vanessa moves to face SK and smiles. SK continues singing the song. Angela points to Vanessa again; Vanessa is facing SK and smiling. SK is singing 'If you're happy and you know it, say 'we are'' and Angela and Vanessa appear happy and responsive in this interaction segment; Vanessa repeatedly turns to SK and smiles.

Vanessa's responses during this segment of interaction are positive in terms of attention focus and social proximity, and moves from passive to very positive before becoming positive in terms of facial expression. Here, Vanessa is very responsive, for a child who ordinarily crouches over her self-stimulating hand rubbing; the moment of turning and leaning to face close to the adult and smiling broadly is very positive pro-social behaviour.

Angela shouts 'we are' and looks directly at SK, and SK continues to sing 'if you're happy and you know it say 'we are,' Angela shouts 'we are'. SK sings 'if you're happy and you know it and you really want to show it, if you're happy and you know it say 'we are' Angela shouts 'we are'. Vanessa is exploring her hands, and touching her mouth, she is leaning forward. Vanessa turns to smile broadly at SK again. Angela points at Vanessa and Angela speaks 'oh no, oh no'.

Angela's responses to the song at the end of this episode are very positive across attention focus, social proximity and facial expression scales, her speech and attempts to communicate are clear, and very positive.

Episode 4: Speech

Vanessa is slumped forward and is rubbing her hands together. SK asks if Angela is pointing to Vanessa and Angela responds vocally 'eh'. SK asks Angela 'are you pointing to Vanessa? Is Vanessa singing too?' and Angela responds vocally 'eh'. SK repeats her 'yes?' she pauses, 'what else shall we sing?' SK pauses again, 'what about…?'

Vanessa has slumped forward and is beginning to self-stimulate again, this behaviour is coded as passive on social proximity and facial expression scales, but as negative in terms of attention focus.

Episode 5: Song

SK begins to sing a different song, also familiar, the action rhyme 'Miss Polly had a Dolly'. Vanessa moves her hand, to reach out and touch SK's as she motions with the song, her body is slumped, her head is down and she faces the floor, this behaviour is coded negatively. SK sings 'Miss Polly

had a dolly who was sick, sick, sick.' SK says 'good girl'. SK sings again 'so she phoned for the doctor to come quick, quick, quick.' Vanessa leans closer to SK and rests her head on SK's throat, so her right temple rests on SK's collar bone and her face is nestled under her chin, one hand is touching SK's arm and the other is touching her own mouth.

'The doctor came with his bag and his hat and he knocked on the door with a rat-a- tat- tat'

SK says 'good girl'. SK sings 'he looked at the dolly and he shook his head' and shakes her head from side to side, Angela shakes her head also. Vanessa puts her ear and cheek onto SK's chest and moves her arm to rest her right hand on SK's back just below her shoulder blade, with her left hand she places her open palm on her own chest, so her neck is between her thumb and forefinger and she can feel herself breathing as her chest rises up and down, the back of her fingers are touching SK's chest. SK continues to sing 'he said, Miss Polly put her straight to bed,' Angela puts her hand to her face in the sign for 'bed'.

 SK sings 'he wrote on the paper for a pill, pill, pill.' SK sings 'I'll be back in the morning yes I will, will, will'.

 In terms of her social proximity this is unusual and positive behaviour for Vanessa, who is typically wary of touching others; for Vanessa to actively reach out and touch and explore and move in to be in closer proximity to the adult is very positive in terms of her interaction and engagement with the social world.

Episode 6: Speech
 Angela turns to face SK, and SK says 'bye bye doctor' as she waves. SK says 'good girl' to Angela. Vanessa is cuddled very closely into SK, feeling the vibrations from SK's throat and chest with her cheek, body, arm and hand. Vanessa withdraws her hand, and begins self-stimulating. As the song and speech finishes, Vanessa is leaning against SK with her head; her posture has slumped a little bit, so she is facing slightly downwards towards her hands and her lap. She is self-stimulating by touching her fingers together, her expression is neutral and she appears disengaged from the interaction.

Vanessa's responses shift from very positive to neutral in terms of attention focus, very positive to positive in terms of social proximity, and positive to passive in terms of facial expression.

Episode 7: Song
The adult joins in singing with the teddy during the last chorus of 'put your finger on your nose, on your nose' and Angela puts her finger on her nose, and smiles at SK. SK says 'good girl.' Vanessa continues to lean her temple against SK's collar bone, her posture is still slumped and she has a neutral expression, she is touching her hands together and is not engaged in the interaction between Angela and SK.

Vanessa's response behaviour continues to be negative in terms of attention focus, positive in terms of social (as an after effect, she remains leaning against the adult) and passive in terms of facial expression.

Episode 8: Speech

The adult talks to Angela 'shall we touch his foot?' and offers the teddy bear for Angela to touch. 'Let's see what happens when we touch his foot'. Vanessa continues to sit leaning down facing her hands as she manipulates them, rubbing her fingers against her mouth and cheeks. The classroom has become noisy and the dialogue is indistinct because of the sound of loud pupil voices. The adult is quiet while the teddy talks, then asks 'can you hold him?' about the teddy bear. SK joins in speaking with the teddy bear 'wee wee wee all the way home'. Vanessa has responded minimally to this interaction episode, she continues facing downwards, touching her hands together and touching her face with her finger tips, her expression neutral. SK has been moving her arms and legs (thereby moving Vanessa about, as she is sitting on SK's lap) but Vanessa has not responded to this movement at all.

Vanessa's response behaviour continues to be negative in terms of attention focus, positive in terms of social proximity and passive in terms of facial expression.

Episode 9: Song

When SK joins in singing 'like a teddy bear. One step, two step, tickle you under there' then tickles Angela, who giggles and smiles at SK. SK asks 'was that good?' and touches the teddy bear 'shall we do that one again?' Vanessa continued to gently self-stimulate in this episode, leaning forward to face her lap with a neutral expression and touching her fingers together close to her face.

Vanessa's response behaviour continues to be negative in terms of attention focus, positive in terms of social proximity and passive in terms of facial expression.

Episode 10: Song + Hand Touch

The teddy sings again 'round and round the garden like a teddy bear'. Vanessa is leaning against SK, her cheek is on SK's collarbone, she faces down, and her hands are self-stimulating. Vanessa appears disengaged until SK touches her lightly on the palm of the hand. SK is singing along with the bear and touching Vanessa's hand. Vanessa responds by moving to wrap her free arm around SK and SK sings and tickles her 'one step, two steps, tickly under there'. Vanessa smiles and raises her other arm to embrace SK around the neck, Vanessa leans in to hold SK close- she is smiling as she leans in to the adult.

Vanessa's response behaviour shifts from negative in terms of attention focus to passive to positive by the end of this interaction segment. Vanessa's response behaviour continues to be positive in terms of social proximity and passive in terms of facial expression.

Episode 11: Speech

SK asks Angela 'are you finished with it now? Thank you. Shall I put it back in the box?' Vanessa's face is not visible for seven seconds of this segment (indicated by a dotted line) as she has her back to the camera, while she embraces SK closely around the neck with both arms.

This response is very positive in terms of attention focus and positive in terms of social proximity. The facial expression score assumes continuity of the positive facial expression from the start of the interaction segment.

Event figure 6.3: Vanessa's responses in video 30 31

The event figure details the interaction captured in Video 30 31, it presents the adult interaction approaches, and Vanessa's attention focus, social proximity, facial expression behaviours in response.

6.3 Adult input and Vanessa's responses in Video 30 31
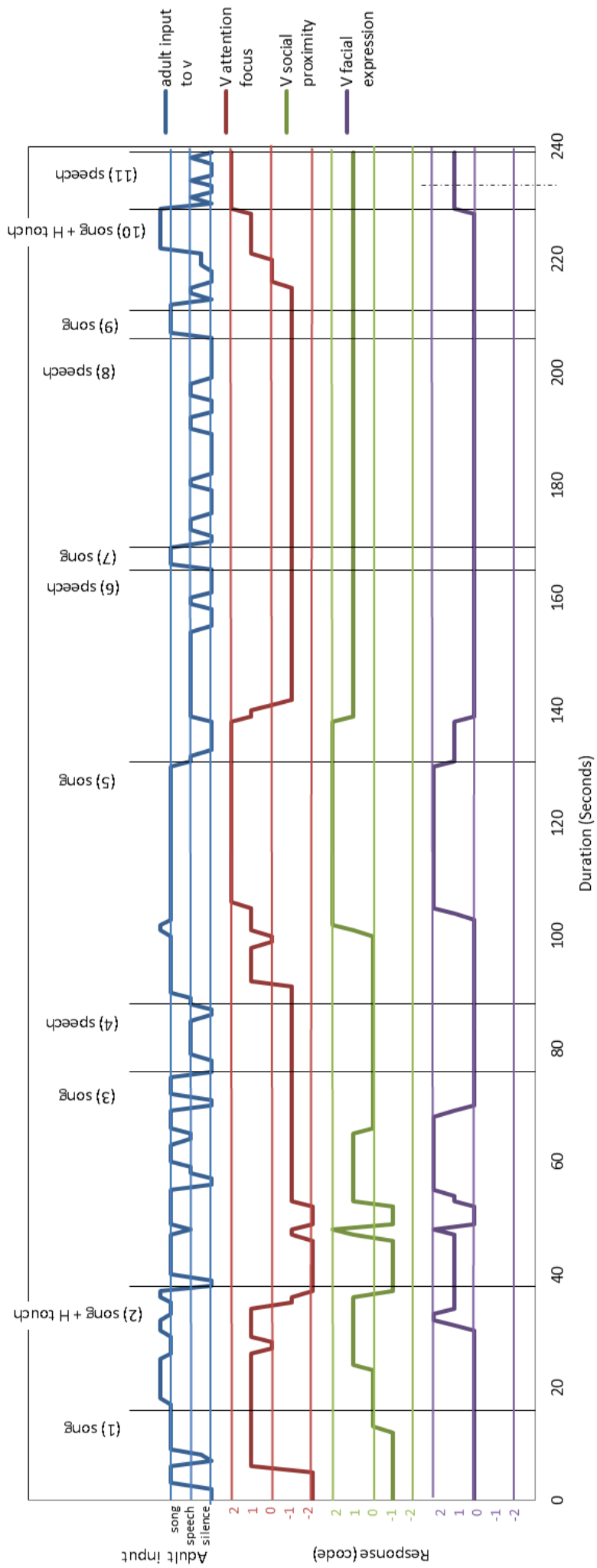
Pupil compiled response scores (Vanessa)

There was insufficient data to analyse Vanessa's responses to all the inputs, so only those inputs where there were 10s of input and response were compiled into a response score. If there were less than 10s of response, the score would be less reliable than for a longer duration.

Statistical comparisons of Vanessa's responses to different stimuli in video 30 31

Codes for Vanessa's responses in different conditions were compared.

Table 6.4 offers a comparison between adult song and song + hand touch inputs in terms of the behavioural response scores elicited. The behavioural codes were described in Table V1. For the attention focus scores, the effect size was small, negative (d = -0.28) and did reach statistical significance. There was no statistically reliable difference in social proximity scores showed. Facial expression scores showed a medium effect size (d = 0.74) that was statistically significant with song eliciting a more positive response than song + hand touch.

Table 6.4: Vanessa's Responses to Song versus Song + Hand touch – means, confidence intervals and effect sizes

	Song (n = 107)	Song + H (n = 40)	Analysis			
	Mean (SD)	Mean (SD)	Mean diff [CI]	t	df	d
Attention Focus	13.01 (1.50)	13.40 (0.96)	-0.39 [-0.81, 0.02]	-1.87	109	-0.28[†]
Social Proximity	8.57 (1.14)	8.73 (0.55)	-0.15 [-0.43, 0.12]	-1.10	135	-0.15
Facial Expression	3.90 (0.93)	3.28 (0.55)	0.62 [0.37,0.87]	4.95	116	0.74**

*p < .05, two-tailed. **p < .01, two-tailed. [†]p < .05, one-tailed. [#]p < .01, one-tailed.

Table 6.5 offers a comparison between adult song and speech inputs in terms of the behavioural response scores elicited. For the attention focus scores, the effect size was small, positive (d = 0.30) and did reach statistical significance. Social proximity scores showed a small (d = -0.42) negative effect size that was statistically significant, favouring speech over song. Facial expression scores showed a large effect size (d = 0.98) that was statistically significant with song eliciting a more positive response than speech.

Table 6.5: Vanessa's Responses to Song versus Speech – means, confidence intervals and effect sizes

	Song (n = 107)	Speech (n = 93)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.01 (1.50)	12.60 (1.18)	0.41 [0.03, 0.78]	2.15	196	0.30*
Social Proximity	8.57 (1.14)	8.95 (0.45)	-0.38 [-0.61, -0.14]	-3.14	142	-0.42**
Facial Expression	3.90 (0.93)	3.18 (0.39)	0.71 [0.52, 0.91]	7.24	145	0.98**

*$p < .05$, two-tailed. **$p < .01$, two-tailed. †$p < .05$, one-tailed. #$p < .01$, one-tailed.

Table 6.6 offers a comparison between adult song + hand touch, and speech, in terms of the behavioural response scores elicited. For the attention focus scores, the effect size was medium, positive ($d = 0.71$) and did reach statistical significance. Social proximity scores showed a small ($d = -0.46$), negative, statistically significant difference favouring speech over song + hand touch. Facial expression scores showed a small effect size that did not reach statistical significance.

Table of condition comparisons video 30 31 Vanessa

Table 6.6: Vanessa's Responses to Song + Hand touch versus Speech – means, confidence intervals and effect sizes

	Song + H (n = 40)	Speech (n = 93)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.40 (0.96)	12.60 (1.18)	0.80 [0.41, 1.18]	4.10	90	0.71**
Social Proximity	8.73 (0.55)	8.95 (0.45)	-0.22 [-0.42, -0.02]	-2.23	62	-0.46*
Facial Expression	3.28 (0.55)	3.18 (0.39)	0.09 [-0.10, 0.29]	0.96	56	0.21

*$p < .05$, two-tailed. **$p < .01$, two-tailed. †$p < .05$, one-tailed. #$p < .01$, one-tailed.

Table 6.7 compares the effect sizes of Vanessa's attentional focus behaviours to three interaction approaches. Both song, and song + hand touch elicited more positive responses than speech; song + hand touch elicited more positive responses than song alone.

Table 6.7: Vanessa's Attention Focus during Song, Song + Hand Touch and Speech in Video 30 and 31 - effect sizes

Condition	M (SD)	n	Song	Song + H	Speech
				Condition	
Song	13.01 (1.50)	107	–	-0.28†	0.30*
Song + H	13.40 (0.96)	40		–	0.71**
Speech	12.60 (1.18)	93			–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. $^{\#}$p < .01, one-tailed.

Table 6.8 compares the effect sizes of Vanessa's social proximity behaviours to the three interaction approaches. Speech elicited more positive responses than either song and hand touch, or song alone.

Table 6.8: Vanessa's Social Proximity during Song, Song + Hand Touch and Speech in Video 30 and 31 - effect sizes

Condition	M (SD)	n	Song	Song + H	Speech
				Condition	
Song	8.57 (1.14)	107	–	-0.15	-0.42**
Song + H	8.73 (0.55)	40		–	-0.46*
Speech	8.95 (0.45)	93			–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. $^{\#}$p < .01, one-tailed.

Table 6.9 compares the effect sizes of Vanessa's facial expression behaviours to the three interaction approaches. Song elicited far more positive responses than either speech, or song and hand touch.

Table 6.9: Vanessa's Facial Expression during Song, Song + Hand Touch and Speech in Video 30 and 31 - effect sizes

Condition	M (SD)	n	Song	Song + H	Speech
				Condition	
Song	3.90 (0.93)	107	–	0.74**	0.98**
Song + H	3.28 (0.55)	40		–	0.21
Speech	3.18 (0.39)	93			–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. $^{\#}$p < .01, one-tailed.

Discussion of results in Video 30 31

Vanessa's facial expression was far more positive during song, and song and hand touch, than during speech so it can be demonstrated that responses to song were more positive than responses to song and hand touch. Her attention focus was more positive during song, and song and hand touch, than during speech where song and hand touch elicited slightly more positive responses than did song. Social proximity measures showed unexpected results: speech was associated with more positive responses than either song or song and hand touch.

The speech input always occurs immediately after or during song, and so the positive social response may well be the result of an 'after effect' of song because Vanessa enjoys the tactile

stimulation gained from cuddling, and wants it to continue. Another interpretation is that she is attempting to elicit more song, by continuing to cuddle into the adult.

A minor surprise is that Vanessa who has multisensory impairment and so relies heavily upon touch, responds more positively in facial expression to the sung input than to song and touch which one might expect to be her preference.

From the combination of the detailed description of the interaction episode, the event figure and the statistical analysis, we can identify several points in the interaction where Vanessa responded very positively to the approaches from the adult. In the event figure we see that episode 5 (song) and episode 11 (speech) elicited very positive attention focus responses. Episode 6 (speech) shows a lasting after effect from the preceding song episode - the positive responses continue for a little while after the input has changed. Episode 11 (speech) follows a very positive episode 10 (song and hand touch) and I would suggest that this is also a lasting after effect of the interaction where she was tickled by the adult. This after effect would explain why Vanessa's responses to this segment of speech is so much more positive than the others, and why the statistical analysis produces seemingly paradoxical results.

The analysis of these segments demonstrates that as an interaction approach, song elicits a different response to speech.

Conclusions

Vanessa responded differently to the various input approaches in the interactions recorded in video 30 31. The interaction sequence was complex, and involved three people (not being a conversational dialogue). The session revealed some very positive, pro-social behaviour which Vanessa rarely exhibits. Vanessa is a pupil with visual impairment and hearing impairment, so it seems surprising that she would respond so differently to song and speech. It also seems paradoxical that her responses to song and touch are not those which elicit the most positive responses across all response scales.

The clear evidence of after effects, where pupil states persist even though the nature of the episode has changed, raises interesting methodological questions(methodological, theoretical, practical) and presents a challenge to the appropriateness of the simple statistical analyses being attempted here.

Chapter 7: Diane

Introducing Diane

Diane features in two interaction sequences. The first uses short, scripted interactions comparing speech and song. Information from two very short adjacent recordings which were separated by a 5 second gap (videos 38 and 39) are analysed. The second interaction sequence (video 33) is much longer, and features a range of stimuli in different combinations. Table details Diane's observed behaviours and classifies them according to the analytic constructs of attention focus, social proximity and facial expression. These classifications and codings were used in the microanalysis of the interaction, which is presented in the event figure.

Vignette

Diane is a young girl (aged 13) who has Rett syndrome. She has very low tolerance for social proximity to others and is often extremely distressed by the touch, closeness or interaction attempts of others. The profound physical disabilities which she experiences mean that she requires support from others with feeding, dressing, toileting, movement of her body, back and legs, and with other daily activities. She is commonly so distressed by having her nappy changed before lunch (which is the daily routine at school and home) that she screams, cries and self-harms for up to and often over an hour. This extreme distress also commonly occurs during touch or interaction attempts by others (both familiar and new) towards her. A typical response to her cries of distress in school is to remove her from the situation which seems to be disturbing her (this often has little effect) in order to reduce the disruption caused to the classroom environment, while she screams, wails and violently self-harms. As Diane's distress mounts, the intensity of tempo and force of her usual self stimulation behaviours - such as hand wringing or tapping - increases. Diane regularly hurts her hands, arms and face by banging them forcefully, often biting her hands, and punching her own face. Her front teeth are broken and sharp, and cause tissue damage to her hands and forearms. Her screaming also becomes louder and more persistent and it often takes a long time to quieten (whether she is removed from the situation or not). When Diane has harmed herself it takes longer than one would typically expect for her to heal, because the wounds are often reopened and exacerbated by regular, distress related, self-harm. The pain and distress are often compounded by the need to dress the wounds and cover her hands to prevent further damage, which is upsetting for Diane.

Interaction and communication are significant challenges for Diane, and finding appropriate interaction strategies to approach her without causing significant distress were pressing issues for teachers and staff in school. Successful educational inclusion of a pupil like Diane posed a major challenge for staff and pupils, who wished to involve Diane without causing distress, self-harm and serious disruption to the school environment. When one child is screaming in a classroom the

teacher cannot teach. Equally important, however, is Diane's right to communicate and be offered opportunities to be heard. It would be potentially life changing to find an interaction approach which reduces Diane's distress and offers her a way to engage and communicate with others, even in a minor way. A reduction in the level of distress induced self-harm could dramatically improve her quality of life by reducing pain, improving healing time, and reducing the amount of time her hands are covered in medical dressings and gloves. Any intervention which would allow her to enter into a social interaction with others at a level which is tolerable to her would make daily routines and activities more bearable.

The method used to classify and code Diane's behaviours was the same in both videos. These are set out in Table 7.1 (on following page).

Table 7.1: Diane's behaviour: classifying and coding responses

Classification	Behavioural Indicators	Coding
Attention Focus	closed eyes	Very negative (11)
	eyes looking past adult, unfocused eyes not directed at object, person or activity in room	Negative (12)
	brief attention, eyes looking towards adult body or an object for around 1s- scanning	Passive (13)
	eye pointing to adult hands, or object for a more sustained period before moving on to look at another item or activity; eyes directed at face briefly (1 or 2s)	Positive (14)
	very good attention on activity or adult, purposeful control of body, sustained eye gaze toward adult face	Very Positive (15)
Social proximity	movement or control of body away from adult	Very Negative (6)
	movement or control to increase distance from adult	Negative (7)
	movement or body control to sustain a neutral position	Passive (8)
	movement or control of body to maintain proximity to adult	Positive (9)
	movement or control of body to increase proximity to adult	Very positive (10)
Facial Expression	grimacing (extreme frown, closed or open mouth), banging hands into mouth very hard in distress, screaming when touched	Very Negative (1)
	yelling, frowning, moderate self-hitting, banging head, hands and/or face with some force	Negative (2)
	watchful, neutral expression, neither smiling nor frowning	Passive (3)
	smile, reduced force of self-hitting- more self-stimulating than harming e.g. gentle hand shaking, rubbing, patting and tapping, rather than banging	Positive (4)
	broad smile-noticeable across the whole face in eyes and eyebrow area and cheeks, no self-harm, wiggles head to side with pleasure (giggles while doing this)	Very positive (5)
Vocalisation	scream	Negative (0.5)
	song	Positive (6)

Table 7.2 shows the codes used to classify adult inputs.

Table 7.2 Adult's behaviour: classifying and coding adult inputs

Adult interaction Approach	Coding number
Adult song	18
Adult song and hand touch	18.5
Adult speech	17
Adult speech and hand touch	17.5
Adult silent	16
Adult silent and hand touch	16.5
Silent and Object touch	16.7
Adult speech and object touch	17.7
Adult song and object touch	18.7
mimic	19

Videos 38 and 39

Participants and relationships between participants: Diane is a 13 year old girl, with Rett syndrome. Staff member SK is a familiar adult; she is approximately 30 years old and works with Diane on a daily basis, and is her main support. Staff member SR is a familiar adult and has taught Diane for more than a year, and is holding the video camera.

Setting and Activity: The sessions were recorded in an ordinary classroom context. The lesson planning, activities and staff were unchanged; the recording was made via the Vado. The usual routine for this pupil in the morning was to be 'welcomed' into the class by an adult speaking or singing, who also ensured their comfortable positioning. The episode was videoed in the classroom, where Diane is lying on the floor, with her head resting on a cushion; the adults are kneeling on the floor next to her, and SK is addressing Diane. The adult was attempting to interact with the pupil using the typical daily routine - a spoken version of the 'hello song' with familiar words, and a familiar rhythm to engage the pupil's interest. The adult touched Diane with her hands, to straighten her jumper, where the adult and Diane touch her hands is indicated in the description and in the event figure.

Detailed Description of Interaction with Diane in Videos 38 and 39

The camera is close to the child and SK isn't visible. The child is reclining on cushions on the floor as a part of her routine physiotherapy; her head is oriented towards SK who is kneeling close to her. Diane's eyes are half closed and she lies still, her facial expression is neutral. Diane watches the adult sitting close to her. SK is quiet and Diane is passive.

Episode 1: Speech

The adult begins the script saying 'Hello, Diane' (at 2s) 'how are you?' (at 4s). Diane remains passive. Diane remains still in her facial expression and upper body, but reaches out with her left hand towards the adult.

The adult repeats 'Hello, Diane; how are you?' (at 7s) and holds Diane's hand. Diane begins to wail and removes her hand, as the adult speaks again she moves her face away and avoids eye contact. The adult speaks again: 'Hello, Diane, How are you? How are you today?' (at 10s). Diane raises her hand and pulls her hand to claw at her face, with an open mouthed grimace and short vocal wail, and closed eyes (at 17s). She moves her face away from the adult, and opens her eyes (at 22s), her facial expression becoming neutral. Diane moves her head to face the adult and her facial expression remains neutral while she looks at the adult.

Diane's attention focus and social proximity were initially neutral, and then became negative. Her facial expression began neutrally but became very negative, her vocalisations were negative and then halted. Finally her facial expression became neutral again.

Episode 2: Silence

The child's face is oriented towards the adult and her facial expression is neutral. She looks at the adult, and smiles slightly (at 27s).

Diane's responses to silent input from the adult, in terms of attention focus transitioned from very negative to negative, and in terms of social proximity moved from very negative, to negative and then became neutral. The facial expression of Diane moved from very negative with some negative vocalisation, to negative facial expression.

Episode 3: Song

As the adult sings 'Hello Diane, how are you?' she smiles broadly and orients her face away from the adult. Still smiling she closes her eyes briefly. At 29s Diane raises her head up from the pillows and continues to smile, now towards the adult. The adult sings 'Hello Diane, how are you?' (at 33s) while Diane reaches out with her arms.

Diane's responses changed across all the observed behaviour measures. In terms of attention focus Diane's attention shifted from negative to neutral, in terms of social proximity, her responses moved from very negative to very positive. Diane's facial expression shifted from neutral to positive to very positive and she vocalised positively.

Episode 4: Silence

Diane's head remains raised for 6s, and both her arms are raised for 6s duration (to 35s, and 36s). The adult sings 'hello Diane how are you, how are you today?' (to 38s).

Diane's responses in terms of attention focus moved from negative to very positive, in terms of social proximity were very positive, and in terms of facial expression moved from very positive to positive with no vocalisations.

Episode 5: Silence + Hand Touch

She continues to smile broadly, her right arm still stretching upwards, giggling softly while her left arm reaches out towards the adult then up to the ceiling, she is smiling upwards at the ceiling (at 38s).

Diane's response in terms of attention focus was very positive, as was her response in terms of social proximity and in terms of facial expression was positive.

Episode 6: Song + Hand Touch

As the adult sings 'How are you today' Diane looks at her again, orienting her face towards the adult, and reaching her hand to touch the adult's hand. The adult sings 'Hello everybody I'm alright' (at 44s) and is moving both their hands.

Diane's response in terms of attention focus moved from very positive to very negative, in terms of social proximity her response changed from very positive to negative, and in terms of facial expression moved from positive to very negative and she vocalised negatively.

Episode 7: Song

During the hand motion - Diane quite suddenly becomes distressed (at 44s); she wails loudly, looking away from and then towards the adult. The adult continues to sing 'Hello everybody I'm alright.' Diane stills, her facial expression becoming neutral again, and she looks directly towards the adult again. The adult sings 'Hello everybody I'm alright, I'm alright today'. Diane vocalises negatively but much more quietly, while looking at the adult and the adult's hand, then (at 53s) begins wailing in distress again, just as the adult song ends.

Diane's response in terms of attention focus was mixed, with some negative eye gaze away from the adult and some positive looking toward the adult. Diane's social positioning is neutral, and she doesn't move. Diane's facial expression was negative.

Episode 8: Silence

Diane's right hand is underneath a blanket, and it may be this tactile experience which is causing her distress, but this is unclear.

Diane's response in terms of attention focus was very negative. Diane's response in terms of social proximity was negative, in terms of facial expression her responses were very negative and she vocalised negatively for a sustained time period.

Event Figure 7.3 Diane's responses to the adult input in video 38 39

7.3 Adult input and Diane's responses in video 38 39
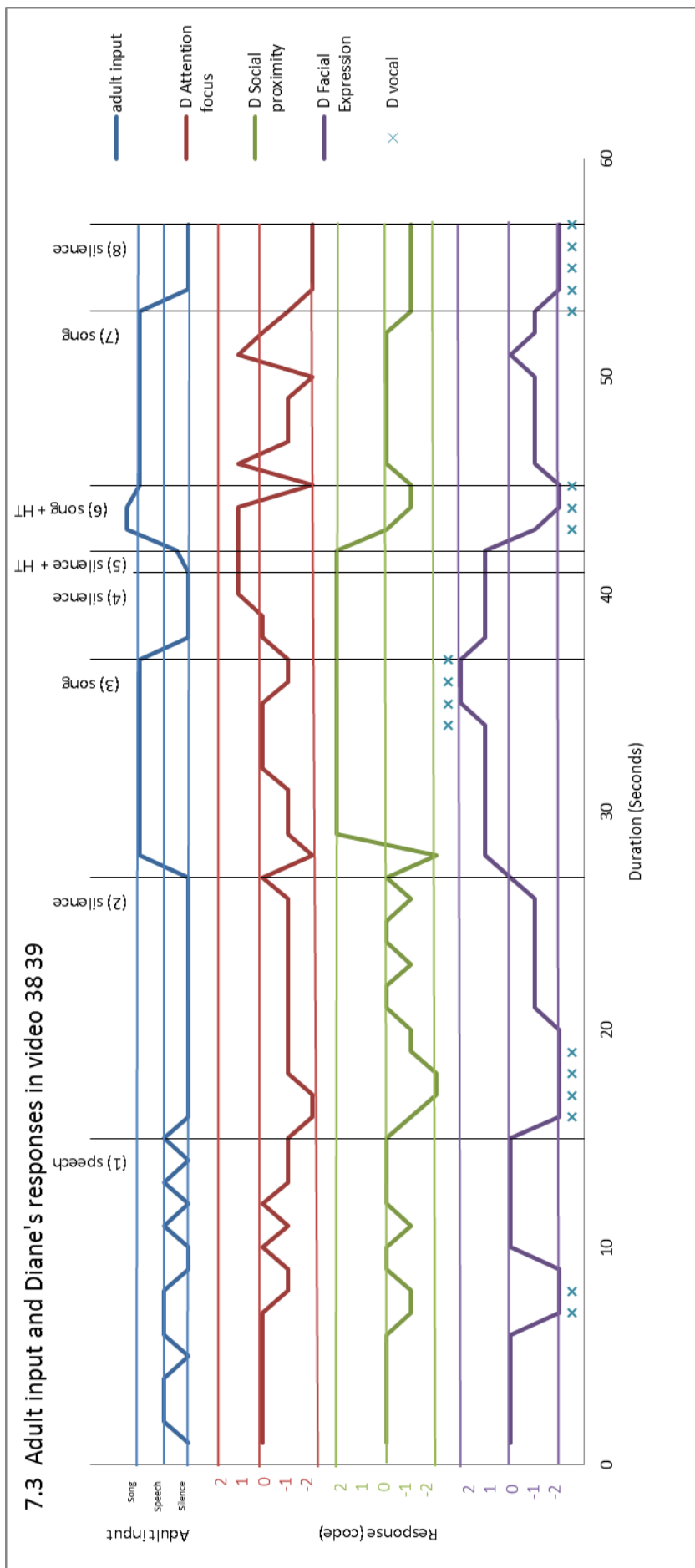
Statistical comparisons of Diane's responses to different stimuli in video 38 39

Codes for Diane's responses in different conditions were compared.

Several episodes had to be excluded from this analysis because there was insufficient data to draw reasonable conclusions (10s or less of input and response data was the exclusion criterion).

Table 7.4: Diane's Responses to Song versus Speech - means, confidence intervals and effect sizes

	Song	Speech	Analysis		
	(n = 18)	(n = 15)			
	Mean (SD)	Mean (SD)	Mean diff [CI]	t	df	D
Attention Focus	12.39 (0.85)	12.60 (0.51)	-0.21 [-0.70, 0.28]	-0.88	28	-0.29
Social Proximity	8.83 (1.29)	7.80 (0.41)	1.03 [0.36, 1.71]	3.20	21	1.04**
Facial Expression	3.33 (1.19)	2.60 (0.83)	0.73 [0.01, 1.45]	2.08	30	0.70*

*p < .05, two tailed. **p < .01, two-tailed. † p < .05, one-tailed. †† p < .01, one-tailed.

Table 7.4 offers a comparison between adult song and speech inputs in terms of the behavioural response scores elicited. The behavioural codes are described in Table 4.1. For the attention focus scores, (based largely on eye gaze) the effect size was small (d = -0.29) and did not reach statistical significance. Social proximity scores (based on posture, positioning and orientation) showed a large (d = 1.04), positive, statistically significant difference favouring song over speech. Facial expression scores (based on mouth and cheek movement) showed a medium effect size (d = 0.70) that was statistically significant with song eliciting a more positive response than speech.

Table 7.5: Diane's Responses to Song versus Silence - means, confidence intervals and effect sizes

	Song	Silence	Analysis		
	(n = 18)	(n = 20)			
	Mean (SD)	Mean (SD)	Mean diff [CI]	t	df	d
Attention Focus	12.39 (0.85)	12.05 (0.94)	0.34 [-0.25, 0.93]	1.16	35	0.38
Social Proximity	8.83 (1.29)	7.75 (1.29)	1.08 [0.23, 1.94]	2.58	35	0.84**
Facial Expression	3.33 (1.19)	2.00 (1.17)	1.33 [0.56, 2.11]	3.48	35	1.13**

*p < .05, two tailed. **p < .01, two-tailed. †p < .05, one-tailed. ‡p < .01, one-tailed.

Table 7.5 compares Diane's behavioural responses to song input as opposed to silence. In Diane's responses to song versus silence, her attention focus showed a small effect in favour of song (0.38) but this result was not statistically significant. Diane's social proximity responses showed a large (d = 0.84) effect that was statistically significant. Diane's facial expressions also showed a large effect with a more positive response to song than to silence (1.13**) that was statistically significant.

Table 7.6: Diane's Responses to Speech versus Silence - means, confidence intervals and effect sizes

	Speech	Silence	Analysis		
	(n = 15)	(n = 20)			
	Mean (SD)	Mean (SD)	Mean diff [CI]	t	df	d
Attention Focus	12.60 (0.51)	12.05 (0.94)	0.55 [0.04, 1.06]	2.21	30	0.70*
Social Proximity	7.80 (0.41)	7.75 (1.29)	0.05 [-0.59, 0.69]	0.16	23	0.05
Facial Expression	2.60 (0.83)	2.00 (1.17)	0.60 [-0.09, 1.29]	1.78	32	0.58†

*p < .05, two tailed. **p < .01, two-tailed. †p < .05, one-tailed. ‡p < .01, one-tailed.

Table 7.6 compares Diane's responses to speech versus silence. Diane's response in terms of her attention focus is more positive towards speech than silence and this is a medium effect size (d = 0.70) that is statistically significant. Diane's responses in terms of social proximity showed little difference between conditions (d = 0.05), and the result didn't reach statistical significance. Diane's facial expression was more positive towards speech than silence, this was a medium sized response (d = 0.58) and was significant in a one tailed analysis (0.58[†]).

Table 7.7: Diane's Attention Focus during Song, Speech and Silence in Video 38 and 39 - effect sizes

			Condition		
Condition	*M (SD)*	*n*	Song	Speech	Silence
Song	12.39 (0.85)	18	–	-0.29	0.38
Speech	12.60 (0.51)	15		–	0.70*
Silence	12.05 (0.94)	20			–

*p < .05, two tailed. **p < .01, two-tailed. [†]p < .05, one-tailed. [††]p < .01, one-tailed.

Table 7.7 compares the effect sizes of Diane's attention focus behaviours to three interaction approaches by the adult. There was a statistically significant difference in terms of speech eliciting more positive responses than silence, the non- significant results were that speech elicited more positive results than song; and song than silence.

Table 7.8: Diane's Social Proximity during Song, Speech and Silence in Video 38 and 39 - effect sizes

Condition	M (SD)	n	Song	Speech	Silence
				Condition	
Song	8.83 (1.29)	18	–	1.04**	0.84**
Speech	7.80 (0.41)	15		–	0.05
Silence	7.75 (1.29)	20			–

*p < .05, two tailed. **p < .01, two-tailed. †p < .05, one-tailed. ††p < .01, one-tailed.

Table 7.8 compares the effect sizes of Diane's social proximity behaviours to three interaction approaches by the adult. There were two large and statistically significant results, which were Diane's positive responses to song over speech and to song over silence.

Table 7.9: Diane's Facial Expression during Song, Speech and Silence in Video 38 and 39 - effect sizes

Condition	M (SD)	n	Song	Speech	Silence
				Condition	
Song	3.33 (1.19)	18	–	0.70*	1.13**
Speech	2.60 (0.83)	15		–	0.58†
Silence	2.00 (1.17)	20			–

*p < .05, two tailed. **p < .01, two-tailed. †p < .05, one-tailed. ††p < .01, one-tailed.

Table 7.9 compares the effect sizes of Diane's facial expression behaviours to three interaction approaches by the adult. There was a large positive difference in responses to song over silence, a medium difference in response to song over speech and a moderate positive difference in response to speech over silence.

No statistical analysis has been conducted for Diane's negative and positive vocalisations. However, event figure 7.3 shows a clear picture: all the positive vocalisations occur in the song episode; there are negative vocalisations during speech, silence, and during the song and touch episode.

Discussion of Results

Diane's responses to the stimuli were different; song elicited more positive responses than either speech or silence in social proximity and facial expression.

When examining responses of Diane to song versus speech we see large and significant differences in her facial expression and social proximity behaviours (see tables 7.8 and 7.9). Diane's responds more positively during adult song than during speech or silence (Diane is more tolerant of proximity and reaches out towards others, and she smiles more during sung input). She also vocalises positively during song, but not during any other inputs in these interaction episodes (see event figure 7.3).

Diane's differential responses in terms of attention focus are much less easy to interpret (see Table 7.7, and event figure 7.3) and it isn't reasonable to speculate about why her eye gaze behaviours are so different – perhaps analysis of further interactions will support the exploration of this issue.

In the adult song episode (video 39) Diane used a wider range of facial expressions, and vocalised more, making positive smiles and giggles as well as screams when unhappy. During song Diane moved and used her body more, lifting her torso from the floor, stretching her arms and purposefully reached out her arms. These behaviours were coded as relating to social proximity and facial expression responses to adult song, and were quite different to the adult speech episode (see figure 7.3 and statistical analysis of social proximity in table 7.5).

There were differences in the responses from Diane to adult speech, and adult song. This was evident in viewing the videos, in the graphic presentation of the interaction in the videos and in the coded response scores of Diane to the different inputs. Diane disliked touch from others and screamed when this happened. In the episode where the adult sings and touches her, Diane recovers from her distress more quickly than might have been predicted, given her typical behavioural responses to touch (see figure 7.3).

The adult speech input elicited positive attention focus behaviours when compared to silence, but when compared to song, the results were inconclusive. This is an interesting finding (see tables 7.4, 7.5, 7.6) and the figure (event figure 7.3) supports this. In the next episode of analysis we can re-examine this issue and see if it is an anomalous result, or part of a pattern of attention focus behaviours linking adult speech to pupil eye contact.

Summary of findings in Video 38 39
One conclusion is that Diane responds differently to the different adult inputs in the interaction.

In video 38 and 39, Diane responded more positively to song in terms of her social proximity. She demonstrated greater physical control, movement toward the adult and better tolerance for social proximity during song input than the other inputs (speech and silence).

Diane's facial expression was more positive during song input than in spoken or silent interaction approaches by the adult, which can be seen in the event figure 7.3, and in the statistical analysis (table 7.8 and 7.9).

Diane vocalised positively during song input, and negatively during other interactions (see event figure 7.3).

Diane's responses in terms of attention focus are inconclusive and need further exploration (see table 7.7) there was some statistical evidence of a link between speech by the adult and eye gaze. This will be explored further later in the chapter.

Video 33

Participants and relationship between participants: Diane and SR were described earlier. Diane's peers are engaged with their work on the computers and are quiet in the background. Staff member SD is also in the room, working with other pupils; Staff member SA is working in the classroom, supporting a pair of children with their work. Staff member SG enters the room towards the end of the session; she interacts briefly with Diane, before speaking to SD. All staff members are familiar with the children.

Setting and Activity: The sessions were recorded in a routine classroom context. The lesson planning, activities and staff remained as normal, the recording took place using a Vado. The interactions took place in a classroom where the other children are facing the computers. Diane is seated at the front of the classroom and a teacher (SR) is seated opposite but out of the view of the camera, which is directed at Diane, who is seated close to a fan which is switched on. The adult was attempting to interact and engage with the pupil in a range of approaches, which occurred in different combinations across the episodes. The inputs were: speech, song, touch with hand, and touch with object, in various combinations.

Coding for different behaviours are set out in table 7.1.

Detailed Description of Interaction with Diane in Video 33

Episode 1: Silence

Diane sits next to the adult SR; she has moved her head to face the door and another pupil whose back is toward her. The classroom is full of pupils working quietly; there is the low level noise of adults talking. Diane rolls her head to face SR, and sighs lightly, as she turns away. Her attention and face are directed to the door and the back of another pupil again; the fan gently blows her hair. The camera moves to show the fan, and then returns to Diane. She faces SR then smiles, looking directly at the adult, and vocalises positively. She looks away and continues to vocalise. Then she looks down and rolls her head back towards SR. She rocks her head again from side to side, and then begins biting the sleeve of her jumper.

The interactive episode began with environmental noise but silent input from the adult. Diane is generally neutral in her attention focus, social proximity and facial expression, though there are short moments of positivity in her response to silence from the adult, and a short positive vocalisation she then becomes passive again across all measures.

Episode 2: Speech

SR speaks her name twice, 'Diane, Diane' and then pauses. Diane stops biting her arm and looks at SR, when SR asks 'Shall we sing a song?' Diane smiles and vocalises positively. She makes brief

eye contact with the adult, before looking at the fan. The adult SR speaks 'Shall we sing?' SR asks 'Shall we sing a tickling song?'

Diane is generally neutral in her response to adult speech in her attention focus, social proximity and facial expression. There is a brief interlude of positivity and positive vocalisation during the speech input, and then Diane responds more passively again on all three scales.

Episode 3: Song + Object Touch
SR begins to sing 'Tickle tickle' the telephone rings loudly disrupting the interaction the adult continues to sing 'on your nose'. Diane begins biting her arm, SR brushes Diane's nose with a fibre optic torch and says 'beep'. Diane stops biting arm and looks at SR, vocalises positively and the teacher continues singing. SR is singing a made up (unfamiliar) song 'tickle tickle on your toes. Tickle tickle on your knee', the adult is touching Diane's knee with a fibre optic brush torch and Diane is watching the object. SR continues to sing: 'tickle tickle, sing with me,' and moves the brush torch, and Diane continues to watch it, and moves her head to continue to look at it. SR continues to sing. SD speaks loudly, 'name, log off' and a pupil closes the computer programme, stands up and walks across the room. Diane turns her head to watch the pupil, then looks again at SR. SR continues to sing 'tickle tickle on your ear', and touches Diane's ear with the torch; Diane tolerates this and turns to look at object, and then she looks away. She looks again at the object then to the boy in class; SR continues to sing 'tickle tickle, far or near' and moves the object away from and towards Diane, then touches Diane again with the brush torch on her hand and sings 'tickle tickle on your hand, tickle tickle just like that.' Diane tolerates this touch, then she moves her hand; she looks at the object then to SR and holds eye contact for 1 second. Diane looks again at the object and SR sings 'tickle, tickle on your cheek' and touches Diane's cheek with it. Diane smiles, and then she begins to bite her arm. SR sings 'tickle tickle on your beak' and says 'beep beep beep' and touches her nose with the fibre optic brush torch and Diane smiles and vocalises (positively) making brief eye contact. SR touches her hand with the brush as she continues to sing 'tickle tickle on your hand, tickle tickle just as planned' and Diane tolerates this contact for 5s before moving her hand.

During this song and touch episode, Diane's responses in terms of attention focus are somewhat mixed. There are some positive responses, becoming negative (a period of looking towards the object, looking away, briefly looking at the adult then scanning the room.) In terms of social proximity, her responses are a mixture of tolerance levels of proximity, and movement of head towards and away from stimulation. Diane's facial expression in this episode is generally positive and very positive; she vocalised positively.

Episode 4: Silence

Diane is looking at the object held by SR - a fibre optic brush torch. SR is silent. Diane looks around and vocalises positively, lightly sighing. Her body and face are positioned at neutral proximity with the adult, neither turned towards nor away from the attempts at interaction. She raises her left hand to her face and begins tapping her face with both of her clasped hands; she bangs her nose with her hands, finds her mouth with her hands and blows a raspberry with her tongue; her eyes gaze at the floor and then she begins to pull her tongue.

Diane's responses to silence in terms of attention focus were negative. Her responses changed from negative to neutral in terms of social proximity, and her facial expressions were mostly neutral, Diane made several positive vocalisations in this episode.

Episode 5: Speech + Object Touch

SR speaks 'be gentle, Diane', 'be nice and gentle'. Diane continues to bang her face with her hands, but her eyes have moved to look toward the adult from the corner of her eyes. SR asks 'How's Diane? Does Diane want to touch my hand?' and offers her hand palm upwards to her; Diane grunts negatively. SR asks 'can I tickle you?' … 'Can I tickle you on your knee?' Diane keeps her hands over her face and does not respond, when the adult produces the object to tickle Diane with, Diane moves her hands from her face and smiles, vocalising positively. SR asks 'can I tickle you on your hand?' but Diane moves her hand, arm and face away and vocalises negatively. SR uses the torch and gently brushes her cheek with the fibre torch and Diane vocalises quietly, positively; Diane lowers her arms and smiles. SR asks Diane 'can I tickle you, can I?' and brushes her cheek with the fibre optic torch; Diane smiles, vocalises positively and looks at the wall. The adult speaks 'can I stroke your face?' The adult strokes Diane's cheek with the optic torch and Diane closes her eyes briefly, smiles and looks at the wall; this action is repeated. Diane closes her eyes and looks peaceful. Diane vocalises quietly when the torch touches her chin. The adult asks 'can I stroke your chin?' The torch brushes her chin again and Diane wails loudly and negatively. The torch brushes Diane's chin and cheek again and she quietly vocalises positively. The torch brushes her chin and Diane looks anxious. Diane looks at the object and vocalises quietly and positively. She smiles at the torch and vocalises loudly and positively. SR asks 'do you like the lights? Are they pretty?' Diane turns away and vocalises quietly and positively, she vocalises again and turns to the adult and smiles.

Diane's responses to speech and object touch in terms of attention focus was mostly negative. In terms of her social proximity her responses are neutral, but mixed so there was some negative and some positive response and tolerance of touch. In terms of facial expression Diane's responses were mixed with some negative responses and negative vocalisations. There were also some neutral, positive and very positive responses; the complex picture can be seen in event figure 7.10.

Episode 6: Silent

Diane begins to rub her hands together. SR waves the torch and Diane protests loudly, then looks away and sighs. Diane watches SR put the torch down and looks at it and vocalises negatively.

Diane's responses to silent adult input, in terms of attention focus her response is very mixed. In terms of her social proximity Diane's responses to silence were negative, and in terms of facial expression her responses were mixed, both positive (with some positive and negative vocalisation) and neutral.

Episode 7: Song

SR asks 'shall we sing another song?' Diane vocalises quietly and positively. SR begins singing a familiar song: 'If you're happy and you know it, clap your hands'. The pupils in the classroom clap their hands, Diane looks away. SR continues to sing 'if you're happy and you know it, clap your hands'. SR is singing 'if you're happy and you know it, and you really want to show it, if you're happy and you know it clap your hands' and pupils in class (still facing computers) clap. Diane is looking away as the adult sings 'if you're happy and you know it say 'we are', we are' Diane turns and smiles, vocalising positively for 3s. Diane turns away again, the adult SR sings: 'if you're happy and you know it say 'we are', we are. If you're happy and you know it and you really want to show it if you're happy and you know it say 'we are''. Diane then looks at SR again, and vocalises positively. Diane looks down and then turns to SR and smiles widely, and vocalises positively. SR sings 'if you're happy and you know it nod your head, nod nod.' The other pupils in class are nodding and now singing along also, and Diane is vocalising quietly. SR sings 'if you're happy and you know it nod your head, nod nod. If you're happy and you know it and you really want to show it, if you're happy and you know it nod your head.' Diane turns and vocalises positively, the pupils in the background giggle, and SR asks they if they enjoyed singing, and they respond 'yes'; SR laughs. Diane looks at SR blankly and pupils begin singing, and Diane smiles. Teacher SR is singing, Diane looks at SR, peer pupils clap their hands, and laugh. Diane looks away and pupils continue to sing with SR 'if you're happy and you know it clap your hands. If you're happy and you know it and you really want to show it, if you're happy and you know it clap your hands', and pupils clap. Diane looks away. SR tells pupils to stop singing 'right, time to stop singing now, well done everyone. Carry on with your work now, please'. Diane turns to face teacher, and vocalises quietly and positively.

Diane's responses to song input, in terms of attention focus was mixed - she looked away and towards the adult, she maintained eye contact with the adult for a sustained period but the general trend of this response was to become more positive for longer periods during the input. In terms of her social proximity, Diane's responses to song were negative becoming more positive and more sustained. In terms of her facial expressions her responses were neutral and then

become more positive (accompanied by positive vocalisations which became more intense and continuous).

Episode 8: Silence + Hand Touch

SR initially speaks to Diane (this speech lasts 4s in this input episode, silent hand touch in this episode lasts 9s-hence it is the majority input in the episode.) SR touches Diane's arm: 'Hello Diane. How are you? Are you alright?' Diane looks away and moves her arm away from the teacher, vocalising loudly and positively. The adult touches her arm again, silently. Diane tolerates this for a moment, before raising her arm over her head.

The adult input of silence and hand touch elicited mixed responses from Diane. Initially Diane's attention focus was good with direct and sustained eye contact, then she looked around and began scanning the room with her eyes (so the trend was initially positive becoming neutral, and remaining so). Diane's head orientation and posture were positively oriented towards the adult initially, and then she swung her head away and straightened her body away from the adult upon being touched (the trend was a shift from positive to negative social proximity). Diane's facial expressions shifted in this interaction episode, moving from positive, to negative (at 324s) and then becoming briefly positive before becoming neutral again. Diane vocalised positively during this interaction episode. The general trend across all factors during silence and hand touch was a shift from positive responses to more negative responses.

Episode 9: Speech

Diane raises her arms and clasps hands, moves her head and vocalises quietly and positively to herself. SR asks the time, and Diane looks around briefly, SR asks SD. SD responds and Diane vocalises loudly, positively. SR speaks to the class and tells them they have 'choice time' pupils respond saying 'yes!' SD speaks 'ok, guys, quietly' and D clasps her hands. Diane moves her head away from and then toward the teacher, still clasping her hands, and smiling slightly she makes quiet positive vocalisations

Diane's response to speech from the adult in terms of attention focus was mostly negative with very little eye gaze directed towards the adult, though there were two instances of this of 1 second duration each. In terms of social proximity her response was mixed; there was some movement towards the adult at the end of the input, but she quickly returned to a neutral position. In her facial expressions Diane showed a neutral facial expression but became positive in two one second instances and very positive in 1 instance lasting 1 second. Diane vocalised positively during the speech input from the adult.

Episode 10: Song

Diane turns to look at SR, SR begins to sing 'tommy thumb' (a familiar song with actions) and Diane looks at the teacher's hand actions. SR sings 'Tommy thumb, tommy thumb, where are

you? Here I am, here I am, how do you do?' The telephone rings loudly, Diane turns away. Teacher sings again very quietly 'Peter pointer, Peter pointer where are you? Here I am, here I am how do you do?' and peer pupils join in; Diane looks around. She scratches her face with her hand and then turns to face SR and smiles; she vocalises positively. Diane vocalises quietly and moves her head, looking at the adult's hands and face. This is repeated. Diane looks at SR, smiles, and moves her head and sings quietly, she continues to look at the adult's hands and face. This is repeated. Diane looks at SR and vocalises positively and loudly. Then she moves her head from side to side vocalising quietly.

In response to the adult input of song, Diane's attention focus was mixed with some very positive sustained eye gaze toward the adult and some negative eye gaze away from the interaction which coincided with her head movements towards and away from the adult as she swung her head from side to side. In terms of social proximity, Diane moved her head and face around a lot, moving towards and away from the adult as she swung her head to the music, so the responses are mixed - both positive and negative. Her facial expressions in response to song are positive, with some very positive and lots of positive vocalisations.

Episode 11: Speech and Hand Touch
Diane moves her head from side to side, vocalising quietly and positively. This is repeated. SR speaks: 'Diane. Diane, please can you touch your nose?' SR then asks 'can you touch your nose? Can I touch your nose?' and then gently touches it with her finger and says 'beep'. Diane has a blank expression, but maintains eye contact. SR asks Diane 'where is your cheek?' then asks 'is this your cheek?' whilst touching it with a hand. SR repeats 'this is your cheek' and touches Diane's face four times. Diane begins to vocalise loudly and negatively, looking at SR. SR reaches out towards Diane to comfort her, but then stops before touching her. SR says 'It's alright', and then asks 'Diane, can I touch your hand?' Diane screams and raises arm, Diane looks at her other hand and smiles briefly at it. SR touches her hand; Diane raises arms and screams loudly and negatively.

Diane reacted to the speech and hand touch input in an initially positive way across all the scales (attention focus, social proximity, facial expression and also via positive vocalisation), but this became more negative, and quite intensely so. By the end of this interaction, Diane was vocalising intensely and negatively, her facial expression was very negative, she had withdrawn physically from the interaction (very negative social proximity) and had turned away, her eyes were closed (very negative attention focus). The speech and hand touch input from the adult was terminated quickly after this intense negative response.

Episode 12: Speech
Diane continues to cry loudly and negatively. She begins to bang her head and screams; her eyes

are tightly closed and she appears extremely distressed. Diane is distressed, she cries loudly and negatively. SR says 'I'm sorry, I'm sorry' and Diane vocalises more quietly. SR asks 'can I touch your hand with this' (and holds up the fibre optic torch); Diane raises hand to mouth and begins banging her hand and mouth together, and cries. She continues to be distressed. SR asks 'ok, shall we sing a song?' and Diane very quietly vocalises negatively.

In response to speech from the adult, Diane's attention focus and facial expressions transition from being very negative with associated negative vocalisations, to negative attention focus, and facial expression. Diane continued to vocalise negatively and intensely throughout the episode and her social proximity (posture and orientation) remained very negative. The event figure displays this pattern quite clearly, and it seems that this negative response is a carry-over from the distress caused by the hand touch input earlier.

Episode 13: Song

SR begins singing; 'if you're happy and you know it' Diane looks at the teacher and smiles. SR sings 'clap your hands' and claps her hand. Diane vocalises positively and loudly, smiling, and watching the teacher's hands moving. Diane moves her head and looks away, and the fan blows her hair. SR continues to sing 'if you're happy and you know it clap your hands. If you're happy and you know it and you really want to show it, if you're happy and you know it clap your hands'. Diane then begins to bang her hands, vocalising loudly and positively. SR sings louder 'if you're happy and you know it say 'we are', we are. If you're happy and you know it say 'we are', we are, if you're happy and you know it and you really want to show it if you're happy and you know it say 'we are.'' Diane looks down, and begins to bang her hand against her mouth. SR continues to sing 'if you're happy and you know it click your fingers' and Diane looks down, finding her tongue with her hands. Teacher clicks her fingers in time to song and continues singing ' if you're happy and you know it click your fingers, if you're happy and you know it and you really want to show it if you're happy and you know it click your fingers'. Diane watches teacher SR clicking her fingers in time with song. Diane smiles, and sits passively. SR asks 'Is that better? Is that better? Are you feeling calm now? I'm sorry that I touched you and that it didn't feel ok. Shall we sing another song?' Diane has both hands clasped at her face and is gently tapping her nose and stretching her tongue with her thumbs, her eyes move from the adult to her hands, and back to the adult. SR moves her hand so that Diane can easily watch her actions, and begins to sing '1, 2, 3, 4, 5 once I caught a fish alive'. Diane chews her thumb and watches SR's hand intently. SR continues to sing '6, 7, 8, 9, 10, then I let it go again. Why did you let it go? Because it bit my finger so. Which finger did it bite? This little finger on my right'. Diane vocalises positively at the end of the song, and moves her hands away from her face, and into the air in front of her. She turns to orient her face to the ceiling, and looks up. Diane continues to vocalise positively, looking up at the ceiling. SR talks to

another pupil, and Diane looks down, then turns her head to face SR and vocalises loudly and positively to her, with a smile. SR asks 'Are you feeling better now? Shall we sing another song?' and pauses briefly, before starting to sing a different song (a familiar song) 'three little ducks went swimming one day, over the hills and far away'. Diane nods her head and smiles. SR continues to sing 'mummy duck said quack quack quack quack, but only two little ducks came back'. Diane waggles her head from side to side, vocalising 'da da da da' in time and with a downward melodic contour (strongly positive) and moves her head from side to side to the rhythm in a coordinated action with her hands in front of her. SR sings 'two little ducks went swimming one day' Diane briefly bites her jumper. Diane begins waggling her head to the song SR is singing 'over the hills and far away, mummy duck said quack, quack, quack quack, but only one little duck came back'. She looks at SR and vocalises positively and loudly, looks forward and vocalises loudly and positively, Diane begins to waggle her head again, this time clasping her hands together in front of her. Teacher SR continues to sing ' one little duck went swimming one day, over the hills and far away, mummy duck said quack quack quack quack, and three little ducks came swimming back'. Diane bobs her head forwards and backwards with a wide smile on her face. Diane stops still when the song finishes.

During this song episode, Diane's attention focus and social proximity began negatively and became increasingly positive. In terms of her facial expression, Diane's responses transitioned from negative, to neutral and became positive initially with negative vocalisations, and later with positive vocalisations. There is a shift in Diane's attention focus behaviours. After about 30s of sung input (530 s on the event figure) we see her eye gaze being directed and sustained towards the adult for a sustained duration, this then changes, and as her head begins to move to the song, her eye gaze becomes less continuous. During the latter part of the sung input approach (after 600s) Diane seems to have significantly recovered from her earlier distress and begins to rock her head from side to side while vocalising rhythmically.

Episode 14: Unscripted Mimicking by Diane
SR speaks, 'that was good, did you like that?' and Diane sits passively, with a blank expression. SR speaks again 'how are you feeling now - are you happy?' Diane nods her head, the adult says 'yes?' are you good and happy?' Diane looks to the ceiling, SR asks 'are you good and happy, good girl.' Diane turns to face her and makes direct eye contact. A different member of staff enters (SG). Diane makes eye contact with her and vocalises positively (trying to initiate an interaction?). SG repeats the sound and Diane smiles and vocalises positively in response. SG repeats this and then speaks to other teachers, Diane continues to vocalise to that member of staff, the adult approaches her, and stands close by, Diane watches her (event line (14) mimic).

In this section, Diane initiated the interaction, and her attention shifted from negative to neutral to positive, her social proximity remained neutral and her facial expression moves from neutral to

positive, and she vocalised positively, in an attempt to communicate with the adult entering the room. This is remarkable and very unusual behaviour for this child.

Episode 15: Silence

SG realises that she has entered the video field of view, and moves out of shot saying 'sorry I didn't realise you were busy'. Diane turns and vocalises positively and quietly looking toward the SR's hand, which is now holding the optic torch again (event line (15) silent).

In response to the silence following the interaction which Diane led, there is a reduction in attention focus from positive to neutral, her social proximity remains neutral, and her facial expression remains positive, she vocalises positively (in the event graph it is clear that this vocalisation has continued from the previous interaction approach.

Episode 16: Speech

SR speaks to Diane again 'do you like the lights? are the lights nice as well?', Diane smiles and turns her face away from the adult to a neutral position, where she can looks at the wall, but can move her eyes to view the object. SR continues to speak 'oh, that's better, we're having a nice day now aren't we? No screaming. We're having a good day aren't we Diane? Really good'. Diane turns her shoulder away from the adult and faces in the other direction, she raises her arm so her face is blocked by her hand.

Diane's responses to (16) speech from the adult were neutral in terms of attention focus, social proximity and facial expression, this is maintained throughout the input.

Event Figure 7.10: Diane's responses in video 33

7.10 Adult input and Diane's responses in Video 33
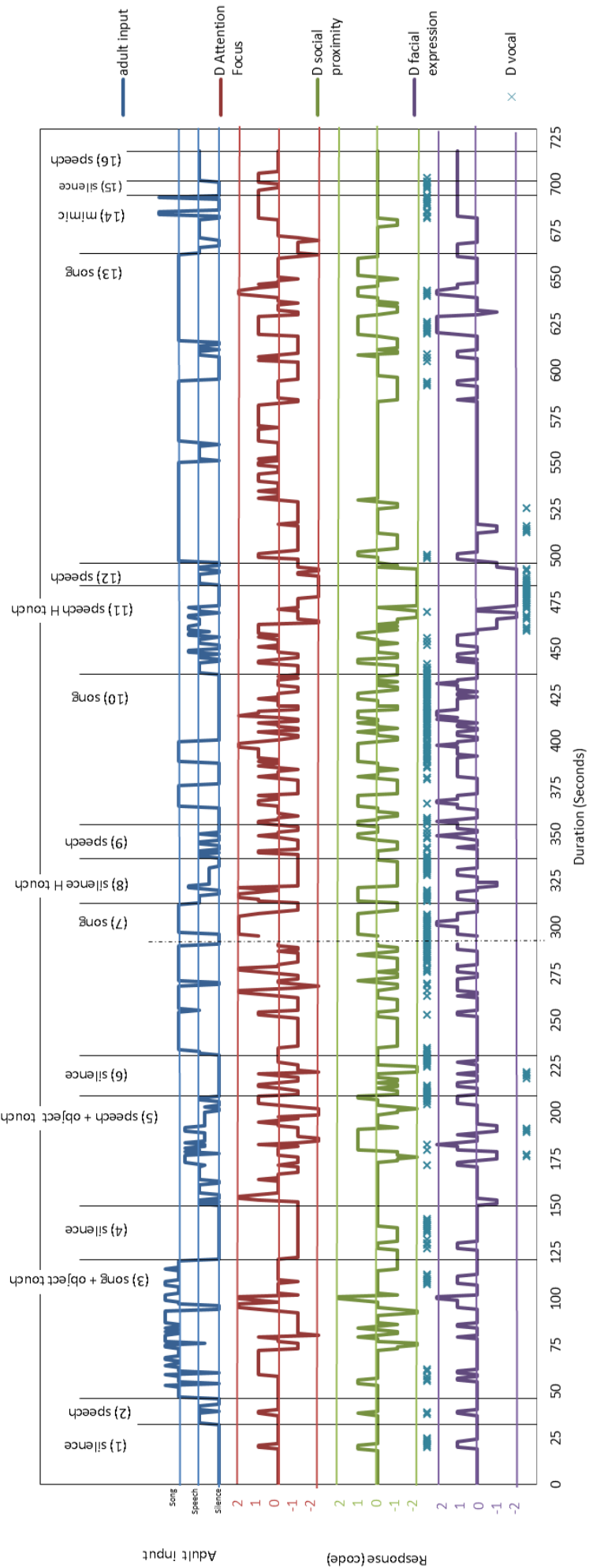
In video 33 there were insufficient data to analyse Diane's responses to all the inputs, so only those inputs where there at least <mark>10s of input</mark> and response could be compiled into a response score. However, in some interactions some critical data would be lost if the 10s rule were applied (notably where responses were aversive and the episode was terminated). Exceptions to the 10s rule are highlighted to draw attention.

Table 7.11: Diane's Attention Focus during Song, Song + Object touch, Speech, Speech + Object touch, Speech + Hand touch and Silence in Video 33 - effect sizes

			Condition					
Condition	M (SD)	n	Song	Song + O	Speech	Speech + O	Speech + H	Silence
Song	12.96 (0.98)	329	−	-0.14	0.33**	0.29*	0.39**	0.31**
Song + O	13.09 (0.89)	74		−	0.51**	0.45**	0.53**	0.55**
Speech	12.63 (0.90)	63			−	-0.04	0.07	-0.04
Speech + O	12.67 (0.98)	58				−	0.10	-0.01
Speech + H	12.57 (1.09)	72					−	-0.11
Silence	12.67 (0.68)	93						−

$*p < .05$, two tailed. $**p < .01$, two-tailed. $^{I}p < .05$, one-tailed. $^{II}p < .01$, one-tailed.

Table 7.11 presents a comparison of Diane's attentional focus behaviours during the interaction episodes recorded in video 33. Effect sizes were calculated, along with the statistical significance of any differences found in mean response levels.

Song, and song and object touch, both produced positive responses, and responses that were significantly better than responses to speech, speech and object touch, speech and hand touch, and silence.

The responses to song and object touch were far more positive than expected (given Diane's typical response to touch is extremely negative).

It is reasonable to suppose that, had not the episode been terminated abruptly because of

Diane's obvious distress, the responses to speech and hand touch would have shown large (and significantly different) negative effects in comparison to all the other conditions.

Table 7.12: Diane's Social Proximity during Song, Song + Object touch, Speech, Speech + Object touch, Speech + Hand touch and Silence in Video 33 - effect sizes

Condition	M (SD)	n	Song	Song + O	Speech	Speech + O	Speech + H	Silence
Song	7.90 (0.78)	329	−	0.04	0.29*	-0.13	0.66**	0.22*
Song + O	7.86 (0.75)	74		−	0.25	-0.18	0.58**	0.20
Speech	7.67 (0.84)	63			−	-0.42*	0.34*	-0.09
Speech + O	8.00 (0.73)	58				−	0.72**	0.41*
Speech + H	7.35 (1.02)	72					−	-0.47**
Silence	7.73 (0.61)	93						−

*p < .05, two tailed. **p < .01, two-tailed. ^{I}p < .05, one-tailed. ^{II}p < .01, one-tailed.

Table 7.12 presents Diane's social proximity response behaviours in the interaction episodes recorded in video 33. Effect sizes were calculated, along with the statistical significance of any differences found in mean response levels.

Speech and hand touch elicited more negative responses than all other interactions.

Song elicited more positive responses than speech.

Speech and object touch elicited greater positive responses than speech, speech and hand touch, and silence.

This is a surprising result, given Diane's general aversion to touch.

Table 7.13: Diane's Facial Expression during Song, Song + Object touch, Speech, Speech + Object touch, Speech + Hand touch and Silence in Video 33 - effect sizes

Condition	M (SD)	n	Song	Song + O	Speech	Speech + O	Speech + H	Silence
					Condition			
Song	3.43 (0.66)	329	−	0.23*	0.50**	0.62**	0.93**	0.33**
Song + O	3.28 (0.51)	74		−	0.27	0.45*	0.66**	0.13
Speech	3.06 (1.08)	63			−	0.05	0.31	-0.21
Speech + O	3.02 (0.69)	58				−	0.31$^{\mathrm{I}}$	-0.39*
Speech + H	2.74 (1.06)	72					−	-0.64**
Silence	3.23 (0.42)	93						−

*p < .05, two tailed. **p < .01, two-tailed. $^{\mathrm{I}}$p < .05, one-tailed. $^{\mathrm{II}}$p < .01, one-tailed.

Table 7.13 presents a comparison of Diane's facial expressions during the interaction episodes recorded in video 33.

Song is preferred to all other inputs.

Song and object touch is preferred to both speech and object touch and speech and hand touch.

Speech and hand touch is associated with more negative facial expressions than all other conditions except speech.

Discussion of Results in Video 33

The event graph provides a view of how Diane responds to inputs across the duration of the video, and the event lines divide the interaction approaches into segments to support interpretation. This is a long and quite complex interaction episode and the statistical analysis provides additional information to support a clearer analysis of input and responses. The   difference in Diane's responses supports the claim that the inputs elicit different responses (Diane acts differently) and that some (notably song) are preferred over others. What is particularly interesting in this analysis is that Diane filled up the silences with her own vocalisation, singing in the gaps, and this is shown in the event graph - we can see that she vocalises positively for a significant amount in this video. For a pupil who is hard to reach, this level of vocalisation in response to an input (and sometimes perhaps as an after effect, is really surprising.

During the song input (episodes10 and 13)) it is notable that Diane exercises considerable body control in swinging her head from side to side while she vocalises to the song and that this is a very positive response to the adult input. A limitation of the methodology is that by only classifying the observable behaviour against strict criteria, independent of the context in which the behaviours are occurring, (and regardless of how the stream of behaviours unfolds) we only get a partial picture of her responses. More specifically, the behaviour scores (analysed and reflected in the statistical analysis) are lower than would be expected because each time Diane rocks away from the adult (during the song input) it elicits a lower social proximity and attention score, rather than being viewed as a part of the positive engagement in the interaction.

During episode 11, speech and hand touch, the input was terminated for ethical reasons because of Diane's very negative responses. This meant that this episode was shorter, less data were collected, and so the analysis found effects that are less strong than those that a traditional ABAB design might have found, were equal time devoted to each episode. Ethically however, stopping an input which caused such extreme distress to Diane was the only appropriate response.

The input which caused the most surprising result was touch with an object, which Diane responded to far more positively than was predicted. For a child who dislikes social proximity and is touch averse, Diane's positive responses to touch with an object was really surprising.

A moment of wonder in this episode was the unscripted episode 14 (mimic), where Diane initiated an interaction with an adult in the classroom. Her attention focus and facial expression were positive, and her vocalisations were also positive. However this representation fails to adequately capture the significance of Diane's behaviour. It is a wonderful moment, because no one had previously thought Diane was interested in or capable of initiating an interaction with another person. To have recorded evidence of this in video 33 is both surprising and truly remarkable.

Conclusions
 Diane responded differently to the different interaction approaches recorded in videos 38/39 and in video 33. In both analyses, Diane responded more positively to song across all behavioural measures. Diane is positively responsive to song and to song and object touch across all three measures, attention focus, social proximity and facial expression in video 33 – more so that to almost all other conditions on almost all measures. Diane's vocalisations during song were positive. The analysis highlights some of the strengths and weaknesses of the methods used. The analyses do demonstrate Diane's differential responses to episodes, but the behavioural coding system underestimates some aspects of Diane's engagement, because the coding system takes no account of the context of the behaviours, for example, in the coding of rocking behaviour.

Chapter 8: Colin

Introducing Colin

In this chapter we will explore the responses of Colin to different adult interaction approaches during a choir practice. The chapter presents the detailed analysis of video 44. The chapter then goes on to provide a discussion of the significance of the data, with respect to Colin's responses and the types of stimuli which evoke responses from him.

Vignette

Colin is a 10 year old boy who has PMLD. He has very low social tolerance, and exhibits a range of severe self-injurious behaviours, and violent behaviours towards others. He is pre-verbal and becomes distressed during social contact. He requires support with feeding, toileting, physiotherapy and medical support and these regular care routines are not easy or enjoyable for Colin, or for his support workers. Colin shows some awareness of social proximity, in that he tends to punch, kick or grab people within his proximity, but these behaviours have an anti-social effect. Interaction and communication are significant challenges for Colin, and finding appropriate interaction strategies to approach him were pressing issues for teachers and staff in school. Successful educational inclusion of a pupil like Colin posed a major challenge for staff and pupils, who wished to involve Colin without causing him to self-harm or encourage violent incidents to occur. It would be potentially life changing for Colin, to find an interaction approach which reduces his distress and aggression, and offers him a way to engage and communicate with others, even in a minor way. A reduction in the level of distress induced self-harm could dramatically improve his quality of life by reducing pain, and time being isolated from others. Any intervention which would allow him to enter into a social interaction with others at a level which is tolerable to him would make daily routines and activities more bearable for everyone.

Video 44

Participants and relationships between participants: Colin is ambulatory and wears a helmet on his head to prevent self-harm through head butting, and he is doubly incontinent. Colin displays many challenging and negative behaviours, and is aggressive. Colin commonly bites, hits, pushes, punches, nips, scratches and hair pulls others, adult or child, familiar or unfamiliar- he does this at home and in school. His self-stimulatory behaviours are also challenging, and include regurgitation, saliva exploration, head shaking, head banging, punching self, and biting self. SJ is a male member of staff who is approximately 20 years old. He is a support assistant and has much experience of working with Colin. SM is a female teacher, approximately 60 years old. She is familiar to all pupils and is giving the choir practice at the front of the hall. SR is a female and approximately 25 years old, she is a teacher who has had many interactions with Colin. She is holding a video camera. She is seated across the hall from Colin, and is visible to all staff and

students. SW is a female member of staff aged approximately 50 years old, she is the teacher of Colin's class and is familiar to him. She is seated close to Colin and SJ.

Setting and activity: Colin has been in this setting many times. Colin is seated with his peers in the assembly hall. A member of staff (SJ) sits behind Colin, with his arms surrounding Colin, - but not touching him. Colin appears calm and interested in adults' activities. The activity for this study was a school choir rehearsal. The adult SM was familiar and used different activities to engage with the audience (e.g. speaking, singing, speaking with music, and singing with music). This created some 'natural experiments' that could be observed. The 'music' input was SM playing the piano.

Recording: Video 44 was 5 minutes and 50 seconds long. Table 8.1 details Colin's observed behaviours and classifies them according to the analytic constructs of attention focus, social proximity and facial expression. These classifications and codings were used in the microanalysis of the interaction, which is presented in the event figure. Table 8.1 appears on following page.

Table 8.1: Colin's behaviour: classifying and coding

Classification	Behavioural Indicators	Coding (number)
Attention Focus	closed eyes (not blinking)	Very negative (11)
	eyes looking past adult, unfocused eyes not directed at object, person or activity in room e.g. looking at ceiling or blank wall for +2s	Negative (12)
	brief attention, eyes looking towards adult body or an object for around 1s- scanning	Passive (13)
	eye pointing to adult hands, or object for more sustained period before moving onto look at other item or activity, eyes directed at face briefly (1 or 2 seconds)	Positive (14)
	sustained eye gaze toward adult face (+2s) lasting attention to object/hands/adult, purposeful control of body to sustain eye contact	Very Positive (15)
Social proximity	major movement or control of body away from adult/other person withdrawing hands or arms and/or moving head to face away, and/or shifting body to turn shoulder to other person	Very Negative (10)
	minor withdrawal movement away from adult and/or slight lean away	Negative (9)
	head positioning still or movement or body control to sustain a neutral position, passive tolerance to social approaches, to face adult (not as close +1m)	Passive (8)
	movement or control of body to remain close to nearby adult (around 30cm) tolerance of proximity without distress or withdrawal, may lean toward adult/ other person	Positive (7)
	movement or control of body to increase proximity to adult to move closer, (20 cm or less), may reach out toward adult, may move to face adult, may maintain face to face posture, may attempt to communicate for example by touching adult (nonviolent)	Very positive (6)
Facial Expression	grimacing (extreme distress, big frown, closed or open mouth), and /or face punching, or head banging and/ or occurs with negative vocalisations screams, or roars, or wails and/or aggressive to others hitting, clawing, nipping, head butting	Very Negative (1)
	Frowning, and /or moderate self-hitting of hands or face, banging head, hands and/or face with moderate force against hard objects or self, and/or may growl, sob, or moan	Negative (2)
	May be watchful, neutral expression- neither smiling nor frowning, not sobbing or gasping, self-stimulation may still be intense but emotions of distress or enjoyment not apparent on face	Passive (3)
	smile, self-stimulating activities may continue (i.e. gentler hand shaking, rubbing, patting and flapping not slapping)	Positive (4)
	Laughing and/or broad smile-noticeable across whole face in eyes and eyebrow area and cheeks, no self-harm	Very positive (5)
Vocalisation	Growling, roaring	Negative (2)
	Quiet humming	Passive (3)
	Sighing, mew like vocalisations	Positive (4)
Coordinated action	Clap hands and/or rock body forward and back and/or points finger and/or nods head and/or stamps foot	Positive (6)

Table 8.2: Adult behaviour: classifying and coding

Adult interaction Approach	Coding number
Adult silence	16
Adult speech	17
Adult song	18
Adult speech + music	19
Adult music	20
Adult song + music	21

Detailed Description of Interaction with Colin in Video 44

Episode 1: Silence

The hall is quiet there is some indistinct adult speech but it is low level. Pupils sit in the hall; Colin sits passively with SJ seated behind him. Colin sits passively but looks attentively towards the adult SM who is at the front of the hall, some distance away from him, he watches expectantly.

Colin's behaviour is positive in terms of attention focus and neutral in terms of social proximity facial expression in this segment.

Episode 2: Music

SM starts to play the piano; the notes are loud and break the quiet of the room. She plays the melody for the hymn the choir are about to learn. SM addresses the children 'Now listen to this and see if you can remember this tune' she begins to play the piano again. As the music plays (at 27s) an adult SW enters and sits nearby, Colin looks at her as she enters and sits down (29s). Colin turns to face SW and sits still, he watches intently. Colin's body is leaning forwards and his eye gaze and facial orientation look directly at the adult this is interpreted positive attention focus.

Colin's behaviour is positive in terms of attention focus and neutral in terms of facial expression in this segment. Colin's social proximity in this segment is dominantly neutral but when he turns to face the adult and leans in this is coded as positive.

Episode 3: Speech

The adult at the front SM speaks again, 'now put your hand up if you remember the tune, oh well that's four people who can sing it anyway.' At 44s Colin turns to face SM and watches her. SM continues to speak 'The virgin Mary had a baby boy' can you say that?' The children join in speaking with SM as she repeats 'the virgin Mary had a baby boy'. The children (including Colin) sit watching SM, she continues to speak 'now we repeat that three times and then, what was his name? (indistinct) and they say that his name was Jesus and they say that his name was Jesus, say it after me.' Colin begins gently self-stimulating wiggling his head, so his head jiggles from side to

side, we can hear Angela vocalising in the background. Some of the children speak with SM 'and they say that his name was Jesus'. SM speaks 'here we go' and begins to play the piano.

Colin's behaviour is positive in terms of attention focus and neutral in terms of social proximity facial expression in this segment.

Episode 4: Song + Music

When SM begins playing the piano and singing (at 64s) , Colin begins rocking backwards and forwards rhythmically. SM sings 'The virgin Mary had a baby boy, the virgin Mary had a baby boy, the virgin Mary had a baby boy, and they say that his name was Jesus.' At 77s Colin looks to the adult filming the rehearsal (SR) and continues to rock, then he turns his head and looks to SM again his expression is neutral. He stops rocking when SM speaks, 'I'll sit down so I can hit the right notes' (80s) and then Colin begins rocking again. SM speaks 'One, two three four' and SM and the choir all begin singing together 'The virgin Mary had a baby boy, the virgin Mary had a baby boy, the virgin Mary had a baby boy, and they say that his name was Jesus.'(99s) The contrast between the stillness when Colin is focused on the adult speaking, and his rocking movements when the adult is singing to the piano music is stark. SM speaks again 'that was brilliant, right, do you want to sing that bit again and then we'll do the chorus'.

Colin's responses in this part of the segment in terms of attention focus are passive, with a brief moment of positive response. In terms of social proximity Colin's response is very positive and then passive. In terms of facial expression Colin's response is passive in this episode.

As soon as she begins to play again, Colin begins to rock his body backwards and forwards with a slight smile. SM speaks 'one, two three four' (at 110s). Then SM stops speaking, plays the piano, before she and the children sing again. Colin's attention focus and social proximity remain passive, but he begins to rock again to the music and his eyes open wider and his expression becomes more open and positive. The children begin to sing with SM 'The Virgin Mary had a baby boy, the Virgin Mary had a baby boy, the Virgin Mary had a baby boy, and they say that his name was Jesus.' Colin continuously rocks his body forwards and back during the song and music, and smiles.

Colin's attention focus is passive but becomes positive at the end of the segment, his social proximity is passive and his facial expression is positive.

Episode 5: Speech

As soon as the music stops, Colin stops rocking. SM speaks: 'and then we have a clap' (she claps). SM asks: 'Can everyone? One two three' (children clap). SM continues to speak 'Marvellous, oh I shouldn't say that word? He come from the glory, right, can you say that?'(at 139s) the children in the choir all speak together with SM 'he come from the glory', SM continues to speak alone '

because this is a west Indian calypso, so that's why we sing he come (indistinct- Angela is vocalising loudly in the back of the room) he come from the glorious kingdom. Yes.'(at 149s) The children speak with SM repeating 'he come from the glorious kingdom' (at 153s).

Colin's attention focus is positive initially during this segment, but becomes negative as he looks around. His social proximity remains neutral. Colin's facial expression in this segment is mostly passive with a moment of positive expression. Colin does not move very much in this segment, there is little coordinated action.

Episode 6: Song + Music
SM Speaks 'right, clap' and the children in the audience clap, while the adult speaks, Colin looks at adult SW and sits still. SM speaks 'right, one, two, three' (2.40) she begins to play the piano and sing (the children gradually start singing too) 'he come from the glory, he comes from the glorious kingdom' (at 168s). Colin begins rocking and smiling to the music and song until the adult begins speaking, and then stills. SM says: 'right. When we've sung that bit we sing' (she claps) she sings 'he come from the glory' (she claps twice) then sings 'he come from the glorious kingdom' (at 177s). Colin begins to look around, then turns back to SM. The children and adults clap then SM counts 'one two three four' and they clap again then start to sing quietly 'He come from the glory', (they clap twice) 'he comes from the glorious kingdom.' They clap then sing 'He come from the glory' (they clap twice) 'he comes from the glorious kingdom'(at 196s). SM speaks, 'Ready? We'll do that again, one two three four' (at 200s) the audience clap once 'he come from the glory', (they clap twice) 'he comes from the glorious kingdom.' The children and adults clap 'he come from the glory', (they clap twice) 'he comes from the glorious kingdom.' (at 215s) Colin rocks during the song and piano playing, forward and back. 'SM speaks 'and then we go, oh yes believer' she plays the melody on the piano (at 245s) and Colin rocks. SM speaks 'and I think that's where we'll leave it, right. (indistinctly) So can we do that then, the virgin Mary had a baby boy three times, they called his name Jesus. He come from the glorious kingdom. Ok, one two three four. Right, one two three four' she starts to play the piano and the audience join in singing (at 260s) 'The virgin Mary had a baby boy, the virgin Mary had a baby boy, the virgin Mary had a baby boy, and they say that his name was Jesus. He come from the glory', (some of the group clap twice) 'he comes from the glorious kingdom.' Then more children join in to clap, and then sing 'He come from the glory' (they clap twice) 'he comes from the glorious kingdom(at 291s). Colin rocks rhythmically during the singing, looking forward at SM and smiling with his mouth open, as the song finishes Colin looks around. He is alert and looks at the teacher holding the camera.

Colin's attention focus in this segment is positive when he looks directly at the adult leading the interaction (SM) with some elements of passive focus where Colin looks around. Colin's social proximity remains passive throughout this segment. Colin's facial expression is largely passive,

with one instance of positive expression during the song and music in the middle of this interaction segment.

Episode 7: Speech
SM speaks 'that's it then we have a clap at the end, the second verse we'll sing the angels and when the baby was born, and we'll repeat the same thing (indistinct, Diane is vocalising loudly). So it's the angels sang when the baby was born, can you say that?'(at 304s) the children join in speaking with SM 'the angels sang when the baby was born' SM speaks alone 'and then we sing the same thing, then they sang that his name was Jesus. Ready: one, two three: …' (at 318s)

Colin's response in terms of attention focus is initially passive, and becomes and remains positive. Colin's responses in terms of social proximity remain passive and so does his facial expression.

Episode 8: Song + Music
SM and the children sing 'the angels sang when the baby was born, the angels sang when the baby was born, the angels sang when the baby was born, and they sang that his name was Jesus.' Colin is rocking backwards and forwards, watching the adult SW singing- she isn't looking directly at him. The children and adults SM and SW continue to sing 'He come from the glory', (they clap twice, Colin continues to rock.) 'He come from the glorious kingdom. He come from the glory' (they clap twice) 'he comes from the glorious kingdom.' (At 347s) Colin continues to rock and looks around scanning the room. SM speaks 'can we just practice that from the end?' video ends.

Colin's response to song and music in segment 10 is positive in terms of attention focus, although he becomes passive and looks around at the end of the episode. In terms of social proximity and facial expression he remains passive.

Event Figure 8.3: Colin's responses in video 44

The event figure details the interaction captured in Video 44, it presents the adult interaction approaches, and Colin's attention focus, social proximity, facial expression behaviours in response as well as his coordinated actions and vocalisations.

8.3 Adult input and Colin's responses in video 44
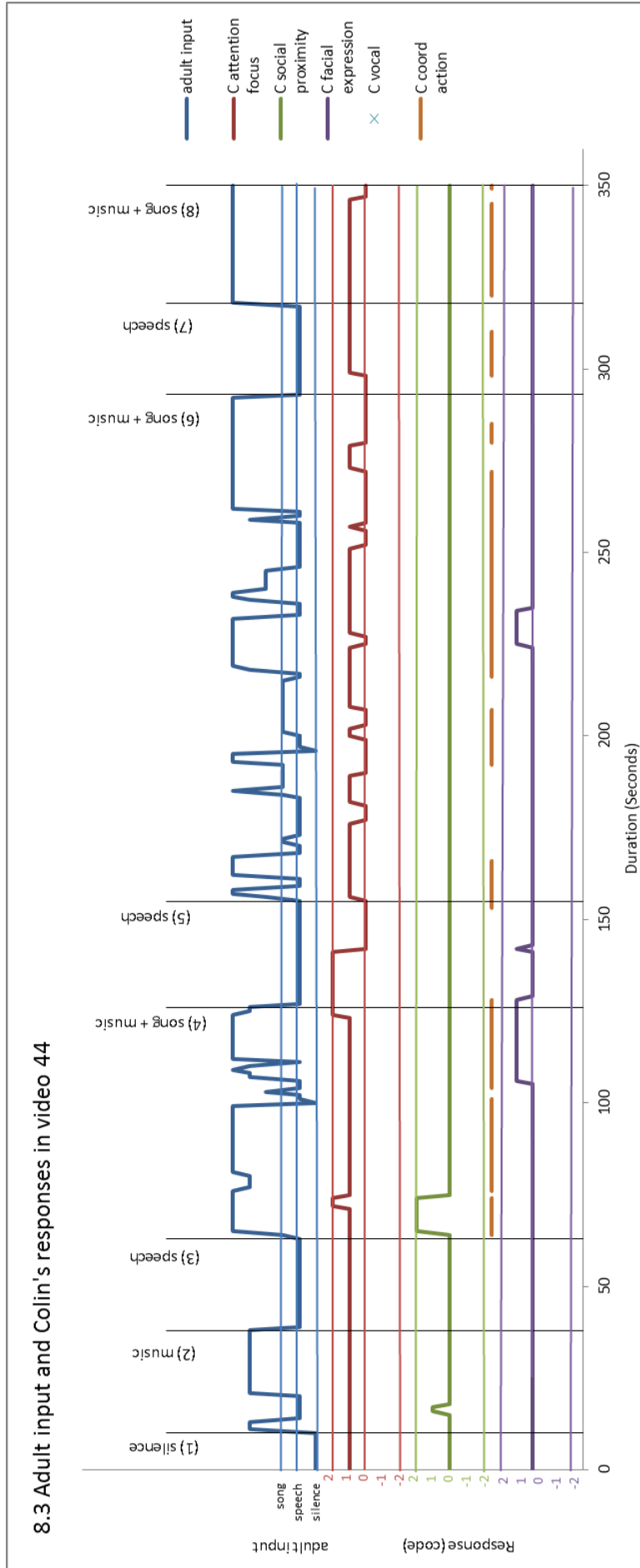
Statistical analysis and results

In video 44 there were insufficient data to analyse Colin's responses to all the inputs, so only those inputs where there were 10s of input and response were compiled into a response score. Adult speaking playing music (14 on figure) there were insufficient data (only 9s). Adult silence (segment 1) there were insufficient data (only 9 s).

Statistical comparisons of Colin's Responses to different stimuli in video 44

Table 8.4: Colin's Responses to Song + Music versus Music - means, confidence intervals and effect sizes

	Song + Music (*n* = 234)	Music (*n* = 27)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.79 (0.59)	14.00 (0.00)	-0.21 [-0.29, -0.13]	-5.44	233	-0.38**
Social Proximity	8.09 (0.41)	8.07 (0.27)	0.01 [-0.11, 0.13]	0.20	41	0.03
Facial Expression	3.15 (0.35)	3.00 (0.00)	0.15 [0.10, 0.19]	6.29	233	0.43**

$*p < .05$, two-tailed. $**p < .01$, two-tailed. $^†p < .05$, one-tailed. $^#p < .01$, one-tailed.

Table 8.4 offers a comparison between adult song + music and music inputs in terms of the behavioural response scores elicited. The behavioural codes were described in Table 8.1. For the attention focus scores, (based largely on eye gaze) the effect size was small and negative and did reach statistical significance (-0.38**). This suggested that eye gaze was more direct during music than song and music. Social proximity scores (based on posture, positioning and orientation) showed a small difference which was not statistically significant. Colin's facial expression scores differed significantly between song + music and music alone (0.43**).

Table 8.5: Colin's Responses to Song + Music versus Speech - means, confidence intervals and effect sizes

	Song + Music (n = 234)	Speech (n = 79)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.79 (0.59)	13.87 (0.33)	-0.08 [-0.19,- 0.02]	-1.54	238	-0.15
Social Proximity	8.09 (0.41)	8.00 (0.00)	0.09 [0.03, 0.14]	3.23	233	0.24**
Facial Expression	3.15 (0.35)	3.00 (0.00)	0.15 [0.10, 0.19]	6.29	233	0.48**

*p < .05, two-tailed. **p < .01, two-tailed. ⁺p < .05, one-tailed. #p < .01, one-tailed.

Table 8.5 offers a comparison between adult song + music and speech inputs in terms of the behavioural response scores elicited. The behavioural codes were described in Table 8.1. For the attention focus scores, (based largely on eye gaze) the effect size was small, negative and did not reach statistical significance (-0.15). Social proximity scores showed a small difference which did reach significance (effect size 0.24**). Colin's facial expression scores differed significantly between song + music and speech (effect size 0.48**) with song +music eliciting a more positive response than speech.

Table 8.6: Colin's Responses to Music versus Speech - means, confidence intervals and effect sizes

	Music (n = 27)	Speech (n = 79)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	14.00 (0.00)	13.87 (0.33)	0.13 [0.05, 0.20]	3.36	78	0.44**
Social Proximity	8.07 (0.27)	8.00 (0.00)	0.07 [-0.03, 0.18]	1.44	26	0.56
Facial Expression	3.00 (0.00)	3.00 (0.00)	0.00 [0.00, 0.00]	0.00	0	0.00

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. $^{\#}$p < .01, one-tailed.

Table 8.6 offers a comparison between adult music and speech inputs in terms of the behavioural response scores elicited. The behavioural codes were described in Table 8.1. For the attention focus scores, the effect size was medium, positive and reached statistical significance (0.44**). This suggested that eye gaze was more direct during music than speech. Social proximity scores showed a difference which did not reach significance (effect size 0.56). Colin's facial expression scores did not differ between music and speech.

Table 8.7: Colin's Attention Focus During Song + Music, Music, and Speech in Video 44 - effect sizes

			Condition		
Condition	*M (SD)*	*n*	Song + Music	Music	Speech
Song + Music	13.79 (0.59)	234	–	-0.38**	-0.15
Music	14.00 (0.00)	27		–	0.44**
Speech	13.87 (0.33)	79			–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. $^{\#}$p < .01, one-tailed.

Table 8.7 compares Colin's attention focus behaviours to three interaction inputs by the adult. There were statistically significant results in terms of music eliciting more positive responses than both song + music, and speech. There was no statistically reliable difference in Colin's responses to song + music and speech.

Table 8.8: Colin's Social Proximity During Song + Music, Music, and Speech in Video 44 - effect sizes

			Condition		
Condition	*M (SD)*	*n*	Song + Music	Music	Speech
Song + Music	8.09 (0.41)	234	–	0.03	0.24**
Music	8.07 (0.27)	27		–	0.56
Speech	8.00 (0.00)	79			–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. #p < .01, one-tailed.

Table 8.8 compares Colin's social proximity behaviours to three interaction inputs by the adult. There was a statistically significant effect in terms of music + song eliciting a more positive response than speech. No other differences were statistically reliable.

Table 8.9: Colin's Facial Expression during Song + Music, Music, and Speech in Video 44 - effect sizes

			Condition		
Condition	*M (SD)*	*n*	Song + Music	Music	Speech
Song + Music	3.15 (0.35)	234	–	0.43**	0.48**
Music	3.00 (0.00)	27		–	0.00
Speech	3.00 (0.00)	79			–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. #p < .01, one-tailed.

Table 8.9 compares Colin's facial expressions in response to three interaction inputs by the adult. There were statistically significant effects in terms of music + song eliciting a more positive response than speech, and also in terms of music + song eliciting a more positive response than music only.

Discussion of Results in Video 44

One of the limitations in this session is that the recording is of a choir rehearsal, rather than an 'interaction' episode *per se*. It was selected for inclusion, because it met the inclusion criteria, despite being imperfect, and not a direct interaction. This means that what we are analysing is a less responsive, less interactive episode featuring Colin than would have been recorded in a more intimate 1:1 interaction. Because the choir rehearsal took place in an assembly hall full of other children, the setting was not a preferred environment for Colin. As a result, some of his responses

might have been more negative than in a less busy environment. The adult recording the episode was not seated next to Colin but was across the room from him, so some of the nuanced less pronounced behaviours which Colin displayed may not have been visible in the recording. It is certainly the case that facial expressions and social proximal behaviours were much harder to detect in this recorded episode, and this perhaps reflects the limitations of the tools of analysis as well as the challenges of recording naturalistic behaviours in a real school setting. Despite these limitations in the environment and recording of the episode, we do gain some data about Colin's responses to adult inputs even though these are not occurring in an 'interaction' per se.

No data analysis of the silence at the start of the episode was possible because there was less than 10s data. This limited the number of comparisons which were possible between the different inputs.

In video 44, Colin's responses were mixed. Colin's responses in terms of attention focus were unexpected and need to be contextualized in relation to the detailed description of the session. In the recording, it is notable that Colin rocks forward and backwards during the song + music input from the adult. It is difficult for him to make sustained direct eye contact when he is doing this rocking motion, and thus the attention focus scores are lower than we would have expected. The coordinated action which is marked on the event figure is Colin's rocking backwards and forwards. There is a clear pattern of the intensification of this behaviour during song+ music input. It is also clear that in episode 6, there is a complex mixture of different inputs occurring, a little speech, a little music some song and music, then a little speech - this complex pattern seems to prompt Colin to look around him which may also explain the lower than expected attention focus scores during song + music in this episode.

Colin moved around a lot by rocking forwards and backwards in this episode session (video 44). He moved rhythmically, and moved more during song and music than in the other inputs. He moved for 2 of 27s duration during the music input (7% of the time). He rocked for 32 of 79 s duration during the speech input (40% of the time). Colin rocked for 164 of 234 s duration of song and music input (70% of the time).

Colin responded more positively to song + music than speech in terms of his social proximity. Colin's facial expression was more positive during song + music input than in spoken or music input. His attention focus was positive during music than speech.

Conclusions

Colin responded differently to the adult inputs of song and music, music and speech in this session. We can conclude that the inputs are perceived to be different by Colin.

Colin's facial expression was more positive during song + music input than in spoken or music input. Colin responded more positively to song + music than speech in terms of his social proximity. We also saw a lot of rocking (coordinated action) in this episode, and to some extent this made his positive response clear, but it also made interpretation of some results more difficult (for example attention focus was reduced when he rocked because he couldn't rock and maintain eye contact at the same time). However this complexity of responses might also have reflected the complex nature of the stimulation. During the session, there was singing, music, coordinated action, and clapping, as well as speech, in a variety of combinations.

A final conclusion reflects the difficulty of interpreting the results of this session. The adult input is quite unresponsive to Colin as an individual, and perhaps, it is unfair to label the episode as an 'interaction'. This session therefore has some limitations in terms of application to our understandings of communication and interaction. It can be used to identify patterns of response to input, but further speculation based on the evidence here would necessarily be tentative.

Chapter 9: Jessica

Introducing Jessica

In the previous chapter we examined the different responses of Colin to the interaction approaches by the adult. In this chapter we will be exploring Jessica's responses. Jessica is a six year old girl with PMLD. She is in a setting which she finds challenging, in that she is surrounded by people, it is noisy and busy. This chapter will examine two recorded episodes in detail, in order to explore her responses to different stimuli, after which a discussion of the findings will be offered. The following chapter features Jessica. The description and the classification and coding of her behaviours will be the same for all interaction sequences will be cross referenced to avoid duplication.

Vignette

Jessica is the youngest participant in the study, and as she was still in the primary department of the school this limited the kinds of observation sessions which could be conducted. It wasn't possible to record direct taught sessions with Jessica as it would have involved changing ordinary school routines; this seemed an unacceptable step which might well have affected the results and wouldn't have been of benefit to the participant.

Jessica features in two studies in natural assembly settings. Jessica was filmed across the academic year at school, and her responses to speech and song were analysed. The analysis was broken into one minute segments, which showed her responses to different interaction inputs over time. The overall responses in each interaction sequence were collated to form compiled response scores. Jessica's responses were compared with those of her peers to see if insights could be gained about patterns of response, and if any similarities or differences could be detected.

Video 13

Participants and relationships between participants (pupils, staff, and peers):

Participants were Jessica, Staff member SL, all the pupils in the school, Staff seated with pupils, and staff member SR who did the video recording. There were two unfamiliar adults, who were musicians A and B who were conducting a music assembly. Jessica is a 6 year old girl with PMLD; she can walk with the aid of leg callipers, but does not have functional speech with at most 5 words. She becomes distressed when people speak to her and cries. Jessica functions at P level P3.2 in receptive and expressive communication. There are four additional female staff members sitting close to Jessica, and all are familiar to her. SR is holding a video camera, and is seated on the floor at the front of the assembly and is visible to all staff and children; in this position she is seated across the hall from Jessica, who seems unaware of the recording. Adults MA and MB are male visitors to the school, age approximately 30 years old, they have a drum and a guitar. They

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are standing at the front of the assembly hall out of camera shot. None of the pupils are familiar with these adults.

Setting and Activity: The observations were conducted during a school assembly with visiting musicians. Jessica has been in this setting many times. She is seated on a chair next to a member of staff (SL) and the pupils in her class are seated on the floor around her. The activity in this study was a music assembly. The adults MA and MB were unfamiliar to the pupils, and used different approaches to engage with the audience (e.g. speaking, singing, speaking with music and singing with music). This created 'natural experiments' that could be observed. In this case the sequence of activities that were observed were: unfamiliar adult speech, music, music and song, audience shout, speech, music, audience clap.

Recording: Video 13 is 3 minutes and 19 seconds long. It was shot from the front of the assembly; all pupils and staff were aware of the camera being held by a familiar member of staff.

Table 9.1 details Jessica's observed behaviours and classifies them according to the analytic constructs of attention focus, social proximity and facial expression. These classifications and codings were used in the microanalysis of the interaction, which is presented in the event figure.

Table 9.1 appears on following page.

Table 9.1: Jessica's behaviour: classifying and coding

Classification	Behavioural Indicators	Coding
Attention Focus	closed eyes	Very negative (11)
	eyes looking past adult/ persons in room, unfocused eyes not directed at object, person or activity in room	Negative (12)
	brief attention, eyes looking towards adult body or an object for -1s scanning	Passive (13)
	eye pointing to adult hands, or object for more sustained period before moving onto look at other item or activity, eyes directed at face briefly (1 or 2 seconds)	Positive (14)
	sustained eye gaze toward adult face, lasting attention to object/hands/adult, purposeful control of body to sustain eye contact	Very Positive (15)
Social proximity	movement or control of body away from adult, withdrawing hands or arms, moving head to face away, orientation of head to face away	Very Negative (6)
	movement or control to increase distance from adult, slight movement of arm away from adult, leaning body away	Negative (7)
	head positioning still or movement or body control maintaining posture or position in relation to other people/adult	Passive (8)
	movement or control of body to remain close to adult (around 30cm) tolerance of proximity without distress or withdrawal, may lean toward adult/other	Positive (9)
	movement or control of body to increase proximity to adult to move closer, (20 cm or less), may reach out toward adult, may move to face adult, may maintain face to face posture	Very positive (10)
Facial Expression	grimacing (extreme distress, big frown, closed or open mouth), and/or head banging, and/or face hitting, and/or hair pulling and/ or occurs with negative vocalisations screams, or roars, or wails, may be tearful, unsettled and sob or cry	Very Negative (1)
	frowning, moderate may be close to tears, unsettled and upset appearance may sob or gasp and/or face rubbing, and /or rocking head, and/or flapping, and/or face stroking, and/or thumb sucking, attempts to self -comfort unsuccessful- remains upset	Negative (2)
	May be watchful, neutral expression- neither smiling nor frowning, not sobbing or gasping, self - stimulation may still be intense but emotions of distress or enjoyment not apparent on face and/ or face stroking and/or thumb sucking with neutral affect	Passive (3)
	smile, self-stimulating activities may continue, head may bob slightly,	Positive (4)
	broad smile -noticeable across whole face in eyes and eyebrow area and cheeks, and/or no self-harm, and/or whole body coordinated movements may indicate enjoyment- such as hand flapping with broad smile, clapping hands with broad smile, or rocking body with broad smile	Very positive (5)
Coordinated Action	sway, rock, hand slap	Positive (6)
Vocalisation	wail, scream	Negative (0.5)
	shout, speak, sing	Positive (6)

Adult interaction Approach	Coding number
Adult song	18
Adult speech	17
Adult silent	16
Song + Music	21

In the event figure, when Jessica is not visible in the video, data were excluded from the analysis. Where data are missing this is indicated in the event figure 9.3 by a dotted line. It follows that the description of the whole session (below) does not match the events in the event figure exactly, but it does provide a detailed account of the full interaction (and does identify times when Jessica is not visible but may be heard).

Detailed Description of Interaction with Jessica in Video 13

Episode 1: Speech

The video begins with a shot of the audience with 16 pupils including Jessica and 3 members of staff. An adult (MA) is speaking off screen. The pupils and adults are watching MA closely. Jessica is looking away from MA and is stroking her face, making noises and shouting 'bye' (5s from the start) and waving her hand. An adult (SL) leans in closely to look at Jessica and says 'sh' as does another member of staff (SB). Jessica begins sucking her thumb briefly. Jessica cries loudly (10s from the start), and the camera pans across the peers, who are sitting quietly on the floor, watching MA. We cannot see Jessica but can hear her crying (15s, 22s, and 25s). The camera moves back to include Jessica and she is looking at SL, who is also looking at her. Jessica is vocalising 'uhh' (30s) and then begins to self sooth, sucking her thumb, and stroking her neck. The peers in the audience sit passively, though three pupils are looking around the hall now (42s). The camera pans across the audience and the rest of the peers can be seen watching MA intently (48s) for ten seconds. The camera returns to include Jessica in the shot and she has her head down, and is crying loudly. SL is leaning over to her, talking quietly without touching her. Jessica begins to self-stimulate, sucking her thumb and stroking her neck.

In the first segment when the adult speaks, Jessica predominantly has a negative response across attention focus, social proximity and facial expression. She vocalises negatively and repeatedly throughout the adult speech input. Jessica self stimulates and this soothes her for a short period and she is briefly passive. However, she becomes distressed again, and vocalises negatively, as the adult speaks. Jessica's responses are quite different to her peers. They sit attentively and passively, listening to the adult. Jessica is distressed in a normal assembly setting, with peers around her and an adult speaking. Jessica in this segment tries to self-stimulate, to comfort herself, but this is brief and does not have a lasting impact on Jessica's emotional self-regulation.

Jessica is self-stimulating (64s) for four seconds, then drops her hands and begins to cry again (71s). Jessica then rocks her head back and grimaces. The camera pans across the audience, showing pupils sitting passively and watching MA intently (84s) for ten seconds. The camera continues to move across the audience, some pupils have their hands up. MA asks them what sound a cuckoo makes and to shout out after the count of three if they know. The peers shout 'cuckoo' (112s) and Jessica covers her face with both hands and begins to cry. The pupils again shout 'cuckoo' (117s) and Jessica continues to cry.

In this segment, the adult continues to speak, and Jessica's social proximity, attention focus and facial expression responses are negative. Jessica continues to vocalise negatively throughout. The peer response becomes more positive, when the adult asks them to participate. One would expect the peers to sit attentively and listen, and to join in when asked. One would expect that Jessica would not fit in with these responses. Again, she responds negatively to adult speech, and her attempts to regulate her emotions through self-stimulation/self-comfort are brief, have a short term effect, but no lasting impact on her emotional state.

The camera moves, showing the pupils in the audience, sitting passively, watching MA and MB intently (121s) for 15s. MA asks the pupils to repeat the word cuckoo when it appears in the song, and asks 'is that ok?' The pupils respond by shouting out 'yeah' and then they all turn to look at SC as she answers the same question. MA tells the audience they will practice the song first, and the children watch attentively as MB begins to play the guitar (152s).

Episode 2: Song and music
Jessica sucks her thumb and strokes her neck (166s); she looks briefly to SL then to MA. The camera moves to show the pupils in the audience sitting quietly and watching MA and MB intently (170s). MA and MB are at the front of the hall, playing on the guitar. MB starts to sing: 'Gonna find me, on a mountain, so-ooh high. So that I can, I can see the pretty bird, for where she goes, passing by. Ooh that cuckoo.' The audience joins in with MA and MB shouting out 'cuckoo' (at 177s in the video). MB continues to sing 'She is a pretty bird, and she warbles, as she flies.

Yeah, but she never, she never hollers, cuckoo'. The audience joins in with MA and MB shouting out 'cuckoo' (190 s). MB continues to sing: 'In May, or July.' MB stops singing, and they finish the song with a strum on the guitar.

Jessica's response to song and music is very positive becoming positive in terms of attention focus. Jessica's social proximity response is very positive, becoming positive. Jessica's facial expression is positive and she stops vocalising negatively in this segment.

End of Episode 2

The camera is on the pupils around the hall. MA halts the song (197s) and says 'that was alright' and Jessica begins to roll her head back and shouts 'ba' and begins to cry. There are less than 10s of recorded response to this spoken input

The event figure (9.3) details the interaction captured in Video 13, it presents the adult interaction approaches, and Jessica's attention focus, social proximity, facial expression behaviours in response as well as her coordinated actions and vocalisations. Where data are missing this is indicated by a dotted line. Event figure 9.3 features on the following page.

Event figure 9.3: Jessica's responses in video 13

9.3 Adult input and Jessica's responses in Video 13
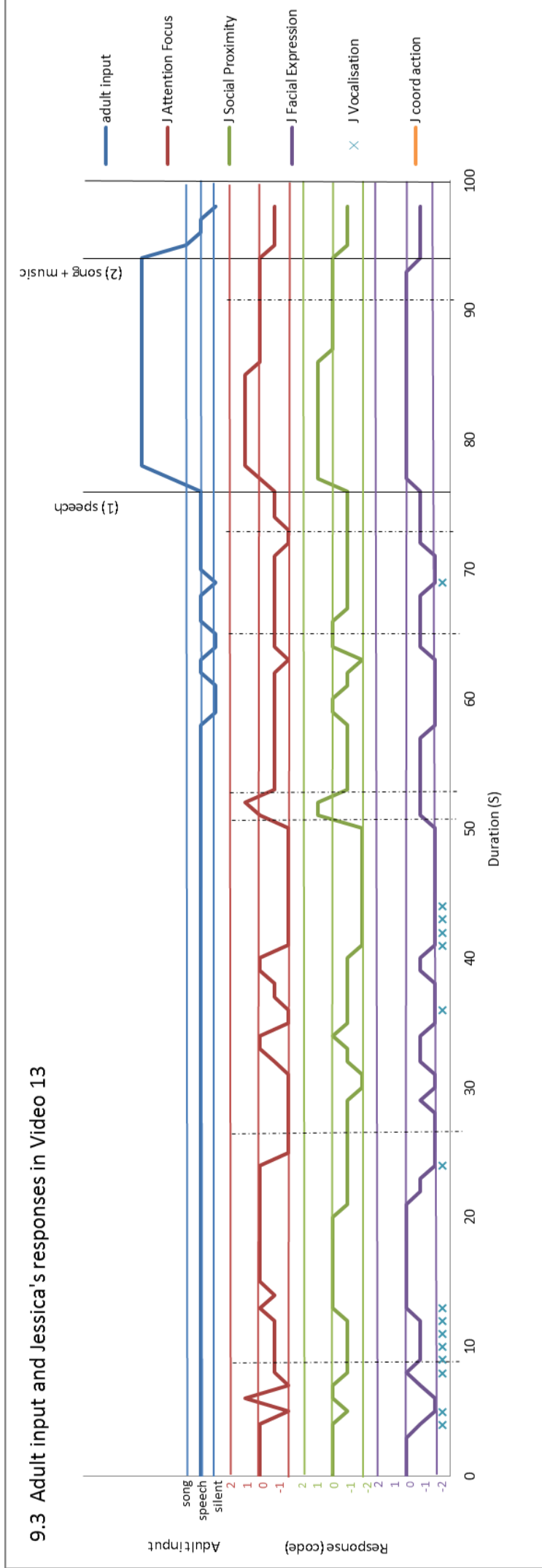
Statistical results and analysis

Jessica vocalised negatively during spoken input, and not at all during song and music, this is evident in event figure 9.3.

Table 9.4: Jessica's Responses to Song + Music versus Spoken – means, confidence intervals and effect sizes

	Song + Music (n = 18)	Spoken (n = 77)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.44 (0.51)	12.01 (0.83)	1.43 [1.12, 1.74]	9.32	41	1.82**
Social Proximity	8.56 (0.51)	7.16 (0.73)	1.40 [1.10, 1.70]	9.57	35	2.02**
Facial Expression	2.94 (0.24)	1.77 (0.74)	1.18 [0.98, 1.38]	11.65	84	1.74**

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. #p < .01, one-tailed.

Table 9.4 compares Jessica's responses to song and music with her responses to speech across attention focus, social proximity and facial expression measures. The differences are large and statistically significant. Jessica responds more positively to Song + music than to speech in all elements in the analysis of the interaction episode recorded in video 13.

Table 9.5: Jessica's Attention Focus During Song + Music and Speech - effect sizes

Condition	*M (SD)*	*n*	Condition	
			Song + Music	Speech
Song + Music	13.44 (0.51)	18	–	1.82**
Speech	12.01 (0.83)	77		–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. #p < .01, one-tailed.

Table 9.5 compares Jessica's attention focus scores in response to song and music with those of her responses to speech. There is a very large effect that is statistically significant. Jessica responds more positively to Song + music than to speech.

Table 9.6: Jessica's Social Proximity During Song + Music and Speech - effect sizes

			Condition	
Condition	*M (SD)*	*n*	Song + Music	Speech
Song + Music	8.56 (0.51)	18	–	2.02**
Speech	7.16 (0.73)	77		–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. #p < .01, one-tailed.

Table 9.6 compares Jessica's social proximity scores in response to song and music with those of her responses to speech.

There is a very large effect that is statistically significant. Jessica responds more positively to Song + music than to speech.

Table 9.7: Jessica's Facial Expression During Song + Music and Speech - effect sizes

			Condition	
Condition	*M (SD)*	*n*	Song + Music	Speech
Song + Music	2.94 (0.24)	18	–	1.74**
Speech	1.77 (0.74)	77		–

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. #p < .01, one-tailed.

Table 9.7 compares Jessica's facial expression scores in response to song and music with those of her responses to speech. There is a very large effect that is statistically significant. Jessica responds more positively to Song + music than to speech.

Discussion of Results in Video 13

In video 13 Jessica was in a large assembly hall, filled with peers, which was an uncomfortable environment for her but which is part of typical school routines. Jessica's responses to different inputs were more negative than those of the peers seated around her. This seems likely to be a response to the noise, and to the social environment of a school assembly.

The naturally occurring 'experimental design' was ABA (a longer final A section, or an ABAB design would allow clearer conclusions to be drawn). It is possible that the results arise from Jessica's accommodation to the environment, although this seems implausible. Nevertheless, conclusions must be drawn with caution. The event figure shows a dramatic difference in her responses to the two conditions; visual inspection is supported by the statistical analysis. Jessica responded far more positively during song and music than during speech episodes in terms of her attention focus, social proximity and facial expression.

Conclusions

The interaction episode recorded in video 13 points to some tentative conclusions. Jessica responds differently to different adult inputs. She responded far more positively to song and music in terms of her social proximity, facial expression and attention focus.

Jessica vocalised negatively during spoken input and not during song. This vocalisation comprised cries or wailing, indicating distress.

In terms of methodology, there are some problems with this recorded episode similar to those seen with Colin. The first problem is that the focus pupil isn't visible throughout the episode, and so in order to analyse the data, the timeline was collapsed, thereby excluding all data where Jessica isn't visible and this meant that some of the vocalisation data were excluded from the analysis. A second problem is that the 'design' of this 'natural experiment' was ABA, with a short final A episode. A longer final A episode, and an additional B episode might have allowed firmer conclusions to be drawn.

Video 22

Participants and relationships between participants: *as video 13*

Setting and activity: *as video 13*

Recording*:* Video 22 is seven minutes long. It was shot from the front of the assembly. All pupils and staff were aware of the camera being held by a familiar member of staff.

Video analysis: the method of analysis is the same as for video 13; again, the timeline has been edited so that sections where Jessica is not in view have not been analysed.

Incidental observations are captured here of Diane and Colin – two other pupils who are studied in detail in this thesis.

Detailed Description of interaction with Jessica in Video 22

Episode 1: Speech

The video shows the pupils sitting on the floor looking at the adults in the front of the hall (for 6s). Jessica is seated on a chair, next to an adult (SL).We hear her crying before we see her (at 8s); she is distressed and crying, her eyes are closed; as the adult (MA) at the front of the hall talks to the pupils in the audience.

Jessica's responses in terms of social proximity during the adult input of speech are negative. Jessica's responses to speech in this episode are negative and very negative in terms of attention focus and facial expression. Jessica vocalises negatively during this episode.

Episode 2: Music

When the adult stops talking and begins to play the guitar she becomes more alert, sits upright, orients her head so she is facing the adults and looks at the adults MA and MB. As the music continues she continues to hold her body still, and at 38s she turns to adult SL and waves her hand, looking at her face and making a sound 'aw arr'; SL waves back.

Jessica's response to music is neutral in terms of attention focus, social proximity and facial expression, she vocalises once, positively in this episode.

Episode 3: Song + Music

MA begins to sing (40s) 'Jesus on the main line, tell him what you want. Jesus on the main line, tell him what you want. Jesus on the mainline, tell him what you want. Just call him up and tell him what you need' (these lyrics are repeated several times in the song, and are accompanied by guitar and hand drum). Jessica turns quickly to look at MA and MB as soon as the singing begins. Jessica sits still and watches them, she looks briefly at the adult holding the camera then watches her peers; other pupils sitting on the floor begin to move their bodies to the music (50s). Jessica is out of camera shot.

Jessica is moving her feet to the music and song which is coded as coordinated action, and her peers are moving as well. Jessica looks at SL (1.08s) and begins to rock rhythmically from side to side in her chair; the adult joins in. Jessica swings her chair so the legs lift of the floor, the adult puts her hand on the chair and Jessica swings more gently. The adults in the background are all swaying to the music, and Jessica turns to the camera and smiles, waving her hand as she continues to sway. She then begins to rock her head up and down and continues to smile at the camera, then she almost stands, sits back down and drums on her lap with her hands, still looking at the camera and smiling. Jessica looks at the staff seated around her, and they copy her hand movement – drumming on their laps and smiling at her. She looks back at the camera, and as the music quietens, she begins to slow down, moving around less. She moves out of her seat then pushes it back as she sits again, and begins to sway. Jessica looks at the adult holding the camera and smiles, and starts to pat her legs again (125s). Then she begins to stamp her feet to the music (141s). The camera moves to show the peer pupils sitting in the audience, some of whom are moving, but many sit passively. The adults and pupils in the audience begin to clap in time to the music (165s), and Jessica rocks backwards and forwards. Diane and Colin are in the audience, sitting in the middle of the hall, and the video shows Diane holding a bottle and drinking from it, and Colin smiling at an adult while they clap their hands. The audience members clap their hands to the music (until 214s) and Jessica rocks, flexing her hands, and stretching up with her arms, her head is positioned neutrally in relation to the adults seated next to her, and her eyes are looking around. MA and MB stop singing and playing.

Jessica's attention focus was positive, with several instances of very positive eye contact which was maintained. Jessica's social proximity behaviours are neutral with some positive and one instance of very positive pro social behaviour. Jessica's facial expressions during this episode were neutral with some positive and very positive instances. Jessica rocked and moved her body to the music for a sustained period during this episode.

Episode 4: Speech

The pupils in the audience clap their hands. Jessica begins to vocalise, and sings 'I love you' (221s). The audience sits passively and MA begins to speak. Jessica sits and makes some vocalisations; her movements are jerky, and she screams occasionally. Her hands are clasped and she looks around her. Jessica covers her eyes with her fists and flaps her hands briefly (254s). Jessica throws herself forward, flaps her hands and vocalises negatively, she is frowning and looking at MA and MB. Diane cries out over the adult speaking. The audience claps and Jessica cries loudly, in distress. Diane is in the middle of the hall, and begins screaming loudly with distress, during the adult speech; the camera shows her banging her head and screaming. Colin has turned around and is watching her. An adult tries to pass her a drink but this does not calm her, so the adult takes Diane out of the hall (297s). The pupils in the audience sit passively, and Jessica cries and vocalises. Jessica is unhappy and calls out. Some of Jessica's sounds are song like and some sound like words. Her eyes are half closed and she frowns. The most distinct sound is when she calls out 'bye' and waves her arm, and begins to self-comfort, by sucking her thumb and stroking her face with her other hand (333s).

Jessica's attention focus during this episode is neutral with many instances of very negative eye gaze behaviours in which she covers up her eyes and tries to look away. Jessica's social proximity behaviours are also neutral with many instances of very negative behaviours where she curls her head down towards her lap away from the social environment. Jessica's facial expressions in this episode are negative with some neutral elements; she vocalises negatively, and cries in this episode.

Episode 5: Music

MA and MB begin to play some music and as the rhythm develops, Jessica puts her hand down away from her face, though she continues to suck her thumb (355s). The pupils in the audience are clapping, but not moving to the music or singing along. The music in this segment is a more complex and less rhythmic piece of music. As the pupils in the audience begin to clap their hands to the music in a more organized rhythm, Jessica moves both her hands down and begins moving gently to the music, and stamping her feet very briefly (382s). She begins to clap her hands together (388s). Jessica puts her hand to her mouth and begins exploring her mouth with her

fingers (405s). She looks to adult SB and begins mimicking her movement by stamping her feet (424s) and cries out at the end of the music.

Jessica's attention focus in this episode is neutral with some positive moments. Jessica's social proximity and facial expression are neutral; she performs some coordinated actions and begins to vocalise positively at the end of the episode.

Episode 6: Silence

As the audience clap Jessica claps and raises her head upwards to face the ceiling. The pupils in the audience cheer and she vocalises with sounds, keeping her body still, then she sings 'I love you' again (442s).

Jessica's attention focus in this episode is very negative and neutral, her social proximity is neutral, her facial expression is neutral. She does vocalises positively in this episode.

Event figure (9.8) details the interaction captured in Video 22, it presents the adult interaction approaches, and Jessica's attention focus, social proximity, facial expression behaviours in response as well as her coordinated actions and vocalisations. Event figure 9.8 is on following page.

Event figure 9.8: Jessica's responses in video 22

9.8 Adult input and Jessica's responses in video 22
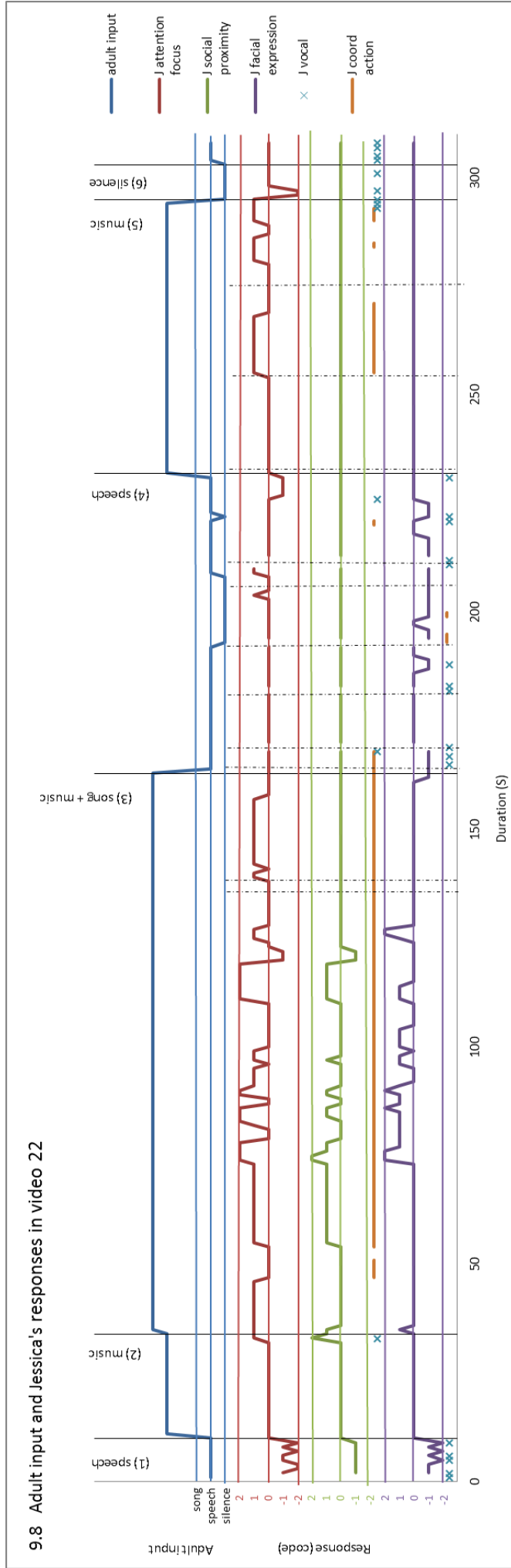
Statistical results and analysis

Table 9.9: Jessica's Responses to Song + Music versus Music- means, confidence intervals and effect sizes

	Song + Music (n = 129)	Music (n = 87)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.76 (0.74)	13.31 (0.47)	0.45 [0.29, 0.61]	5.49	213	0.70**
Social Proximity	8.30 (0.54)	8.03 (0.24)	0.27 [0.16, 0.37]	4.97	189	0.60**
Facial Expression	3.30 (0.59)	3.00 (0.00)	0.30 [0.20, 0.41]	5.78	128	0.66**

*$p < .05$, two-tailed. **$p < .01$, two-tailed. ᵗ$p < .05$, one-tailed. ᴴ$p < .01$, one-tailed.

Table 9.9 compares Jessica's attention focus, social proximity and facial expression scores in response to song and music with those of her responses to music. All differences are large and statistically significant. Jessica responds more positively to Song + music than to music in video 22.

Table 9.10: Jessica's Responses to Song + Music versus Speech - means, confidence intervals and effect sizes

	Song + Music (n = 129)	Speech (n = 65)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.76 (0.74)	12.58 (0.90)	1.18 [0.92, 1.43]	9.10	108	1.48**
Social Proximity	8.30 (0.54)	7.69 (0.77)	0.61 [0.40, 0.82]	5.73	96	0.98**
Facial Expression	3.30 (0.59)	2.52 (0.59)	0.78 [0.60, 0.96]	8.60	128	1.31**

*$p < .05$, two-tailed. **$p < .01$, two-tailed. ᵗ$p < .05$, one-tailed. ᴴ$p < .01$, one-tailed.

Table 9.10 compares Jessica's attention focus, social proximity and facial expression scores in response to song and music with those of her responses to speech. All differences are large and statistically significant. Jessica responds more positively to Song + music than to speech in video 22.

Table 9.11: Jessica's Responses to Song + Music versus Silence - means, confidence intervals and effect sizes

	Song + Music (n = 129)	Silence (n = 26)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.76 (0.74)	12.81 (0.85)	0.95 [0.59, 1.32]	5.32	33	1.26**
Social Proximity	8.30 (0.54)	7.88 (0.59)	0.42 [0.16, 0.67]	3.35	33	0.76**
Facial Expression	3.30 (0.59)	2.44 (0.51)	0.86 [0.64, 1.09]	7.68	40	1.48**

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. ⁺⁺p < .01, one-tailed.

Table 9.11 compares Jessica's attention focus, social proximity and facial expression scores in response to song and music with those of her responses to silence. All differences are large and statistically significant. Jessica responds more positively to Song + music than to silence in video 22.

Table 9.12: Jessica's Responses to Music versus Speech - means, confidence intervals and effect sizes

	Music (n = 87)	Speech (n = 65)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.31 (0.47)	12.58 (0.90)	0.73 [0.48, 0.97]	5.94	89	1.06**
Social Proximity	8.03 (0.24)	7.69 (0.77)	0.34 [0.15, 0.54]	3.46	73	0.64**
Facial Expression	3.00 (0.00)	2.52 (0.59)	0.48 [0.33, 0.62]	6.45	64	1.22**

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. ⁺⁺p < .01, one-tailed.

Table 9.12 compares Jessica's attention focus, social proximity and facial expression scores in response to music with those of her responses to speech. All differences are large and statistically significant. Jessica responds more positively to music than to speech in video 22.

Table 9.13: Jessica's Responses to Music versus Silence - means, confidence intervals and effect sizes

	Music (n = 87)	Silence (n = 26)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	13.31 (0.47)	12.81 (0.85)	0.50 [0.15, 0.86]	2.89	29	0.87**
Social Proximity	8.03 (0.24)	7.88 (0.59)	0.15 [-0.09, 0.39]	1.27	27	0.43
Facial Expression	3.00 (0.00)	2.44 (0.51)	0.56 [0.36, 0.76]	5.64	25	2.33**

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. #p < .01, one-tailed.

Table 9.13 compares Jessica's attention focus, social proximity and facial expression scores in response to music with those of her responses to silence. All differences are large and statistically significant in terms of her attention focus and facial expression, the difference does not reach significance in the case of social proximity. Jessica responds more positively in terms of attention focus and facial expression to music than to silence in video 22.

Table 9.14: Jessica's Responses to Speech versus Silence - means, confidence intervals and effect sizes

	Speech (n = 65)	Silence (n = 26)	Analysis			
	Mean (SD)	*Mean (SD)*	*Mean diff [CI]*	*t*	*df*	*d*
Attention Focus	12.58 (0.90)	12.81 (0.85)	-0.22 [-0.63, 0.18]	-1.11	48	-0.25
Social Proximity	7.69 (0.77)	7.88 (0.59)	-0.19 [-0.49, 0.11]	-1.28	59	-0.27
Facial Expression	2.52 (0.59)	2.44 (0.51)	0.08 [-0.16, 0.33]	0.68	53	0.15

*p < .05, two-tailed. **p < .01, two-tailed. ¹p < .05, one-tailed. #p < .01, one-tailed.

Table 9.14 compares Jessica's attention focus, social proximity and facial expression scores in response to speech with those of her responses to silence. All differences are small and do not reach statistical significance. No firm conclusions can be drawn when comparing speech to silence in video 22.

Table 9.15: Jessica's Attention Focus during Song + Music, Music, Speech and Silence touch in Video 22 - effect sizes

			Condition			
Condition	*M (SD)*	*n*	Song + Music	Music	Speech	Silence
Song + Music	13.76 (0.74)	129	–	0.70**	1.48**	1.26**
Music	13.31 (0.47)	87		–	1.06**	0.87**
Speech	12.58 (0.90)	65			–	-0.25
Silence	12.81 (0.85)	26				–

p < .05, two-tailed. **p* < .01, two-tailed. †*p* < .05, one-tailed. $^\#$*p* < .01, one-tailed.

Table 9.15 compares Jessica's attention focus scores in response to song and music, music, speech, and silence. Song and music elicits more positive responses than all other inputs. All differences are large and statistically significant. Music elicits more positive responses than both speech and silence. All differences are large and statistically significant. There is no statistically reliable difference between her responses to speech and silence.

Table 9.16: Jessica's Social Proximity during Song + Music, Music, Speech and Silence touch in Video 22 - effect sizes

			Condition			
Condition	*M (SD)*	*n*	Song + Music	Music	Speech	Silence
Song + Music	8.30 (0.54)	129	–	0.60**	0.98**	0.76**
Music	8.03 (0.24)	87		–	0.64**	0.43
Speech	7.69 (0.77)	65			–	-0.27
Silence	7.88 (0.59)	26				–

p < .05, two-tailed. **p* < .01, two-tailed. †*p* < .05, one-tailed. $^\#$*p* < .01, one-tailed.

Table 9.16 compares Jessica's facial expression scores in response to song and music, music, speech, and silence. Song and music elicits more positive responses that all other inputs. All differences are large and statistically significant. Music elicits more positive responses than

speech. The difference is large and statistically significant. Other differences are not statistically significant.

Table 9.17: Jessica's Facial Expression during Song + Music, Music, Speech and Silence touch in Video 22 - effect sizes

			Condition			
Condition	*M (SD)*	*n*	Song + Music	Music	Speech	Silence
Song + Music	3.30 (0.59)	129	−	0.66**	1.31**	1.48**
Music	3.00 (0.00)	87		−	1.22**	2.33**
Speech	2.52 (0.59)	65			−	0.15
Silence	2.44 (0.51)	26				−

*p < .05, two-tailed. **p < .01, two-tailed. †p < .05, one-tailed. #p < .01, one-tailed.

Table 9.17 compares Jessica's facial expression scores in response to song and music, music, speech, and silence. Song and music elicits more positive responses than all other inputs. All differences are large and statistically significant. Music elicits more positive responses than both speech and silence. All differences are large and statistically significant. There is no statistically reliable difference between her responses to speech and silence.

Discussion of Results in Video 22

Some issues may have a bearing on analysis. Jessica was recorded in a busy assembly hall, which is an environment she was not comfortable in although it is part of the typical school routine, and this may have meant that her responses were more negative than if she had been recorded in a more intimate one to one interaction, with less noise and fewer people around her. The adults conducting this assembly and giving the input were unfamiliar, however she was seated with familiar adults, and this may have changed her response behaviours in some way. The songs and music in this interaction episode were unfamiliar, but the first had a strong rhythm and a repeated chorus so was of a familiar structure to school songs. The second song had no words and was more rhythmically complex- it was a bluegrass tune and as it changed rhythms the children in the audience stopped clapping and sat passively. This may have had a bearing on the responses which Jessica displayed. The video recording was not an ideal one, there were moments in the recording where Jessica was not visible in the shot, and so no data were recorded. In response to this limitation, the event timeline was edited to exclude all seconds of the episode where Jessica was not visible, this meant that some of the data were lost, and it also meant that the event

figure does not correlate exactly to the detailed description of the interaction, which might make it confusing for the reader. The purpose of editing the timeline in this way was solely to support interpretation of the response behaviours of Jessica. The episode acted as a naturally developing experiment with repeated baselines of input, the limitation of this was that because no directed script was followed it did not follow a perfect design and the 'speech and music' segment was not repeated later in the video- which would have been useful to support arguments about the replicability of the findings.

The interaction episode recorded in video 22 was divided into segments using event lines to support interpretation of the results. The event figure presented the different segments of the interaction and patterns of response could be seen. The event figure presented some clear patterns in Jessica's responses to the different interaction approaches. Jessica's responses to speech were generally far more negative than her responses to music or song and music. Jessica moved more and coordinated her actions such as rocking, clapping and hand patting during song and music than in the other interaction approaches. The statistical analysis of the scores supported the observable patterns in the event figure, and leant support to the claim that the interaction approaches were different, and that song and music were preferred by Jessica in video 22. The results presented in tables 9.15, 9.16, 9.17 showed large and statistically significant differences in response between song and music, music, speech and silence as interaction approaches.

Suggestive Conclusions for video 22

The episode recorded in video 22 suggested that Jessica responded differently to the inputs of song and music, music, speech and silence. The patterns of response in the event figure suggested that Jessica's preferred input was song and music, given her more positive response in terms of attention focus, social proximity, facial expression than in the other inputs. The statistical analysis supported these conclusions, where Jessica's more positive response to song and music was evident in her attention focus, social proximity and facial expression in large and statistically significant differences in response score.

Conclusions

In the analysis of the two recorded episodes of interaction which feature Jessica, some caution must be exercised. There are weaknesses in the application of the methodology in the communal environment, which meant that some of the patterns of response may have been shaped by poor design (as in video 13). This will be discussed more fully in Chapter 11.

The interaction episode recorded in video 13 suggests two conclusions. First is that the interaction approaches of song and speech elicited different responses. This is evident in event figure 9.3 and in the detailed description of interaction in video 13.

The second is that Jessica responded more positively to song and music as an adult input, than to adult speech in terms of her attention focus, social proximity and facial expression- this difference was evident in the event figure and in the statistical analysis which showed large and statistically significant differences between the input responses.

The interaction episode recorded in video 22 supported the conclusions suggested by analysis of video 13. The interaction in video 22 also supported the conclusion that the interaction approaches were different in that they elicited different responses from Jessica during the recorded episode. The interaction in video 22 also supported the conclusion that song and music was a preferred interaction approach (during this type of interaction episode) than other input approaches such as music, speech or silence. The event figure presenting the input and response patterns suggested that song and music elicited more positive responses in terms of attention focus, social proximity and facial expression than the other inputs. The statistical analysis of the segments of the interaction episode supported this pattern, revealing that song and music elicited more positive responses than music, speech and silence. The findings were large and statistically significant, this demonstrated that in recorded episode 22, Jessica responded more positively to the adult input of song and music than to any other input attempt.

Overall, clear themes are noticeable in the responses of Jessica to interaction attempts by the adults in the recorded episodes in video 13 and 22. Jessica responds differently to the interaction inputs in both episodes. Jessica responds more positively to song and music than to the other interaction inputs in both videos, across attention focus, social proximity and facial expression response scales.

Chapter 10: Case Study Discussion

Having presented an exhaustive analysis of the video data in the preceding chapters, the aim here is to draw out the key themes from the video analysis and discuss the implications for both the children involved, and in relation to literature, theory and methodology. This discussion is important as the population involved in this study is hard to reach, and underrepresented in the literature.

Behaviour observation can identify patterns of expressive behaviours and consistent response to interaction approaches

One major finding is that individuals with PMLD in the study could express their internal states through consistent patterns in their eye gaze, social proximity, facial expression, and vocal behaviours. There was some suggestion in the literature (Hogg, Reeves, Roberts, & Mudford, 2001) that this might not be the case. If these authors were right, the behaviour observation methodology used in this study and others (Arthur, 2004; Forster, 2011; Green & Reid, 1996; Lyons, 2005; Munde, Vlaskamp, Maes, & Ruijssenaars, 2012; Neerinckx, Vos, Van den Noortgate, & Maes, 2013; Vlaskamp & van der Putten, 2011; Vos *et al.*, 2013) would not produce consistent patterns of pupil response. That distinctive patterns have been found supports the value of the methodological approach deployed. Here, patterns of behavioural responses were identifiable, and repetition of input approaches elicited similar responses in the participants (Colin, Vanessa, Angela in video 30, and Diane in video 33).

The second major finding was the identification of patterns of interaction. If interaction inputs and response behaviours of individual participants were unrelated, no pattern would be discernible and random responses would be observable in the event figures. The use of some statistical analysis identified the likelihood of the patterns of responses occurring as a result of a random process, and supported the assertion that the behaviours were consistent, and found patterns of dyadic interaction which were most unlikely to have occurred by chance.

Hostyn, Neerinckx, and Maes (2011) aimed to create a:

> "reliable, direct behavioural observation to generate a meaningful and detailed picture of the frequency and nature of both partners' attention directing behaviours, the attention episodes resulting from their dyadic interaction and the association between these variables both for the individual dyads and for the group as a whole."(Hostyn *et al.*, 2011, p. 499).

The value of identifying consistent patterns of behaviour in interactions is twofold. Primarily it means communicative partners, carers or practitioners can make reasonable predictions about responses to different interaction approaches and care in daily life in order to minimise distress and encourage responsiveness, thereby improving the quality of experience and quality of life for the individual with PMLD. These patterns of dyadic behaviour may also be used as foundations for

establishing further communicative dyads and interaction opportunities in order to develop further communication opportunities and capacity for the individual with PMLD. At least as important, promoting responsiveness in communication leads every participant to take seriously the role of the individual with PMLD as an empowered individual, capable of communicative activity (Maes, 2002) which has a direct impact on quality of life (Petry, Maes, & Vlaskamp, 2007a, 2007b).

Responsive interaction is key to successful communication

The role of the communication partner is highlighted in the literature on interaction reviewed in Chapter 2 (Nind & Hewett, 2001; Nind & Thomas, 2005). The significance of the communication partner is clear, and its oversight in some of the videos is a significant omission. Communication partners are very important in directing, structuring, creating openings for students' vocal contributions, and maintaining student responses through turn taking and extending the interaction activities. This was suggested in the work of Bunning, Smith, Kennedy, and Greenham (2013) and Nind and Thomas (2005) and the findings in this small study supported this. In this thesis it was the adult who initiated the interaction inputs and persevered or changed them in response to participant's behaviours with only one very unusual exception. The 'naturally occurring experiments' were orchestrated and conducted by the adult communication partner, and were lightly scripted. Responsiveness was a key part of the research orientation (influenced by Ware, 1994, 1996; Ware & Evans, 1986), so these scripts were often altered or abandoned and new interactive directions taken following the lead of the child's communicative behaviours. An example of responsiveness is where an interaction approach elicited an extremely negative and distressed response; the input was immediately halted and a social 'repair strategy' was attempted with variable success.

Interactions are context dependent

The fourth major finding, supports the idea introduced in the literature review, but which came through very strongly in the results of this study, was that interactions were shaped and influenced by both environment and context. The first situation in which this became clear was where the videoed episodes were not dyadic interactions, but shaped by the context of the busy social environment in the school assembly hall. This strongly influenced the nature of the episode. Jessica, for example, responded negatively throughout the videoed interaction episodes because this environment was unpleasant for her although it was a familiar part of the routine at school. The noisy, unpredictable school environment also affected the quality of interactions at that background sound level and disruption and interruptions were commonplace, reflecting the real life environment of the school.

Simple behavioural descriptors are insensitive to context, and need to be complemented by qualitative descriptions

The complex context of interactions posed a challenge to the simple behaviour observation methods use in the study. In Video 30 during the song 'Miss Polly had a dolly' the adult sang and performed actions about the dolly going 'straight to bed'. Angela followed these actions and participated in the interaction in a socially appropriate and engaged way by pretending to sleep like the 'dolly' in the song. This excerpt, if interpreted using simple behaviour measures (closed eyes, averted gaze, head turned to 'rest') would indicate disengagement in the interaction. Clearly context independence is a significant flaw in this context and could have led to a misinterpretation of the response measures had the detailed interaction description not been used in conjunction with a qualitative description of events. If the statistical analyses based on behavioural response scores were used alone without further reference to the complex context, they would misrepresent the interaction and the responses elicited.

Adult use of speech and song to initiate interaction – elicited different responses

The fifth major finding involved the interaction approaches used by the adult communication partners. The results of each individual case study showed that each participant responded differently to the different interaction approaches. This lends strong support to the claim that the interaction approaches of song and speech are different in the responses they elicit in an interaction episode with an individual with PMLD. The children featured in each case chapter displayed subtly different responses to varied interaction approaches, as would be expected in such a heterogeneous group.

Microanalysis of behaviours can reveal 'moments of wonder' which can have important practical implications

Angela and Diane both showed that they were able to initiate and direct interactions. This was a surprise to familiar, caring and competent staff. These 'moments of wonder' overturned expectations about who was leading interactions; none of the participants was thought to be capable of secondary intersubjectivity and attention directing behaviours before the study began. Through frequent feedback and discussion with staff as described in the methodology throughout the research period, a shift in expectations occurred. These moments of wonder enthused support staff about the power of potentially communicative behaviour, and encouraged many staff to continue with this practice with more confidence. This meant that during staff discussions about including song in pupil documentation such as communication passports, there was an informed discussion about this between teaching and support staff as well as parents, where

support staff could articulate an authoritative view which had some influence on the development of the documents.

Communicating with the hard to reach: overview of findings of the individual case studies

Overall, Vanessa displayed more positive facial expressions and attention focus during sung input. During the sung interaction, Vanessa reached around the adult and put her hands on the adult's back and chest and rested her cheek against the adult during the song. In terms of the statistical analysis she displayed more positive social proximity behaviours during speech than song; the detailed interaction description suggests that this is a lasting after-effect of song, where Vanessa remained cuddled into the adult. The findings of this part of the study suggest that song is a useful strategy to use with Vanessa to develop her social interaction skills. Song based interactions could be used to give her more opportunities to extend her attention focus such as her reaching out and touching behaviours that engender less distress to Vanessa than using speech as she responds more positively to interactions using song than speech in terms of her facial expressions. It seems that for Vanessa, song can be an effective communication medium, to scaffold her attention focus behaviours to support her developing interaction skills.

Conclusions about Colin's responses to interaction are limited by the setting of the interaction episode, in that it is not a direct dyadic interaction; this limits the ability to draw conclusions. It does, however, provide useful evidence to establish that individuals with PMLD like Colin respond consistently to different interaction approaches, and that a pattern of responses observable in an event figure can be developed. Colin's coordinated movement, rhythmically rocking as soon as song began, indicates a positive response to song and music. He stopped rocking immediately upon the adult speaking. This suggests that for Colin, song and speech are different, and further that song is a pleasurable input for Colin. This might be a useful approach to encourage Colin to perform enjoyable activities like rocking which do not involve self-injurious behaviour, and are more pro-social. Further work with Colin is needed, in order to develop a more detailed profile of his responses to song and music, and explore how working in this medium could be beneficial for him.

Jessica also featured in interaction episodes which were not optimal for her with the environment being a busy assembly hall in both episodes recorded in video 13 and 22. Song and music elicited more positive response behaviours in terms of attention focus, social proximity and facial expression than did other interaction approaches and these differences were large and statistically significant. Video 22 featured much irrelevant data, and so the episode timeline was edited to cut out all scenes where Jessica did not feature visibly. This is clearly a limitation in the detailed operationalisation of the methodology. However, despite these limitations, Jessica

showed consistently positive responses to song and music. The findings suggest that song is an effective interaction strategy to use with Jessica. Despite being in an unpleasant environment from her perspective, Jessica still demonstrated greater attention focus, social tolerance to close proximity with others, and more positive facial expressions during song than spoken interaction approaches. Further work should be done with Jessica, in a more optimal environment such as a one to one and quiet environment, to encourage these positive responses and to scaffold her developing social skills.

Diane featured in two recorded episodes, videos 33 and 38. In video 33 Diane vocalised during adult silences more than usual, and moved her body and head during the song. Her side to side rocking was an engaged response to the song in terms of the detailed description. However, the strict application of a behavioural observation methodology meant that the statistical analysis was limited by this, with an excessively negative interpretation of the 'rocking away' behaviour. Overall in this episode there were positive responses to song in terms of attention focus, social proximity and facial expression; there was a surprisingly positive and unexpected result from object touch in this episode which should be explored further in future work. In the episode featured in video 38, song elicited more positive responses in terms of social expression and facial expression from Diane. Her eye gaze was more positive during speech. Diane displayed a wider range of facial expressions and vocalised more during song than any other interaction approach in this episode. This section of the study suggests that for Diane song can be an effective communication approach. This should be explored further, to offer Diane opportunities to experience social interaction which is less distressing to her, and to encourage the development of her tolerance for social proximity during interactions.

Angela featured in two recorded episodes. In videos 7 8 she responded more positively during total song in attention focus, social proximity and facial expression measures. She exhibited differential preferences between songs, and in both recorded episodes exhibited surprisingly accomplished communication skills and intersubjective awareness not before witnessed. This strongly suggests that Angela responded positively to social interaction attempts by an adult using song, and that song was an effective communication medium with Angela. The further exploration of Angela's preferences through song is recommended.

These collated findings confirm that across participants and classroom contexts overall, song elicited more positive communicative behaviours than other interaction approaches for Vanessa, Jessica, Angela, and Diane. In terms of the development of interaction and communication, song is a useful interactive approach and should continue to be used as an interaction practice in schools. The further exploration of individual preferences in interaction style should be conducted

cautiously, with the context of the interaction and the responsiveness of the communication partner as key considerations in the development of this work.

Chapter 11: Conclusions and implications

The research reported in this thesis aimed to explore the benefits (or otherwise) of the existing school practice of using song as an interaction approach with individuals with PMLD. Additional themes emerged which are highly relevant for education practices in a wider context. The research revealed consistent communicative behaviours and a means to identify these in individuals with PMLD and poor social tolerance. This confirmed that strategies used in the work of Green and Reid (1996), Petry and Maes (2006), and Vos *et al*. (2012) where behaviour observation methods were used to support analysis of responses of individuals with PMLD were appropriate methodologies. This thesis also modelled a strategy for collating a profile of communicative behaviours where patterns of behaviour were identifiable to adults familiar with children's communicative behaviours. This might support practice more widely despite the limitations discussed earlier. A theme revealed in the literature on interaction was the responsiveness of the communication partner, and this had a significant impact on the methodology in this study. Responsiveness was a central underpinning element of the research approach, so that interaction attempts were shaped by the responses elicited, and a reciprocal communication exchange developed through feedback.

This is an important issue in the methodological approach of the study, because it means that the 'design' of the interactions were to some extent 'co-written' by the participant and action researcher. This developing duet of interaction is a feature which could be used to foster other mixed methodological approaches with more elements of balance between the participant and the researcher. This reflects a more naturalistic experience of interaction for these participants and provides us with a richer understanding of their communicative potential. The familiarity of partners and the interplay of input and response build a relationship (Bunning, 2009, 2013; Carnaby, 2007; Hogg 2007).

This work identified features of successful interaction with individuals with PMLD who are hard to reach, based on the literature on developmental models and research literature in the area with individuals in this group. The work in this study confirmed that successful dyadic interaction needs scaffolding through structuring by a lead communication partner and over interpretation of response behaviours by the lead communication partner fosters dialogue patterns in those who are hard to reach. This is much like what mothers do with infants as noted by Schaffer (1977, 1984) and Brazelton (1973). The most important theme was the communication partner's responsiveness. The strategies offered here reinforce the need for the communication partner to build familiarity and focus on a detailed analysis of communicative behaviours of individuals with

PMLD. This has potential benefits for communication (Williams et al., 2007) and by implication to quality of life for individuals with PMLD (Petry 2007a, 2005; Reinders, 2002).

Implications for practice: individual and setting based

The implications of this research for my own pupils and their families are profound - as a teacher in the school during and after the research I ensured that details of the communicative behaviours of participants were circulated around staff in the school using a 'communication passport' for each participant from 2011 onwards. This information was shared with parents and carers, by sending home a copy of the final 'passport' which had been developed in cooperation with parents and staff. Interestingly, pupils at the school also picked up on this practice of singing to communicate, and tried to be responsive to their peers by, for example singing to them in greeting and this had variable levels of success.

Colin's self-injurious behaviour has not reduced, and he continues to pose a challenge in terms of his communication and inclusion into school life. Song is one of the strategies which staff use to engage his attention, but as yet, impact has been limited.

For Diane, whose extreme distress during personal care routines was vocal and could be heard around the school, support assistants were encouraged to use song to improve her tolerance of touch during these interactions. This had some limited success; Diane still has good days and bad days.

The support workers closely associated with Angela and Vanessa used the insights from the work in 2010 using the prototype behaviour descriptors developed at that time to encourage interactions and communication skills. The use of song became a more explicit part of the daily routine and was a planned element in lessons by the class teacher in 2011 and into 2012. Sadly, Angela and Vanessa did not survive to see this work completed. One of the many contributions that their short lives made has been to encourage one of their teachers to explore the world of song, and its use with them, and with other young people who struggle to interact.

Jessica's mother reports using song a lot at home, where it forms a big part of her daily life and routines. Jessica's spoken language is increasing and her classmates enjoy singing with her to help her calm down if she is upset. Her communication and improved social interaction are a source of pleasure for her, her family and staff in school.

Many elements of this study were imperfect and could be improved, however, the work has made a positive contribution to school life, and to the lives of some pupils, confirming and enhancing the efficacy of an existing practice as an appropriate and useful interaction approach for some children who have PMLD and low social tolerance.

Reflections on Methodology

Microanalysis of the interaction episodes revealed behaviours which had not been identified before during everyday practice. Given that song was already being used in the classroom with the participants, it is strength of the methodology that it offers opportunities to support more focused analysis of potentially communicative behaviour by participants. An example of this can be found in the analysis of video 33, where quiet positive vocalisations made by Diane were identified which had previously gone unnoticed. When the early event figure was shared with support staff (details can be seen in the information sharing section of chapter 3), these quiet positive vocalisations were identified and staff learned to 'listen for' them. Without the microanalysis, this valuable insight might have remained undetected.

An advantage of exploring the role of song in supporting communicative interactions is its low risk, and it requires little or no financial investment. It is fairly simple for practitioners and carers to explore whether using song to support communication is effective with individuals with PMLD or not. It is something which could then be explored further without major obstacles to its implementation on an individual case by case basis. The research was based in an authentic setting; this means that potential flaws with lab-based experimental work have been avoided and, as I was both a familiar member of staff and did not alter the usual routines of the school, any suggestion of an 'outsider researcher' effect has been avoided. Serendipitous identification of surprising findings was also possible, that may not have been available to a visiting researcher.

Limitations

There are, of course, limitations to any research, and elements of this study, detailed below, could be improved. The small student sample, and the heterogeneous nature of participants in relation to the population with PMLD means that one must be cautious in generalising the findings. Context-dependency has been shown to be key, and therefore what has emerged in this case may only be germane to these particular children in these settings and there were, of course, challenges when the school environment was not optimal for the children or the research. This means that noise, imperfect lighting, regular disruptions and interruptions rendered much of the video unsuitable or unusable for the purposes of this study.

An associated issue was the lack of a clear focus during the early recording phase of the study (2009); this meant that some episodes had to be edited to exclude seconds of interaction where the case participant did not feature. If this study were to be repeated, this could (and should) be avoided by using more than one camera, which would facilitate recording the actions of both communication partners, as suggested by Wosch and Wigram (2007). This would, however, have been difficult to arrange as a lone teacher-researcher. Another useful strategy would have been to use a more focused recording plan, which might have helped to avoid errors in recording.

There were also flaws in the design of the sequences of interaction; better designs (such as ABAB designs) might have made it easier to draw firm conclusions about the effects of different interactions.

The use of a detailed behavioural coding scheme raised interesting methodological issues. A virtue of the behaviour observation scale is that it documents observable behaviours, and so is clear and simple to understand (especially in its 2012 format). It is ideographic and is tailored to the specific behaviours of individuals, within a common analytic framework. A disadvantage is that it is context independent. It fails to capture many significant elements in the interaction, for example, the detailed interactions between the partners. Appropriateness and engaged behaviours are not captured by these scales, but are of key significance to support the development of our understanding of the interactions. This was particularly frustrating when this limitation affected the statistical analysis; more reliance needs to be placed on the descriptive account of the interaction in order to support the interpretation of what is happening in an interaction in context.

 In future research, I would suggest taking these issues into account, and placing more weight on parallel discursive accounts which highlight context relevant behaviours. So, for example, where a participant's ratings on the behavioural scales indicate that the pupil is disengaged, but a professional teacher judgment is that the student is actively engaged e.g. rocking to the song, or pretending to sleep (in a relevant cognitive context), an alternative coding strand could be used to prevent mis-labelling of positive behaviours. Unfortunately, time limitations prevented this solution being trialled in this study, but this may be a next step in future iterations of this methodology.

The 'moments of wonder' where participants displayed behaviour which was unpredicted posed challenges to the methodology. An example of this was when Diane began initiating an interaction with an adult who interrupted the recorded session. 'Moments of wonder' were really valuable in terms of the insights they offered, but were difficult to accommodate within the analytic framework adopted here and, of course, pose a challenge to any pre-determined coding system. They show that analytic methods need to be complemented with more discursive accounts.

The effectiveness of song in communicating with children with PMLD

In each of the case studies a detailed analysis of responses to the different interaction mediums was conducted. The responses elicited during adult song were different to those elicited by adult speech, establishing that song is an effective communication medium for these children. Further, the collated results from the individual cases showed that song was a medium which elicited more positive communicative behavioural responses in terms of attention focus, social proximity

and facial expression from the children involved. Issues of confirmation bias, or selection bias have been discussed above, and provided that attention is focused on the context dependence of the findings, the very unusual circumstances of the study may be perceived as strength. Taleb (2007) echoes Popper's (1959) use of the metaphorical 'black swan', which although rare, exists and once noticed, makes a small contribution to our understanding of the nature of 'swans'. The conclusion of this thesis, that song *can* be an effective communicative approach may be viewed as being too vague. Take-up or increased use of song by the teachers and parents of some children show that they are sufficiently convinced by the evidence to act upon it in their dealings with a child with PMLD. The results have value in both the intellectual challenge they pose to us in the contribution to the exploration of communication and interaction it prompts, and in the potential contribution that the use of song can make in improving communicative opportunities for individuals with PMLD and poor social tolerance. For both of these reasons, further work needs to be done to explore the issue.

Why might song be effective?

Sloboda (2005) expressed concerns that research in the area of music and its effects on individuals adopts an overly mechanistic 'pharmaceutical' model. The work of this thesis does not aim to adopt such a stance. It would be an overly simplistic interpretation of the work to suggest that a 'treatment' of song can promote higher engagement. If it were only 'song' as a 'treatment' which fostered communicative engagement we would have seen responses from Angela and Vanessa to the singing teddy featured in video 30 31 which matched their responses to the singing adult. This was not observed, so it cannot be concluded that it is 'song' which fosters communicative interaction, are other elements in the social interaction contribute to the improved social engagement observed. Singing is a broad construct (with many component features). It is not clear which feature of song made it effective as an interaction approach; we might have been examining the effects of melodic tone, rhythmicity, or repetition). This requires further exploration. The effects observed in this work may, alternatively, be related to the familiarity of the adults and participants and the accentuation of typical interaction features through song on both the participant and the communication partner.

Gabrielsson and Lindstrom (1995) and Sloboda (1992) identified the role of music in the altering of mood. This suggests that there are affective implications of working through song and music with individuals with PMLD who are hard to reach, which may be hidden and require further exploration. Waterman (1996) and Sloboda (1991) identified melodic structural features ('hot spots') in music which acted to arouse emotions and also to regulate them in typically developing adult listeners. This mirrored M. Papousek *et al*. (1991) work on emotional arousal and affect regulation through melodic tone structures in 'motherese'. If song and sing-song speech can act as a scaffold to support arousal of emotion or as a means to regulate and dampen anxiety and

distress in both adults and infants, it seems reasonable to suggest it may serve similar functions for the participants in this study. This might be related to Jessica's differential emotional responses (through facial expression and negative vocalisations) to adult speech and adult song which can be seen in the analysis of video 13 and 22.

Alternatively it may be that songs provide additional support for interactive turn taking behaviours through what Maier (1978a) called rhythmicity. It may be that by offering a structure for turn taking behaviour, where pauses are emphasised and repetition features strongly (supporting familiarity with patterns of interaction) song supports communicative interaction through its rhythmic structure. The rhythmic components of interactions between infants and adult carers, as well as between children and adults has been noted in the other work in this area(Bruner, 1977, 1983; Condon, 1975; Lewis & Rosenblum, 1974; Maier, 1978a, 1978b, 1987; Schaffer, 1977, 1984; Stern, 1974; Trevarthen, 1977; Trevarthen & Aitken, 2001). The work of Trevarthen (1977) used the concept of communicative musicality to develop this theme (Malloch & Trevarthen, 2009; Trevarthen, 1977, 1996; Trevarthen & Aitken, 2001; Trevarthen & Daniel, 2005). In later work Trevarthen and Daniel (2005) identified disorganised rhythm as an obstacle to effective interactions between a typically developing infant, and a non-typically developing infant in their interactions with an attuned and responsive caregiver. This suggests then, that song may act as a scaffold to support interactive behaviour through providing an explicit rhythmic pulse and a familiar pattern to structure such interactions. This is consistent with anecdotal evidence from Sachs (2007) and the observation of Angela's turn taking behaviours in video 30 31.

It is possible that implicit structural elements in song support the development of communicative interactions by providing repetition and thereby familiarity, rhythm and well signalled opportunities to take turns in the interaction, and melodic contours which support affect arousal and regulation. However, for this to be effective, it seems evident that this needs to take place in the right setting, and with a familiar and responsive communicative partner. These implicit structural features of song and music and their impact on the development on communicative interaction need further exploration in future research.

Future research directions

As signalled above, interaction attempts elicited different responses, and more positive responses were elicited to the input of song than other interaction attempts. This suggests that song can be an effective communication approach with individuals with PMLD who are hard to reach. However, this was a study with a small sample of unique individuals and caution is needed before results can be generalised. It is far from conclusive, therefore, that all children with PMLD can benefit from this approach so an important next step in this area would be to do more exploration of the difference between interaction approaches, and gather more information on

the elements which support effective communication, and their effects on both communication partners. It may also be a useful research direction to develop the research by exploring more closely the body language of the communication partner in interacting with the participant with PMLD- it may be that we can observe mirroring and turn taking behaviours between the two as suggested in work by Condon (1975) on interaction. A second area for future work in this area would be to explore aspects of behavioural observation measures further to examine the relationships between eye gaze which was used as an indicator of attention and other behavioural responses. Literature suggested there might be overlap between the constructs of attention and emotional regulation, and while no conclusions about this could be drawn from the findings in this study, the relationship between measures warrants further exploration.

Further work would be needed to explore any potentially effective generalisation of the findings of this study, to see if it can be applied more broadly. Further barriers to effective social interaction in education settings should also be investigated in more detail. In this work, the very nature of the school environment posed significant opportunities and barriers to effective communication as well as to the recording of episodes of interaction and this may result in benefits for a variety of stakeholders. It would also be useful to develop more context responsive measures to support accurate analysis and portrayal of interaction with individuals with PMLD, in order to improve the effectiveness of research in this area. Future work in this area might also focus on the role of family and peers in fostering social interactions with this group of participants. This is a field rich for potential development. Many challenges face traditional research approaches, but practitioner-researchers and collaborative practices are ideally positioned to maximise the positive contribution of each area of expertise to advocate for and enhance the opportunities to develop interaction skills and communication opportunities of this underrepresented group of individuals, who have so much to teach us about the true meaning of engagement, communication and living a life of quality that is interdependent with others.

References

Abberley, P. (1987). The concept of oppression and the development of a social theory of disability. *Disability, Handicap and Society*, 2, 5-19. doi: 10.1080/02674648766780021

Adams, D., & Oliver, C. (2011). The expression and assessment of emotions and internal states in individuals with severe or profound intellectual disabilities. *Clinical Psychology Review*, 31(3), 293-306. doi: 10.1016/j.cpr.2011.01.003

Adelson, E., & Fraiberg, S. (1974). Gross Motor Development in Infants Blind from Birth. *Child Development*, 45(1), 114-126. doi: 10.2307/1127757

Aigen, K. (2008). An analysis of qualitative music therapy research reports 1987-2006: Doctoral Studies. *The Arts in Psychotherapy*, 35 (5), 307-319. doi : 10.1016/j.aip.2008.06.001

Ainscow, M. (2007). From Special Education to effective schools for all: A review of progress so far. In L. Florian (Ed.), *The Sage Handbook of Special Education* (pp. 146-159). London: Sage.

Amaral, I. (2003). *Analyzing teacher/child interactions: What makes communication successful?* Paper presented at the XIII DbI World Conference, Toronto.

Anderson, C. (2006). Early communication strategies: using video analysis to support teachers working with preverbal pupils. *British Journal of Special Education*, 33(3), 114-120. doi: 10.1111/j.1467- 8578.2006.00426.x

Arthur-Kelly, M., Bochner, S., Center, Y., & Mok, M. (2007). Socio-communicative perspectives on research and evidence-based practice in the education of students with profound and multiple disabilities. *Journal of Developmental and Physical Disabilities*, 19(3), 161-176. doi: 10.1007/s10882-007-9045-9

Arthur-Kelly, M., Foreman, P., Bennett, D., & Pascoe, S. (2008). Interaction, Inclusion and students with profound and multiple disabilities: Towards an agenda for research and practice. *Journal of Research in Special Education Needs*, 8(3), 161-166. doi: 10.1111/j.1471-3802.2008.00114.X

Arthur, J., Waring, M., Coe, R., & Hedges, L. V. (Eds.). (2012). *Research Methods & Methodologies in Education*. London. Sage.

Arthur, M., Hook, J., & Butterfield, N. (1995). Behaviour state: Exploring issues in best practice for students with the most severe and multiple disabilities. *Australian Journal of Special Education*, 19 (1), 37-44. doi: 10.1080/1030011950190105

Bakeman, R., & Adamson, I. B. (1984). Coordinating attention to people and objects in mother-infant and peer-infant interaction. *Child Development*, 55 (4), 1278-1289. doi: 10.2307/1129997

Bakeman, R., & Gottman, J. M. (1997). *Observing interaction: An introduction to sequential analysis*. New York: Cambridge University Press.

Bakeman, R., & Quera, V. (2011). *Sequential Analysis and Observational Methods for Behavioral Sciences*. United States of America: Cambridge University Press.

Baldwin, D. (1995). Understanding the link between joint attention and language acquisition. In C. Moore & P. J. Dunham (Eds.), *Joint attention: Its origins and role in development* (pp. 131-158). Hillsdale, NJ.: Erlbaum.

Barber, M. (2012). Promoting Communication rather than generating data. In D. Hewett (Ed.), *Intensive Interaction Theoretical Perspectives* (pp. 88-103). London: Sage.

Baron-Cohen, S. (1995). *Mindblindness: An Essay on Autism and Theory of Mind*. London: MIT Press.

Baron-Cohen, S., Campbell, R., Karmiloff-Smith, A., Grant, J., & Walker, J. (1995). Are children with Autism blind to the mentalistic significance of the eyes? *British Journal of Developmental Psychology*, 13 (4), 379- 398. doi 10.1111/j.2044-835X.1995.tb00687.x

Baron-Cohen, S. (1996). Reading the mind in the face: A cross-cultural and developmental study. *Visual Cognition*, *3*(1), 39-60. doi: 10.1080/713756728

Baron-Cohen, S., Wheelwright, S., & Joliffe, T. (1997). Is There a 'Language of the Eyes'? Evidence from Normal Adults, and Adults with Autism or Asperger Syndrome. *Visual Cognition,* 4(3), 311-331. doi: http://dx.doi.org/10.1080/713756761

Bartlett, C., & Bunning, K. (1997). The importance of communication partnerships: A study to investigate the communicative exchanges between staff and adults with learning disabilities. *British Journal of Learning Disabilities*, 25 (4), 148-153. doi: 10.1111/j.1468-3156.1997.tb00030.x

Barton, L. (1998). Developing an emancipatory research agenda: possibilities and dilemmas. In P. Clough & L. Barton (Eds.), *Articulating with difficulty: research voices in inclusive education* (pp. 29-39). London: Paul Chapman.

Barton, L., & Oliver, M. (1997). *Disability Studies: past, present and future*. Leeds: Disability Press.

Basil, C. (1992). Social interaction and learned Helplessness in Severely Disabled Children. *Augmentative and Alternative Communication*, 8(3), 188-199. doi:10.1080/07434619212331276183

Bellamy, G., Croot, L., Bush, A., Berry, H., & Smith, A. (2010). A study to define: Profound and multiple learning disabilities (PMLD). *Journal of Intellectual Disabilities*, 14(3), 221-235. doi:10.1177/1744629510386290

Bergeson, T. R., & Trehub, S. E. (2007). Signature Tunes in mothers' speech to infants. *Infant Behavior and Development*, 30 (4), 648-654. doi: 10.1016/j.infbeh.2007.03.003

Bero, L. A., Grilli, R., Grimshaw, J. M., Harvey, E., Oxman, A. D., & Thomson, M. A. (1998). Closing the gap between research and practice: An overview of systematic reviews of interventions to promote the implementation of research findings. *British Medical Journal*, 317 (7156), 465-468. doi: 10.1136/bmj.317.7156.465

Bindemann, M., Burton, A. M*., & Langton, S. R. H. (2008). How do eye gaze and facial expression interact? Visual Cognition*, 16 (6), 708-733. doi: 10.1080/13506280701269318

Blacking, J. (1973). *How musical is man?* American Council of Learned Societies, University of Washington Press.

Blacking, J. (1987). *A commonsense view of all music : reflections on Percy Grainger's contribution to ethnomusicology and music education*. Cambridge: Cambridge University Press.

Blacking, J., & Byron, R. (1995). *Music, culture, & experience: selected papers of John Blacking*. Chicago: University of Chicago Press.

Booth, T., & Booth, W. (1996). Sounds of Silence: Narrative Research with inarticulate subjects.

Disability and Society, 11 (1), 55-70. doi:10.1080/09687500650023326

Brazelton, T. B. (1973). Effect of maternal expectations on early infant behavior. *Early Child Development and Care*, *2*(3), 259-273. doi: 10.1080/0300443730020301

Brazelton, T. B. (1984). *Neonatal behavioural assessment scale*. London: Heinemann Medical Books.

Brooks, T., Camurri, A., Canagarajah, N., & Hasselblad, S. (2002). *Interaction with Shapes and Sounds as a therapy for special needs and rehabilitation*. Paper presented at the 4th international Conference on Disability, Virtual Reality and Associated Technologies, Veszprem, Hungary

Bruce, S. M. (2011). Severe and Multiple Disabilities. In J. M. Kauffman, Hallahan, D.P. (Ed.), *Handbook of Special Education* (pp. 291-304). London: Routledge.

Bruce, S. M., & Vargas, C. (2007). Intentional communication acts expressed by children with severe disabilities in high-rate contexts. *Augmentative and Alternative Communication*, 23(4), 300-311. doi:10.1080/07434610601179960

Bruner, J. S. (1977). Early social interaction and language acquisition. In H. F. Schaffer (Ed.), *Studies in mother- infant interaction* (pp. 271-289). New York: Academic.

Bruner, J. S. (1983). Childs Talk: learning to use language. London: W W Norton and Company

Bull, J. (2008). Autism and the Family: Group Music Therapy with Mothers and Children. In A. Oldfield, Flower, C. (Ed.), *Music Therapy with Children and their Families* (pp. 71-89). London: Jessica Kingsley.

Bunning, K. (2009). Making Sense of Communication. In J. Palwyn & S. Carnaby (Eds.), *Profound intellectual Multiple Disabilities: Nursing Complex Needs* (pp. 46-61). Oxford: Wiley- Blackwell.

Bunning, K., Smith, C., Kennedy, P., & Greenham, C. (2013). Examination of the communication interface between students with severe to profound and multiple intellectual disability and educational staff during structured teaching sessions. *Journal of Intellectual Disability Research*, 57(1), 39-52. doi: 10.1111/j.1365-2788.2011.01513.x

Bunt, L. (1994*). Music Therapy: an art beyond words*. London: Routledge.

Bunt, L., & Pavlicevic, M. (2001). Music and Emotion: Perspectives from Music Therapy. In P. N. Juslin, Sloboda. J. A. (Ed.), *Music and Emotion: Theory and Research* (pp. 181-199). Oxford: Oxford University Press.

Burford, B., & Trevarthen, C. (1996). Evoking communication in Rett syndrome: Comparisons with conversations and games in mother-infant interaction. *European Child and Adolescent Psychiatry*, 6 (1), 26-30.

Butterfield, N., & Arthur, M. (1995). Shifting the focus: Emerging priorities in communication programming for students with a severe intellectual disability. *Education and Training in Mental Retardation and Developmental Disabilities*, 30 (1), 41-50.

Cakiroglu, O. (2012). Single subject research: applications to special education. *British Journal of Special Education*, 39 (1), 21- 29. doi: 10.1111/j.1467-8578.2012.00530.x

Calculator, S., & Dollaghan, C. (1982). The use of communication boards in a residential setting: an evaluation. *Journal of Speech and Hearing Disorders*, 47 (3), 281-287. doi:10.1044/jshd.4703.281

Calhoun, C. (1994). *Social Theory and the Politics of Identity*. Oxford: Blackwell.

Cambridge, P. (1999). The First Hit: A case study of the physical abuse of people with learning disabilities and challenging behaviours in a residential service. *Disability & Society*, 14 (3), 285-308. doi: 10.1080/09687599926154

Campbell, C. H., & Wilcox, M. J. (1986). *Communicative Effectiveness of movement patterns used by non-vocal children with severe handicaps*. Paper presented at the International Conference of the International Society for Augmentive and Alternative Communication, Cardiff.

Carnaby, S. (2004). *People with PMLD: A review of the research about their lives*: Commissioned by MENCAP.

Carnaby, S. (2007). Developing Good Practice in the Clinical Assessment of People with Profound Intellectual Disabilities and Multiple Impairment. *Journal of Policy and Practice in Intellectual Disabilities*, 4(2), 88-96. doi: 10.1111/j.1741-1130.2007.00105.

Carpenter, M., Nagell, K., & Tomasello, M. (1998). Social Cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monograph for the Society for Research in Child Development*, 63(4), 1-143. http://www.jstor.org/stable/1166214

Chastey, H., & Friel, J. (1991). *Children with Special Needs. Assessment, law and practice- caught in the act*. London: Jessica Kingsley.

Clegg, J. A. (1993). Putting people first: a social constructionist approach to learning disability. *British Journal of Clinical Psychology*, 32 (4), 389-406. doi: 10.1111/j.2044-8260.1993.tb01074.x

Condon, W. (1975). Speech makes babies move. In R. Lewin (Ed.), *Child Alive* (pp. 75-85). New York: Doubleday. doi: 10.1037/h0084216

Consedine, N. S., Magai, C., & Bonnano, G. A. (2002). Moderators of the emotion inhibition-health relationship: a review and research agenda. *Review of General Psychology*, 6 (2), 204-228. doi: 10.1037//1089-2680.6.2.204

Cooper, R. P., & Aslin, R. N. (1989). the language environment of the young infant: implications for early perceptual development. *Canadian Journal of Psychology*, 43 (2), 247-265.

Coupe O'Kane, J., & Goldbart, J. (1998). Communication before Speech: Development and assessment (2 ed.). London: David Fulton Publishers.

Cumming, G. (2012). *Understanding the New Statistics*: effect sizes, confidence intervals, and meta-analysis. New York: Routledge.

Cummins, R. A. (2002). Proxy Responding for Subjective Well-Being: A Review. *International Review of Research in Mental Retardation,* 25, 183- 207. doi:10.1016/S00747750(02)80009-X

Darwin, C. (1872). *The origin of species by means of natural selection*. London: John Murray.

Davies, C. E., Zeedyk, M. S., Walls, S., Betts, N., & Parry, S. (2008). Using imitation to establish channels of communication with institutionalised children in Romania: bridging the gap. In M. S. Zeedyk (Ed.), *Promoting social Interaction for individuals with communicative impairments: Making Contact* (pp. 84-101). London: Jessica Kingsley.

Davies, E. (2008). It's a Family affair: Music Therapy for Children and Families at a Psychiatric Unit.

In C. Flower & A. Oldfield (Eds.), *Music Therapy with Children and their Families* (pp. 121-140). London: Jessica Kingsley.

De Bortoli, T., Arthur-Kelly, M., Mathisen, B., Foreman, P., & Balandin, S. (2010). Where are Teachers voices? A research agenda to enhance the communicative interactions of students with multiple and severe disabilities at school. *Disability and Rehabilitation*, 32(13), 1059-1072. doi: 10.3109/09638280903410730

Department for Children, Schools and Families. (2009). *Lamb Inquiry: Special Educational Needs and Parental Confidence*. London: DfCSF

Drake, T. (2008). Back to Basics: Community- based Music Therapy for Vulnerable Young Children and their Parents. In A. Oldfield, Flower, C. (Ed.), *Music Therapy with Children and their Families* (pp. 37-52). London: Jessica Kingsley.

Driver, J., Davis, G., Ricciardelli, P., Kidd, P., Maxwell, E., & Baron-Cohen, S. (1999). Gaze perception triggers reflexive visuospatial orienting. *Visual cognition*, 6(5), 509-540. doi: 10.1080/135062899394920

Dunn, H. G. (2001). Importance of Rett syndrome in child neurology. *Brain and Development*, 23 (1), 38-43. http://dx.doi.org/10.1016/S0387-7604(01)00335-7

Eilan, N., Hoerl, C., McCormack, T., & Roessler, J. (2005). *Joint Attention: Communication and Other Minds: Issues in Philosophy and Psychology*. Oxford University Press.

Ekman, P. W., & Friesen, W. (1978). *Facial Action Coding System: A technique for the measurement of facial movement* Palo Alto, CA: Consulting Psychologist Press.

Ekman, P. W., & Friesen, W. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, 17 (2), 124-129. doi: 10.1037/h0030377

Elefant, C., & Wigram, T. (2005). Learning ability in children with Rett Syndrome. *Brain and Development*, 27, 97-101. http://dx.doi.org/10.1016/j.braindev.2005.03.020

Ellis, P. (1996). Layered Analysis: A Video-based Qualitative Research Tool to Support the Development of a New Approach for Children with Special Needs. *Bulletin of the Council for Research in Music Education*, *130*, 65-74.

Emerson, E. (1995). *Challenging behaviour: Analysis and intervention in people with learning disabilities*. Cambridge: Cambridge University Press.

Emerson, E. (2009). Estimating future numbers of adults with profound and multiple learning disabilities in England. *Tizard Learning Disability Review*, 14(4), 49-55. doi: 10.1108/13595474200900040

Emerson, E., & Emerson, C. (1987). Barriers to the effective implementation of habilitative behavioural programmes in an institutional setting. *Mental Retardation*, 25 (2), 101-106.

Felce, D., Jones, E., & Lowe, K. (2002). Active support: planning daily activities and support for people with severe mental retardation. In S. Holburn & P. M. Vietze (Eds.), *Person-centred planning. Research, practice and future directions* (pp. 247-269). Baltimore: P.H. Brookes.

Felce, D., & Perry, J. (1995). Quality of life: Its definition and measurement. *Research in developmental disabilities*, *16*(1), 51-74. http://dx.doi.org/10.1016/0891-4222(94)00028-8

Felce, D., & Perry, J. (1996). Asessment of quality of life. In R. L. Schalock (Ed.), *Quality of Life: Conceptualization and Measurement* (Vol. 1). Washington: AAMR.

Fernald, A. (1984). The perceptual and affective salience of mother's speech to infants. In L. Feagans, C. Garvey, & R. Golinkoff (Eds.), *The origins and growth of communication* (pp 5-29) Norwood, New Jersey: Ablex.

Fernald, A., & Kuhl, P. K. (1987). Acoustic determinants infant preference for motherese speech. *Infant behaviour and development*, 10 (3), 279-293. doi:10.1016/0163-6383(87)90017-8

Field, T. M. (1977). Effects of early separation, interactive deficits, and experimental manipulations on infant-mother face-to-face interaction. *Child Development*, 763-771. http://www.jstor.org/stable/1128325

Firth, G., Elford, H., Leeming, C., & Crabbe, M. (2008). Intensive interaction as a Novel Approach in Social Care: Care Staff's Views on Practice Change Process. *Journal of Applied Research in Intellectual Disabilities*, 21, 58-69. doi: 10.1111/j.1468-3148.2007.00369.x

Florian, L. (Ed.). (2007). *The Sage handbook of Special Educational Needs*. London: Sage.

Flower, C. (2008). Living with Dying: Reflections on Family Music Therapy with Children near the End of Life. In A. Oldfield, Flower, C. (Ed.), *Music Therapy with Children and Their Families* (pp. 177-190). London: Jessica Kingsley

Foreman, P., & Arthur-Kelly, M. (2005). *Alertness levels and communication involvement in students with the most severe multiple disabilities in Australian classrooms: effects of short teacher training programs*. Paper presented at the ISEC, Glasgow.

Foreman, P., Arthur-Kelly, M., Bennett, D., Neilands, J., & Colyvas, K. (2013). Observed changes in the alertness and communicative involvement of students with multiple and severe disability following in-class mentor modelling for staff in segregated and general education classrooms. *Journal of Intellectual Disability Research*, 1-16. doi: 10.1111/jir.12066

Forster, S. (2011). *Affect Attunement in communicative interactions between adults with PIMD and support workers*. (Doctoral thesis, Monash University, Victoria, Australia.) Retrieved from: http://www.cddh.monash.org/assets/documents/forster-phd-submitted-errata-included-in-text.pdf

Forster, S., & Ianoco, T. (2008). Disability support workers' experience of interaction with a person with profound intellectual disability. *Journal of Intellectual and Developmental Disability*, 33 (2), 137-147. doi: 10.1080/13668250802094216

Frederickson, N., & Cline, T. (2002). *Special educational needs, inclusion, and diversity: a textbook*. Buckingham: Open University Press.

Friesen, C. K., & Kingstone, A. (1998). The eyes have it! Reflexive orienting is triggered by nonpredictive eye gaze. *Psychonomic Bulletin Review*, 5 (3), 490-495. Doi: 10.3758/BF03208827

Gabrielsson, A., & Lindström, S. (1995). Can Strong Experiences of Music Have Therapeutic Implications? In R. Steinberg (Ed.), *Music and the Mind Machine* (pp. 195-202): Springer Berlin Heidelberg.

Geertz, C. (1973). *The interpretation of cultures: selected essays*. New York: Basic Books.

Geertz, C. (1983). *Local Knowledge: Further essays in interpretive anthropology*. New York: Basic Books

Gilroy, A. (2006). *Art Therapy, Research and Evidence- based practice.* London: Sage.

Gold, K. (2003). *Statementing? What a disaster we created*. Interview with Mary Warnock in Article in TES (4550),   first published 11 may 2003.

Goldbart, J. (1994). Opening the communication curriculum to students with PMLDs. In J. Ware (Ed.), *Educating Children with Profound and Multiple Learning Difficulties* (pp. 15-62). London: David Fulton.

Goldbart, J., & Caton, S. (2010). *Communication and people with the most complex needs: what works and   why this is essential.*   A guide produced for Mencap http://hampshirelearningdisabilitypartnershipboard.org.uk/uploads/attachment/266/communicating-with-people-with-complex- needs-what-works.pdf

Goldman, R. (2009a). ORION, an Online Digital Video Data Analysis Tool: Changing our Perspectives as an   Interpretive Community. In R. Goldman, Pea, R., Barron, B., Denny, S. J (Ed.) *Video Research in the Learning Sciences* (pp. 507-520). London: Routledge.

Goldman, R. (2009b). Video Representations and the Perspectivity Framework: Epistemology, Ethnography, Evaluation and Ethics. In R. Goldman, Pea, R., Barron, B., Denny, S. J. (Ed.), *Video Research in the Learning Sciences* (pp. 3-37). London: Routledge.

Goldman, R., Pea, R., Barron, B., & Derry, S. J. (Eds.). (2009). *Video Research in the Learning Sciences.* London: Routledge.

Goode, D. (1990). The world of the congenitally deaf-blind: towards the grounds for achieving human   understanding. In J. Jacobs (Ed.), *Mental Retardation: A Phenomenological Approach* (pp. 381-396).   Philadelphia: Temple University Press.

Goodley, D. (2001). 'Learning Difficulties', the Social Model of Disability and Impairment: challenging epistemologies. *Disability and Society*, 16 (2), 207- 231. doi: 10.1080/09687590120085816

Goodley, D., & Tregaskis, C. (2006). Storying Disability and Impairment: Retrospective Accounts of Disabled   Family Life. *Qualitative Health Research*, 16 (5), 630-646. doi: 10.1177/1049732305285840

Graham, J. (2004). Communicating with the uncommunicative: music therapy with pre-verbal adults. British   Journal of Learning Disabilities, 32 (1), 24-29. doi: 10.1901/jaba.1996.29-67

Green, C., & Reid, D. (1996). Defining, validating, and increasing indices of happiness among people with   profound multiple disabilities. *Journal of Applied Behaviour Analysis*, 29 (1), 67-78.doi: 10.1901/jaba.1996.29-67

Green, C., & Reid, D. (1999). A behavioral approach to identifying sources of happiness and unhappiness   among individuals with profound multiple disabilities. *Behavior Modification,* 23 (2), 280-293. doi: 10.1177/0145445599232006

Greenspan, S. I., Wieder, S., & Simons, R. (1998). *The child with special needs: Encouraging intellectual and emotional growth*. Jackson, TN: Perseus Books.

Grenier, M. (2007). Inclusion in Physical Education: From the Medical Model to Social Constructionism. *Quest*, 59(3), 298-310. doi: 10.1080/00336297.2007.10483554

Gresham, F. M., Gansle, K. A., & Noell, G. H. (1993). Treatment integrity in applied behavior analysis with children. *Journal of Applied Behavior Analysis*, *26* (2), 257–263.

doi: 10.1901/jaba.1993.26-257

Grol, R. (1996). Research and development in quality of care: Establishing the research agenda. *Quality in   Health Care*, 5 (4), 235-242. doi: 10.1001/jama.286.20.2578z

Grove, N., Bunning, K., Porter, J., & Olsson, C. (1999). 'See what I mean': interpreting the meaning of communication by people with severe and profound intellectual disabilities. *Journal of Applied Research in   Intellectual Disabilities*, 12 (3), 190-203. doi: 10.1111/j.1468-3148.1999.tb00076.x

Guess, D., Roberts, S., & Guy, B. (1999). Implications of behavior state for the assessment and education of students with profound disabilities. In A. C. Repp & R. H. Horner (Eds.), *Functional Analysis of Problem Behavior- From Effective Assessment to Effective Support*. Belmont, CA: Wadsworth.

Guess, D., Roberts, S., & Rues, J. (2002). Longitudinal analysis of state patterns and related variables among   infants and children with significant disabilities*. Research and Practices for Persons with Severe Disabilities*,   27 (2), 112-124. doi: 10.2511/rpsd.27.2.112

Guess, D., Roberts, S., Siegel-Causey, E., Ault, M. M., Guy, B., Thompson, A. S., (1993). Analysis of behavior state conditions and associated environmental variables among students with profound handicaps. *American Journal on Mental Retardation*, 97 (6), 634-653.

Hagberg, B., & Witt-Engerstrom, I. (1986). Rett Syndrome: A suggested staging system for describing impairment profile with increasing age toward adolescence. *American Journal of Medical Genetics*, 24, 47- 59. doi: 10.1002/ajmg.1320250506

Hastings, R. P. (1997). Staff Beliefs about the Challenging Behaviors of Children and Adults with Mental Retardation. *Clinical Psychology Review*, 17(7), 775-790. doi: 10.1016/S02727358(97)00050-0

Hattie, J. (2009). *Visible learning: a synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.

Hersen, M., & Barlow, D. H. (1976). *Basic A-B-A designs*. Oxford: Pergamon.

Hewett, D. (2007). Do Touch: physical contact and people who have severe, profound and multiple learning difficulties. *Support for Learning*, 22(3), 116-123. doi: 10.1111/j.1467-9604.2007.00458.x

Hewett, D. (2009). *Intensive interaction: priorities and principles for teaching communication to pupils with PIMD*. Paper presented at the CCEA Conference, Connemara, Ireland.

Hewett, D., & Nind, M. (Eds.). (1998). *Interaction in Action*. London: David Fulton Publishers.

Heyvaert, M., Maes, B., Van den Noortgate, W., Kuppens, S., & Onghena, P. (2012)*. A multilevel meta-analysis of single-case and small-n research on interventions for reducing challenging behaviour in persons with intellectual disabilities. *Research in Developmental Disabilities*, 33(2), 766-780. doi: 10.1016/j.ridd.2011.10.010

Hodkinson, A. (2010). Inclusive and Special Education in the English Educational System: historical perspectives, recent developments and future challenges. *British Journal of Special Education*, 37(2), 61-67. doi: http://dx.doi.org/10.1111/j.1467-8578.2010.00462.x

Hogg, J. (2007). Complex needs and complex solutions: the challenge of profound intellectual and multiple disabilities. *Journal of Policy and Practice in Intellectual Disabilities*, 4(2), 4-14. doi: 10.1111/j.1741-1130.2007.00103.x

Hogg, J., Reeves, D., Roberts, J., & Mudford, O. C. (2001). Consistency, context and confidence in judgements of affective communication in adults with PIMD. *Journal of Intellectual Disability Research*, 45(1), 18-29. doi: 10.1111/j.1365-2788.2001.00289.x

Hogg, J., & Sebba, J. (1986). *Profound retardation and multiple impairment* (Vol. 1). London: Croom-Helm.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The Use of Single-Subject Research to Identify Evidence-Based Practice in Special Education. *Exceptional Children,* 71(2), 165-179.

Horvat, J., & O'Neill, N. (2008). 'Who is the Therapy for?' Involving a Parent or Carer in their Child's Music Therapy. In A. Oldfield, Flower, C. (Ed.), *Music therapy for Children and their Families* (pp. 89- 102). London: Jessica Kingsley.

Hostyn, I., Daelman, M., Janssen, M. J., & Maes, B. (2010). Describing dialogue between persons with profound intellectual and multiple disabilities and direct support staff using the Scale for Dialogical Meaning Making. *Journal of Intellectual Disability Research*, 54(8), 679-690. doi: 10.1111/j.1365-2788.2010.01292.x

Hostyn, I., Neerinckx, H., & Maes, B. (2011). Attentional processes in interactions between people with profound intellectual and multiple disabilities and direct support staff. *Research in Developmental Disabilities*, 32(2), 491-503. doi: 10.1016/j.ridd.2010.12.034

Ianoco, T., Carter, M., & Hook, J. (1998). Identification of intentional communication in students with severe and multiple disabilities. *Augmentative and Alternative Communication*, 14(2), 102-114. doi: 10.1080/07434619812331278246

Ingersoll, B., & Schreibman, L. (2006). Teaching reciprocal imitation skills to young children with autism using a naturalistic behavioral approach: effects on language, pretend play, and joint attention. *Journal of Autism and Developmental Disorders*, 36 (4), 487-505. doi: 10.1007/S10803-006-0089-Y

Jacobs, J. K., Kawanaka, T., & Stigler, J. W. (1999). Integrating qualitative and quantitative approaches to the analysis of video data on classroom teaching. *International Journal of Educational Research*, 31(8), 717-724. http://dx.doi.org/10.1016/S0883-0355(99)00036-1

Janssen, C. G., Schuengel, C., & Stolk, J. (2002). Understanding challenging behavior in people with severe and profound intellectual disability: a stress-attachment model. *Journal of Intellectual Disability Research*, 46 (6), 445-453. doi: 10.1046/j.1365-2788.2002.00430.x

Jeong, S., & Kim, M. T. (2007). Effects of a theory-driven music and movement program for stroke survivors in a community setting. *Applied Nursing Research*, 20 (3), 125-131. doi: 10.1016/j.apnr.2007.04.005

Jones, R., & Williams, H. (2005). Reducing stereotyped behavior: an experimental analysis of intensive   interaction. *International Journal of Practical Approaches to Disability*, 22(2), 21-25. Jones, R. S. P., Wint, D., & Ellis, N. C. (1990). The social effects of stereotyped behavior. *Journal of Mental Deficiency Research*, 34(3), 261-268. doi: 10.1111/j.1365-2788.1990.tb01537.x

Jonides, J. (1981). Voluntary versus automatic control over the mind's eye's movement. In T. Field & N. Fox   (Eds*.), Attention and Performance,* Vol 9, (pp. 187-203): Erlbaum.

Juslin, P. N., & Sloboda, J. A. (2001). *Music and emotion: Theory and research*. Oxford University

Press.

Kane, R. L., Kane, R. A., Bershadsky, B., Degenholtz, H., Kling, K., & Totten, A. (2005). Proxy Sources for   information on nursing home residents' quality of life. *Journals of Gerontology series B- Psychological   Sciences and Social Sciences,* 60(3), 318- 325. doi: 10.1093/geronb/60.6.S318

Kauffman, A. S. (1994*). Intelligent testing with the WISC-III*. Oxford, England: John Wiley and Sons.

Kazdin, A. E. (1982). *Single Case Research Designs: methods for clinical and applied settings*. New York: Oxford University Press.

Kellett, M. (2005). Catherine's Legacy: Social Communication development for individuals with profound   learning difficulties and fragile life expectancies. *British Journal of Special Education*, 32(3), 116-121.doi: 10.1111/j.0952-3383.2005.00383.x

Kellett, M., & Nind, M. (2001). Ethics in quasi-experimental research on people with severe learning disabilities: dilemmas and compromises. *British Journal of Learning Disabilities*, 29(2), 51-55. doi: 10.1046/j.1468-3156.2001.00096.x

Kemp, A. S., Fillmore, P. T., Lenjavi, M. R., Lyon, M., Chicz-Demet, A., Touchette, P. E., & Sandman, C. A.   (2008). Temporal patterns of self-injurious behavior correlate with stress hormone levels in the developmentally disabled. *Psychiatry Research,* 157(1-3), 181-189. doi: 10.1016/j.psychres.2007.04.003

Kennedy, H., & Sked, H. (2008). Video interaction guidance: a bridge to better interactions for individuals   with communication impairments. In M. S. Zeedyk (Ed.), *Promoting social interaction for individuals with   Communicative Impairments: Making Contact*. London: Jessica Kingsley.

Kiernan, C., & Reid, B. (1987). *Pre-verbal communication schedule*. Windsor: NFER Nelson.

Kingstone, A., Friesen, C. K., & Gazzaniga, M. S. (2000). Reflexive Joint Attention Depends on Lateralized   Cortical Connections. *Psychological Science, 11*(2), 159-166. doi: 10.1111/1467-9280.00232

Koch, T. (2001). Disability and Difference: balancing social and physical constructions. *Journal of Medical   Ethics*, 27 (6), 370-376. doi:10.1136/jme.27.6.370

Kraat, A. (1985). *Communication between Aided and Natural Speakers: A State of the Art Report: IPCAS   Project*: Canadian Rehabilitation Council for the Disabled.

Langton, S. R. H., & Bruce, V. (1999). Reflexive visual orienting in response to the social attention of others. *Visual Cognition*, 6 (5), 541-568. doi: 10.1080/135062899394939

Langton, S. R. H., Watt, R. J., & Bruce, V. (2000). Do the eyes have it? Cues to the direction of social attention. *Trends in Cognitive Sciences*, 4(2), 50-59. http://dx.doi.org/10.1016/S1364-6613(99)01436-9

Lebedeva, G. C., & Kuhl, P. K. (2010). Sing that tune: Infants' perception of melody and lyrics and the facilitation of phonetic recognition in songs. *Infant Behavior and Development*, 33 (4), 419-430 http://dx.doi.org/10.1016/j.infbeh.2010.04.006

Lewis, M., & Rosenblum, L. A. (Eds.). (1974). *The effects of the Infant on its Caregiver*. New York: John Wiley

Levitin, D. (2006). *This is Your Brain on Music: Understanding a human obsession*. Croydon: Atlantic

Books.Light,

Levitin, D. (2008). *The World in Six Songs: how the musical brain created human nature*. Croydon: Aurum Press.

Light, J. (1984). More on Interaction. *Communicating Together*, 2, 15-17. doi: 10.1080/07434618812331274657

Light, J., Collier, B., & Parnes, P. (1985). Communicative interaction between young nonspeaking physically disabled children and their primary caregivers: Part II-Communicative function. *Augmentative and Alternative Communication*, 1(3), 98-107. doi:10.1080/07434618512331273591

Linell, P. (1998). *Approaching Dialogue. Talk, Interaction and Contexts in Dialogical Perspectives*. Amsterdam: John Benjamins Publishing Company.

Lock, A. J. (2000). Preverbal Communication. In J. G. Bremner, Fogel, A. (Ed.), *Handbook of Infancy Research*. Oxford: Blackwell.

Lovett, H. (1996). *Learning to Listen*. London: Jessica Kingsley Press.

Lyons, G. (2003). *Life satisfaction for children with profound and multiple disabilities: seeking eudaimonia*. (Doctorate), University of Newcastle, Newcastle.

Lyons, G. (2005). The Life Satisfaction Matrix: An instrument and procedure for assessing the subjective quality of life of individuals with profound multiple disabilities. *Journal of Intellectual Disability Research*, 49, 766-769. doi: 10.1111/J.13652788.2005.00748.X

Maes, B. (2002). *The significance of the relationship between direct care staff and persons with disabilities for quality of care and quality of life*. Paper presented at the IASSID Europe Quadrennial Conference, Dublin, Ireland.

Maier, H. W. (1978a). Piagetian Principles Applied to the Beginning Phase in Professional Helping. In R. Brown (Ed.), *Piagetian Theory and the Helping Professions* (pp. 1-13). Los Angeles, California: University Press, University of California.

Maier, H. W. (1978b). *Three Theories of Child Development* (3rd ed.). New York: Harper and Row.

Maier, H. W. (1987). *Developmental group care of children and youth: concepts and practice*. New York: Haworth.

Malloch, S., & Trevarthen, C. (2009). *Communicative musicality: exploring the basis of human companionship*. Oxford : Oxford University Press.

Markova, I., Graumann, C., & Foppa, K. (1995). *Mutualities in Dialogue*. Cambridge: Cambridge University Press.

Matson, J. L., Cooper, C., Malone, C. J., & Moskow, S. L. (2008). The relationship of self-injurious behaviour and other maladaptive behaviours among individuals with severe and profound intellectual disability. *Research in Developmental Disabilities*, 29(2), 141-148. doi: 10.1016/j.ridd.2007.02.001

Matson, J. L., & Mayville, E. A. (2001). The Relationship of Functional Variables and Psychopathology to Aggressive Behavior in Persons With Severe and Profound Mental Retardation. *Journal of Psychopathology and Behavioral Assessment*, 23(1), 3-9. doi: 10.1023/A:1011083221991

McClimens, A. (2005). From Vagabonds to Victorian Values: the Social Construction of a Disability Identity. In G. Grant, P. Goward, M. Richardson & P. Ramcharan (Eds.), *Learning Disability: A lifecycle approach to valuing people*. (pp 28-46) Milton Keynes: Open University Press.

McNiff, J. (1995). *Action research for professional development* (pp. 137-151). Bournemouth: Hyde Publications.

Medcof, J., Roth, J., & Emslie, G. R. (1979). *Approaches to Psychology*. Milton Keynes, England: The Open University Press.

MENCAP. (2012). *Mencap - All about Learning Disability* Retrieved 13th February 2012, from http://www.mencap.org.uk/all-about-learning-disability/information-professionals/pmld/about-pmld

Miall, D. S., & Dissanyake, E. (2003). The Poetics of Babytalk. *Human Nature*, 14(4), 337-364. doi: 10.1007/S12110-003-1010-4

Mossman, D. A., Hastings, R. P., & Brown, T. (2002). Mediator's responses to self-injurious behavior: An experimental study. *American Journal of Mental Retardation*, 107(4), 252-260. doi: 10.1352/0895-8017(2002)107

Mudford, O. C., Hogg, J., & Roberts, J. (1997). Interobserver agreement and disagreement in continuous recording exemplified by measurement of behavior state. *American Journal on Mental Retardation*, 102(1), 54-66. doi: 10.1352/08958017(1997)102

Munde, V. S., Vlaskamp, C., Maes, B., & Ruijssenaars, A. J. J. M. (2012). Catch the wave! Time-window sequential analysis of alertness stimulation in individuals with profound intellectual and multiple disabilities. *Child: care, health and development*, 40 (1), 95-105. doi: 10.1111/j.1365-2214.2012.01415.x

Munde, V. S., Vlaskamp, C., Ruijssenaars, A. J., & Nakken, H. (2009). Alertness in individuals with profound intellectual and multiple disabilities: a literature review. *Research in Developmental Disabilities*, 30(3), 462-480. doi: 10.1016/j.ridd.2008.07.003

Munn-Giddings, C. (2012). Action Research. In J. Arthur, M. Waring, R Coe & L. V. Hedges (Eds.), *Research Methods & Methodologies in Education* (pp71- 75). London: Sage.

Myrbakk, E., & von Tetzchner, S. (2008). Psychiatric disorders and behavior problems in people with intellectual disability. *Research in Developmental Disabilities*, 29(4), 316-332. doi: 10.1016/j.ridd.2007.06.002

Nafstad, A., & Rodbroe, I. (1999). *Co-creating Communication: Perspectives on diagnostic education for individuals who are congenitally deafblind and individuals whose impairments may have similar effects*. Oslo: Forlaget-Nord Press.

Nakken, H., & Vlaskamp, C. (2002). Joining Forces: supporting individuals with profound multiple learning disabilities. *Tizard Learning Disability Review*, 7(3), 10-15. doi: 10.1108/13595474200200023

Nakken, H., & Vlaskamp, C. (2007). A Need for a Taxonomy for Profound Intellectual and Multiple Disabilities. *Journal of Policy and Practice in Intellectual Disabilities*, 4(2), 83- 87. doi: 10.1111/j.1741-1130.2007.00104.x

Neerinckx, H., Vos, P., Van den Noortgate, W., & Maes, B. (2013). Temporal analysis of attentional

processes in spontaneous interactions between people with profound intellectual and multiple disabilities and their support workers. Journal of Intellectual Disability Research. doi: 10.1111/jir.12067

Neuman, S. B., & McCormick, S. (1995). *Single-Subject Experimental Research: applications for literacy*. Newark, Delaware: International Reading Association.

Neumann, I. D., & Landgraf, R. (Eds.). (2008). *Advances in vasopressin and oxytocin: from genes to behavior to disease*. Amsterdam: Elsevier.

Nind, M. (1996). Efficacy of Intensive Interaction: developing sociability and communication in people with severe and complex learning difficulties using an approach based on caregiver- infant interaction. *European Journal of Special Needs Education*, 11(1), 48-66. doi: 10.1080/0885625960110104

Nind, M., & Hewett, D. (1994). *Access to communication: developing the basics of communication with people with severe learning difficulties through intensive interaction*. London: David Fulton.

Nind, M., & Hewett, D. (1996). When age-appropriateness isn't appropriate. In J. Coupe O'Kane & J. Goldbart (Eds.), *Whose choice? Contentious issues for those working with people with learning difficulties*. London: David Fulton.

Nind, M., & Hewett, D. (2001). *A practical guide to intensive interaction*. Kidderminster: British Institute of Learning Disabilities.

Nind, M., & Thomas, G. (2005). Reinstating the value of teachers' tacit knowledge for the benefit of learners: using 'intensive interaction'. *Journal of Research in Special Education Needs*, 5(3), 97-100. doi: 10.1111/j.1471-3802.2005.00048.x

Ockelford, A., Welch, G., & Zimmerman, S. (2002). Focus of Practice: Music Education for pupils with severe or profound and multiple difficulties- current provision and future need. *British Journal of Special Education*, 29(4), 178-182. doi: 10.1111/1467-8527.00266

Ofsted. (2006). *Ofsted finds little difference in the quality of provision for pupils with learning difficulties and disabilities in mainstream and special schools,* press release. Retrieved from http://www.ofsted.gov.uk/news/ofsted-finds-little-difference-quality-of-provision-for-pupils-learning- difficulties-and-disabilitie

Oldfield, A., & Flower, C. (Eds.). (2008). *Music Therapy with Children and their Families*. London: Jessica Kingsley.

Oliver, M. (1989). Conductive Education: if it wasn't so sad it would be funny. *Disability, Handicap and Society*, 4(2), 197-200. doi: 10.1080/02674648966780191

Oliver, M. (1996). *Understanding Disability: from theory to practice*. Basingstoke: Macmillan.

Olsson, C. (2004). Dyadic interaction with a child with multiple disabilities: a system theory perspective on communication. *Augmentative and Alternative Communication*, 20(4), 228-242. doi:10.1080/07434610400005622

World Health Organization (2010). International Classification of Disease (ICD) 10. Retrieved from http://apps.who.int/classifications/icd10/browse/2010/en#/F73.1

Ouellette-Kuntz, H., & McCreary, B. (1996). Quality of life assessment for persons with severe developmental disabilities. In R. Renwick, I. Brown & M. Nagler (Eds.), *Quality of Life in Health*

Promotion and Rehabilitation Conceptual Approaches, Issues and Applications (pp. 268-278). London: Sage.

Papousek, H. (1996). Musicality in Infancy Research: Biological and Cultural Origins of Early Musicality. In I. Deliege & J. Sloboda (Eds.), *Musical Beginnings, Origins and Development of Musical Competence*. (pp37-55) Oxford: Oxford University Press.

Papousek, H. (Ed.). (1969). Individual variability in learned responses in human infants. London: Academic.

Papousek, M. (2007). Communication in Early Infancy: an Area of Intersubjective Learning'. *Infant Behaviour and Development*, 30 (2), 258-266. http://dx.doi.org/10.1016/j.infbeh.2007.02.003

Papousek, M., & Papousek, H. (1981). Musical Elements in the Infant's Vocalisation: Their Significance for Communication, Cognition and Creativity. In L. P. Lipsett (Ed.), *Advances in Infancy Research* (Vol.1). Norwood, NJ.: Ablex.

Papousek, M., Papousek, H., & Symmes, D. (1991). The meanings of melodies in Motherese in Tone and Stress Languages. *Infant Behaviour and Development*, 14(4), 415-440. doi: 10.1016/0163-6383(91)90031-m

Parker, L., Georgaca, E., Harper, D., McLaughlin, T., & Stowell-Smith, M. (1995). *Deconstructing Psychopathology.* London: Sage.

Pavlicevic, M., Andsell, G., Procter, S., & Hickey, S. (2009). *Presenting the Evidence. Nordoff Robbins Music Therapy Research Department*, 102. Retrieved from http://www.nordoff-robbins.org.uk/musicTherapy/research/index.html

Perrett, D. I., & Emery, N. J. (1994). Understanding the intentions of others from visual signals: neurophysiological evidence. *Cahiers de Psychologie Cognitive*, 13, 683-694.

Perrett, D. I., Hietanen, J. K., Oram, M. W., & Benson, P. J. (1992). Organization and Functions of cells responsive to faces in the temporal cortex. *Philosophical Transactions Royal Society London.* Series B: Biological Sciences*, 335 (1273), 23-30. doi: 10.1098/rstb.1992.0003

Perry, J., & Felce, D. (2002). Subjective and Objective quality of life assessment: Responsiveness, response bias, and resident: proxy concordance. *Mental Retardation*, 40 (6), 445-456. doi: 10.1352/0047-6765(2002)040

Perry, J. and Felce, D. (2005), Correlation between subjective and objective measures of outcome in staffed community housing. *Journal of Intellectual Disability Research*, 49 (4), 278–287. doi: 10.1111/j.1365-2788.2005.00652.x

Petry, K., & Maes, B. (2006). Identifying expressions of pleasure and displeasure by persons with profound and multiple disabilities. *Journal of Intellectual and Developmental Disability*, 31(1) 28-38. doi: 10.1080/13668250500488678

Petry, K., Maes, B., & Vlaskamp, C. (2005). Domains of Quality of Life of People with Profound Multiple Disabilities: the Perspective of Parents and Direct Support Staff. *Journal of Applied Research in Intellectual Disabilities*, 18(1), 35-46. doi: 10.1111/j.1468-3148.2004.00209.x

Petry, K., Maes, B., & Vlaskamp, C. (2007a). Operationalizing quality of life for people with profound multiple disabilities: a Delphi study. *Journal of Intellectual Disability Research*, 51(5), 334-349. doi: 10.1111/j.1365- 2788.2006.00882.x

Petry, K., Maes, B., & Vlaskamp, C. (2007b). Support characteristics associated with the quality of life of p eople with Profound Intellectual and Multiple Disabilities: the perspective of parents and direct support staff. *Journal of Policy and Practice in Intellectual Disabilities*, 4(2), 104-110. doi: 10.1111/j.1741-1130.2007.00107.x

Petry, K., Maes, B., & Vlaskamp, C. (2009). Measuring the quality of life of people with profound multiple disabilities using the QOL-PMD: first results. *Research in Developmental Disabilities*, 30 (6), 1394-1405. doi:10.1016/j.ridd.2009.06.007

Plahl, C. (2007). Microanalysis of preverbal communication in music therapy. In T. Wosch & T. Wigram (Eds.) Microanalysis in music therapy: methods, techniques and applications for clinicians, researchers, educators and students (pp41-53). Gateshead: Jessica Kingsley.

PMLDNetwork. (2012). *PMLD network Campaign: to be included, heard, considered, understood* Retrieved 13th February 2012. Retrieved from http://www.pmldnetwork.org/what_do_we_want/a_right_to_be_understood.htm

Popper, K. (1959). *The Logic of Scientific Discovery*. London: Hutchinson.

Poppes, P., van der Putten, A. J. J., & Vlaskamp, C. (2010). Frequency and severity of challenging behaviour in people with profound intellectual and multiple disabilities. *Research in Developmental Disabilities*, 31 (6), 1269-1275. doi:10.1016/j.ridd.2010.07.017

Posner, M. I. (1980). Orienting of attention. *Quarterly journal of experimental psychology*, *32* (1), 3-25. doi: 10.1080/00335558008248231

Prain, M. (2012). *Starting to feel connected: Investigating interactions between adults with congenital deafblindness and disability support workers*. (Doctoral Thesis, RMIT, Victoria, Australia.) Retreived from http://researchbank.rmit.edu.au/eserv/rmit:160328/Prain.pdf

Pumfrey, P. D. (2010). United Kingdom Special Educational Need: Reflections and Current Concerns. *Psychology of Education Review*, 34(2), 3-12.

Reber, A. S., Allen, R., & Reber, E. S. (Eds.). (2009) *Dictionary of Psychology* (4 ed.). London: Penguin.

Reid, D. H., & Green, C. W. (2002). Person-centred planning with people who have severe multiple disabilities: validated practices and misapplications. In S. Holburn & P. M. Vietze (Eds.), *Person-centred planning. Research , practices and future directions* (pp. 183-202). Baltimore: P.H.Brookes.

Reinders, J. S. (2002). The good life for citizens with intellectual disability. *Journal of Intellectual Disability Research*, 46 (1), 1-5. doi: 10.1046/j.1365-2788.2002.00386.x

Rett, A. (1982). Grundlagen der Musictherapie und Music-Psychologie. In G. Herausgeber (Ed.), *Harrer* (Vol. 2). Stuttgart: Neurbearbeitete Auflage.

Reynell, J. (1970). The Psychological Assessment of Mental and Physical and Handicaps. In H. J. Butcher (Ed.), *Methuen's Manuals of Modern Psychology* (pp. 443-467). Edinburgh: Methuen and Co Ltd.

Richards, S. B., & Sternberg, L. (1992). A preliminary analysis of environmental variables affecting the observed biobehavioural states of individuals with profound handicaps. *Journal of Intellectual Disability Research*, 36(5), 403-414. doi: 10.1111/j.1365-2788.1992.tb00558.x

Richards, S. B., Taylor, R. L., Ramasamy, R., & Richards, R. Y. (1999). *Single -Subject Research: applications in educational and clinical settings*. San Diego: Singular.

Rodgers, J., Townsley, R., Tarleton, B., Folkes, L., Mears, C., Levy, G., Thurman, S. (2004). *Information for all: guidance.* Retrieved 2nd September 2013. Retrieved from http://www.easyinfo.org.uk

Rojahn, J. (1994). Epidemiology and topographic taxonomy in self-injurious behaviour. In T. Thompson & D.B. Gray (Eds.), *Destructive Behaviour in Developmental Disabilities: Diagnosis and treatment*. Thousand Oaks, CA.: Sage.

Rowland, C., & Schweigert, P. (1993). Analyzing the communication environment to increase functional   communication. *Journal of the Association for Persons with Severe Handicaps*, 18(3), 161-176.

Sachs, O. (2007). *Musicophilia: Tales of Music and the Brain*. London: Picador.

Salt, T. (2010). *Independent review of Teacher supply for pupils with SLD and PMLD*. London: Department   for Children, Schools and Families.

Samuel, J., & Maggs, J. (1998). Introducing Intensive Interaction for people with profound learning disabilities living in small staffed houses in the community. In D. Hewett & M. Nind (Eds*.), Interaction in   action: reflections on the use of Intensive Interaction* (pp. 119-148). London: David Fulton.

Schaffer, H. R. (1977). *Mothering*. Cambridge: Harvard University Press.

Schaffer, H. R. (1984). *The Child's entry in to a social world*. London: Academic Press.

Schalock, R. L. (2004). The concept of quality of life: what we know and do not know. *Journal of Intellectual   Disability Research*, 48(3), 203-216. doi:10.1111/j.1365-2788.2003.00558.x

Schalock, R. L., Bonham, G. S., & Verdugo, M. A. (2008). The conceptualization and measurement of quality   of life: implications for program planning and evaluation in the field of intellectual disabilities. *Evaluation and Program Planning*, 31(2), 181-190. doi:10.1016/j.evalprogplan.2008.02.001

Schalock, R. L., Brown, I., Brown, R., Cummins, R. A., Felce, D., Matikka, L., Parmenter, T. (2002). Conceptualization, measurement, and application of quality of life for people with intellectual disabilities: report of an international panel of experts. *Mental Retardation*, 40 (6), 457- 470. http://dx.doi.org/10.1352/0047-6765(2002)040<0457:CMAAOQ>2.0.CO;2

Schalock, R. L., & Verdugo, M. A. (2002). *Handbook on Quality of Life for Human Service Practitioners*.   Washington, D.C.: American Association on Mental Retardation.

Schore, A. N. (2003). *Affect regulation and the repair of the self*. Interpersonal Neurobiology (vol 2). New York: Norton.

Senior, P., & Croall, J. (1993). *Helping to Heal*: *the arts in health care*. London: Calouste-Gulbenkian Foundation.

Shakespeare, T. (2002). The social model of disability: an outdated ideology? *Research in Social Science and Disability*, 2, 9-28. doi: 10.1016/S1479-3547(01)80018-X

Shakespeare, T., & Watson, N. (1997). Defending the Social Model. *Disability and Society*, 12(2), 293-300. doi 10.1080/09687599727380

Siegel-Causey, E., Sims, C., Ernst, B., & Guess, D. (1986). Elements of prelanguage communication

and early interactional processes. In M. Bullis (Ed.), *Communication development in young children with deaf- blindness: Literature review 2*. Monmouth, Oregon.: Oregon State System of Higher Education.

Siegel-Causey, E., & Wetherby, A. (1993). Non-symbolic Communication. In M. E. Snell (Ed.), *Instruction of students with severe disabilities* (pp. 290-318). New York: Macmillan.

Sigafoos, J., Roberts, D., Couzens, D., & Kerr, M. (1993). Providing opportunities for choice-making and turn-taking to adults with multiple disabilities. *Journal of Developmental and Physical Disabilities*, *5*(4), 297-310. http://dx.doi.org/10.1016/j.ridd.2004.04.004

Sigafoos, J., Green, V. A., Schlosser, R., O'Reilly, M. F., Lancioni, G. E., Rispoli, M., & Lang, R. (2009). Communication intervention in Rett Syndrome: a systematic review. *Research in Autism Spectrum Disorders*, 3(2), 304-318. doi: 10.1016/j.rasd.2008.09.006

Sime, D. (2008). Ethical and methodological issues in engaging young people living in poverty with participatory research methods. *Children's Geographies, 6*(1), 63-78. doi: 10.1080/14733280701791926

Sloboda, J. (2005). *Exploring the musical mind*: Cognition, Emotion, Ability, Function. Oxford: Oxford University Press.

Sloboda, J. A. (1989). Music psychology and the composer. In S. Nielzen, Olsson, O. (Ed.), *Structure and perception of electroacoustic sound and music*.(pp3-12) Amsterdam: Elsevier.

Sloboda, J. A. (1991). Music structure and emotional response: some empirical findings. *Psychology of Music*, 19(2), 110-120. http://www.brainmusic.org/MBB91%20Webpage/Sloboda_1991.pdf

Sloboda, J. A. (1992). Empirical studies of emotional response to music. In M. Reiss Jones, Holleran, S. (Ed.), *Cognitive bases of musical communication*. Washington DC: American Psychological Association.

Smith, B. (1996). Discussion: Age- appropriate or developmentally appropriate activities? In J. Coupe O'Kane & J. Goldbart (Eds.), Whose Choice? *Contentious issues for those working with people with learning difficulties* (pp. 70-80). London: David Fulton.

Spiker, D., Boyce, G. C., & Boyce, L. K. (2002). Parent-Child interactions when young children have disabilities. In L. M. Glidden (Ed.), *International Review of Research in Mental Retardation*.(pp35-70) San Diego: Academic Press.

Stern, D. N. (1974). Mother and Infant at play: the dyadic interaction involving facial, vocal and gaze behaviours. In M. Lewis, Rosenblum, L.A. (Ed.), *The effect of the infant on its caregiver* (pp. 187-283). New York: Wiley.

Stillman, R., & Siegel-Causey, E. (1989). Introduction to nonsymbolic communication. In E. Siegel-Causey & D. Guess (Eds.), *Enhancing Nonsymbolic Communication Interactions among Learners with Severe Disabilities* (pp. 1-13). Baltimore: Paul H Brooks.

Taleb, N. N. (2007). *The Black Swan: the impact of the highly improbable*. London: Penguin Books

Tasker, S. L., & Schmidt, L. A. (2008). The 'dual usage problem' in the explanations of 'joint attention' and children's socioemotional development: A reconceptualization. *Developmental Review*, 28(3), 263-288. http://dx.doi.org/10.1016/j.dr.2007.07.001

Thompson, T., & Caruso, M. (2002). Epidemiology of self-injurious behavior in mental retardation: A

review. In S. R. Schroeder, M. L. Oster-Granite & T. Thompson (Eds.), *Self-injurious behavior: Gene-brain- behavior relationships*. Washington, D.C: American Psychological Association.

Thurman, S., Jones, J., & Tarleton, B. (2005). Without words–meaningful information for people with high individual communication needs. *British Journal of Learning Disabilities*, *33*(2), 83-89. doi: 10.1111/j.1468-3156.2005.00342.x

Tiegerman, E., & Primavera, L. (1984). Imitating the autistic child: Facilitating communicative gaze behaviour. *Journal of autism and developmental disorders*, 14 (1), 27-38. doi: 10.1007/BF02408553

Trevarthen, C. (1977). Descriptive analysis of infant communicative behaviour. In H. R. Schaffer (Ed.), *Studies in mother- child interaction*. London: Academic Press.

Trevarthen, C. (1996). *Children with Autism: diagnosis and interventions to meet their needs London*: Jessica Kingsley Publishers.

Trevarthen, C., & Aitken, K. J. (2001). Infant intersubjectivity: research, theory and clinical applications. Annual research review. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, 42(1), 3-48. doi: 10.1111/1469-7610.00701

Trevarthen, C., & Daniel, S. (2005). Disorganised rhythm and synchrony: Early signs of Autism and Rett syndrome. *Brain and Development*, 27, 25-34. doi: 10.1016/j.braindev.2005.03.016

Trevarthen, C., & Hubley, P. (1978). Secondary intersubjectivity: confidence, confiding and acts of meaning in the first year. In A. Lock (Ed.), *Action gesture and symbol* (pp. 183-229). London: Academic Press.

Tronick, E. Z., & Weinberg, M. K. (Eds.). (1997). *Depressed mothers and infants: failure to form dyadic states of consciousness*. New York: The Guildford press.

Turner, J. H. (2000). *On the sociology of human emotions: a sociological inquiry the evolution of human affect.* Stanford, California: Stanford University Press.

Utts, J., & Heckard, R. (2007). *Mind on Statistics* (3rd ed.). Belmont, CA.: Brooks/Cole.

Van der Putten, A., Vlaskamp, C., & Poppes, P. (2009). The content of support of persons with profound intellectual and multiple disabilities: an analysis of the number and content of goals in educational programmes. *Journal of Applied Research in Intellectual Disabilities*, 22(4), 391-394. doi:10.1111/j.1468-3148.2008.00469.x

van Dijk, J. (1986). Educational Curriculum for deaf-blind multi-disabled persons. In D. Ellis (Ed.), *Sensory impairments in mentally disabled people*.(pp374-382). London: Croom Helm.

Vlaskamp, C. (1997). The implementation of a care programme for individuals with profound multiple disabilities. *European Journal on Mental Disability*, 4(13), 3-12.

Vlaskamp, C., Hiemstra, S. J., & Wiersma, L. A. (2007). Becoming Aware of What You Know or Need to Know: Gathering Client and Context Characteristics in Day Services for Persons with Profound Intellectual and Multiple Disabilities. *Journal of Policy and Practice in Intellectual Disabilities*, 4(2), 97-103. doi: 10.1111/j.1741-1130.2007.00106.x

Vlaskamp, C., Poppes, P., & Zijlstra, H. P. (2005). Een programma von jezelf. *Een opvoedingsprogramma voor kinderen meet zeer ernstige verstandelijke en meervoudige beperkingen*. Assen: Van Gorcum.

Vlaskamp, C., & van der Putten, A. (2011). Pain assessment in people with profound intellectual and multiple disabilities; a pilot study into the use of the Pain Behaviour Checklist in everyday practice. *Research in Developmental Disabilities,* 32(5), 1677-1684. doi:10.1016/j.ridd.2011.02.020

Vos, P., De Cock, P., Munde, V., Neerinckx, H., Petry, K., Van den Noortgate, W., & Maes, B. (2013). The role of attention in the affective life of people with severe or profound intellectual disabilities. *Research in Developmental Disabilities*, 34(3), 902-909. doi: 10.1016/j.ridd.2012.11.013

Vos, P., De Cock, P., Munde, V., Petry, K., Van den Noortgate, W., & Maes, B. (2012). The tell-tale: what do heart rate; skin temperature and skin conductance reveal about emotions of people with severe and profound intellectual disabilities? *Research in Developmental Disabilities*, 33 (4), 1117-1127. doi: 10.1016/j.ridd.2012.02.006

Vos, P., De Cock, P., Petry, K., Van den Noortgate, W., & Maes, B. (2010). What makes them feel like they do? Investigating the subjective well-being in people with severe and profound disabilities. *Research in Developmental Disabilities*, 31(6), 1623-1632. doi: 10.1016/j.ridd.2010.04.021

Vygotsky, L. (1978). *Mind in society: the development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Ware, J. (1996). *Creating a responsive environment for people with profound and multiple learning difficulties*. London: David Fulton.

Ware, J. (Ed.). (1994). *Educating children with Profound and Multiple Learning Difficulties*. London: David Fulton Publishers.

Ware, J. & Evans, P. (1986) 'Interactions between profoundly handicapped pupils in a special care class', in J.Berg & J.De Jong, (eds) *Science and Service in Mental Retardation*. London: Methuen.

Warner, C. (2007). Challenging Behaviour: working with the blindingly obvious. In T. Watson (Ed.), *Music Therapy with Adults with Learning Disabilities* (pp. 47-57). Great Britain: Routledge.

Warnock, M. (1978). *Special Educational Needs. Report of the Committee of Enquiry into the Education of Handicapped Children and Young People*. London: HMSCO.

Warnock, M., & Norwich, B. (2010). *Special Educational Needs: a new look* (2nd ed.). London Continuum.

Waterman, M. (1996). Emotional Responses to music: implicit and explicit effects in listeners. *Psychology of Music*, 24 (1), 52-67. doi: 10.1177/0305735696241006

Wetherby, A. M., & Prizant, B. M. (1992). Profiling young children's communicative competence. In S. Warren & J. Reichle (Eds.), *Causes and effects in communication and language intervention* (pp. 217-253). Baltimore: Paul H. Brooks.

Westwood, P. S. (2009). *Commonsense methods for children with Special Educational Needs* (6th ed.). London Routledge.

Whitaker, S. (1989). Quality of life and people with a very profound handicap. *British Journal of Mental Subnormality*, 35 (68), 3-7.

Wigram, T., & Lawrence, M. (2005). Music Therapy as a tool for assessing hand use and communicativeness in children with Rett Syndrome. *Brain and Development*, 27, 95-96. doi: 10.1016/j.braindev.2005.03.019

Wilder, J. (2008). *Proximal processes of children with profound multiple disabilities*. (Doctoral thesis, Stockholm University, Sweden.) Retrieved from http://www.diva-portal.org/smash/get/diva2:199674/FULLTEXT01.pdf

Williams, C., Petersson, E., & Brooks, T. (2007). Picturing Sound: an overview of its efficacy. *Digital Creativity*, 18 (2), 106-114.

Williams, M., & Grove, N. (1989). Getting to grips with Aided Communication: an overview of the literature. *British Journal of Special Education*, 16(2), 63-68. doi:10.1111/j.1467-8578.1989.tb00781.

Woodyatt, G., & Sigafoos, J. (1999). Effects of amount and type of social interaction/activity on stereotyped hand mannerisms in individuals with Rett Syndrome. *Australasian Journal of Special Education*, *23*(1), 15-24. doi: 10.1080/1030011990230103

Wosch, T., & Wigram, T. (Eds.). (2007). *Microanalysis in Music Therapy: Methods, Techniques and Applications for Clinicians, Researchers, Educators and Students*. Gateshead: Jessica Kingsley.

Yasuhara, A., & Sugiyama, Y. (2001). Music Therapy for children with Rett Syndrome. *Brain and Development*, 23 (1), 82-84. http://dx.doi.org/10.1016/S0387-7604(01)00336-9

Yiend, J. (2010). The effects of emotion on attention: A review of attentional processing of emotional information. *Cognition and Emotion*, 24(1), 3-47. doi: 10.1080/02699930903205698

Zeedyk, M. S. (2006). From intersubjectivity to subjectivity: The transformative roles of emotional intimacy and imitation. *Infant and Child Development*, 15 (3), 321-344.

Zeedyk, M. S. (2011). Wired for communication: how the neuroscience of infancy helps in understanding the effectiveness of intensive interaction. In D. Hewett (Ed.), *Intensive Interaction: Theoretical Perspectives* (pp. 55-71). London: Sage.

Zeedyk, M. S. (Ed.). (2008). *Promoting Social Interaction for individuals with Communicative Impairments: Making Contact*. London: Jessica Kingsley.

Zirpoli, T. J., Snell, M. E., & Lloyd, B. H. (1987). Characteristics of persons with mental retardation who have been abused by caregivers. *Journal of Special Education,* 21 (2), 31-41. doi: 10.1177/002246698702100204

Appendix A information letter and consent form sent to parents of participants

Information sheet about 'singing or speaking as an approach to communication?'

Miss Rosie Ridgway is studying (part time) at Durham University, and would like your child to be a part of her project.

The study is to try to gather evidence about whether singing or speaking is a good way to approach interacting and communicating with children who have profound and multiple learning disabilities (PMLD) or Severe Learning Disabilities (SLD) who find social interaction difficult.

The research will involve a familiar adult (Rosie Ridgway) video recording your child while she or another familiar member of school staff sing and speak to your child. The study will also include video recording of your child in assemblies, when singing and speaking are happening (to see if the setting makes any difference).

The interaction session will be responsive to your child, and will stop immediately if your child shows signs of unhappiness or distress. Your child will be with their usual teacher at all times. The sessions won't involve anything unfamiliar or unusual to classroom practice. The recording of sessions is just to gather evidence for Rosie's academic studies.

The videos of the children will not be seen by anyone but Rosie, her supervisors, and her examiners (if they ask to see them!) The videos will be kept safe. Your child will be given an anonymous name, and will not be identified in Rosie's assignment. Mr. XXXX and the School Governors are happy to accommodate these activities in school.

I really hope you will give consent to include your child in this activity.

It is totally up to you, and if you don't want them to be involved, that is ok!

If you can circle the YES/NO and sign the sheet, I'd appreciate it.

 I will telephone you to talk about the study, so you can ask me questions in the next two weeks.

Thanks

Rosie Ridgway

(Miss Ridgway- XXXXX form teacher and ICT teacher in Key stage 3)

ANON school name

Pupil, Class names

Please cross out as necessary

Have you read/been read the Information Sheet   YES / NO

Have you had an opportunity to ask questions and to

discuss the study   YES / NO

Have you received satisfactory answers to all of your questions?   YES / NO

Do you understand that the videos including your child will be stored

securely, and will only be viewed by Rosie Ridgway, her academic

supervisor and the examiners?   YES/NO

Have you received enough information about the study and the

Intended uses of, and access arrangements to, any data which

you supply?   YES / NO

Were you given enough time to consider whether you

want your child to participate?   YES/NO

Do you consent to your child participating in the study?   YES/NO

Do you understand that you are free to withdraw from the study:

* at any time and

* without having to give a reason for withdrawing and

* without any adverse result of any kind   YES / NO

Signed ....……................. **Date** ....

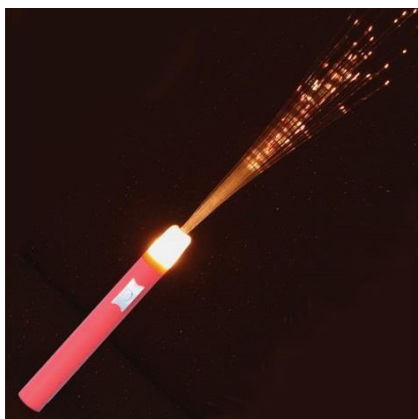(NAME IN BLOCK LETTERS) ....……........................

Appendix B Images of equipment used in the study

1. Vado Video camera used in the study to record observations. Measures 3.9" x 2.2" x 0.6"

2. Fibre optic torch used in interaction with Diane

3. Singing teddy bear used in interaction with Angela and Vanessa

Appendix C video inclusion list

Film	date	type	Pupils	description:	Include?	duration
vid00006	08/07/2009	01:01	RS	good interaction and variance, pupil on ASC	no	1.01
vid00007	09/07/2009	01:01	A	speech and song optimal	yes	0.47
vid00008	09/07/2009	01:01	A	song* interactive song	yes	1.18
vid00013	25/03/2009	group	J	cuckoo practise, speech, peers	yes	3.19
vid00014	25/03/2009	group	C, R, J,H, D, L	cuckoo song, individuals shown in short sections with peers	no	7.34
vid00015	25/03/2009	group no music	JA	speech only	no	0.59
vid00016	25/03/2009	group	A	speech, not much going on to vary stimulus	no	0.44
vid00017	25/03/2009	group	J	speech, distress not much going on to vary stimulus	no	0.57
vid00018	25/03/2009	group	J	speech, audience participation and clapping (sound of input qual ?) distress, stimulus not varied	no	4.19
vid00019	25/03/2009	music obs	J	speech, audience participation and clapping (sound of input qual ?) distress, stimulus not varied	no	0.48
vid00020	25/03/2009	music obs	J	speech, audience participation and clapping (sound of input qual ?) distress, stimulus not varied	no	0.22
vid00021	25/03/2009	music obs	N/A	embarrassed teenagers, not focus of study	no	3.18
vid00022	25/03/2009	music obs	J H D	j dancing clapping to song and speech	yes	7.24
vid00023	19/06/2009	victorians	J	victorians- crying, during speech, just one type of stimulus, poor light qual	no	0.25
vid00024	19/06/2009	victorians	J	distressed, j moving and clapping, cries at end, light qual ?	no	0.08
vid00025	19/06/2009	victorians	J	j intent watching, protests at applause, light qual?	no	0.33
vid00026	19/06/2009	victorians	J	J still, speech input, light qual?	no	
vid00027	19/06/2009	victorians	H J	victorians- acting performance, different songs, some recorded, light qual?	no	12.58
vid00028	19/06/2009	victorians	J	recorded,live song, spoken, sitting calmly, light qual?	no	5.41
vid00030	25/06/2009	01:01	A V	singing social interaction	yes	2.19
vid00033	06/06/2009	01:01	D	varied interaction, good quality sound, light	yes	11.58
vid00031	25/06/2009	01:01	A V	singing toy, pupil responses, varied input	yes	1.39
vid00034	23/09/2009	01:01	D	sensory- dark room, qual?	no	2.13
vid0003	23/09/2009	01:01	D	sensory- dark room, qual?	no	0.26

5					no	
vid00036	23/09/2009	01:01	L	sensory- dark room, qual?	no	0.35
vid00037	23/09/2009	01:01	mf	sensory- dark room, pupil is ASC	no	0.07
vid00038	16/10/2009	01:01	d	sung/speech dissociation	yes	0.26
vid00039	16/10/2009	01:01	d	sung/speech dissociation	yes	0.31
video 41		optimal	d teacher	musical instrument, passive response, quality?	no	3.45
vid00042	23/11/2009	assembly	V	stroking hand no response, interaction not varied	no	1.48
vid00044	23/11/2009	assembly	C	speech song, pupil coordinated movement, varied interaction	yes	5.5
elvet1	03/12/2009	class	JM,C, LT, MF	poor light quality- too dark?	no	
elvet2	03/12/2009	class	JM,C, LT, MF	poor light quality- too dark?	no	
elvet3	03/12/2009	class	JM,C, LT, MF	poor quality- dark	no	
elvet4	03/12/2009	class	JM,C, LT, MF	poor quality- dark	no	
elvet5	03/12/2009	class	JM,C, LT, MF	poor quality- dark	no	
elvet6	03/12/2009	class	JM,C, LT, MF	poor quality- dark	no	
elvet7	03/12/2009	class	JM,C, LT, MF	poor quality- dark	no	
elvet8	03/12/2009	class	JM,C, LT, MF	poor quality- dark	no	
elvet9	03/12/2009	class	JM,C, LT, MF	poor quality- dark	no	
P101	19/10/2009	cupboard		mld class music lesson- not relevant	no	
P102	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	
P103	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	

P104	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	
P105	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	
P106	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	
P1078	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	
P1079	19/10/2009	doorway		mld class music lesson- not relevant	no	
P1080	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	
P1081	19/10/2009	Ks2 class		mld class music lesson- not relevant	no	
Primary 1 18	10/12/2009	group obs		children playing along to jingle bells, not responding to adult speech, no participant focus	no	
primary 1 19	10/12/2009	group obs		listening to recorded music, no participant focus- excluded participant, too much ill health absence	no	
primary 1 20	10/12/2009	group obs		cldd pupil passive, not a participant- too much ill health absence	no	
primary 1 21	10/12/2009	group obs		too short not a participant- too much ill health absence	no	
primary 1 22	15/01/2010	group obs		too short not a participant- too much ill health absence	no	
primary 1 23	15/01/2010	group obs		too short,not a participant- too much ill health absence	no	
primary 1 24	15/01/2010	group obs	AM	am passive adult guided instrtuments, not a participant- too much ill health absence	no	
primary 1 25	15/01/2010	group obs	AM	am sung to no response, not a participant- too much ill health absence	no	
primary 1 26	15/01/2010	optimal		pupil on step tones, ASC	no	
primary 1 27	15/01/2010	group obs	AM	am sung to only input, not a participant- too much ill health absence	no	
primary 1 28	15/01/2010	group obs	AM	am sung to only input, not a participant- too much ill health absence	no	
primary 1 29	05/02/2010	optimal		ASC pupil lining toys up in nursery class	no	
primary 1 30	05/02/2010	group obs		busy classroom no participant focus	no	
primary 1 31	05/02/2010	group obs	AM	playing a drum! Not a participant, too much ill health absence	no	
primary 1 32	11/03/2010	group obs	AM	nursery children singing to cldd pupil- hello song, chinese, not focus participant, too much ill health absence	no	
xmas1	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	
xmas2	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	6.25
xmas3	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	7.12
xmas4	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	8.54
xmas5	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	1.04

xmas6	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	8.04
xmas7	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	0.39
xmas8	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	5.26
xmas9	25/11/2009	group obs	CR RD	peers adult speech and song, mld- not relevant	no	0.5
P10472	17/05/2010	group	LT, CB, MF, JM	brief useless clip- chaos	no	
P10473	17/05/2010	group	LT, CB, MF, JM	tickling and singing, class interaction hard to manage	no	
P10474	17/05/2010	group	MF	ASC pupil responding to song not speech	no	
video 68	10/06/2010	optimal	MF	asc using song to try and initiate interaction with adult	no	
video 69	10/06/2010	group	MF	asc pupil wandering, not noticing interaction attempts	no	
				Inclusion Criteria	**Exclusion Rule**	
				Participant- PMLD, hard to reach	**Participant**	
				Video- Focuses on Participant enough to reap sufficient data	**Focus**	
				Video Quality- lighting, sound suitable for micro analysis	**Quality**	
				Variation of interaction approach- more than one in videoed episode or captured consecutively	**Variation**	