ENGAGING THE FEELING AND WILL OF CHILDREN WITH AUTISM THROUGH THE MEDIUM OF COLOUR

by

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ABSTRACT

This is a case study of the role of feeling and will in interaction with children with autism. It investigates the use of changing colours of light for enhancement of engagement at this level. The research was carried out in a specially designed room where the whole interior colour could be changed using dimmer-controlled lights. 19 children aged between 8 and 17 years with a diagnosis of severe autism were involved in the study. Data were collected using video recordings, a research diary and small-scale informal interviews and were analysed by quantitative and qualitative methods.

Three main stages were developed. These involved observations of behaviour of children in different colours of light, of children interacting directly with changing coloured light, and of intensive interaction augmented by changing colour moods.

The main findings were that colour could affect behaviour and that in general reds were more arousing than blues and greens. Some children engaged readily in interaction with changing coloured lights, though many did not. When changing colour was used in conjunction with intentional creation of affect by an adult during intensive interaction, improvements in social engagement and communication skills were observed.

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My family have had to put up with nearly five years of hard work and endless all-night sessions at the computer, so perhaps most of all I would like to thank them, and especially my husband Roger for all his help and practical support.

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VIDEOS (DVDs)

The thesis has been written so that it stands on its own as a text. However, since most of the data were obtained in the form of video recordings, two short edited videos (on DVD) are included. These form a companion to the main text and some of the episodes described are shown. They are briefly described below and accompanying notes are included in Appendix 5. There is no text on the videos but the notes include dates and descriptions so that the viewer can find their way through the edited clips.

Video 1. (DVD 1)

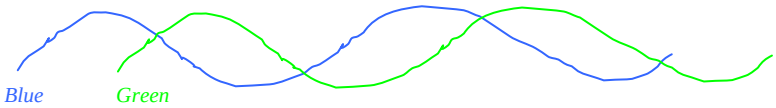
This shows examples of the three main stages through clips of several of the children.

Video 2. (DVD 2)

This [...]shows the progress of one child through the three years she
was with the project. This is the child described in the text as ‘Anna’ but since in the film her real name is obvious it has been used for this video. Parental permission had been granted.

The videos are not available in the web edition of this thesis

GLOSSARY AND USE OF TERMS

Term	Meaning
Affect	In the Concise Oxford Dictionary (OUP 1964) this word is defined as, 'Feeling, emotion, desire, esp. as leading to action.' This appears to indicate that it covers an element of will as well as feeling. However, its use is usually more restricted and normally refers only to feeling. This is the way it is used in the rest of the text.
After-Image	When a strong coloured shape is viewed against a white background it will be noticed that after some minutes a glowing ring appears around its edges. This is a pastel shade and always the complementary to the original colour. On looking away from the object, its shape in this lustrous complementary colour will be seen for some seconds afterwards. This is called the after-image. It is believed to be due to the recovery from chemical changes in the retina. In the colour room an after image will appear following any strong colour and its lustre will mix with the next colour to produce some unusual effects.
Blue/Green Rocking	The blue and green lights are gently alternately up-faded and down-faded in a wave-like movement, as illustrated below: 
Colour Mood Dialogue (CMD)	The direct interaction between the child and the lights. The light operator responds with varying colours and fading styles through the use of dimmers to gesture and vocalisation etc of the child. Through a sensitive and creative alternation of leading and following, a 'dialogue' between lights and child can be set up.
Colour Response Profile (CRP)	The behavioural reaction of each individual child to a range of different colours
Up- fade, Down-fade	These terms are used in stage lighting terminology to describe the slow increase or decrease in the brightness of a light as controlled by dimmers.

CHAPTER 1

INTRODUCTION AND OVERVIEW

A Note on the Use of Terms

The term ‘autism’ is used in this thesis as a general term to mean ‘Autistic Spectrum Disorders’ (ASD) as a whole. ASD covers a range of categories such as Asperger’s syndrome, Kanner’s autism and ‘atypical’ autism. This is in line with the way the term is used by Jordan (1999). In the literature review, more specific conditions within the spectrum will be referred to by name where appropriate.

Introduction and Overview

This brief account has been written to give the reader an overall view of the nature and structure of the thesis. The principal aim of the research was to explore the quality of interaction with children with autism when an attempt is made to engage at the affective level. Affect was considered of significance for autism because much of the current literature would suggest a fundamental deficit in this area (see literature review). Colour was used to enhance positive affect, as means of instigating social interaction. This is similar in principle to the use of music in music therapy or interactive music interventions. Although there is evidence in the literature that colour does affect mood of people in general, virtually nothing was found that related specifically to autism. A decision was therefore made to investigate the effects of colour itself on the behaviour of children with autism as a first stage of the research. As an adjunct to this, the possibility of a ‘dialogue’ between the colours and the child was also explored. Later in the research, colour was used to augment affect during interaction with another individual.

The research was therefore in three main stages. These were:

- **First Stage:** The investigation of the effects of colour on behaviour of children with autism.
- **Second Stage:** The exploration of producing a ‘dialogue’ between the child and the changing lights.
- **Third Stage:** The exploration the effectiveness of interacting at the affective level with affect augmented by the use of colour.

The research was carried out in a residential special school for children with severe and complex learning difficulties where a specially designed colour/light room had been built. The author of this thesis was responsible for the initial concept for this research, plus the design and use of the colour/light room. The research also involved a research officer and five psychology assistants.

The school was founded in 1930 on the principles of the Austrian philosopher Rudolf Steiner. During the 1940s and continuing on into the 1960s, pioneering work was carried out to find new educational methods, amongst which was the use of colour, both in the form of paints and coloured light. Indications were that colour could affect behaviour, different hues producing different moods and emotions (Grahl and Wilson, undated and unpublished). The Nordoff Robbins music therapy work came into being in this school during these years (Nordoff and Robbins 1971a and 1971b).

This new research was seen as a continuation of this work, and was influenced not only by the original colour work but also particularly by the interactive music therapy as practised by Paul

Nordoff. As a teenager this author was lucky enough to be present at several of Nordoff's sessions. Together with the child he would use his remarkable musical artistry to jointly 'improvise' a piece of music. It was as though a musical 'conversation' were taking place between himself and the child, with all the emotional 'ups' and 'downs' of animated and purposeful communication. This is believed likely to have been the source of the current ideas for an interactive 'therapy'.

The current research will be referred to in this thesis as the 'colour project'.

CHAPTER 2

THE NATURE OF AUTISM – A LITERATURE REVIEW

Autism has only been recognised as a condition since the early 1940s. Leo Kanner first described it in a paper in 1943 (Kanner 1973) and there have been many new insights into its nature since that time. It is generally now recognised as a disorder of development and is classified as such both by the *International Statistical Classification of Diseases and Related Health Problems* (ICD 10) published by the World Health Organisation (1993), and the *Diagnostic and Statistical Manual* (DSM IV) of the American Psychiatric Association (1994). However there is still no undisputed understanding of its cause. These diagnostic criteria are lengthy and will not be gone into in detail here but Gillberg and Peeters (1995) suggest that for a diagnosis of autism to be made, they can be summarised into the three major impairments put forward by Wing (1996) below:

The 'Triad of Impairments'

- **Impairments of Social Interaction:** This is perhaps the most commonly recognised attribute of a child with autism. Wing (1966) describes four broad categories, though she points out that there is no clear distinction between them. The first are the aloof group where the individual behaves as though 'other people did not exist' (35). They lack interest and sympathy, appear cut off from others and seem not to possess the normal drive to interact socially. The second is the passive group, which she describes as the least common. Although they do not initiate social interaction, they often accept social approaches and are 'more amenable and willing to do as they are told' (36), and for this reason she describes them as having fewer behavioural problems than the other groups. The 'active but odd' group (37) do make social approaches but this is often inappropriate

and one-sided in that they do not seem to pay any attention to the feelings or needs of the other. Despite their inept approach, they do appear to want social contact but do not have the conventional social skills to achieve it successfully. The fourth group, seen in later adolescence and adults, she describes as over-formal or stilted. They are 'excessively polite and formal in their behaviour' (37), and stick rigidly to the rules of social interaction as a means of compensating for the lack of real understanding.

- **Impairments of Communication:** All children with autism have problems with communication, though the form it takes may vary. Many are completely non-verbal while others have an excellent grasp of both vocabulary and grammar. However in either case they are usually unable to use language for normal 'human to human' engagement in conversation. Language, when it does exist is often echolalic with odd and monotonous intonation and there is often a difficulty in the understanding and use of the pronouns 'I' and 'you'. Wing (1996, 97) puts this down to a 'lack of the normally innate drive to communicate with others' rather than a developmental language disorder, though this may exist in addition. The understanding of language also often goes only as far as a literal comprehension of the words and does not reach the level of the significance or the context (Williams 1999).

- **Impairments of Imagination:** Wing (1996) describes how most children with autism do not develop pretend play and imaginative games in the same way as typically developing children and cannot 'act out imaginative stories' (44). They are more inclined to handle toys and other objects purely for the physical sensations. However, some are apparently able to invent sequences of events which they act out, but these are usually repeated endlessly without any changes. Others can enact a character, usually someone or

something they have seen on television or in a book, but again the actions are repetitive and limited. Wing describes this in the following way: ‘The curious feature of this behaviour is that the child seems to be living the character or object, rather then pretending’ (Wing 1966, 44). She describes how some can enjoy watching television or videos but it is more for the sensory stimulation than the imaginative content. She also describes individuals with autism as lacking the imagination to be able to share emotions or ideas with others and therefore being denied most of the usual sources of social satisfaction. Repetitive and stereotyped routines bring comfort and reassurance in what is known and predictable, as a substitute for the dynamic unpredictability of normal human interaction, which is denied to them because of their autism. She believes that true and creative imagination is of immense value in life generally and the deficit in this area for individuals with autism has ‘wide and deep’ implications (Wing 1996, 99).

Because this study is intended to focus on social interaction the next pages will examine some of the recent literature on the nature of social dysfunction in autism.

Social Interaction in Children with Autism

Frith (1989, 139) describes how one of the key features of autism in young children is ‘the lack of appropriate emotional responsiveness’ which curbs the development of social interpersonal skills. This leads to the social isolation so often seen in the child with autism. She describes how typically developing babies show an active interest in people almost as soon as they are born, and after only a very few weeks can enjoy reciprocal interaction with their carers. Usually, but not always, this is not seen in those who will later be recognised as autistic. One of the earliest signs of autism is the lack of pointing, the lack of the desire to share something with someone else. Without shared attention, the normal development of

carer-infant games and routines cannot normally take pace. This lack of the in-built desire to share, she suggests may lie at the heart of the autistic deficit in the ability to be social.

Trevarthen and Aitken (2001, 3) are of the opinion that the desire in a typically developing newborn infant to interact is more than just a mechanism for getting their immediate biological needs met, rather, they describe it as 'being specifically motivated…to communicate intricately with the expressive forms and rhythms of interest and feeling displayed by other humans'. They call this 'purposeful intersubjectivity, or an initial psychosocial state'. This purposeful intersubjectivity is what appears to be lacking in the infant with autism. They go on to suggest that approaches that address these underlying interpersonal problems will be effective in helping such children and that emotional engagement and joint attention are the most important precursors for language development.

Problems of social dysfunction at the earliest stages of development are also believed by Klin, Volkmar and Sparrow (1992, 861) to account for the some of the characteristic deficits of autism. They describe typical signs as a 'lack of reciprocity in social contact, inappropriate gaze behaviour, tenuous expressions of attachment and paucity of joint play and communicative skills'. They were interested in finding out whether the lack of a 'theory of mind' i.e. a primarily cognitive incapacity to impute mental states to other people and to themselves was the underlying cause of these social deficits. Briefly they compared a group of children with autism, to ability matched controls, for various areas of functioning such as communication, daily living skills, socialisation and motor skills. These were evaluated in relation to expected ages of acquisition based on a standardisation database. Their findings indicated that 'the social dysfunction in autism affects very basic and early emerging social behaviours which are typically present prior to the time at which even the earliest precursors

of a theory of mind apparently emerge'. This again argues for the prime deficit being in the area of innate social capacities.

In a more recent study Klin (2000) compared the ability of typically developing children with those with ASD to distinguish social attributes in an animated cartoon in which geometric shapes enacted a social plot. He analysed the children's abilities to recognise social meaning in the cartoon narrative, as a means of assessing what he calls social cognition i.e. the ability to understand social situations. He found that those with ASD scored considerably lower than the controls thus providing more evidence for a deficit in the area of social cognition. Bauminger (2002, 284) is also of the opinion that social impairments are among the core deficits in autism and he likewise identifies the main problems for high functioning children in the area of social cognition and also of reciprocal peer interaction. Social cognition, he says, includes the 'ability to spontaneously read and correctly interpret verbal and non verbal social and emotional cues' and to 'recognise central and peripheral social and emotional information'. He describes these abilities as 'spontaneous' and it appears that as with the other authors mentioned above, he considers them to develop naturally in typically developing children. He argues that there are few studies which address the 'enhancement of emotional knowledge' and for this reason he devised a cognitive behavioural intervention which focussed on the teaching of interpersonal problem solving, affective knowledge and social interaction. The results demonstrated progress in the areas of social interaction, problem solving and emotional understanding, and teacher-rated social skills. These results, he argues, support the view that interventions aimed at facilitating social-emotional understanding and social interaction are of value for children with autism.

A further study which supports the proposition that the fundamental deficit in autism is in the area of social competence at a very early age, comes from an investigation comparing the

order of developmental sequences in typically developing children with those with autism (Carpenter, Pennington and Rogers 2002). They describe how in typical development, social-cognitive skills follow a reliable sequence involving joint attention, communicative gestures, eye gaze, pointing, imitation and referential language. What they found was that for children with autism this sequence may not be followed in the normal way, referential words being produced before engagement in non-linguistic joint attention. Thus it appears that although language might be acquired, it may not be built up on the normal foundation of social-cognitive abilities and might therefore be expected to be rather mechanical and to lack the emotional richness and empathy of normal conversation.

Jordan (2000, 3) considers the problem of social interaction in children with autism from the point of view of teaching. Because social interaction is transactional, i.e. the 'reactions of each person in the interaction affect those of the other', it is difficult to predict outcomes and 'break them down into short teachable sections'. It is also difficult, she says, to imagine how it would be possible to learn social skills without social understanding. And yet she points out that this appears to be exactly the position for individuals with ASD. 'They are having to learn form the outside, what those of us without ASD feel (recognise at a perceptual, intuitive level) from the inside'. She then goes on to question whether it would ever be possible to teach this 'fundamental, perceptual awareness of social meaning that enables social understanding to develop', since it can only ever be taught 'from the outside'. Aarons and Gittens (1998, 1) also consider the problem of the teaching of social skills and because they believe that 'social disability is the essence of autism' they put forward that 'it would seem misguided to focus on peripheral deficits which exist in many individuals with autism, but are not by any means central to the disorder. That is why programmes such as auditory integration training, sensory integration therapy and behaviour modification techniques, as well as some of the well publicised alternative approaches, will not be effective in the long term'. They suggest that

what is needed is an approach which focuses on social functioning. Again they suggest interventions in the early years to promote the acquisition of social interactive abilities. These two contributions may have relevance for the current research because the aim here is specifically to work, in Jordan's (2000) terms, 'from the inside'; that is at the level of feelings and intuitive perception.

Two studies on the recognition of emotion from facial expression will briefly be mentioned because they may have relevance for the development of social understanding of emotional cues. In the first, Celani, Battacchi and Arcidiacono (1999) compared the ability of children with autism and suitably matched controls, to match faces on the basis of the emotion being expressed. The target picture was presented and then removed before the sample pictures were shown. This was to reduce the possibility of processing strategies being used which depended on learnt typical features of facial expression such as an upturned mouth and to ensure a direct recognition of the emotion. Results showed that the autism group scored significantly less well than the control groups, thus demonstrating the problem with recognition of emotion from facial expression in autism. The second study, carried out by Gepner, Deruelle and Grynfeltt (2001, 37), also involved facial expression recognition tasks but this time videotaped moving faces, as well as 'still' and 'strobe' were used. Surprisingly, those with autism did not perform significantly worse than the controls and the authors suggest that ' slow dynamic presentations facilitate facial recognition by autistic children'. They suggest that this may have implications for the education of children with autism. From the point of view of the present study it may be relevant because it implies that real-life moving faces expressing emotion in interactive sessions might be more meaningful than would otherwise have been expected from studies involving only static faces.

Two examples will now be cited where interventions specifically aimed at developing social interactive skills have been shown to be beneficial. Hwang and Hughes (2000) reviewed 16 empirical studies of social interactive interventions designed to increase early social communicative skills and found that they were generally successful in improving the level of social competence, communication, joint attention and imitative play. Similar findings were reported by El-Ghoroury and Romanczyk (1999) from a study of play interactions of family members with young children with autism. They suggest that parents may be able to compensate to some extent for their child's disability in social interactive skills through early play interventions. Finally, Sonders (2003, 9) considers that 'the ability to participate in mutually satisfying social play is a fundamental form of cultural literacy, which is foundational to all other communicative competencies'. She considers that for children with autism the first priority is to help them to learn to feel comfortable in the company of other people. She describes many social routines which she has found to be successful in improving social competence and says the goal of all of them was to, 'engage children in turn taking interactions that induced smiles, giggles, or belly laughs, to pin-point and shape emerging communication attempts and to show the child how wonderful it is to socially connect'.

The question sometimes arises as to whether individuals with autism would be happier left in their own world and the attempt not be made to draw them into the normal human social relationships. Donna Williams (herself an individual with autism) expressed quite clearly that she did not consider this to be the case in a lecture/workshop (Williams 2001) when she said that people with autism long to be part of the human social organism, it is only that they 'do not know how'.

CHAPTER 3

FEELING, WILLING AND SYMBOLISM IN DEVELOPMENT - A LITERATURE REVIEW

Since cultivating affect in interaction was always to be the main purpose of the work, some consideration to its place in current thinking should therefore be given. There now follow two sections examining the literature on the role of affect (feeling or emotion) and willing (drive) in social interaction and development. A third section on the role of symbolism follows, since for several authors this is intimately bound up with affect in development.

The Role of Feeling or Emotion (Affect)

Some discussion on the two words feeling and emotion are perhaps needed at this point. They are often used interchangeably but sometimes feeling is used to denote something that is conscious whereas emotion is thought to be more instinctive. For general purposes the word feeling will be used in this thesis because it is a more general term than emotion and because the word emotion is often associated with extremes of behaviour. There is little consistency in the literature (though some authors do define their use of these words) so in general they will be used in the review in the context of the particular author being discussed.

It is widely believed that the difficulties experienced by people with autism in forming interpersonal relationships may be due to some kind of deficit or abnormality in the relationship between emotions and their understanding e.g. Jordan and Powell (1995), Frith (1989), Hobson (1993 & 2002), Williams (1992), Gerland (1997), Grandin (1997), Sherratt and Peter (2002), Trevarthen, Aitken, Papoudi and Robarts (1998) (see below). It is also

generally accepted that learning is contingent upon good interpersonal relationships (e.g. Collis and Lacey 1996) and therefore the question of the relationship between understanding (thinking) and feeling, as it relates to the development of social competence and learning would seem to be relevant to the study of autism.

For example, Jordan and Powell (1995) characterise autism as a developmental disorder where there is an underlying emotional difficulty. They state that children with autism 'have difficulty in identifying their own emotions and talking about them' (1995, 37). They also cite (1995, 38) an instance where Temple Grandin, herself autistic, was asked in an interview how she felt about something and for her they say the question was 'literally unanswerable……..since she could not reflect on her feelings…'. Further, Jordan and Powell state (1995, 32): 'It is only those aspects of emotional development that require understanding of emotions as mental states that are disturbed in autism; actual feelings are not disrupted.' A possible interpretation of this might be that feelings cannot be understood as mental states, (understanding requires thinking), because there is an anomalous relationship between thinking and feeling. Individuals with autism cannot easily bring thinking to bear on emotions. In discussing how to deal with outbursts of emotion and frustration they suggest that although the attempt is usually made to defuse the tension, and redirect the attention elsewhere, in fact, real progress is more likely to be made if the child can be led to understand the emotion and then deal with it (Jordan and Powell 1995, 167): 'But in psychological terms we know that real improvements in thinking may only come about if we encourage awareness of the emotional state instead.' Jordan (2001) takes this a step further when discussing how to teach children with autism and severe learning difficulties about emotions. She points out that unless they have a first-hand experience of the emotion in question they are unlikely to grasp its essential qualities:

> ‘Drawing attention to a child’s own actual and current emotion is far more effective than teaching the matching of schematic drawings of facial expressions to some label such as ‘happy’ or ‘sad’, which is unlikely to related to knowledge of real situations. It is only once children have learnt to recognise and identify their own emotional states that they can begin to recognise those emotions in the facial expressions of others’ (Jordan 2001, 42).

Jordan and Powell (1995) go on to describe how because individuals with autism have difficulty in recognising expressions of emotion, other people’s mental states often remain obscure to them. For example (Jordan and Powell 1995, 95), ‘They do not seem to be able to think that because an icy cold shower is uncomfortable for them then it may well be so for someone else.’ Furthermore they suggest that sometimes this may even apply to their own emotions in that they are not consciously aware that they are having the sensation or feeling. Continuing with the example of the cold shower they state (Jordan and Powell 1995, 95):

> ‘Indeed many individuals with autism do not even appear to have this level of awareness with respect to their own sensations; they experience the coldness of the shower but it is as if they do not know that they are having that experience. This is a difficult notion to grasp when for us the connection between having an experience, and knowing that we have it, is seamless and automatic.’

It appears from the above that in autism, the experience of a sensation or feeling is not automatically followed by the conscious awareness of it. In other words feeling somehow exists separately from its related consciousness.

A similar hypothesis is put forward by Wing (1996, 26) as illustrated by the following: ‘It is possible that, at an even deeper level, there is a disturbance of the normal inbuilt system for assigning different degrees of emotional significance to different experiences.’ And (82) ‘..it seems that people with autistic disorders have great difficulty in seeing, or rather feeling, meaning in their experiences. Instead of developing the usual pattern of priorities that are common to humanity, though modified by culture, only a few things have emotional significance for people with autistic disorders and these tend to be idiosyncratic to the person concerned and usually of little use in adapting to life.’ She also points out the unusual response of people with autism to proximal sensory stimuli (as distinct from hearing and vision). For example pain, extremes of temperature or hunger whilst clearly perceived do not cause the expected levels of disquiet. It seems that it is the emotional significance of these stimuli that is abnormal. She appears to be suggesting that the difficulty arises because of the lack of ability to attach appropriate emotional significance to events or experiences. Again this appears to point to a kind of detachment of the feeling from the appropriate understanding of it.

Caldwell (2000, 22) also speaks of ‘disconnected’ feelings. Referring to the experiences of individuals with autism she says. ‘… it is not just sensory information from the outside world that can cause overload, but also the bodily feeling generated by emotional contact which may be perceived as hostile. The brain just can’t process the information fast enough and people have problems keeping up. Internal physical feelings become disconnected from the events that set them off.’ Although rather different from the example given by Wing above, this appears to be a further instance of a disconnection between feelings and the cognitive understanding (thinking) of how, and from where, they were generated.

Writings by Individuals with Autism

Some examples describing this problem of 'disconnected feelings' will now be given from the writings of people who themselves have autism.

Temple Grandin

Temple Grandin, in explaining how she believed she functioned differently from others (Grandin 1997), expressed how she had not originally realized that for most people 'thoughts are usually connected to feelings'. It appears therefore that for her, feelings may in some way be separated or disconnected from thinking.

Donna Williams

Donna Williams refers on several occasions to the difficulty of connecting thoughts or understanding to feelings: 'I could say what I thought, but the problem was that I could not say what I felt.' (Williams 1992, 47). Or, 'I had learned to fear the complete loss of all attachment to my emotional self,…' (Williams 1992, 91). Again something similar is expressed in the following, '….the words, have no meaning when the thoughts have no feelings' (Williams 1992, 146).

A more objective description is given in the following: 'Human beings are made up of three systems which in the normal person are reasonably integrated: mind, body and emotions. In some people one of these systems is faulty and makes complete integration impossible.'…. 'I believe that autism is the case where some sort of mechanism which controls emotion does not function properly, leaving an otherwise relatively normal body and a normal mind unable to express itself with the depth that it would otherwise be capable of' (Williams 1992, 181).

Finally, in describing other individuals with autism she says (Williams 1992, 189), 'All thought begins with feeling. Such children, I believe, have feeling but it has developed in

isolation and can't be verbalized in the usual way…'. Her suggestion appears to be that although feelings are in themselves intact, they cannot be understood properly because they are in some way, to use her expression, 'isolated' from thought.

Gunilla Gerland

Gunilla Gerland, another young woman with autism who has written an autobiography gives several examples where she describes how feelings and thought do not in her case seem to be connected in the normal way. For example when describing her experience of pain she says (Gerland 1996, 157):

> 'And yet I felt- my actual feelings were not shut off- because when I was aware that I had injured myself somewhere, I could sense something, a non-pain, which branched out into my body from the place where the injury was. But the fact was, it didn't hurt.'

This is not easy to explain but it seems that the bodily sensations were intact but the conscious feelings were not. Here again it seems that it is the bodily feelings that are somehow disconnected from the rest of the system. Another example concerns problems with the toilet (Gerland 1996, 120):

> 'I also had another problem, which required extending my lavatory strategies, though it was a problem I never understood until I was adult. I thought it was the same for everyone. I couldn't feel that I needed to go to the lavatory, so I had to think out when I needed to go. I didn't know other people had a signalling system that warned them at intervals before the need to go became urgent. I had no such system. I felt nothing, nothing, nothing ….'

It seems that in her case the normal connection from the feeling (discomfort of a full bladder) to thinking (knowing of the need for the toilet) to action (going to the toilet) was not there. The feeling has perhaps somehow become detached from the thinking.

Wendy Lawson

There are similar descriptions in the autobiography of Wendy Lawson, another woman with autism. For example (Lawson 1998, i),

> ‘Throughout my life I have been unable to identify, understand and express my emotions, and so have always felt misunderstood and alienated from those around me. Because I appear to be “different”, confused and a misfit, I have often been treated as if I am either deaf or stupid.’

Interestingly, she relates that if it is possible for something to be connected to an emotion, it is then easier to relate to (Lawson 1998, 3). ‘For me, these things are often painfully overwhelming, non-existent or just confusing, but when an experience or emotion is attached to some form of connecting stimuli, such as colour and fragrance, I am more likely to relate to it.’ This may be significant as a strategy for the current research because she is suggesting that where a connection between a feeling (or event) and a sensation such as colour can be made, then more sense can be made of it. Thus to emphasise affect together with colour during an interaction may help to make the experience more meaningful. Later, she again expresses her difficulties with emotions (Lawson 1998, 8),

> ‘ To an autistic person, kindness, affection and intimacy are confusing because they do not seem to have a purpose; sometimes it is tempting to think that maybe that is their purpose. Emotions are not concrete structures that can be seen, held or organised.’ ‘I could tell the

difference between a comfortable feeling and an uncomfortable one, but I didn't know what to do with it.'

This last comment seems to show that the actual feelings were intact but the problem was in making sense of them and then knowing how to act appropriately. Again the normal connection from the feeling to understanding appears somehow to be lacking. On another occasion she describes a disconnection but this time it is between head and body. She appears to be describing some sort of nervous breakdown and says (Lawson 1998, 66), 'I only remember that my head seemed disconnected from my body and I felt desperate to get it back.' It may be that she was alluding to the impression that her thinking process had become detached from the rest of her psychological functions.

Edgar Schneider

Edgar Schneider is another able individual with autism. Originally diagnosed as schizophrenic, he suffered a great deal before finally being diagnosed as an autistic savant. His view (Schneider 1999, 94) is that an emotional deficit is 'the bedrock of autism'. 'All other autistic traits can be explained in terms of it.' He also describes himself in the following way (1999, 25): 'I have an important component of the human psyche missing: the ability to connect emotionally with other human beings.' He goes on to explain, 'We are not automata, totally devoid of *all* feeling. What we lack are the emotions that enable people to 'connect' with the emotions of other people.' This is an interesting point. He appears to be alluding to an emotionally based ability to 'sense' the emotions of others directly which is lacking in autism. He later describes how, despite not being able to 'feel' other people's feelings, he can understand them cognitively (1999, 27): 'Does being unable to 'feel' preclude my discussing his or her feelings with an NT person? Absolutely not. If the other person can accurately describe those feelings in words, they become thoughts or ideas, and those I can deal with

very well.' (NT refers to the expression Neuro Typical.) Like Gunilla Gerland he also describes how he had an unusually high pain threshold. On several occasions he had injured himself quite severely but felt virtually no pain. This appears to be yet another example of an unusual relationship of feelings to consciousness.

Other Writers on the Role of Feelings and Autism

Examples will now be considered from other writers who in their various fields acknowledge the problems with emotions for people with autism and the importance of coming to terms with them.

Trevarthen, Aitken, Papoudi and Robarts (1998) are of the opinion that one of the main problems in autism is the difficulty of making affective interpersonal contact. In studying communication between mothers and infants they proposed the 'Theory of Innate Intersubjectivity'. Fundamentally, normal infants have a natural ability to engage sympathetically with another person and can effortlessly and instantly model or mirror their motivations and purposes. Emotional or motivational reactions to others, and reciprocal engagement with them occurs at a very early stage in development where there is as yet insufficient cognitive development for a 'theory of the other's mind' and certainly before the development of thought in words. In other words this 'Innate Intersubjectivity' is an inborn ability to perceive and respond directly to feelings and motives without the need of the intellect. Their suggestion is that this ability is what is lacking in autism. They go on to describe (117) the normal interactive process between infant and caregiver as a 'conversation' of feelings. It is 'an imitative meeting of rhythmic motives for expression that is driven by contributions from both…' They suggest that the problem with playful communication in autism may be due to a 'faulty sensitivity for the mother's feelings' or 'an abnormal expression of timing in reaction to what she does'. Whilst they are clear (118) that autism is a

disorder ‘originating in the child’ they still hold that much can be done to improve the situation through appropriate encouragement of emotional engagement with another person. Hobson (1993, 3) also sees the problem with autism as one of an incapacity to make affective contact with other people, the inability for a ‘meeting of hearts and minds’. He also calls this interpersonal affective connectedness ‘intersubjectivity’ and describes it in the following way (1993, 13): ‘…the autistic child’s limited experience of intersubjective engagement *per se*, …..is what severely constrains their ability to develop an understanding of the nature of persons and *thereby* to evolve a range of supervenient cognitive, linguistic, and social capacities.’

Sherratt and Peter (2002), in discussing the benefit of play and drama therapy for children with autism argue strongly that it is the affective or emotional aspect that makes the difference. For example (2002, viii): ‘Putting children with autism directly in touch with their feeling responses will enable them to see how events and experiences come together to have a *meaning*- a personal significance -….’. Or (2002, ix), children are enabled to flourish if there is a ‘psychological fusion of children’s interest and emotional engagement’. Again (23), ‘for something to be meaningful, it has to connect the emotions and cognition, creating an attitude towards the event.’ They relate the experience of emotion to brain function and state (34), ‘However, unless affective brain activity is stimulated in children with autism, and unless experiences acquire an emotional resonance, their view of the world will remain fragmentary and they will remain isolated.’ The whole emphasis of their thesis on the advantage of play and drama is that it facilitates the bringing together of the affective or emotional aspect with the cognitive.

Nind and Powell (2000, 100), whilst advocating an interactive approach for children with autism, describe the necessity for sensitivity and reciprocity and also note the need for

‘optimum levels of affective involvement.’ They also appear to be suggesting that focussing on emotions and feelings as well as on cognition should form an integral part of the interactive process. For example (106), when engaging in close face-to-face interactions the communication of the affective aspect is of utmost importance and should be clear and exaggerated as if expressing, ‘this is what I’m feeling and this is the facial expression that goes with it’. In fact one of the main objectives for Intensive Interaction for Nind and Hewett (1994, 81) is to develop ‘sensations of emotional empathy’. All the above could be interpreted as arguing for a ‘reconnection’ of cognition and feeling as an essential part of the interactive process if successful interpersonal relationships are to be achieved.

Another relevant contribution to this argument is the work of Hobson (2002). His main concern is the development of thinking but he argues that thinking only develops as a result of emotional engagement with other people. He suggests that the root of the problem with autism might be the failure of this emotional engagement to take place in the earliest years of infancy. For example (Hobson 2002, xiv) ‘if an infant were not involved with other people, then she would not come to think’ and (xvi),

> ‘ I was especially taken with the idea that Wittgenstein’s philosophical account of how we understand other minds through perceiving and responding to expressions of feeling might explain autistic children’s severely limited understanding of other people – and beyond this, might explain their restricted creativity in thought.’

Further, (5):

> ‘Centrally and critically, autism reveals what it means to have mutual engagement with someone else. It reveals this by presenting us with the tragic picture of human beings for

whom such engagement is partial or missing. The autistic child's lack of emotional connectedness with others is devastating in its own right, but also it has quite startling implications for the child's ability to think. These implications are what enable us to see how thinking itself is born out of interpersonal relations.'

Hobson uses the term 'emotional connectedness' to describe the prime deficit in autism. He puts forward the argument that normal human development is totally dependent on an experience of emotional engagement with others and that it is this disconnection of emotion in the case of autism which is so detrimental. The result is not only the absence of social ability but also the inability to engage in normal thought processes. In fact he proposes (2002, 151) that thinking and feeling are 'integral to each other' and that disorders of thinking and disorders of feeling often go 'hand in hand'. His proposition that people have an innate ability to respond directly to expressions of feeling in others, which is more basic than thought, provides an alternative explanation of the observations that led to Frith's 'Theory of Mind' hypothesis (1989). If this ability is what is lacking in autism, then he suggests it would be difficult to experience people *as* people. One would not have the normal direct access to their mental life and would therefore not arrive at the understanding that people have minds. He believes that interpersonal engagement is something that happens before thought and that it probably forms the basis for the development of thought itself. The problem with understanding other people's minds would therefore not be so much the inability to think out how another person's mind is working as the inability to feel empathetically how the other is feeling. The connection through feelings must come first, then the thinking becomes possible. Frith herself also mentions that affective contact probably has a part to play in the understanding of minds.

Coupe O'Kane and Goldbart (1998) are also concerned with the role of emotion or affect in the development of communication. In discussing the development of early communication in typically developing infants and in individuals with learning disabilities, they address the issue of what they call 'affective communication'. At a very early stage, before individuals have any intention to communicate deliberately they will give certain signs or behaviours in response to what is going on around them. These may be for example simple reflexes, facial expressions, sounds or body movements etc. which, though not made with any conscious intent to communicate can nevertheless be interpreted as having meaning by a sensitive observer. Gradually the observer can build up the recognition of a repertoire of understood behaviours. What is significant is that the behaviours described are all emotional responses, expressing feelings towards stimuli. It appears that they are suggesting that the earliest and most primitive communicative acts always involve feelings or emotion. Later these may develop into intentional and though-out communicative acts but the most fundamental aspect is affect or emotion. It would seem therefore that when considering embarking on a course of interactive engagement with children with autism the affective element is of crucial importance.

The Work of Antonio Damasio

A further significant contribution to the argument concerning the importance of feelings is found in the work of Damasio (1994) in his book entitled *Descartes' Error.* Damasio, a neurologist, argues that good and effective real-life decisions are made as much on the basis of what arises out of feelings as from logical thinking. He puts forward that the normally accepted view that rationality is dependent only on intelligent and logical reasoning (attributed to Descartes) is incorrect. His main evidence comes from studies of patients who had suffered frontal lobe brain damage through accidents. Apparently unable to cope properly in life since their accidents, they nevertheless scored consistently well on intelligence tests.

His question was, if reasoning was not impaired by the damage yet coping in life was, what was the nature of the malfunction? What he discovered from psychological testing was that it was the feelings of these patients that had been altered. Pictures such as gory accidents or other disasters which would previously have produced strong emotion now no longer had any effect. Rational behaviour he argues requires intact feelings as well as intact thinking. Although Damasio does not discuss the situation in autism as such, his thesis may be relevant because he is also describing a situation of disturbance in behaviour (and to a great extent social behaviour), which is due to thinking being deprived of its natural guidance from feelings.

Damasio's Somatic Marker Hypothesis

Damasio (1994) gives a great deal of detail about brain and neural function in general but essentially he argues that the essence of emotion is a collection of changes in bodily state brought about by a vast interconnecting network of neural circuits under the control of a dedicated brain system which responds to the content of thoughts relative to a particular event. In other words what is experienced as emotion is really a change in body state due to the stimulus of a thought. There are both externally visible body states such as facial expression, skin colour and body posture as well as the internally perceptible states such as the sensation of adrenaline in the abdomen or the 'lump in the throat' feeling associated with crying. These are just a few examples; there will be many, many more, associated with different emotions and often far less easy to describe. However what is important is that he associates emotion more with bodily states than mind states, although the original thought affects both body and brain. Feelings he defines as the conscious awareness of these changes in state. The somatic marker hypothesis is briefly as follows: Often, when a situation presents itself to us, before there has been time for any reasoning to take place a sort of 'gut-feeling' arises within us signalling either a good or a bad outcome. This 'feeling' will have been

connected by previous learning to the good or bad outcome of such a situation but it manifests in a body state or emotion instantaneously. It acts like a sort of inner beacon which flashes up positively or negatively and can be the main factor in determining our decision. Reasoning may follow later. He names it a 'somatic' (meaning body) marker because that is where it originates. He is suggesting that in practice the 'somatic marker' feeling is a main prerequisite for good judgment. What is important for this discussion is that it must eventually manifest in conscious feelings to be effective for decision making i.e. it must be possible to connect it to thinking. The 'bad' life-decisions made by his apparently intelligent frontal lobe damaged patients may be due to a failure in this somatic marker system. In other words their disability is due to a failure of feelings i.e. the conscious awareness of emotions.

'Descartes' Error'

Damasio (1994) discusses the philosophical view of Descartes, which is that mind and body are separate; i.e. thinking and reasoning can somehow be 'pure' and not part and parcel of the functioning of the rest of the body. Although such an idea is in itself not really acceptable today, he still believes it to be highly influential in modern Western thought. The analogy that the mind is the 'software' programme which runs a piece of computer 'hardware' called the brain, he believes may well derive from this Cartesian view. Damasio sees this as an unacceptable distinction in fundamental nature between mind and body. A curious consequence of this is the popular scientific assumption that the workings of the mind can be investigated by examining the neurobiology of the brain alone, without recourse to the circumstances in the rest of the body. It could be argued that a further consequence of this Cartesian view is to be found in our education system. The main emphasis is on the development of the intellect, with intellectual ability being most highly valued. Morality, honesty and diligence rate much lower, and even when they are taught it is always through the intellect and does not approach the bodily emotions as described by Damasio. This is also the

normal approach to teaching children with autism. Even if emotion is to be considered, it is almost always done by for example showing pictures of happy and sad faces and then teaching the appropriate names for these emotions followed by the correct responses (see Jordan 2001 page 14). It is very rare to find an attempt to guide the child to inwardly experience the emotion before learning the name. Yet the evidence is that the real meaning and understanding is not accessible without the direct experience of the affective element.

Again, Damasio's ideas on the nature of emotion and feeling have relevance to autism because they demonstrate the detrimental effect on behaviour of a malfunctioning emotional system. In the case of Damasio's patients the disconnection of emotion to thinking was physical; in the case of autism the reason for the disconnection is not clear, but the similarity of effect is still apparent.

Background Feelings and the Concept of Self

According to Damasio (1994) background feelings are the awareness of normal body states and are more akin to general mood. They are not the same as intense emotional states; they are more in the background and are more like'…the feeling of life itself, the sense of being' (150). The importance of background feelings is that we are generally 'only subtly aware of a background feeling, but aware enough to be able to report instantly on its quality' and what '…we experience most frequently in a lifetime' (150). He further describes them as '…our image of the body landscape when it is not shaken by emotion' (1994, 151). He then goes on to say, 'If you try for a moment to imagine what it would be like *without* background feelings, you will have no doubt what I am introducing. I submit that without them the very core of your representation of self would be broken.' Again, it could be argued that this has a remarkable similarity to the situation in autism.

Jordan (1996, 93) expresses something similar in that she ascribes some of the difficulties of autism to a lack of an 'experiencing self'. She points out that individuals with autism often show problems with 'personal episodic memory' and that it has been postulated that this might be due to a lack of 'experiencing self'. This is in turn may be because of a 'disturbance in the affectual colouring of events due to abnormalities in emotion regulation ….'. Once more this alludes to the possibility of emotion and consciousness being separated in autism. Although theories diverge over the role of emotion in the development of a 'sense of self' there are several examples of research that do support this proposal (Jordan 1999). In discussing how to approach the question of developing a sense of self, Jordan and Powell (1995, 44) see the central core of self-recognition as, '…being aware of the self as an intentional and problem-solving ego…'. This statement introduces the idea that recognition of self may involve intention (or willing) as well as feeling (see later).

The next example is cited because it suggests that there might actually be some neurological evidence for a disconnection between emotions and thinking in individuals with autism. It arises from some neurological investigations of brain function by LeDoux (1996) who distinguishes between feelings and emotions in a similar way to Damasio (1994) cited above. According to LeDoux (1996) the two (unconscious emotions and conscious feelings) are mediated by different neural systems; emotion is mediated by the amygdala in the subcortical region of the brain, resulting in behavioural, autonomic and hormonal responses, whereas feelings are produced as a result of interaction between the subcortical system and the cortex, and are conscious. Shalom (2000) considers that this may have relevance to the understanding of autism. He argues that the relatively intact emotions but impaired feelings shown by individuals with autism may be due to a miscommunication between the subcortical and cortical regions of the brain. Thus although arguing from a biological standpoint, Shalom is also suggesting a disconnection between emotion and thinking in autism as discussed earlier.

The Perception of Another's Feelings

It has already been suggested that it is possible, and desirable to 'share' feelings directly during the course of an interaction. This calls into question the nature of perception of another person's feelings. The proposal is that one can somehow 'sense' an atmosphere or mood around an individual. This would not just be a case of seeing or hearing certain tell-tale signs of facial expression or sound etc. which would require cognitive interpretation, but rather some sort of direct 'sense of emotion'. At present there is no suggestion as to exactly how this might take place, it is simply being put forward as common experience for many people. It is a point considered by Hobson (2002, 174) when discussing how a mother's feelings are transferred to her infant. Though he does not say exactly how this happens he uses the expression, 'the baby comes to assimilate and contain the feelings herself.' This seems to imply some sort of direct assimilation of the mother's feelings and in any case the baby would be too young to use cognitive reasoning to deduce the mother's feelings from signals such as facial expression etc. This has clear similarities to Trevarthen, Aitken, Papoudi and Robarts's (1998) 'Innate Intersubjectivity' discussed earlier. Later, Hobson (2002) discusses in more detail the mechanism for perceiving another's feelings. He suggests (243) that '…the way we apprehend another person involves us with that person's subjective life.' He then goes on to quote the philosopher Wittgenstein: ''We *see* emotion.'- As opposed to what? We do not see facial contortions and *make the inference* that he is feeling joy, grief, boredom. We describe a face immediately as sad, radiant, bored, even when we are unable to give any other description of the features.' Hobson describes this (244) as having a 'direct route into the minds of others'. He goes on, 'We do not perceive a smile as an upturned configuration of the mouth and by an intellectual process decide that this configuration means the person is happy.' He believes that we become affectively involved with people first and then, as a result of this engagement we come to realise that they have minds. He summarises his views with the following statements (251): 'First, if we are to understand that other people have

subjective experiences (that is, a mind), we need to relate to people with feelings. Second, in relating to people we get access to minds directly, not via a convoluted route of inferences, deductions and analogies. Minds are neither so hidden nor so abstract as they may seem.' He goes on to say (252) that as part of developing the skill of interpersonal engagement it is necessary to be able to '…respond with feelings to the feelings of others. This is the first step to understanding minds.'

Steiner (1981) also does not see the process of the perception of feelings as one of observation followed by inference. Like Wittgenstein and Hobson he infers that the process is direct; and furthermore he stresses the necessity of understanding this for a healthy social life. The belief in the observation and inference theory where feelings are concerned would, he suggests, lead to social isolation.

Reciprocation of Feelings in Interaction

What is perhaps more unusual is the idea that it is possible to attempt to create this mood or affect deliberately so that it can be 'picked up' i.e. directly experienced as a feeling by another person. Other writers have suggested the need for exaggerated expressions of emotional states (e.g. Sherratt and Peter 2002) when interacting with individuals with autism, but what is intended in this research is to attempt to create the affect in such a way that it is directly perceived by the child as something that can be shared. A deliberate effort would therefore have to be made on the part of the adult to create and 'exude' feeling and to be sufficiently sensitive to respond appropriately to similar 'offerings' from the child. This is not easy to describe since language arises from thought and the proposition here is to engage directly through feelings as described by Hobson (2000) above. Outer signs of the projection of feelings might be body posture, facial expression, intonation in the voice, or expression in the eyes but none of these are actually the same thing as the feeling. The aim in this study is

nevertheless to attempt to share reciprocal affective ‘emanations’ as an essential precursor to normal interpersonal communication.

The Role of Affect in the Current Research

This question of the apparent separation between feeling and awareness of it (thinking) is one of the key issues in this research. The attempt will therefore be made to share the emotional content of an event so that the affective element is experienced directly, as described above. Feeling and emotion are believed to be something that exist and can be experienced in their own right in the first instance and not via cognition. Conscious awareness can then be encouraged; but essentially the proposal is that without the direct experience in the first place, emotion is emaciated, and no proper understanding is possible. If the problem with autism is in the realm of affective engagement with other people as suggested by Hobson (2002) above, then concentrating in this area might lead to progress. Changing colours, because of their effect on mood and atmosphere, are employed as an adjunct in the process to augment the creation of ‘movement’ and change in affect.

Practical Creation of Affect in the Current Research

The next section centres on the question of how to bring affect or emotion into the interactive process with the children involved in the project. The word ‘affect’ (see glossary) is commonly used to describe what is apparently malfunctioning in autism but what is required is a word for a wider concept than just feelings or emotion. What is needed is a word that includes, besides states like joy, sadness, pleasure, pain etc., states such as the following:

- Excitement
- Arousal
- Tension
- Expectation

- The experience of the ‘pregnant pause’
- Release of tension
- Calmness
- Engagement
- Disengagement
- Impatience
- A sense of timing
- Resonance
- Attentiveness
- Anticipation

These words have been chosen in an attempt to describe what it is that gives ‘animation’ to an animated conversation or interaction between people. It is the substance of the ebb and flow of the conversation, its movement or ‘life’. The words ‘emotion’ or ‘feeling’ are too limited in their meaning and ‘affect’ is not really adequate since they may also contain an element of willing (see later) but for want of a more suitable word it will suffice for the time being. In the interactive sessions this affective element is provided partly by the adult through gesture, facial expression, intonation etc. and partly by the changing colours. The colour serves to back up and to augment the ‘affective atmosphere’. It is therefore an adjunct to the ‘affect’ projection of the adult.

Peter (2003), in a lecture describing what is needed to enable children with autism to socialise, summed up what has been put forward here very eloquently and succinctly in the following, ‘What we need to do is to re-integrate head and heart’.

The Role of Willing

Thinking (Cognition), Feeling (Affect) and Willing (Conation)

This section will consider the nature of 'will' or 'drive' in the autistic state. 'Willing' is a difficult concept to characterize but for the purposes of this chapter it will be used to denote something like 'the predisposition to carry something out'. Jordan (1996) sees 'will' as having a part to play in child development as well as cognition and feeling. She suggests that the autistic condition may help to elucidate the way in which these three faculties work together (1996, 58): 'At another level, autism involves a unique and early developmental disturbance that can throw light on the developmental process itself and offer insights into the role played by cognition, affective (emotional), conative (will) and social factors in development…'. This statement could be interpreted as implying that these three faculties are not working together in the normal way in autism although she does not explicitly say this. Nevertheless she does see all three as playing a part in development. Hobson (2002, xiii) similarly describes mental activity as being divided into these three parts and uses the same words: 'Ever since the seventeenth century, when Aristotle's distinction between knowledge and desire was elaborated into a threefold division of mental activity involving cognition (thought), conation (the will) and affect (feelings)…'.

Although there is considerable literature on intention and agency, there is very little that refers specifically to the word conation. A substantial paper was written by Alexander in 1911 but very little has appeared since. He (Alexander 1911) proposed a whole psychological theory based on conation and discussed in detail the relationship between thinking, feeling and conation. He also used the word 'willing' and connected it to conation in the following way (248):

> ‘ So again in willing, the primary object of the conation is ‘the remote cue’ or end. Willing is the conative process by which this end is transformed from a merely ideal or represented condition to a real or presented condition, and this is effected in the ordinary case through bodily movements.’

This passage has been quoted because it shows that for this author conation and will are expressed through movement of the body. In the colour project, where it is desired to activate the will of a child, the attempt is made to achieve this through encouraging body movements. Alexander was also of the view that will is needed in cognitive acts. In other words will is necessary to direct the thinking (even if not consciously) to form concepts and find meaning (see below). He expressed it in the following (250):

> ‘Above all, it must be insisted that each so-called act of cognition is some form of conation or attention and consequently the intellectual development will appear as stages in the growth of conation or, to use more pointedly the name of its final development, of volition.’

Although this is a very old piece of writing it has been mentioned because it shows that there has been at least some work on the principle that integration of thinking, feeling and willing is necessary for normal psychological functioning.

Willing as an Element of Mental Functioning

Russell (1996, 89) is one of the few modern writers to be particularly concerned with willing. He usually uses the term ‘willing’ and this will be followed in this thesis. He proposes that consciousness of personal willing is necessary for the development of a sense of self and this will be discussed later in this chapter.

Damasio (2000) is also of the view that willing (action) has a part to play in human behaviour. In discussing the role of emotions and feelings he suggests in the following (2000, 43) that all three, i.e. feeling, thinking and will function together in normal behaviour: 'The fabric of our minds and of our behaviour is woven around continuous cycles of emotions followed by feelings that become known and beget new emotions, a running polyphony that underscores and punctuates specific thoughts in our minds and actions in our behaviour.' He appears to be suggesting that the starting point for behaviour is emotion, followed by feelings which then initiate thoughts and then result in an action.

Steiner refers in many instances to something similar (e.g. 1954, 1969,1971b, 1993) and he calls them the three faculties thinking, feeling and willing. He also suggests that normal mental functioning is dependent on the coordinated working together of these three and the development of a harmonious balance forms a large part of his educational philosophy. In describing how they can become imbalanced or separated, he says,

> 'Especially in the case of children, one may notice that the three members of the human organization do not snap properly into one another. A really large part of the anomalies of life are due to this improper articulation. To begin with, the children have headaches and at the same time one notices that the digestion is disturbed and so on. The most varied conditions may appear' (Steiner 1983, 10).

He also asserts (1983) that human intellect has developed at a faster rate than human will and that in fact the intellect alone, if not accompanied by the appropriate level of will, is in itself ineffective in real life situations (note the similarity to Damasio (1994) above). This is not a reference to autism but it does illustrate his view that if thinking, feeling and willing do not function together effectively then impaired functioning results.

Trevarthen, Aitken, Papoudi and Robarts (1998, ix) also see these three as of significance in the search for an understanding for autism and suggests that there has been too much concentration on thinking and language and not enough on motives and emotions. They believe that problems with motives and emotions are facets of the disorder of autism which are at a 'much more fundamental level'.

Will as the Drive to Form Concepts

This next section is concerned particularly with how a disconnection from willing to thinking might account for the reduction in concept formation often seen in autism (Williams 1996a).

The role of willing or drive to think is also discussed by Frith (1989). In her view it is a deficit in the area of drive that is responsible for the lack of central coherence in autism. In this case, drive to form thoughts about things. Forming coherence involves making sense of things, i.e. forming concepts (information-processing) about things we perceive (or sense) and this she says is something we normally do quite automatically. She describes this will or drive to form concepts in the following way (1989, 100):

> 'In the normal cognitive system there is a built-in propensity to form coherence over as wider range of contexts as possible. It is this drive that results in grand systems of thought …' 'It is this capacity for coherence that is diminished in autistic children. As a result, their information-processing systems, like their very beings, are characterised by detachment.'

And (101):

> ‘The normal operation of central coherence compels us human beings to give priority to understanding meaning’.

It appears therefore that according to Frith there is a problem with the ‘drive’ or ‘will’ to form interconnecting concepts (to process information to find meaning) in autism. It could be argued that what she is saying is that in normal development there is an automatic drive or will to form concepts and that in autism this connection between drive and thinking (concept forming) may be diminished.

This is beautifully illustrated by Williams (1998), who herself has autism, in the following comparison of the ‘autistic’ viewpoint of the world to the ‘normal’:

> ‘Most people perceive objects beyond their grainy, sheeny, reflective, flowing, coloured or opaque appearances, beyond their smooth, raspy, cold, textured tactile experience, beyond the sounds of their chinking, thud-thud, tap-tap surfaces when impacted upon, their sweet, or savoury or chemical tastes or smells, their flexibility, solidness or bounce when bitten into or impacted upon. Most people experience the object before the art of it. They whisk over the sensory into the literal and experience themselves not only in the company of glass, wood, metal, paper, plastic derived objects but beyond this to the significant; that these objects are for cooking, decoration, belong to their neighbour, require a good clean etc.’ (Williams 1998, 14).

The first part of her description illustrates what it might be like if one perceived the world just as pure sensory sensations without the usual and immediate formation of concepts. It can perhaps be deduced from this description why the world would seem so confusing for a person with autism, since the normal and automatic processing of sensory information to form concepts would not be taking place (or reduced, depending on the severity of the autism).

Further, Williams (1996a, 132) uses the word 'shutdown' to describe what happens when, usually in conditions of 'sensory overload', information processing from one or more of the senses apparently stops. She relates how she has experienced shutdown with regard to vision in the following:

> 'My experience of a total temporary systems shutdown on a visual channel means that even though the eyes continue to see form, colour, pattern and movement clearly, the brain does not process any meaning or significance of anything that is being seen (i.e. people, faces, objects, places, even parts of one's own body)'.

Janert (2000, 139-140) uses the term 'dismantling' to describe the consequences of this lack of drive to form concepts from sense perceptions where sensory impressions remain fragmented. In order to better understand the autistic state she wanted to know what this 'dismantled' state would feel like. In order to attempt to experience it first hand, she tried deliberately to prevent her mind from finding meaning, i.e. to 'switch off' information processing or concept formation, and described the experience in the following way:

> 'I was surprised to find that it was possible to look and see without engaging emotionally, to 'switch off' the meaning of what I saw, deliberately or simply letting it

slip away by not keeping my 'mental grip' on it: I had been gazing at the comings and goings of London's Docklands Light Railway trains like patterns with no more significance than the water of the fountain in the courtyard below, resting my eyes on the movement – nothing other than a visual sensual experience with a surface quality without any emotional depth. Nice colours perhaps. It was perception as sensation, rather than perception as cognitive activity that is linked with cognitive processes of generating meaning.'

'In this mode of perception, what is seen, heard and noticed is either devoid of any of its potential meaning, which would be tied together by ideas, memories or associations that could be shared with and communicated to another person or is stripped of it. I can watch the train coming and going from my high window and wonder about it, for example where it is going, liking its colours, planning to travel on it. But it is also possible to disconnect one's thoughts from the simple act of seeing so it has no meaning or significance, just watching 'it' go past (whatever 'it' is), waiting blankly for whatever might be next … coming-gone, coming-gone… endlessly and without thinking or emotional engagement. No questions asked, no thoughts, no fantasies, no desire other than for that nice soft feeling-state of non-involvement to continue. The process in which someone's mind is stripped of its meaning-giving qualities is sometimes referred to as 'dismantling'….' (Janert 2000, 139-140).

She goes on to describe how children with autism often seem to be in this 'dismantled' state:

'Some autistic children seem to have got into a habit of simply, and passively, letting their mind and mental activity slip away. Others seem at times genuinely unable to stop their senses from falling apart, to make the mental link between what they hear and see.

> Some can't get a mental 'grip' on it and eagerly make use of an adult's offer to try to pull things together *for* them. Others seem to relish this state of weightless, 'mindlessness', apparently making an actual effort, in much more deliberate ways, to keep their mind and their own capacity for multi-sensory perception in a dismantled state. Nobody knows for sure how and why they do this, or why it happens. What is certain is that they do not know how else to do it, or how *not* to do it. They need our help to, or relearn, that there other ways of using one's mind than those to which they have become used, or addicted' (Janert 2000, 139-140).

This passage has been quoted at length because it paints such an imaginative picture of the experience of being in this state. The experience of a world consisting of sensations only and devoid of meaning is very perceptively described. Essentially it appears that she is saying this is what it would be like if the drive to find meaning were missing, i.e. there is no in-built will to form concepts from sensory sensations, and this is the case in autism. Another way of putting this might be to say that the will is not connected to the thinking in such a way as to cause it to find meaning.

Will and its Connection to Mental and Physical Functioning

The role of will in autism is also discussed by Wing (1996) though in a rather different context. She is particularly concerned with the effect of will or motivation on body movements and motor skills. She describes how the gait and posture of children with autism are usually abnormal and movement is nearly always immature. However she points out that motivation or will affect the degree to which these abnormalities show. Movements may be agile and skilled where there is motivation i.e. a will to carry them out, but clumsy and limp where there is none. It would seem in this case that the degree to which body movements can

be properly co-ordinated depends on the extent to which they are connected to intention i.e. to thinking. She also attributes the inconsistencies in attention to questions of motivation or will. The narrow special interests so characteristic of people with autism is due to a lack of motivation to engage with anything else. This would appear to have certain similarities to the lack of drive to form concepts described above. Furthermore she believes that in autism the normal drive towards independence is lacking (Wing 1996, 54), 'For example, there is usually little or no drive to become independent, so the child, or even adult, is quite happy to allow a parent or carer to dress, wash, even feed them.' Again she uses the word 'drive' and again it appears she is describing a kind of automatic will or motivation to achieve something. In normal development this drive appears to be present, in autism it appears reduced or absent. She mentions the word 'drive' again when comparing the propensity of children with and without autism to take part in social interactions. She says (1996, 66), 'Most important of all, children who are not autistic have a strong drive to take part in social interactions, communication and play, especially with their age peers.' She appears to be suggesting that in autism this natural drive is to some extent lacking.

The effect of motivation on motor development is also discussed by Jordan and Powell (1995). Their view is to some extent similar to that of Wing in that they attribute inconsistencies in muscle tone and dexterity in part to questions of motivation.

Something in the nature of a disconnection between thinking and will is also discussed by Caldwell (2000, 9). She describes how an individual with autism appears to get 'stuck' when trying to carry out an action and ascribes this to a detachment between brain and motor system in the following:

> ‘Similarly, we may speak of a person with ASD who will not move as ‘posing’, when in fact what they are probably experiencing is a failure of the processing system which leads to an uncoupling of the motor system. They are *unable* to move.’

The commonly seen occurrence of ‘shut down’ she believes to be part of the same phenomenon (2000, 23):

> ‘Sometimes the effect of shut down may be less severe. The person starts activities but comes to a halt and stands waiting for help. This is sometimes interpreted as laziness but it is not. The person needs visual cues to re-establish the connection between the brain and the motor system.’

She describes this again (71) more succinctly,

> ‘Quite often a person with autism will start to do something and then get stuck (their motor system becomes disconnected from the brain) and they stand waiting. The person can become very stressed at this point, torn between an expectation that they will do something and an inability to perform.’

If, in Caldwell’s examples the brain is equated with thinking and the motor system (action) with will then it would seem reasonable to suggest that she is proposing a disconnection from the thinking to the will.

Lawson (1998, 8), the woman with autism mentioned earlier, gives a description of her own experience of a problem which could be considered to be characteristic of a problem between cognition, feeling and willing in the following: ‘I could tell the difference between a

comfortable feeling and an uncomfortable one, but I didn't know what to do with it.' The feeling itself appears to be normal, but the understanding and appropriate action or will are not. The automatic coordination between feeling, cognition and action (willing) does not appear to be present for this woman with autism.

Hobson (2002) also describes autism as arising from a problem not only with emotions and feeling but also with their connection to an appropriate action (will). He states (2002, 215):

> 'One is tempted to say that children with autism are almost blind to the feelings of others. This is largely true, but the problem goes deeper than this. They are not *moved* by people's feelings. As I have stressed before, the business of being moved by others is vitally important for thinking as well as for refinement of feeling with our fellow humans.'

He goes on to stress that this ability to give the appropriate response (action) to feelings is essentially what enables the development of the concept of self. (This has similarities to the views of Damasio and Russell concerning agency, discussed later in this chapter.) He attributes the development of what is often called a theory of mind to being able to relate to another person's feelings and actions, rather than just their thoughts. In describing the development of the infant he says (2002, 271):

> 'This fact- the fact that the human infant is drawn into the feelings and actions of the other- is one that has profound implications. It leads to what we have called 'identifying with' other people. Identifying with people is what leads to mental perspective-taking. Mental perspective-taking leads to insight into what it means to have a subjective perspective.'

He appears to be arguing that the reason why individuals with autism do not easily form a theory of mind is not just because they do not identify with another's thoughts but also just as importantly with their feelings and actions.

Trevarthen, Aitken, Papoudi and Robarts (1998) are also of the view that appropriate will (action) as well as feelings is necessary for satisfactory mother/infant interactions. Their suggestion (117) that in autism the difficulty with playful communication may be due to a 'faulty sensitivity for the mother's feelings' or 'an abnormal expression of timing in reaction to what she does', illustrates this. In using the phrase 'expression …in reaction' they imply some sort of action (will) and appear to be indicating that the impairment in autism may lie in this realm as well as that of emotions. Further they state (125), 'Thus the social impairment in autism appears not to reside mainly in a lack of social and emotional responsiveness of the child, or in imitative tendency, but to reflect a specific failure in comprehension of how to reciprocate with the other people.' They appear to be suggesting that the difficulty is an inability to respond in the appropriate way as much as a lack of sensitivity. They go on to point out how this can give the impression of indifference on the part of the child when in fact it is more a question of insufficient expression. They say (125),

> ' …even a grossly avoidant autistic child may feel an affectionate attachment and may be sensitive to the feelings and attitudes of other known persons. They should not be led to treat an apparently indifferent autistic child as if he or she cannot feel emotional about human contact, or sense the messages in behaviour and speech.'

Thus the problem may have as much to do with what children with autism actually do i.e. how they expresses themselves through action (willing), as with feelings or cognition.

Willing, Agency and the Concept of Self

The concept of 'self' has been discussed earlier in connection with feeling and emotion (page 27). It was noted that several authors suggested that a true concept of self was not possible without appropriate levels of feeling. Something similar is expressed by several writers with regard to willing.

For example Russell (1996, 89) proposes that in order to experience a sense of self it is necessary to have an 'experience of agency'. By this he means that one has, 'the immediate knowledge that one has acted' and the recognition that one's actions have had an effect on the outer world. The term 'immediate knowledge' needs some further discussion. He describes it in the following way (89):

> '…the fact that agents are in control provides them with a special kind of knowledge of what they are doing: they do not know what they are doing by observing themselves. This is because there is an intimate linkage between the way in which intentions flow into bodily movements and the fact of being in control of what one is doing in the instant of doing it. Subjects who invariably have to watch themselves to see what they are doing would not be in control'.

He then goes on to point out that this kind of immediate knowledge that agents or subjects have of what they are doing leads to their feeling of 'owning' the experiences and consequently gives them a sense of 'I'. (It is interesting to note the similarity with Hobson's (2002) view of the immediate and direct perception of feelings described earlier). Russell (1996) then goes on to link this with the concept of 'willing' by saying that since the agents or subjects (90), '…will be people with *desires* then the fact of willing is exactly what has been

described' He appears to be justifying the use of the concept of willing and to be saying that it is necessary to perceive the action of one's own will to develop a sense of agency or 'I'.

He then discusses the relationship of a sense of agency to autism. Briefly, if the direct knowledge of one's own will or agency is impaired in some way then the development of self-awareness or (253), 'ego development' will also be affected. Without ego development the acquisition of a theory of mind will also be impaired. He relates this to a possible disconnection between thinking and willing in the following (253):

> 'If there is an early impairment in the ability to determine what one does and how one's attention is directed then there will develop an inadequate sense of oneself – given that, at this primitive pre-theoretical level, first person experience is an experience of the flowing together of apprehension and *willing'*.

For normal development he says (178) that, ' … the relation between the willing and knowing components must be in a relation, if not of identity, then at least of complete integration'.

And (179):

> 'There is no 'purely knowing' self as distinct from a 'purely willing' self. Accordingly, there can be no conception of that which 'I know' or 'I believe' or 'I perceive', no conception that these mental states are my own, unless I am also somebody who wills'.

In summary he appears to be suggesting that in autism there is an inadequate consciousness of personal willing which leads to a lack of a sense of agency and hence a lack of a sense of self.

However, he stresses that he is not putting forward a ‘theory of autism’, rather it is a hypothesis about why mentalising dysfunction might be found in autism.

Similar views are expressed by Powell (2000, 7) who also assumes that a sense of agency is necessary in order to realize that one is an ‘experiencing self’. In other words it is only possible for the ‘I’ to experience the world from the inside as a self when it knows that it is responsible for changes to the world around it. This again seems to be expressing the idea that it is necessary to be able to see the effect of one’s will (actions) in the world. He goes on to connect this to autism in the following way, ‘In autism it seems that awareness of being an ‘I who wills’ is somehow impaired and therefore the conceptions of ‘I knowing’ and ‘I believing’ and ‘I perceiving’ are consequently difficult’ (Powell 2000, 7).

The ‘sense of self’ and will is further discussed by Jordan and Powell (1995). In approaching the question of developing a sense of self, they see the central core of self-recognition as (1995, 44), ‘…being aware of the self as an intentional and problem-solving ego…’. This statement again introduces the idea that recognition of self may involve intention (or willing) and for children with autism they suggest that as part of a learning strategy they should physically carry out an action and them be encouraged to reflect on it so that they come to recognize their own role in the outcome. This seems to indicate that they are suggesting that in order for an individual to become aware of their own will it is necessary to carry out an action physically, i.e. to experience intentional body movements. This theme is taken up later in the chapter on exercises and movement (see Chapter 12).

Damasio (2000) is also of the opinion that a sense of agency plays an integral role in the awareness of ‘self’. He states (2000, 145), ‘Agency, of course, requires a body acting in time and space and is meaningless without it.’ Here again, the idea is put forward that cognition

alone is not sufficient for a concept of self, an element of will acting through the body is also required. Nind and Hewett (2001, 80) also use the term ‘sense of agency’ and refer to it in connection with understanding about cause and effect. If an individual realises that they can have an effect on someone else through their own bodily actions, be it gesture or sound, then they develop ‘a sense of their own agency’. This again supports the view that will or action, as well as cognition is necessary for an appreciation of self.

These examples add weight to the proposition that an awareness of both personal willing and emotion is essential for normal development and that in autism there is an impairment in this area. The essential argument being put forward here is that for normal development, thinking, feeling and willing must function together in a coordinated fashion and that in autism this may not be the case.

Reciprocation of Will in Interaction

This is not an easy subject to deal with because perceiving and projecting will is considerably less well understood even than emotions. What is meant by this is a sort of ‘conational’ engagement, rather in the same way that the idea of an ‘affective’ engagement is used. There is very little in the literature that refers directly to the use of will in engagement with children with autism. However there are various instances where it is possible to interpret what is taking place in terms of the adult using their will to influence the actions of the child. Jordan (1998) gives warnings when discussing the effectiveness of various treatments about the so-called Hawthorne effect. This is basically the assertion, discovered from industrial practice (Roethlisberger and Dickson 1939), that any new intervention when first introduced, and irrespective of its actual efficacy seems to have a beneficial effect. This is put down simply to the fact that it is the attention of the researchers to the workforce that is actually making the difference, not the intervention. She says (1998, 129), ‘Studies should take account of effects

of the Hawthorne type, the confusion of treatment with non-treatment variables such as the enthusiasm and dedication of those carrying out the programme…'. Thus it appears that she is suggesting that 'enthusiasm and dedication' can in themselves have an effect on the outcome of whatever is taking place. It could be argued that enthusiasm and dedication operate in the realm of will; will on the part of the individual to bring something about. It is in this sense that 'will' will be discussed i.e. determination, dedication, enthusiasm, strength of mind, fortitude, will power etc.

An outstanding example of this is the extraordinary story of the only apparent case of a 'cure' for autism. Kaufman (1994) relates how he and his wife expended immeasurable amounts of time and energy interacting with their young son with autism. They developed what became known as the 'Son Rise Program', where they started by being interested in the child's own actions and behaviours and interacting with him 'on his own terms' to build up a repertoire of interactive routines. The details, which have much to commend them, will not be discussed at this point but what comes over most strongly in the account is the sheer dedication, determination, effort and time put in by these parents, particularly the mother, with their infant son. These are the very qualities known to have an effect in promoting the desired outcome, whatever the type of intervention; and it could be argued that they are likely to operate in the area of will. It seems these people were able to project their determination (will) towards their young son and effectively 'persuade' him to interact socially with them. The suggestion here is that the deliberate use of will, as well as feeling might be an essential ingredient of any successful interactive strategy.

Another example, despite its very different (from the current research) and behaviourist approach is described by Lovaas (1977). At the outset of his work with children with autism, before his theories and programmes were properly developed, he relates how determined he

was to achieve something with the children in his care. He says (1977, 2), '…we ran out of treatment programmes; we had no choice but to invent and improvise. We were determined that the children were going to learn and that we were going to teach them.' What is evident from this statement and from the subsequent descriptions of treatment sessions is the enormous effort of will and determination expended by the therapists in attempting to engage with the youngsters with autism. It seems that those who were successful with the Lovaas method had not only excellent knowledge of the behaviourist approach but also an abundance of human will, dedication and application. Many would say this is common sense as no 'method' on its own could be expected to work in the absence of human commitment to it; but it is still felt worth mentioning as a necessary part of any successful strategy for engagement with children with autism.

In discussing the development of purposeful play for children with autism, Sherratt and Peter (2002, 40) emphasise the importance of sensitivity to and sharing of actions as well as feelings. In play therapy they describe this as 'affect attunement'. They characterise it in the following way: 'This entails the teacher capturing the essence of a child's movement, rhythm or sound in order to express a shared *feeling*, rather than pure imitation that only reflects superficial shared behaviour.' It seems therefore that they are suggesting that for successful play interaction it is necessary to be able to 'tune into' the child's will and actions as part of a shared expression of their feelings. This must to some extent involve the directed will of the adult being used to reciprocate with that of the child.

Practical Use of the Adult Will in Interaction in the Current Research

This concept is considerably more difficult to portray than in the case of feelings. What it does not involve is physical or verbal coercion to force a child into doing something it does not want to do. If the principle is to try to as it were 'connect up' the child's thinking

(intentionality) with their will (action) then it is first essential that the adult makes the judgment that this action is something which the child would in fact want to carry out but cannot (see Caldwell 2000 above). If the right judgment has been made then if the child does succeed, their pleasure in the achievement has been found to be unmistakable (see Chapter 14). In order to 'will' the child into an action it would be necessary for the adult to feel real inner concern and determination. This might show outwardly by 'forward' body posture, intense eye contact, a strong and persuasive intonation in the voice and above all the ability to persist even when there is little or no positive feedback from the child. If the interaction involved physical touch e.g. pushing or pulling then adult might use physical strength to convey the their own resolve and purposefulness but this will always be to demonstrate the feeling of using will through the body to the child and not to coerce the child into an action. The moment the child does succeed, the general release of tension should be felt immediately, though the congratulations must not be overwhelming (Williams 1996). Unlike the behaviourist approach (Lovaas 1977) there would be no external rewards, instead the 'reward' would come as the pleasure of the achievement itself (Nind and Hewett 1994). Also the adult is not 'in charge' in the same way as in the Lovaas approach since the intended result is not obedience; rather it is the freedom to achieve self-expression. Examples of this are given in Chapter 14.

Feeling and Willing in the Current Research

The arguments set out in this section on the role of feeling and willing as well as thinking tentatively suggest that in autism there is an aberration in the coordination of these three faculties. It would follow that in attempting to take part in interaction with children with autism it would be necessary for the adult to pay special attention to the feeling and willing of the child as well as the thinking; and furthermore it might be possible for the adult to

deliberately direct their own feelings and will in such a way that they can be constructive for the relationship building skills of the child.

The Role of Symbolic Actions

This section is included because the development of the ability to symbolise is an important step in normal child development and appears to be one of the 'stumbling blocks' for children with autism. It is well known that lack of creative symbolic play is one of the classic signs of autism in children. To be able to use a symbol to signify something else is one of the most fundamental human faculties. In fact Hobson (2002, 25) says, 'The ability to symbolise is the hallmark of human thinking'. Language itself can be thought of as sound symbols that convey meaning from one person to another. Jordan (1999) would seem to concur with this view when describing social impairments in children with autism. She includes lack of symbolic (or pretend) play and imagination, as well as communication difficulties as a main characteristic and goes on to link this with inflexibility in thinking. Hobson (2002) sees symbolising as an essential marker along the path of human development. He illustrates this by comparing human behaviour with that of chimpanzees. Chimpanzees, he says, although very acute in picking up how another animal is reacting to something, and in perceiving meanings in actions and expressions of emotion, always direct their attention to the causative object rather than to the inner state of the other animal. In other words they do not engage in intersubjectivity (the mutual sharing of mental states by being drawn into the feelings and actions of the other) and their attention is not 'socialised'. He describes how this relates to symbolising in the following way (2002, 270):

> 'They neither notice nor explore nor understand 'what it is like' for the other chimpanzee to experience the world. This is something that human infants *do* apprehend. Humans relate to the 'bodies' of others as more than objects with surfaces. The human infant is

drawn into the mental life of her caregiver *through* her perception of and responsiveness to bodily expressed attitudes of the adult.'

He goes on to attribute the development of theory of mind to this intersubjectivity. In describing the development of the infant he says (2002, 271),

'This fact- the fact that the human infant is drawn into the feelings and actions of the other- is one that has profound implications. It leads to what we have called 'identifying with' other people. Identifying with people is what leads to mental perspective-taking. Mental perspective-taking leads to insight into what it means to have a subjective perspective. And, once the infant understands that, symbolising becomes possible. Because chimpanzees are not drawn into the feelings and actions of others, they do not identify with other chimpanzees, they do not take or understand perspectives, and they fail to symbolise. At root, their intellectual limitations are social limitations.'

Thus according to Hobson the intersubjective connectedness to the feelings and actions of others leads on to the insight not only that something can stand for something else but that it can be used to communicate this to another, i.e. to symbolising; and this ability is an essential step along the path of social and intellectual development.

Symbolising and the Current Research

It has been put forward earlier that a deficit in the understanding of feeling and will, particularly in identifying with those of other people, may account for some of the characteristic difficulties in autism. It would follow from the argument put forward by Hobson above that this would lead to a failure to be able to symbolise. This in turn might lead

to the limited development seen in autism. If, during interactive sessions the adult attempts to share both the feeling content and will content of the 'game', it might help the child to experience the affective perspective of the adult and so pave the way for the development of symbolising. Sharing symbolic pretend play in this way might therefore lead to a more meaningful interactive experience and so to more flexible thinking and more effective communication. Thus it could be argued that creative symbolic play might usefully form part of a strategy that attempts to guide a child with autism towards deeper and more satisfying interpersonal relationships by integrating thinking, feeling and will.

Symbolism, Pretend Play and Development for Children with Autism

Sherratt and Peter (2002) lay great emphasis on the usefulness of pretend play for children with autism. They point out that pretend play involves symbolising, and give examples which include role-playing such as pretending to cook dinner, object substitution such as using a wooden block as an article of food or social interaction in the form of pretending to go shopping. They have found that there is a positive relationship between language skills and levels of prompted pretend play. They also believe that the thought processes responsible for creative representations in symbolic pretend play are similar to those involved in social understanding, and the social use of language. They have found therefore that not only is creative symbolic play possible for children with autism but that it has desirable outcomes in both the area of social engagement and language development.

There is also some evidence in the literature that abilities in symbolic play correlate with abilities in language. Coupe O'Kane and Goldbart (1998) describe findings which show that in typically developing infants there seems to be a progression from the 'gesture complex' i.e. the communicative gestures of giving, showing, pointing etc. to symbolic play leading on to comprehension and production of language. Abilities in all these pre-verbal skills appeared to

correlate with abilities in language, but in particular there was a connection between symbolic play and language development. They conclude (1998, 38), 'To summarise, there seems to be good reason to accept that there are strong correlations between play and language and communication in children with and without learning difficulties, and correlations between rather more general measures of cognitive development and play in children with learning difficulties.'

Thus it would seem that to encourage abilities in shared feelings and will in symbolic play for children with autism would be a useful first stage on the path to the achievement of social engagement, and language and communication skills.

CHAPTER 4

INTENSIVE INTERACTION FOR CHILDREN WITH AUTISM - A LITERATURE REVIEW

The Nature of Intensive Interaction

Intensive Interaction is the name given to a process (Nind and Hewett 1994) whereby the adult attempts to attract and hold the attention of the learner in one-to-one interactive 'games' so that they become focussed on each other in an enjoyable and creative interchange. The actual nature of the interaction is spontaneous and intuitive and will usually follow and build on the actions of the learner. The quality of the process itself is more important than the learning outcome, since the purpose is to achieve a pleasurable and social exchange with another individual as a foundation for more formal forms of communication. There is generally no particular task to be achieved and the focus is on the quality of the activity of the two participants.

In the following account, Intensive Interaction written with upper case first letters will be used to denote the form of interaction put forward by Nind and Hewett (1994) above. Other forms of interaction will use lower case first letters.

Nind and Hewett (1994, 9) describe Intensive Interaction in the following way:

> 'As well as playfulness, sensitivity is a major theme in Intensive Interaction. The interactive sequence can be seen to be a highly sensitive response network to the signals and feedback of the learner. The staff member continuously, and largely unconsciously

adjusts her or his input to gain and maintain the student's interest and emotional arousal. With more sensitive interpersonal contact the learner's behaviours – which may have been regarded as meaningless – can become readable cues and be treated as communications.'

In fact Hewett and Nind (1998, 3) suggest that responding to apparently meaningless behaviours as though they were intentional, will 'facilitate the transition to truly intentional communication'. They describe this in the following way: 'The practitioner imputes intentionality. S/he credits the learner with thoughts, feelings and intentions. S/he attributes social meaning to actions and responds to behaviours as if they have intentional and communicative significance, long before this is so'. Attempting to engender intentional communication in individuals who are normally unresponsive is one of the prime purposes of Intensive Interaction. Hewett (2002), in a workshop, described Intensive Interaction as appropriate for people who are 'hard to reach'. This is an interesting expression. When asked what it was that was hard to reach he said it was the 'real inner person'. In the Intensive Interaction approach to autism, there appears to be an implicit recognition both of the existence of, and the challenge to reach, this 'real inner person'. The term 'accessing' is used by Nind and Hewett (1994 and 2001), and this word gives the impression that they are also alluding to 'reaching this inner person'.

Caldwell (2000, 55) speaks of Intensive Interaction in a similar way:

'Most people want to communicate. It is part of the condition of being human. There are relatively few people who do not respond to an approach in their own language, and Intensive Interaction (echoing back to them a person's own behaviour) is now a well

established technique for getting in touch with people who are hard to make contact with otherwise.'

When describing the autistic condition Caldwell uses the terms 'their world' and 'our world' to express the way the person with autism is cut off from normal social contact and 'imprisoned' in their own individual inner world. She sees the techniques of Intensive Interaction as a means of reaching such a person and says (2000, 45),

'It is only when we come empty-handed to a person that we are in a position to enter their inner world, reach them and be with them in a way that gives them confidence and helps them to begin to move out through us. However, this is not the same as feeling we 'become' the person we are working with, in which case we would be no more than a hijacked object. We need to be present in ourselves so they may use us a bridge to the world outside. They need to be aware of us as an individual as well as our being a vehicle of their language. They need someone to interact with.'

It is interesting that she is describing more than mere mirroring, more than acting like a sophisticated interactive toy, for her the essential point is that the interactive partner must be recognisable as another human being.

The ability to communicate with other human beings is also seen by Nind and Hewett (2001) as not only essential to the well being of people but also as something in the nature of a 'human right'. They state (2001, 46),

'Communicating seems to be central to being human. Being able to communicate gives us the ability to have relationships, friendships, to know the joy and fulfilment of human

> interaction. It is that important. When people have communication difficulties, it frequently has negative effect on their well-being and behaviour. We would say that for people with SLD, developing their communication ability is the most important issue in their lives. It is so important that we can view it virtually as a human right.'

They see Intensive Interaction as an effective and practical means to enable people with learning difficulties to communicate. However they do not confine communication opportunities to language alone and include many other communication channels (2001, 3): 'There is more to communication than language, however. We use eye contact, facial expressions, gestures, body language, physical contact.' In the current research, because many of the children had little or no language, these other channels of communication were regularly employed in the interactive sessions as a means of building the first 'bridge' to the 'inner person'. Expressions used by Nind and Hewett (2001, 39) to describe what can be achieved through Intensive Interaction include the feeling of 'mutual togetherness', being 'engaged with' and being 'tuned in' to, the other person.

It is interesting to note that they also consider emotion to play a vital role in such person-to-person engagement (Nind and Hewett 2001, 41), and that all other learning is basically contingent upon this. 'Human beings learn best when the learning activity engages them. What we mean by this is that the activity stimulates the intellect and the emotions…' They continue, 'Learning to be engaged by something somebody else has on offer is one of the most basic things learnt during Intensive Interaction, and one of the foundations of all other learning'. Caldwell (2000, 57) also stresses the essential role of emotion in Intensive Interaction. She states, 'Intensive Interaction addresses the emotional state of a person. For both of us, it is a creative opportunity where we can let each other know how we feel – and also test each other out using the simplicity of body language, without the complications of

misunderstanding which are the downside of using words.' Further, 'It is totally non-judgmental. The intellect is not involved – it is pure sensation.'

Two Opposing Views on the Usefulness of Intensive Interaction for Children with Autism

The question of the usefulness of Intensive Interaction for children with autism has been much discussed in the literature. It is generally accepted that for children with autism there is a deficit in the ability to form interpersonal relationships and since Intensive Interaction focuses specifically on just this, the question arises as to whether or not concentrating on a deficit area can be beneficial. There are essentially two opposing views on this. Nind and Powell (2000) take the view that it is worthwhile. Firstly, from a theoretical point of view they argue that any remedial action in an area of deficit is likely to be of help. Secondly they cite examples of children where this approach has clearly been shown to be a pleasurable experience and to improve communicative abilities. They therefore contend that Intensive Interaction is not only theoretically appropriate but is also effective in practice. Wall (2002) however puts the opposite point of view. He also sees the main deficit in autism as being in the area of interpersonal relationships but his view is that since such children cannot find meaning in human relationships it can only further undermine them to focus attention on their disability. Better, he would say, to concentrate on the positive, and further nurture the abilities that they do have, than to exacerbate the situation by concentrating on those they do not. He advocates the TEACCH (Schopler, Mesibov and Hearsey 1995) system where everything is structured, sequential and cued; and where spontaneity and surprise are thought to be confusing and bewildering. Both points of view appear reasonable but the view taken in this research is similar to that of Nind and Powell (2000) where they argue that just because children with autism do not spontaneously achieve the conventions of social interaction it does not mean that it is impossible for them to do so and should therefore be avoided. Rather,

a particularly enhanced, intense and directed interactive strategy is needed to 'coax out' of them the reciprocity which is natural to typically developing children but is so lacking in those with autism. Perhaps the crux of the argument depends on whether the achievement of social interaction is actually impossible for children with autism; if it were then the Wall point of view would be justified. However, there is much in the literature (e.g. Nind 1999, Nind and Powell 2000, Sherratt and Peter 2002) to suggest that this is not the case and the evidence from the practical sessions in this research would support this latter view (see Chapter 14).

Other Views on Interaction

The whole thrust of Hobson's thesis of development (Hobson 2002) is that for the young child, reciprocal social interaction with another human being forms the foundation upon which much of the rest of development depends. He states (2002, 142), 'There is so much that a young child acquires *through* others that there are real disadvantages for the infant or toddler who is unable or unwilling to engage with other people in their dealings with things.' It is clear that in this last statement he is referring to autism. He goes on (2002, 143), 'It means that each person experiences a particular quality of emotional contact and exchange. It is almost as if each has a grip on the mind of the other.' He develops this argument further into an explanation of what is normally referred to as the 'theory of mind'. With reference to this expression he says the following (Hobson 2002, 143):

> 'In many ways this is a daft expression, because it suggests that a child theorizes about the nature of feelings, wishes, beliefs, intentions, and so on. This is not what happens at all. The child comes to know about such aspects of mental life, and the way the child comes to know is mostly very *un*like theorizing.'

As has been discussed earlier (see page 23), his contention is that it is some kind of direct emotional perception of the inner state of the other, but the essential aspect of his thesis for this argument is that if it is through interpersonal interactions that children acquire the ability to understand minds then intensive one-to-one interaction must be a good starting place for the child with autism. The logical conclusion from Hobson's argument is that in order to teach children with autism about the emotional states of others, it would be better to follow the interactive route than for example to explain intellectually the meaning of facial expressions through diagrams of happy and sad faces (see Jordan 2001, page 14).

In considering Piaget's theories on child development he (Hobson 2002) picks up on the ideas about imitation as a social faculty crucial to the development of thought, but is critical of Piaget's omission of the role of emotion and of interpersonal relations. With regard to the latter he says (2002, 104),

> 'The second limitation was Piaget's preoccupation with the individual child's efforts to construct an understanding of the world, to the relative neglect of the part that might be played by the social construction of thought. He was unable to accept that the fabric of thinking may be woven as the warp and weft of transactions *between* people. The very means to thinking may be interpersonal relations.'

Thus in Hobson's view the building of healthy interpersonal relationships is necessary for the development of thinking.

Intensive Interaction for Children with Autism

Hobson himself tentatively suggests that social interventions might be able to help children with autism. The examples of research he cites involve congenitally blind children who also have autism but he then goes on to generalise his findings in the following way (2002, 1960):

> 'If these preliminary observations are borne out, they may point to the value of intensive social input to the children. They also remind us that there may be several routes to the same syndrome. For all the evidence that autism may be very difficult to treat, some children with the disorder may change substantially.'

Stoppard (2000) is also of the view that interactive interventions are of significant benefit for children with autism. Furthermore she believes that the instinctive desire to relate to others is present in all babies including those who will become autistic. She says (2000, xi), 'A newborn infant comes into the world able to recognise the human face and dying to relate to another human being. So does the baby destined to be autistic.' She continues, 'Babies are born wired to respond to the human voice and the more musical, rhythmic and high-pitched the better. The human voice, especially a running commentary of chatter, is music to every baby's ear, including that of the autistic baby.' As regards intervention she says (Stoppard 2000, xi), '…if an autistic child is born with the instincts and equipment to relate to others, then intervention must begin early (at least by nine months) to keep the apparatus in working order.' This last sentence contains an interesting and perhaps rather unusual idea. She maintains that babies with autism not only have the instinct to relate, but they also have the 'apparatus'. By this she presumably means that there is nothing physiological or neurological that would preclude the possibility of forming interpersonal relationships. Although not the generally accepted current view, this gives a rather interesting perspective on the question of how much it is possible to achieve. Her expression 'keep the apparatus in working order'

would seem to suggest that the neurological equipment is present, and it is more a matter of exercising and developing faculties for which the potential is already there. It is arguable that this approach gives far more hope for the child with autism than the more conventional one of assuming an irreversible neurological deficit. According to Stoppard it is therefore a question of finding the right 'bridges' into the world of the baby with autism to enable it to learn how to relate. She is of the view that interactive 'games' as used in Intensive Interaction are suitable building blocks for these bridges. It should be pointed out however, that this is only someone's opinion, and that she does not back this statement up by documented evidence from research. Nevertheless, she is a well-qualified and well-respected individual and her opinion can therefore be taken as an interesting and relevant viewpoint even if not as proven fact. Stoppard's view as to the nature of the autistic state and the efficacy of possible interventions is still of interest for those involved with older children, even though she makes it clear that very early intervention is the ideal.

Janert (2000, 7), also advocates interactive interventions and makes some suggestions about the style: 'But if we can join him and be where *he* is at, if we can tune in without making too many waves, just blending in, then we can perhaps, very slowly and gradually, effect some change. Our chances increase if we make any of the above into a playful game.' She emphasises the difficulty presented by children with autism where, because their natural responsiveness is so much less than in typical infants, it is much harder to maintain interest and enthusiasm with such reduced feedback. Nevertheless she is clear that perseverance is necessary and says (2000, 7), '…with the autistic child all the initiating (and to begin with much of the responding too) needs to come from the adult, who has to make a much greater effort to emphasise, or substitute, the social and good-natured element in the interaction.' Here again is an indication of the degree of activity and effort needed by the adult if they are to get through to the child with autism in an interactive situation. As regards the nature of the

interactive games she recommends playfulness, cheekiness and warm friendly teasing and stresses the difference between this and the mocking attitude in bullying. Situations of surprise and uncertainty will often engage the child's interest. She sums this up with the example (Janert 2000, 10), 'Because it engages an instinctive response, pretend-threat as in "I'm gonna getcha" routines command all the autistic child's awareness and attention.'

A similar approach is taken by Kaufman (1994). In this remarkable account of one-to-one intensive interaction with his infant son, he describes how by starting 'where the child is at' and joining in with his activities a gradual rapport was built up which appears to have 'brought the child out of his autistic world and into ours'. Kaufman relates (1994, 80):

> 'Clearly, our son could neither easily nor successfully negotiate our world. So, wanting not to push him or demand from him what he could not give, we took a very different path: We went to him in his world. By mirroring his movements, we entered his universe, participated with him on his terms, and, as a result, made ourselves more digestible to him.'

This is perhaps the most remarkable example of successful intensive interaction with a child with autism and it is interesting to note that the parents' aim was, in their own words (Kaufman 1994, 67) always an attempt at, '…making contact with our son'. Clearly this 'getting through to him' was of prime importance and the means by which they did this was secondary. They were prepared to go to incredible lengths and join in some extraordinary rituals and behaviours in order to achieve this. The account is an unusual example of intuitive, original, inventive, and courageous use of intensive interaction which appears to have been remarkably successful.

Early infant games are also seen as essential for normal development by Hobson (2002). He claims that it is the fact that both adult and child attend to the game together and share the emotional currents that real communication can start to develop. It is these kind of interactive games which, 'wrest the infant from a kind of self-centredness'. He believes that 'what underlies autism is something lacking in just the kind of person-to-person engagement that is so characteristic of typically developing infants' (Hobson 2002, 43 and 44). It follows that if such interactive games tend to reduce self-centredness they are likely to be helpful for autism. It may also be worth noting that Hobson (2002, 52) contends that emotion and thought are expressed by the whole body and not just by facial expressions. 'But in reality there is not a muscle of the body which does not reveal thoughts and feeling.' The consequences of this might be that when engaged in interactive games with children with autism the adult should make every effort to use or even exaggerate gesture and body attitude to maximise the expressive content. Nind and Hewett (2001, 37) also advocate such deliberate use of body language during Intensive Interaction sessions. They state that staff will need to develop 'the ability to manage their **body language** and to use it powerfully and deliberately.'.

Hobson (2002) uses the term 'emotional currents' to describe the underlying affective state of a person during the course of an interaction with another person. One of the arguments put forward in the current research is that for a child with autism there is a kind of 'emotional stiffness' and that they lack the ability to take part in the affective ebb and flow of normal human communication. In much of the literature on Intensive Interaction there is an emphasis on what might be called 'affective movement' during the course of an interaction with such expressions as 'burst-pause' (e.g. Hewett 2002). In fact Nind and Hewett (2001) actually suggest that highly arousing games can be beneficial in the sense that if interspersed between periods of calm they may help the 'arousal regulating mechanisms' and thus in the longer run reduce levels of arousal for people who are permanently over-stimulated as is so often the

case in autism. In describing such games they say, ‘We need arousal to peak so that we learn how to bring it down again…’ (Nind and Hewett 2001, 60).

Trevarthen, Aitken, Papoudi and Robarts (1998) are also of the view that much can be done to improve the lives of children with autism and suggest that intensive interaction among other approaches can be helpful. They say (1998, xi), ‘Our review leads us to give an optimistic picture’ and, ‘ Autistic people do respond to other people in positive ways, and they learn.’ They consider the stage of ‘protolanguage’ in typically developing infants and describe it in the following way (1998, 103): ‘In protolanguage, vocalisations are combined with gestures to make declarations, indications, observations, orientations etc., sharing interest in events and combining them with signs of where and when the events are occurring.’ Whilst they accept that it is usually at this stage that infants with autism start to fall behind, they do nevertheless advocate the use of intensive interaction techniques; and simple communications involving protolanguage, they suggest, are normally the most suitable way to start. Again they stress the importance of the process rather than the achievement of any particular end result. In expressing the main aim they say (1998, 161), ‘Autistic children need support and augmentation of their intersubjective awareness and skills.’ Powell (2000) uses the term ‘mutuality’ to express a shared experience and stresses the importance of mutuality in any teaching or learning situation for children with autism. He describes several interactive approaches where mutuality is central and recommends these as useful strategies that have been shown to have a beneficial effect.

Interactive Music

Intensive interaction techniques are also advocated by Chandler, Christie, Newson and Prevezer (2002) in their musical interaction therapy. They also start ‘where the child is at’ by imitating and joining in with the child’s own behaviours but in this case the mood created

through the structure of music. The key worker interacts directly with the child and this is accompanied and augmented by the musician, often on a keyboard. They write:

> '…the music specialist will use the structure of music to facilitate all kinds of reciprocal play activity between keyworker and child, including physical contact. For instance the keyworker may sing a commentary (supported by the musician) on anything the child does, seizing any opportunity to treat the child's response (movement, babble, laughter) as an intended contribution to a dialogue, and so beginning to manufacture shared intention and social timing. The keyworker imitates the child, reflecting his behaviour, often using 'props' that encourage reciprocal play…' (Chandler, Christie, Newson and Prevezer 2002, 52).

The principles of this musical interaction 'therapy' are very similar to those of the present research where colour is used to accompany the interactions instead of music. The light operator who controls the colours with dimmers can be compared to the musician on the keyboard. Their principles of starting with imitating, imputing intentionality to a random behaviour with the goal that it will eventually become communicative, building up to shared initiating and joint creativity and are all also an integral part of the current research.

The principle of treating non-intentional acts as though intentional (Prevezer 1990) and (Chandler, Christie, Newson and Prevezer 2002) is also taken up by Nind and Hewett (2001, 45). This will be quoted in full as it so succinctly describes the stages of moving from random to deliberate and communicative behaviour:

> 'It may be that the person with PMLD has not yet reached the stage of deliberate intentional behaviour. In this case, you need to respond to certain movements or sounds

the person makes as if they are social or communicative. If you do this over a period of time, with intensity and consistency, it will help the person to realise that something that they do accidentally, is actually causing you to do something. They may then get the idea and start doing it deliberately. In this way we foster the development of intentionality'.

This technique was regularly used in the interactive sessions in the current research.

Sherborne Developmental Movement

Some notes about Sherborne Developmental Movement have been included here because many of the exercises (or something very similar) were included in intensive interaction routines in the present research. Veronica Sherborne, originator of 'Sherborne Developmental Movement', takes the view that whole body movement is vital in child development. She believes that, 'all children have two basic needs: they need to feel at home in their own bodies and so to gain body mastery, and they need to be able to form relationships. The fulfilment of these needs- relating to oneself and to other people- can be achieved through good movement teaching' (Sherborne 2001, xiii). Underlying Sherborne's developmental movement exercises was the work of the dancer and philosopher Rudolf Laban. He stated, ''Movement' is a feature of all man's activities…..through the movement of our bodies we can learn to relate the inner-self to the outer world' (Laban 1996). It is interesting to note that he sees the potential for body movement in connecting the inner- self with the outer world, something which is clearly a problem for individuals with autism. In discussing the situation of children with special needs Sherborne is of the view that movement is especially important. She also touches on the idea that the relationship between the real inner self and the body is critical for normal development and sees movement as a way of promoting it, 'Movement experiences are fundamental to the development of all children but are particularly important to children

with special needs who often have difficulty in relating to their own bodies and to other people' (Sherborne 2001, xiv).

She also argues that movement and play are forerunners to human communication. In studying the way mothers and babies embark on the pathway that will lead to the development of communication skills she points out the major role of movement play in the following, 'All movement play is a kind of conversation. In the beginning the parent initiates the relationship and the child responds.' Further, 'It is important to encourage the child to focus on the adult's face, particularly on the eyes, and to enjoy and respond to a variety of sounds and noises, and language, made by the adult. This is the beginning of communication' (Sherborne 2001, 38-39). Thus it is also her view that interaction with an adult through body movement and sound is a good starting point for the development of communication. In discussing the concept and importance of body awareness she puts forward the view that there are two possible approaches to movement education. Normal physical education, where particular skills of manipulation or gymnastics are taught she calls the 'objective' approach. Her own form of movement takes the 'subjective' approach where the emphasis is on developing awareness of one's own body and being able to comfortably interact physically with others through it. She considers that the child must experience a sense of wholeness and says, 'Whole body movement involving the free flow of weight has a harmonious effect on all children' (Sherborne 2001, 41). Suggested exercises for this are rolling in the floor, bouncing, sliding and swinging. She characterises the movements of children with autistic tendencies as 'bound', and she maintains that with 'fine touch' and through various exercises she has successfully strengthened their 'subjective' movement skills. She also relates the lack of body awareness to the difficulty in forming relationships and says, '… it is possible to get through to such a child in a one-to-one relationship' (Sherborne 2001, 65).

Rhythmical Movements

Rhythmical movements during interactions have been investigated by Burford (1988). She found that rhythmic groups of cyclical movements, or action cycles, which had a communicative purpose, were seen to occur regularly and naturally in interactions between caregivers and children. She looked at movements such as stroking, patting, tapping, shaking, nudging, rubbing, rocking, bouncing, jiggling or clapping and found that they tended to occur in cycles at particular speeds depending on their communicative purpose and that they were common for many different individuals. She states:

> 'The people with profound mental handicap performed similar actions for apparently similar reasons at similar rates to their caregivers, giving strong indication of a biologically robust system of basic emotional communication which can quite literally be tapped into by caregivers' (Burford 1988, 189).

She puts forward that since these communication movements are based on a common time base that transcends cultural or learning influences, they can usefully be used by the interactive partner to tune into the natural interactive rhythms of the child.

Movement and the 'Sense of Agency'

In some ways Sherborne's (2001) views on body awareness have similarities to the idea of the sense of 'agency' expressed by other authors e.g. Jordan (1999) and Russell (1996) where an individual achieves a 'sense of self' through the effect their own deliberate bodily actions have on the outer world. It is only by being able to express their own will through their body in gesture, sound or language and then being able to see its effect on someone or something else that they can become aware of themselves as an individual. Powell (2000, 7) appears to share a similar view when he says that people become aware of their own 'I' when they learn

to recognise the result of their own actions on the world. He also calls this a sense of agency. In stressing the need for responsiveness on the part of the interactive partner, Nind and Hewett (2001, 80) also see Intensive Interaction as a means to facilitating a sense of agency since the learner will come to realise that they can '…cause an affect in us.' Since particular emphasis is laid on being responsive to whatever the learner offers in order to engender deliberate communicative acts, it could be argued that by cultivating the learner's use of their own deliberate actions (will), a sense of agency or self can be achieved.

Lord (1997, 81) also recommends the use of movement for children with autism. Expressive movements she says, take the form of 'movement phrases which link the rhythms and patterns made by the body with action, emotional vocabulary or rhymes.' They reflect ideas, emotions and moods. She has found expressive movement very effective in helping children with autism to extend their symbolic understanding so that they can eventually replace real objects with representations. Similar exercises are suggested by Pointer (1993). They include such things as sitting back to back and pushing, sliding round the floor, undoing a human 'parcel' and pushing against resistance from the other. For each activity an 'activity value' is given and these include the development of physical strength and stamina, balance, and trust and confidence in the partner. Movement is also considered important to the general learning process by Godfrey and Kephart (1969, 7). In their opinion motor learning is a vital precursor of other accomplishments which include '…complex activities such as perception, symbolic manipulation, concept formation and the like …'.

Many movement exercises similar to those described above are included in the interactive routines of the colour project.

The Relationship Between Movement and Language

There is also evidence in the literature that movement; particularly gesture has relevance to the development of language as well as other aspects of learning. Some recent research (Spinney 2000, 31) into language and gesture has shown ‘a deep evolutionary link between speech and gesture’. Evidence is cited which suggests that early humans communicated using their whole bodies in a form of mime. Speech is believed to have evolved out of this ancient body language, and our present day gesture is all that now remains of it. There is also a certain amount of neurological evidence to support this view. Spinney points to a form of aphasia where there is an inability to string words together into meaningful sentences. Interestingly, hand movements that relate to flow are correspondingly also impoverished, suggesting a direct connection between the two. Furthermore neurological work on monkeys has demonstrated a group of neurones in the brain that fire not only when the monkey makes a particular movement but also when it sees another monkey make the same movement. These neurones are found in a region of the monkey brain that corresponds to the speech production area in humans. Spinney concludes, (2000, 32) ‘ ...it is possible that they may be the key to allowing individuals to understand one another’s gestures- the development that made language possible.’ It is also interesting to note how Spinney associates particular gestures specifically to the flow of language in meaningful sentences. If there are movements that relate specifically to flow, then there may be important consequences for autism. Speech is often echolalic or stilted, so finding the appropriate movements for meaningful flow could therefore be a useful adjunct to encouraging the development of fluency in language.

This gives further support to the proposition that language and movement are connected and it is for this reason also that in the interactive stage in the current research, movement and gesture in the colours were considered to be important.

‘Moving On’ from Basic Responding

The purpose of the Intensive Interaction approach is fundamentally to build up a communicative and trusting social relationship. Since this is believed to be the foundation for virtually all other learning, its achievement is of paramount importance. Even if no more is achieved, Intensive Interaction can still be justified on the grounds that it has desirable effects on behaviour and because communication is in itself felt to be vital to the well being of human beings (Nind and Hewett 2001). However the question does arise as to how to progress from the basic stage, and Nind and Hewett (2001, 69) suggest the following:

1. ‘Adjust the way in which we respond, so that the communication becomes more sophisticated and conventional.’
2. ‘Adjust what we respond to, so that we can help our communication partner to move on.’

In these later ‘more advanced’ stages of Intensive Interaction it is interesting to note that the interactive partner is now taking a slightly more directive role in that although still responding to what the child offers they begin to select on the basis of progress towards ‘new games, settings or people, or to longer interactions, greater involvement and initiation of social contact’ (Nind and Hewett 2001, 84). They propose the introduction of language by responding to sounds which are more like words, in order to encourage the eventual use of real words (unintentional becoming intentional) and fostering interest in other objects, events and people to broaden the horizon and create joint attentiveness on which to base the beginnings of conversation. They make an interesting point regarding people with autistic spectrum disorders concerning the use of language. It is possible to learn to use speech correctly without being able to interact socially; so meaningful conversation is still not easy.

In such cases Intensive Interaction will be particularly helpful for the development of the missing interpersonal skills which could lead to more meaningful use of language.

If the adult's role in intensive interaction is likened to a 'bridge' (Caldwell 2000) between the inner world of the person with autism and the outer world, then first it is necessary to cross over into their world by doing 'their thing' in their way with them. Once a friendly and trusting relationship is built up in their world, it is gradually possible to encourage them cross over 'with us' and join us in 'our world'.

CHAPTER 5

OTHER RELATED WORK: THE EFFECTS OF COLOUR AND MULTI SENSORY ENVIRONMENTS - A LITERATURE REVIEW

As has been stated before, nothing has been found where coloured light was used interactively in the same way as in this research. There are several other related areas that have a bearing on this work and these will now be discussed.

Examples of Effects of Colour

There are a few examples of research which support the view that colour has a physiological and psychological effect on the human being. Hamid and Newport (1989) studied preschool children in rooms painted in pink or blue and found an increase in physical strength (ergometer measurements) and a more positive mood (painting assessments) in the pink. They also state that it is the arousing quality rather than the pleasantness of the colour that is the likely determinant, since the children's colour preferences were unrelated to the strength or mood scores. They suggest that the warm-cool dimension of colour i.e. red/ blue, pink/blue or red/green is the most fruitful in studying arousal effects. Steiner (1989) also suggests that the red/blue contrast would be the most effective colours to use in therapy. Physiological effects of red and green were also investigated by Wilson (1966) using electrical skin conductance measurements. He investigated the effect of viewing red and green slides on undergraduates and this study again suggested that red is a more arousing colour than green. Participants were also asked to describe the difference, and reported that red was more 'stimulating, exciting, awakening, attention-drawing, overpowering and lively' (Wilson 1966, 948). Nakshian

(1964) studied the effect of red and green surroundings on certain behaviours in normal adults. He found that when subjects were asked to trace an arc as slowly as possible, the task was carried out marginally more efficiently in green than red, as estimated by hand tremor and motor inhibition measurements. This was taken as evidence that green has a more calming effect than red and improves performance in tasks requiring judgement and fine psychomotor co-ordination. He does however suggest that these findings are not conclusive and other tests did not yield significant results.

In two further studies (Schauss 1979, and Pellegrini, Schauss and Miller 1981), the effects of room colour on aggressive behaviour were investigated on criminals in detention centres. They state that this work followed some previous studies in which it had been found that arm strength was decreased in pink as compared to blue. This seems rather surprising in the light of the findings of Hamid and Newport (1989) cited above, where they found pink more stimulating than blue. There may be numerous reasons for this apparent contradiction, for example test conditions and objectives were different; but it must also be remembered that exact colours have not been given in these reports and ‘pink’ can range in hue anywhere from magenta to ‘salmon’. Not only this, but pink is a mixture of both blue and red wavelengths, so any use of the word ‘pink’ must be viewed with caution. In 1979 Schauss published a paper in which he described the effect of pink paint for a criminal detention holding cell where newly confined inmates were temporarily held and interviewed. Results showed an overwhelming reduction in episodes of aggressive behaviour towards staff as soon as the room was changed to pink. He also reported similar results from other prisons. However, in 1981 a further paper was published, this time in collaboration with two other researchers. Pellegrini, Schauss and Miller (1981) repeated the above tests rather more methodically and found that although violent incidences were greatly reduced when the pink (in this paper described as ‘hot pink’) was first introduced, the effect soon wore off and incidents after a few months were back to

normal. Their findings were inconclusive as regards the 'tranquillising' effect of pink, but they do suggest that the reduction in violence in the first months was real, and possibly due to its effect on the prison staff rather than the prisoners, or possibly simply due to a 'Hawthorne' type effect mentioned earlier (Roethlisberger and Dickson 1939), because of all the interest and 'media hype'. From the point of view of the current research these are interesting findings because they appear to show that the effect of colour may be temporary and may also act in conjunction with other affective influences.

A further study of the effects of colour on task performance and mood was carried out by Rosenstein (1985) on male and female students of differing scholastic abilities. The coloured environments were created by lining rooms with fabric in red, blue, yellow and neutral. While this study showed that colour had no significant effect on performance, it did affect mood. However it did not affect everyone in the same direction and the direction was not associated solely with personality. For example all the subjects except the women with low Scholastic Aptitude Test (SAT) scores rated themselves calm and in good moods in the blue environment as compared with the other colours. However all subjects, except women with high SAT scores rated themselves as in good moods in the red room as compared with those in the yellow and neutral rooms. Although significant results have been obtained in this study it is difficult to make any broad generalisations as to the effects of colour on mood.

It would appear from the above cited studies that colour often does have an effect on mood and that in general red is arousing and blue calming. However, results are not completely consistent and other factors, not always accounted for may also play a part.

Work by Davies and Corbett (1997) demonstrated the universality of our perception and classification of the different colours. In a cross-cultural study, subjects who were native

speakers of English, Russian and Setswana were asked to sort a large number of colours into groups of similar shades. Although the languages differed in their basic colour terms (for example Setswana speakers use only one term for what in English we would differentiate into blue and green), there was a striking similarity amongst the patterns of choice. The authors concluded that there is 'perceptual universalism' amongst human beings whatever their backgrounds and that this is only partially modulated by linguistic effects.

A number of autobiographies of people with autism specifically mention colour as playing a particularly important part in their attempt to come to terms with the world. Three examples will be mentioned.

Writings about Colour by Individuals with Autism

Gunilla Gerland, the young Swedish woman with a diagnosis of autism mentioned earlier describes how colour seemed to be something she could inwardly 'hold on to' even when comprehension of everything else around her failed (Gerland 1997, 21). She describes how there always seemed to be something, some essential core of the way things worked that she could not get hold of; in her words, 'the actual way it all hung together'. She then describes how colour would sometimes act as the connecting thread (Gerland 1997, 21):

> 'Sometimes it was all so incomprehensible, I couldn't even find an end in the tangle to pull at. Then I would turn in on myself, knowing neither the question nor the answer; and I couldn't tell anyone. My state was just one colour inside myself. I was the only one who had colours: I had an internal colour system which became a way of connecting information about different worlds, about the nursery world and the garden world. Everything became a colour inside me- people, words, feelings, atmospheres. Not understanding was faintly orange, a pale orange with sunlight coming through it.

> Tiredness, what I hadn't the energy to try to understand, came and laid a dark green on top of the orange light and put it out.'
>
> 'The dining-world, the kitchen world and the hall world - none of these had anything to do with each other until a colour made me connect. If my mother said something in a violet- coloured way in the kitchen and two months later used that violet tone of voice in the bathroom, I suddenly realised that the kitchen and bathroom had something to do with each other, so I could begin to find other similarities such as that there was water in both rooms. But the first connection was always via colours' (Gerland 1997, 21).

Although this is only one example of a person with autism using colour as a kind of 'guide' to help her around the world of concepts it is still significant, and appears to suggest that colour may be easier to 'get a grip on' than other sensory impressions.

Donna Williams, uses the expression 'my world' as opposed to 'the world' to describe her experience of her inner life which she knew was so different from everyone else's (Williams1992, 60). She says of 'her world', '…everything was reduced to colours, rhythms and sensations', and again (161), '…each colour of the rainbow was to stand for the different types of feeling people had, which were so evasive within myself.' It would appear that as with Gerland mentioned above, colour in her inner world was also very much connected with feelings, and again perhaps more accessible than the feelings themselves. She also describes (Williams 1996b, 167) her fascination with colour in general and relates the effect of various coloured light bulbs she was given as a child:

> 'One at a time, various colored bulbs had been put in my lamp in my bedroom. The green one had me in the cupboard much of the time. The blue one had had me staring

into space, mesmerising me as it threw a stark white-light effect into the room, making it "otherworldly". The yellow had been better than the green and blue, but it didn't alter the room's lighting much at all. The orange had made me feel less chaotic inside and more alert. The red had made me alert and aware that I had started to look for things to do within the room, instead of staring hypnotically at the mirror or at the pattern on the wallpaper' (Williams 1996b, 167).

It is interesting to note the fact that the blue made her feel mesmerised whereas the red made her alert and active, which is more or less in line with the general findings on the polarity of effect between red and blue.

Wendy Lawson, another young woman with autism, also mentions colour in her autobiography (Lawson 1998, 3). Again she connects emotion and colour, 'For me, these things are often painfully overwhelming, non-existent or just confusing, but when an experience or emotion is attached to some form of connecting stimuli, such as colour and fragrance, I am more likely to relate to it.' It would appear that as with Gerland, connecting an emotion to a colour seems to have some sort of 'anchoring' effect on the emotion which makes it more accessible. She goes on (Lawson 1998, 3):

'I find colour simply fascinating and it stirs up all sorts of feelings in me. The stronger and brighter the colour, the more stirred up I become. My favourite colours are rich emerald green, royal blue, purple, turquoise and all the in-between shades of these colours.'

'My friends tell me most people do not stop and take time to notice the bright colours around them: the colour of a door they are about to open, a wall or a sign that happens

across their path. They don't stop and stare for ages, lost in the wonder at the "feeling" the colour evokes' (Lawson 1998, 3).

Her statement that not only is she fascinated by colours, but that they can also evoke feelings is important for the current research since the premise is that colour can be used to affect the emotional mood of the child with autism. The possibility alluded to by these two writers with autism, that colour can also perhaps be a factor in making emotions more accessible might be of considerable significance for the current research since, as has been discussed, understanding and coping with emotions is a particular problem for people with autism. Deliberately connecting emotions to colours may help to make them easier to relate to.

Colour in Everyday Language and Culture

It is also interesting to note how names of colours are used in everyday language. It is common in English to use the names of the colours red, blue, green, black and yellow to describe moods or character. For example, 'see red' to describe anger, 'feel blue' for sadness, 'green with envy' for jealousy, 'a black mood' for bad temper and 'yellow' for cowardice. This would seem to suggest that it is in our culture to associate colour with mood or emotion. There are similar expressions in other languages such as German, French. Japanese and Chinese (checked from native speakers) and in each case the most common to spring to mind were the red/ blue contrast with red signifying anger or tension and blue melancholy.

A further example of the everyday symbolic use of colour is in the designation of hot and cold on taps. When red and blue are used, no explanation is needed as to which is which. The association of red with hot and blue with cold is implicit in our culture. It is worth imagining what we would make of taps on which one was marked purple and the other yellow!

Other Colour 'Therapies'

There are also large numbers of varying types of 'colour therapies' advertised in health magazines and on the Internet. Claims are made for cures to numerous diseases and conditions for which there is usually very little reliable evidence. Whilst any one of these 'new age' therapies would on its own probably not stand up to scrutiny and have therefore not been cited, it is unlikely that there is no substance at all to the claims for curative properties of colour. Many people believe that they have been helped by such therapies and perhaps the expression 'no smoke without fire' would apply here.

Finally the artist Kandinsky (in Taschen 1993, 1) spoke of colour in the following way: 'Generally speaking, colour is a power which directly influences the soul. Colour is the keyboard, the eyes are the hammers, the soul is the piano with the strings.' This speaks for itself.

Multi Sensory Environments

This subject will be considered only briefly since the principles underlying the use of coloured light in Multi Sensory Environments are fundamentally of a different nature to those in the current research. Basically many different sorts of sensory stimuli are provided, ranging from coloured lights to sounds to scents to textures etc. In the 'Snoezelen' (Hulsegge and Verheul 1987) approach to sensory environments many different and pleasurable sensory experiences are provided and individuals are expected simply to relax and enjoy themselves. This has been justified as 'pleasure for its own sake' for severely disabled adults where recreation opportunities are necessarily limited. Pagliano (2001) describes multi sensory rooms being used in addition for therapy and education. When switches and controls for the sensory equipment are installed it can be used interactively and this is believed to be useful for improving motor skills, for teaching about choice and in giving a sense of agency. There is

still much debate about the educational and therapeutic value of such environments and Pagliano (1999) points out that many of the claims are based more on marketing strategies than on evidence from research. Longhorn (1988) argues that sensory stimulation is an essential precursor to learning for individuals with Profound and Multiple Learning Difficulties and the greater the variety of pleasurable and interesting sensations the more progress will be made. Hence, although some of the lighting equipment is similar to that used in the current research, the philosophy is somewhat different.

The findings cited above would suggest that colour has an effect on mood generally. Although not universal, most of the studies show that the red colours tend to have an arousing effect whereas the blues tend to be calming. Also, colour appears to have a special significance for some individuals with autism in that connects in a particular way to feelings, events and places.

From the point of view of the current research it would therefore seem reasonable to explore the question as to what would happen if colour were to be used to augment mood and atmosphere during interaction with a child with autism.

CHAPTER 6

RESEARCH QUESTIONS AND RESEARCH DESIGN –A LITERATURE REVIEW

Development of the Research Questions

A deficit in the area of feeling (affect) and willing (conation) has been shown in Chapter 3 to account for a significant part of the problem with social interaction for children with autism. The literature appears to suggest that intact feeling and willing are present in children with autism, but that the difficulty arises in their understanding, expression and sharing. As regards feeling, several authors, e.g. Hobson (2002) and Trevarthan, Aitken, Papoudi and Robarts (1998) were shown to suggest that normally developing infants naturally possess what they call innate intersubjectivity which enables them to achieve emotional (feeling) connectedness with others directly and intuitively, so leading to the development of social skills. This innate intersubjectivity, they say, is what is lacking in autism. The question therefore arose as to whether intentionally engaging directly through feelings, thus trying to make up for what is innately lacking, might be helpful in improving quality of interaction and in developing social skills. Further, as regards willing, Russell (1996) and Powell (2000) consider that a lack of a sense of agency i.e. a lack of awareness of personal willing may account for some of the difficulties seen in executive dysfunction in autism. A similar question therefore also arose regarding the possibility of attempting to engage directly through willing.

The evidence from the literature on colour (Chapter 5) would seem to suggest that it has its effect in the realm of mood, atmosphere and possibly physical strength (e.g. Hamid and Newport 1989, Wilson 1966, Nackshian 1964) and that in general reds are more arousing than blues and greens. While none of these studies were carried out with individuals with autism,

several writers with autism (e.g. Lawson 1998, Gerland 1997 and Williams 1996b) mention the important role played by colours in their lives. It therefore it seemed reasonable to ask whether colour could be used for enhancement when attempting to create affective states in interaction. The original research questions were therefore:

1. What observations can be made regarding quality of interaction when engagement is explored at the affective and conational level, augmented by changing colours?

2. Are there correlations between quality of interaction and the acquisition of social and communication skills?

(For a discussion of the use of the word 'quality' in interaction see Chapter 13 page 247). Because there was very little experimental evidence regarding the effect of colour on individuals with autism in the literature, it was decided that this should become a preliminary question. Tests should be carried out to find out how behaviour was affected by different colours. Once the project was underway, but before any formal writing up was undertaken it became clear that the effect of changing the colours of light was sufficiently engaging for some of the children that they would respond directly to the changes with gesture and vocalisation. When the light operator responded back to the child by light manipulation a kind of 'dialogue' could be achieved between the child and the lights. Thus, during the course of the early stages of the project the questions about the effects of colour became modified to include the exploration of producing a 'dialogue' directly between lights and child. Therefore the questions for these initial stages were:

For children with autism,

1. Does changing colour (of the surrounding environment) affect the child in a manner which is detectable through changes in observed behaviour?

2. Are different trends in behaviour discernable for different colours?

3. When the lights are sensitively manipulated by the researcher, are there transactional responses between the lights and the child i.e. can a ‘dialogue’ be produced between child and lights?

The initial investigations (effect of colour on behaviour, and dialogue) were called the first and second stages of the research and the later work (augmenting affect in interaction with colour) was called the third stage. The research questions therefore became:

For the **first and second stage** of the research:

For children with autism,

1. Does changing colour (of the surrounding environment) affect the child in a manner which is detectable through changes in observed behaviour?

2. Are different trends in behaviour discernable for different colours?

3. When the lights are sensitively manipulated by the researcher, are there transactional responses between the lights and the child i.e. can a ‘dialogue’ be produced between child and lights?

And for the **third stage** of the research:

4. What observations can be made regarding quality of interaction when engagement is explored at the affective and conational level, with affect augmented by changing colours?

5. Are there correlations between improved quality of interaction and the acquisition of social and communication skills?

The rest of this chapter will consider the nature of research design, and will attempt to set the colour project within an appropriate design context that will enable the research questions to be answered.

Research Design

Examples of Research Strategies

In considering general design issues for research, Robson (1993) puts forward three main approaches or strategies. These are:

1. Experiment
2. Survey
3. Case study

Experiment

Essentially this involves manipulating variables and measuring their effect on other variables. The general characteristics of an experiment are that samples from a population are subjected to experimental conditions where one or more variables are changed and the responses measured, all other variables being controlled. Experiment often involves hypothesis testing.

Survey

Essentially, information is collected in standardised form from groups of people. The characteristics are that samples of individuals are selected from known populations and data from these individuals are collected usually through questionnaires or structured interviews.

Case Study

This involves detailed intensive study of a single ‘case’ or a small number of related ‘cases’. A single ‘case’ may be, for example, a situation, an individual, a group or an organisation which is selected and studied in its context. Information on the ‘case’ is usually collected by a range of different techniques such as observation, interview and documentary analysis.

In Robson’s (1993) view the purpose of the research should influence the research strategy. He considers three main purposes of an enquiry. These are briefly:

1. Exploratory: Here the main purpose is to find out what is happening, to ask questions and to seek new insights.
2. Descriptive: The main purpose here is to give a detailed profile of persons, events or situations.
3. Explanatory: In this case the main purpose is to establish causal relationships in explaining a situation.

Robson (1993) further considers that as a general, but not fixed rule:

- Case studies are most appropriate for exploratory work.
- Surveys for descriptive studies.
- Experiments for explanatory investigations.

However, he stresses that each strategy can be used for any or all of the purposes and that in particular, case study may be employed for all three.

The current research is exploring the situation of the 'case' of the colour project and therefore according to the above classification of research strategies it would seem reasonable to consider case study as the most appropriate vehicle for the design. This is further discussed at the end of the chapter.

Case Study Methodology

Robson (1993, 52) defines case study in the following way, 'Case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence.' He considers that although case study has in the past been criticised as being 'unscientific' it is now generally considered to be a valid and acceptable strategy and there are many situations for which it is particularly appropriate. For him, one of its benefits is the fact that it allows the enquirer to adopt a 'more flexible and overtly involved stance' towards the investigation where 'your own impressions and perceptions about the processes you are studying can be brought out into the open' (Robson 1993, 54). Interestingly, he also points out that where an experiment or survey takes place in a specific context it may also be considered as case study.

In questioning whether case study can ever be 'true or scientific research' Robson (1993) goes on to discuss the nature of what is meant by the 'scientific' method in the acquisition of knowledge. Traditionally, knowledge derived from science is 'proven', 'objective' and based on 'facts'. It holds true in all situations, and is independent of any personal divergence of approach of different investigators. Robson demonstrates that the above almost never actually holds good, even for the natural scientist, because for example so called 'objective' data are

only ever collected according to some individual's personal inclination, and selection of analysis technique is again subject to individual choice. All steps in the scientific method can in fact be shown to be subject, to a greater or lesser extent, to the individual investigator's personal preferences and prejudices and this has led to dissatisfaction with the traditional view. Robson goes on to describe how this has in turn led to the development of what is called the non-positivist or post-positivist paradigm. In this case the investigators 'free' themselves from the traditional constraints and accept that in the real world of social research, methodologies may have to be more fluid and adaptable, and outcomes more tentative, interpretive and less generalizable. Action Research (Jennings and Graham 1996, and McNiff 1988), which involves researching and attempting to solve concrete problems in real situations is included by Robson in this post-positivist paradigm. Also falling within this post-positivist paradigm, Robson gives various labels such as 'ethnographic', 'phenomenological', 'subjective', 'hermeneutic', 'humanistic' and 'naturalistic' and suggests that they share many of the characteristics of his conception of case study.

Sturman (1997, 61) describes case study as a generic term for the investigation of an individual, group or phenomenon, which may involve both qualitative and quantitative approaches. He holds that the distinguishing feature of case study is the belief that 'human systems develop a characteristic wholeness or integrity and are not simply a loose collection of traits' His view of human systems appears to be essentially 'holistic' and for this reason he finds case study particularly appropriate. Furthermore, he maintains that even with this holistic approach it is quite possible to 'tease out the interrelationships of complex variables'. He also suggests that an in-depth investigation of a case allows researchers not only to understand the nature of events within the case but that if the investigation of the single case is sufficiently thorough it is legitimate to both generalize and predict form it. Thus he sees case study research as having a wider relevance than just for the individual case being studied.

Similarly, Cohen, Manion and Morrison (2000, 79) describe case studies as portraying, analysing and interpreting the uniqueness of real individuals and situations and as giving a sense of 'being there'. They consider case study to be appropriate for research where there is an emphasis on the (181) 'interpretive and subjective dimensions' and that case studies 'can penetrate situations in ways that are not always susceptible to numerical analysis'.

The main features of case studies are highlighted by Denscombe (1998, 31). Firstly he emphasises the 'focus on just one instance of the thing that is to be investigated'. He also believes that the logic of concentrating on just one case rather than many is that there may be insights to be gained which might be missed with the larger scale survey-type approach. Further, these may have wider implications and he sums up by saying that 'the aim is to illuminate the general by looking at the particular'. This is significant because as with Sturman (1997) above, he seems to be suggesting that it is quite possible to generalize from case studies. He then goes on to show his high regard for in-depth study. He also holds that the amount and quality of detail possible from the study of just one instance promotes new discoveries, and that these could be missed with the more superficial strategies. By focussing on relationships and processes, case study tends to bring to light the interconnections and interrelations between the various parts of a social situation. He then states (Denscombe 1998, 31), 'In this respect, case studies tend to be 'holistic' rather than deal with 'isolated factors''. This is another instance of case studies being viewed as 'holistic'. Because the focussing of attention is not so much on outcomes and end products but rather on the processes which led to them, it is possible to answer the question as to why something happened rather than just find out that it did. This he considers to be a fundamental strength of case study. He then points out that the 'case' is always studied in its natural setting rather than in the artificially generated situation characteristic of an experiment. This, he believes is the more 'real' situation. Lastly, he sees the multiple sources and multiple methods used in case study as a

major strength of the approach because it allows and encourages many different viewpoints and stances to be taken.

Case study is viewed by Gillham (2000, 13) as a '*main* method' in research. He sees it also as a multi-method approach and considers the observations made, record analysis, interviews etc. as sub-methods. For him the strength of case study is that where there is agreement between more than one sub-method, there can be a reasonable degree of confidence in the overall findings. This, he says, is often described as triangulation. However he considers (10) all evidence to be of, '*some* value' and likens the case study researcher to a judge presiding over a judicial enquiry where every piece of evidence is used and assessed, and then related to all other evidence. He makes the point, that case study is often appropriate where for example experiment is impracticable or unethical, where the complexities of the situation are too great for 'controlled' approaches, and where the processes rather than outcomes are the main interest. It may also be used as a preliminary to further more formal research which comes later. Similarly, Cohen, Manion and Morrison (2000) also suggest that case study can be usefully employed as an exploratory pilot study to precede further research. The colour project is seen very much in this light, as an exploration of possibilities to form a basis for further research.

Yin (1984) is another writer who classifies case study as a research strategy. Case studies may be exploratory, descriptive or explanatory depending on the research questions being asked. In general, he considers case study as suitable for answering 'how' or 'why' questions, but also 'what' questions in the case of exploratory research. He then gives following example (Yin 1984, 17) where the purpose of the research is exploratory in the question, 'What are the ways in which an effective school is operated?' Case study, he says would be justified as a strategy in this example where the question 'What are the ways in which…?' points to a goal

which would be to ‘develop hypotheses and propositions for further enquiry’. This would seem to suggest that ideas might arise from the case study about what is effective and what is not but to establish cause and effect would require a different research strategy, in a further enquiry. The colour project could also perhaps be considered in this way since the object of the research was essentially to explore the ways in which the project operated, and was also seen as a kind of pilot project where if hypotheses were formulated they could be taken forward in further investigations. Yin (1984) also covers the question of generalisation. He points out that even with scientific experiments, replication is almost always necessary, a single experiment only acting as a pointer for further investigations. The case study can be viewed in a similar light with regard to the particular and general, except that the concept of the research design is different. He sums this up by saying (21) that, ‘…case studies, like experiments are generalizable to theoretical propositions and not to populations or universes.’ A further point stressed by Yin (1984) is the problem of bias. With case study there is always the possibility that the investigator might seek to substantiate a preconceived position. He suggests that to overcome this the investigator should be open to contrary findings or alternative explanations. Multi-method data collection and discussion with colleagues are put forward as a means of overcoming this. These points are discussed further later in this chapter.

The purpose of case study as described by Punch (1998, 150) is to ‘develop as full an understanding of that case as possible’. It aims to ‘understand the case in depth, and in its natural setting, recognising its complexity and its context. It also has a holistic focus, aiming to preserve and understand the wholeness and unity of the case.’ This is very much in line with other writers and it is interesting to note that he also uses the word ‘holistic’ to describe case study. He discusses three types of case study and distinguishes them according to whether the investigators want simply to understand a particular case better (intrinsic case

study), whether they want to gain a new insight into an issue or to refine a theory (instrumental case study), or where the issue is to broaden and generalize (collective case study). With the first two he suggests that the focus is within the case, whereas with the third, which involves multiple cases, it is within and across cases. He then goes into some detail on the question of generalisation and suggests that there are two main ways in which this might be possible. The first is by conceptualising and the second by developing propositions. In the first, the researcher focuses on developing one or more new concepts to explain an aspect of what is being studied and for this an in-depth study will be appropriate. In the second, the researcher puts forward propositions or hypotheses which link concepts within the case and then assesses them for applicability and transferability to other situations. He sees this as a kind of reversal of traditional quantitative research. Instead of beginning with hypotheses or propositions and then testing them out, in case study they arise out of the study and become (154) 'outputs of the research'. He accepts that in neither case is generalizability proved; rather it stands as a possibility and provides a focus for further investigations.

Hakim (1987, 61) considers case study as one of the 'most flexible of all research designs'. Their use ranges from simple descriptive accounts of cases to rigorous experimental isolation of social factors. As with other writers she describes how one or more cases are selected, and gives examples such as communities, social groups, events, life histories or work teams for which a variety of data collection techniques and methods are employed. She does not distinguish between descriptive and exploratory case studies in the same way as Robson (1993) but says, '*Descriptive case studies* may be exploratory, if relatively little previous research exists on the topic, or they may be illustrative 'portraits' of social entities or patterns thought to be typical, representative or average.' This description of case study could arguably be fitting for the colour project since virtually no relevant previous work has been

found and the purpose of the research was primarily to explore the situation. In a sense this research was a ‘portrait’ of the four-year project.

Combining Strategies

Although Robson (1993) distinguishes three main research strategies he points out that the division is by no means absolute and stresses the usefulness of hybrid or combined strategies. It is possible for case studies to be linked to a survey or experiment. More importantly for the colour project he suggests that a small experiment might be incorporated within a case study. The preliminary section of the colour project on behavioural responses of children to colour (see Chapter 10) might be considered as a small experiment (or quasi-experiment) within the case study. This is discussed later. Blaxter, Hughes and Tight (1996) express a similar view with regard to combining strategies and also suggest that experiment or survey might form part of a case study. In choosing a research design, Bickman, Rog and Hedrick (1998) point out that in their experience applied research rarely fits neatly into textbook designs and more typically involve the development of hybrids or combinations of design features.

Experimental and Quasi-experimental Designs

Brief mention will be made of these designs because the section on behavioural responses of children to colour mentioned above might be considered as examples of experimental or quasi-experimental design within a case study (see end of chapter). Robson (1993, 78) describes experimentation ‘as a research strategy involving:

- The assignment of subjects to different conditions;

- Manipulation of one or more variables (called ‘independent variables’) by the experimenter;

- The measurement of the effects of this manipulation on one or more other variables (called ‘dependent variables’); and

- The control of all other variables.’

He describes experiment as being very focussed and controlled, often taking place in a laboratory. Briefly, if the intention is to find out whether a particular treatment (independent variable) has a particular effect (dependent variable), then equal numbers of individuals are randomly assigned either to the ‘treatment’ group or to the ‘control or comparison’ group and the changes are assessed by making observations before and after the treatment is deployed. It is of course essential that the treatment and control groups are as similar as possible so that any changes which take place can confidently be attributed to the treatment. Although such conditions may be achieved in scientific laboratories or agricultural field experiments they are not often possible in social science or educational settings. The quasi-experiment, described by Robson (1993, 98) as a ‘second best’ choice is a design involving an experimental approach where the ‘random assignment to treatment and comparison groups has not been used.’ Lawson (1997) describes a typical situation where a quasi-experimental design may be appropriate. The researcher may be testing the effectiveness of different teaching styles on children, and different classes, already in existence, receive the different styles. However, since there is no control over assignment of children to the classes, it cannot be assumed that the classes were equivalent to start with and it is therefore not possible to attribute observed differences solely to the different teaching styles. He says that although such an investigation is never as robust as a true experiment, much can be gained from such a design provided alternative explanations for observed differences are given serious consideration and a

systematic basis is used where competing explanations are to be ruled out. Bickman, Rog and Hedrick (1998) suggest two forms of quasi-experimental design. The first, similar to that described above involves the use of what they call non-equivalent comparison groups. They also point out that the researcher must develop procedures to make them as similar as possible and then must seek as much information as possible to allow the ruling out of competing explanations. The second involves multiple observations over time. This is a form of time-series design where the treatment group serves as its own comparison group. Many observations must be made over a longer time period so that it can be demonstrated with reasonable confidence that changes are linked with the application of treatments. However they make the point that although such designs may support causal inferences, they are always to some degree open to threats to internal validity and bias. Robson (1993) mentions a similar design for a quasi-experiment where many observations are made over time, leading to a sort of interrupted time-series design. This type of quasi-experiment is also mentioned by Bryman (1989, 99) where he describes the study of a single group which receives the experimental treatment, but for which observations are collected over an extended period of time. This may have relevance for the studies of individual children in the colour project and again will be discussed at the end of the chapter.

Multiple Methods

All authors appear to agree that for case study there should be more than one source of evidence, as mentioned earlier. Some, e.g. Brewer and Hunter (1989) call this the 'Multimethod' approach and are referring to fieldwork, survey research and experimentation etc. and consider the use of more than one method for a study to increase the general validity. Robson (1993), Blaxter, Hughes and Tight (1996) and Vulliamy and Webb (1992) use the word method in the same way and again advocate this to verify validity. Others are referring specifically to the use of quantitative and qualitative methods in the same investigation. For

example, Brannen (1992, 27) advocates the use of both, suggesting that quantitative methods may be used as a facilitator for later qualitative work, or vice-versa or they may both be given dual emphasis. The first will be looked at briefly since this has relevance for the colour project. If quantitative methods are 'subservient or subsidiary to qualitative ones' they may provide quantified background detail in which to contextualise later intensive studies. Alternatively they may be used to test hypotheses produced as a result of qualitative work. Other authors who believe that quantitative and qualitative can usefully be integrated in the same investigation are Hammersley (1998) and Bryman (1998). The question of qualitative and quantitative methods in case study research is also addressed by Gillham (2000, 80). Although case studies are predominantly qualitative, he believes that quantitative data and their analysis can add to the overall picture. He points to two kinds of statistics. Firstly, descriptive statistics such as averages, totals and ranges are ways of summarising data; and secondly, inferential statistics such as correlations and the significance of differences allow the researcher to make inferences. He states that 'both may have a place in case study'. These latter two examples may have relevance for the colour project because they demonstrate that quantitative work is acceptable in case study and may be used as a preliminary to later qualitative work.

Validity, Reliability and Generalizability

In later writings, Yin (2003, 34) further elaborates the ideas mentioned earlier (Yin 1984) and summarises them as questions of validity in case studies. He considers the following four 'tests':

- Construct validity. Here it is essential to establish the correct 'operational measures' for the concepts being studied and to insure that the measures are not just 'subjective judgments'.

- Internal validity. This applies only to explanatory case studies where a causal relationship is to be established. Although applying more to experimental and quasi-experimental research it is relevant to case study where the investigation is attempting to demonstrate that one event is the cause of another. It is necessary to consider all other possible causes. Spurious effects are often described as ‘threats’ to validity.

- External Validity. This is essentially the question of the extent to which findings from a case study can be generalized. This has already been touched on and Yin (2003) considers that replication of the study and multi-method data collection can support external validity.

- Reliability. For a study to be reliable it is necessary to demonstrate that it can be repeated by other investigators with the same results. It would be necessary to repeat the same case study with exactly the same procedures. The aim would be to minimise observer errors and biases.

He states that this list is rather more complex than is often described and particularly in the example of case study, they should be considered throughout course of the study and not just at the initial design work stage. The same four ‘tests’ are referred to by Robson (1993, 66) as a means of establishing what he calls ‘trustworthiness’. However he classifies them in a slightly different way. He divides trustworthiness into two main headings. The first is validity, which covers reliability, construct validity and internal validity and the second is generalizability. For him reliability has a rather broader meaning and covers not only observer

error and observer bias, but also subject error and subject bias. Subject error and bias refer to the possibility where the subjects being observed produce erroneous information due to some spurious situation in the way the investigation has been set up. Examples are where informants happen to be unwell on the day of an interview or where they try unusually hard to please the interviewer. Construct validity and internal validity he considers in much the same way as Yin (2003). Generalizability he believes is possible either by repeating the investigation with other participants or under different conditions and demonstrating similar results, or by making the case that the group studied is in fact representative because it shares certain essential features with other groups.

Robson (1993) brings up a further point about observer reliability when an individual's observations are used as an instrument of data collection in an investigation. Observer consistency or intra-observer reliability refers to the degree to which the same observer produces the same results from observing the same thing on different occasions; and inter-observer reliability or inter-observer agreement to the degree to which different individuals produce the same results. In both cases repeat observations must be made and checked for the level of agreement. Robson suggests various techniques for estimating agreement, such as the confusion matrix or concordance measures, which are designed for investigations where for each observation a distinct 'yes or no' can be given for the level of agreement. For the first stage of the colour project agreement is discussed in Chapter 11 where for frequencies in histograms a different method of estimation is required (Blaikie 2003).

The Question of Ethics in Research

Robson (1993) considers that ethical aspects of an enquiry should be considered at the earliest stage of preparation. The main concerns are those of consent, confidentiality and respect for the participant's interests. He says it is necessary to question the morality of what is being done and balance it against the possible beneficial future outcomes of the research. Where children are concerned, or as in the case of the colour project, those with learning difficulties, there are particular problems since they are unlikely to be in a position to appreciate what is going on and to make rational and informed judgments. In this case Robson's view (1993, 32) is that not only should parents or guardians be consulted but also, since it is 'often possible for the child to understand at least something of what is involved' an attempt should be made to ask the child directly. Sieber (1998) considers that voluntary and informed consent is essential from participants and sees it as an on-going and two-way communication process between participants and researchers. She sees particular problems where children are concerned and lists several reasons for this. They may for example be cognitively, socially or emotionally immature, and in any case they have limited psychological or legal capacity to give informed consent. There may also be external constraints on their self-determination. She stresses that the onus is on the researcher to respond to these characteristics using their knowledge of human development in a sensitive and fair way to reduce risk and vulnerability. In all cases the opportunity should be given for the child to give assent or otherwise and the assent procedure should be 'tailored to the cognitive and social/emotional level of the child' Sieber (1998, 153). These considerations with regard to consent are taken into account in the design of the colour project.

As a final comment many examples of what Robson (1993) calls 'real world research' do not conform to ideal textbook designs, but are hybrids or combinations. Walford (1991, 3)

describes what he calls ‘reflexive accounts’ of people’s experiences or doing research which illustrate the difficulties, conflicts and ambiguities which will inevitably be met. He feels that the idealized models presented in textbooks are not always helpful and recommends the reading of semi-autobiographical accounts which, ‘unveil some of the idiosyncrasies of person and circumstances which are seen as being at the heart of the research process’. Furthermore, as Vidich and Lyman (2003, 57) point out, many accounts are written retrospectively and ‘…take what was experienced originally and shrink it into a set of images that, although purporting to be a description of the actual method of research, exemplify a textbook ideal’. Often, they say, a methodology is actually unique to that particular piece of research.

Research Design and the Colour Project

The colour project was to be a basically exploratory piece of research. Clearly it could not be considered to be a survey but there was a question as to whether it could qualify as an experiment. It had elements of an experiment in that a situation was set up in which certain variables (colour or creation of affect) were altered and the effects observed. However since random selection of treatment and control groups was not possible it was felt that it could not qualify as a true experiment. The overall project will therefore be presented as case study research. However, the first stage needs further discussion. Because the effects of colour on children with autism were not known at the outset it was felt necessary that this should be investigated as a first part of the research. Children were to be observed in the colour/light room without an interactive partner to find out how they reacted to different colours of the surroundings. It was thought that if colour could be shown to have an effect on mood this could then be used in the third (interactive) stage to augment the creation of affect. Thus the first part could be seen as a kind of pre-test within the general case study. Since it was to be set up rather like a laboratory where an association between two variables (colour and

behaviour) was to be investigated, it could perhaps be thought of as having elements of an experiment. There is a question as to whether it would be closer in design to a quasi-experiment since again randomly selected treatment and control groups would not be used. Instead, individuals would form their own controls since the objective was to observe the behaviour of individual children in different colours of light, all other variables being kept virtually constant. Since small-scale experiments (Robson1993) do sometimes form part of case studies the first stage could perhaps be considered as a small-scale quasi-experiment within the general case study.

In considering the third stage, involving colour-augmented interaction, the question arose as to whether this could qualify as a time-series quasi-experiment. Hedrick (1998 see above) describes using multiple observations of a situation over time where the treatment group serves as its own comparison group. In a sense the lengthy and detailed video recording of interactive sessions proposed for the third stage would be similar to this but in the end this strategy was rejected because of the difficulty of finding suitable objective means of quantifying the observations made during interaction and because of the small number of children involved. Therefore, for the third (interactive) stage a plain case study strategy was adopted.

On the question of ethics, Robson's (1993) three main points of consent, confidentiality and respect for the participant's interests were taken into account in the research design. The colour project also followed the ethical guidelines for research as set out in the school's research ethics policy. This states that the aim is, '…to ensure the protection of the rights of participants in research, co-researchers and families, and the integrity of (name of school) as a research focussed organisation, through scrutiny, consent, withdrawal, briefing, de-briefing, confidentiality, proper conduct, dissemination and anti-plagiarism'. Parental consent was

obtained at the outset but as regards consent from the child there were problems over whether ‘informed consent’ was possible. Since all the children involved had autism they would probably fit Sieber’s (1998) categorization of being cognitively, socially or emotionally immature. Where it would be possible to ask directly this would be done, but since the colour project sessions were timetabled into the school day a certain degree of judgment would have to be exercised in deciding at what stage to allow a child to opt out. However it was decided that if any real distress were shown in colour sessions the child would be allowed to withdraw. Also if there were any medical concerns a careful assessment by medical staff would be made and the situation would continually be monitored. In writing up, real names would not be used and data in the form of videos and notes would not generally be shown. Where videos were to be shown, with real names unavoidably obvious, the situation would be explained to parents and permission sought. Most importantly, in respecting the child’s interests, nothing would be done which was not intended to be of benefit either to that child or to those which might come in the future and every care would be taken to ensure that no child could come to harm, either physically or psychologically as a result of the colour project. As regards dissemination of findings, a colour project newsletter was sent out to parents after the first two years, giving a general progress report, but not mentioning children’s real names. A final presentation of the findings for the whole project to all interested parties was planned to take place after completion.

Questions of validity were considered and thought was given as to what operational measures would be suitable for construct and internal validity. These will be further discussed in the appropriate sections on methodology. If the responses of the different children in the study were found to be reasonably consistent then a judgment as to the level of generalizability would be made. For the first stage intra and inter observer reliability tests would be included in the research design.

Returning to Robson's (1993) definition of case study mentioned earlier, the colour project will now be considered in this light. Firstly it investigates a particular case where it naturally occurred. The particular case was that of the four-year colour project and it was studied as it took place in the particular special school. Secondly more than one method of data collection was used; these were video recordings, a research diary and small-scale informal interviews or conversations with staff. The main purpose of the case study was exploratory in that it was to examine the potential of augmenting affective engagement with changing colours. Further, there was an element of combining of strategies where a small-scale quasi-experiment was incorporated as a preliminary test in the first stage (Robson 1993), and both quantitative and qualitative methods were used, quantitative being used as a facilitator for the later qualitative work as put forward by Brannen (1992). It is suggested that this design might therefore be suitable for answering the research questions put forward at the beginning of this chapter.

CHAPTER 7

DESIGN OF THE COLOUR ROOM

The room was designed so that the whole interior colour could be changed by altering the colour of the lights. The photographs in figure 7.1 illustrate the room in blue and red.

Figure 7.1

Blue and red colours produced by the lights on the grey interior of the room

Lighting: Stage lighting equipment was used comprising 32 Fresnel spotlights (500W) and 4 floods (500W). These were grouped to give the following colours: Red, Blue, Green, Yellow and Rose Pink. (These could readily be changed.) The lighting was mounted around the top of

the walls behind wire grills. It was controlled by a computerised dimmer system. (For details of filters and submaster control of lights see Appendix 4 page ciii)

Walls and Floor: 'Rompa' soft play cushioning covered the walls and was optional on the floor. The colour was neutral grey so that the whole room would take up the colour of the light. The layout is illustrated in figure 7.2 below:

Figure 7.2

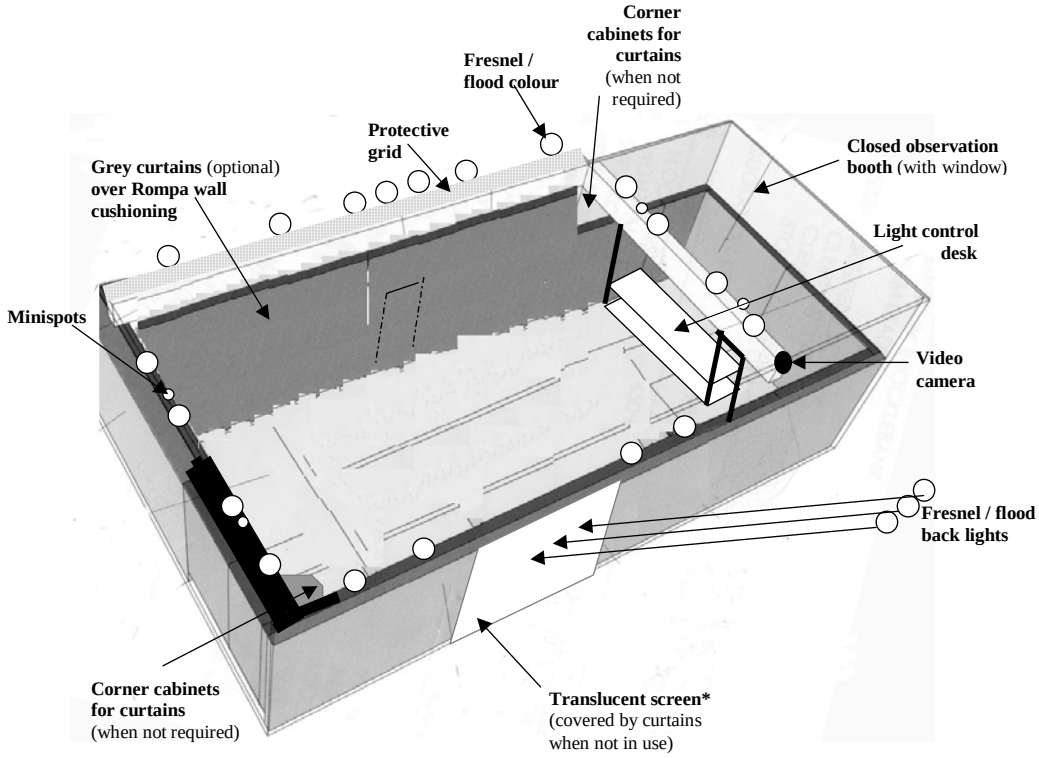


Illustration of colour room design

A separate observation and control booth with a glass screen enabled viewing and recording to be carried out with minimal disturbance.

Coloured Shadow Screen

There was also a removable translucent white screen in one wall onto which 3 coloured spotlights (red, blue and green) were directed. An object moving in front of the lights would throw multiple coloured shadows onto the screen. This is illustrated in the photograph in figure 7.3 below:

Figure 7.3

Photograph of the coloured shadow screen

Design Philosophy

Individuals with autism are often oversensitive to sensory stimulation (Jordan 1999). The room was therefore quiet, warm, enclosed, empty and grey. Light stimuli were applied gradually using the dimmers, increasing only when the child grew in confidence. Sessions began with the room lights on. These were a warm white and were also under dimmer control. Once the child was settled, a colour would slowly be introduced and the room lights dimmed out. Blue light was normally used to begin with since most people (adults who have experienced it) found this the most restful and calming colour. Pink light was then gradually introduced, after which the blues were gradually faded out so that the room colour changed slowly from blue through violet and purple to soft pink. In a similar way the colour could be gradually changed to red, green or yellow and all the colours in between. To begin with, the child was simply observed in the different colours and their behavioural responses recorded (Colour Response Profile). Later, as the child began to show particular reactions, the colour could be sensitively altered in response so that a ‘dialogue’ could be achieved (Colour Mood Dialogue). To begin with there was an adult in the room with the child who remained passive and was only there for support. In the later stages of the research the adult became an active interactive partner. Using the coloured shadow screen it was possible to perform a shadow ‘dance’ together with the child.

CHAPTER 8

METHODOLOGY FOR USE OF THE COLOUR ROOM DATA COLLECTION, ANALYSIS AND RELIABILITY FOR THE FIRST COHORT OF CHILDREN

Methodology for Use of the Colour Room

The following was developed and used during the course of the first cohort trial, and remained more or less unaltered for first and second stages for the duration of the project. The rate of progress from one stage to the next depended on the receptivity of the child, and the level of activity of the support person was kept to a minimum but depended on the needs of the individual child.

- The child would attend the colour room once per week for a session lasting between about 10 and 20 minutes. The earliest sessions tended to be shorter.
- The child was introduced into the room with the warm room lights on only. They were encouraged to sit down and no demands were made on them. At first they would leave again after only a few minutes.
- Gradually in the next session a little colour was introduced, but the room lights were kept on so that the colour was never too intense. A ‘welcome’ colour was established to start and this was normally blue since for most this appeared to be calming and unobtrusive. Slowly this was changed through purple and magenta to soft pink, always being cautious that changes were slow and mild enough not to cause distress to the child. Red and blue were chosen as the two main colours to give a contrasting mood (see p 76).

- The end of a session was always indicated by a gradual cross-fade back to the white room lights.
- The intensity and number of colour ‘swings’ between blue and pink were gradually increased and eventually green was added following the blue.
- Once the children appeared sufficiently confident the room lights were dimmed out and the intensity of the colours increased.
- Two more sudden changes were sometimes introduced where the reds were cross-faded down with blues up in about 5 seconds. This would produce a greenish blue after-image to the red, superimposed over the blue. A similar sudden change out of green would produce a ‘pinkish’ after-image (see glossary).
- A programme running through two sets of colour swings from red through blue to green and back; including two after-image points was developed. This formed the basic colour sequence used, subject to modifications depending on the child’s reactions. It was not properly formulated until several weeks into the project, and therefore many of the sequences analysed in the early sessions did not follow this pattern exactly.
- This was repeated many times until a ‘Colour Response Profile’ i.e. a profile of how the main colours affected each child’s behaviour, was established.
- Using the knowledge of each child’s Colour Response Profile, the interactive stage, which was termed ‘Colour Mood Dialogue’ could then be entered upon.
- In Colour Mood Dialogue the light desk operator continuously and spontaneously made judgements about the child’s mood and disposition from the perceived behaviours such as gesture and vocalisation. They then used their own sympathetic and artistic creativity to interpret and then respond through light manipulation to bring about changing colour mood. The child could then respond back to the lighting change which in turn could be

'answered' by the lights. Thus a kind of 'conversation' between child and light operator took place via the medium of colour.

Recording of Data

Each colour room session was video recorded and this was the main source of data for analysis. Notes in the form of a research diary were also taken immediately following each session. Notes were also taken by the two psychology assistants who attended the session. The video recordings provided a 'complete record' of sessions. It was therefore not necessary to decide at the outset exactly how the sessions would be analysed since it was always possible to 're-visit' a session in the light of new knowledge and reassess the method of analysis.

After viewing the video recording of each session, brief notes of general impressions of the session were made and these were then used in making decisions as to which sessions to analyse in more detail. The nature of these decisions is discussed for each individual child.

Method of Video Analysis

(1) First the video was viewed to get an overall impression of the session and to decide which behaviours would be suitable for analysis. The research diary and the psychology assistant's notes were also consulted.

(2) The timing of the lighting changes was recorded. Each band of the same or broadly similar hue was called a 'colour section' and given a number. This was done by observing the lights and noting the up-fade and down-fade times with a stopwatch. This was found to be a difficult and slightly inaccurate task since it was not easy to tell when a light first began to change. This question is further discussed in the section on intra- and inter-observer reliability. For the non-Colour Mood Dialogue

sessions the changes were recorded in the following way: For example a gradual change from blue through purple and magenta to red i.e. a cross-fade of blues down and reds up would be recorded as **B↓R↑** where **B** represents all the blues and **R** represents all the reds. The time at the start of this change was noted with the stopwatch. It was taken to have finished at the start of the next colour section when either the lights became stable or the next change began. A section of stable lighting was recorded as for example **BPR**. In Colour Mood Dialogue sessions when the lighting changes were fast and continuous, for example a section where the reds and pinks were flashing up and down superimposed over the blues, the section would be recorded as **BR P** sometimes with a note such as 'strong red' or 'fast' or 'slow' etc. (Note: A second video camera recording the lighting console was installed but found to be too cumbersome and unreliable to use.)

(3) Behaviours for analysis were then chosen. Examples included hand flicking, rocking, attentiveness and vocalisation. The video was then re-run, and the cumulative time for the behaviour in each colour section was recorded with the stopwatch.

- The child was considered to be flicking when the hand shaken quickly up and down, normally with a degree of flexibility in the wrist.
- The child was considered to be attentive when concentrating on the lights, usually looking up at them, and not looking at or engaged with anything else.
- Rocking referred to moving the upper body backwards and forwards or sideways in the sitting position.

(4) Step (3) was then repeated for the other chosen behaviours.

(5) These data were recorded in the Video Analysis Recording sheets (given in Appendix 2).

Calculations on Video Analysis Recording Sheets

- The duration of each colour section was calculated by subtracting the time at the start of that section from the time at the start of the next.
- Since the colour sections were not of equal length, raw behaviour times might give a misleading impression. For example, in a longer section there would be more time for the behaviour to take place and if this figure was plotted simply against the colour it might give the impression that it was the colour itself which caused the higher behaviour value rather than just the length of time of exposure to the colour. Therefore a correction for unequal exposure time in the different colours (colour section) was made by expressing the behaviour time as a percentage of the time of the colour section. This is in principle an estimate of what is normally referred to as frequency density.

Displaying of Data on Charts

It was decided that the most suitable method of presenting the results would be to display behaviour levels and colour in chart form. The charts were drawn on Microsoft Excel but since it was not possible to add the colours below the x-axis on Excel, the chart was transferred to Microsoft Word and edited so that a colour section bar could be added. The original data were therefore first transferred to an Excel worksheet. Excel is set up for bar charts rather than histograms. Blaikie (2003) points to this difficulty with currently available software packages. Therefore a rather laborious system was used whereby a percentage behaviour result was assigned to every 2 seconds within a given colour section. In this way Excel would draw a line (bar) for each alternate second and this would appear on the chart like a histogram, i.e. with unequal spaces on the x-axis. These Excel worksheets are very long, so only part of one (Brian, 4th November ’99) has been printed as an example of the formatting and given in Appendix 2 page xlii-xliii. Also one value of 100% was added at the

end of each chart so that all the charts would have the same scale (up to 100%) on the y-axis for ease of comparison.

To add the colour sections at the bottom of the charts they were transferred to Word. The numbers from Excel on the x-axis were moved down and a long divided text box was placed above them. The colours were then added within the divisions. These will now be referred to as 'Colour Sections'.

Where charts for one session are displayed on the same page, they are labelled as (a), (b), (c) etc. and where charts from different sessions are displayed together for comparison they are labelled (1), (2), (3) etc.

Construct and Internal Validity

Since the intention was to find out whether the different colours had a discernable effect on behaviour, suitable behaviours had to be identified for investigation. Hand flicking was found to be satisfactory because it was relatively straightforward to identify and in the case of Brian, occurred frequently. As an indication of state of arousal it was also considered satisfactory because other indications of arousal such as high-pitched vocalisations, jumping up and down and a tense facial expression coincided with more frequent and faster flicking. It was also reported by care staff to be indicative of arousal or excitement. Therefore in Brian's case (see Chapter 10) flicking rate was considered as a suitable indication of arousal. Rocking was less clearly associated with arousal and was therefore not used as an indicator. As regards attentiveness, it was also relatively easy to assess whether the children were showing interest and looking at the lights, so this was considered to be a suitable method of assessment.

The purpose of this first stage of the investigation was to determine whether colour had a discernable effect on the chosen behaviour. The conditions in the colour room were in many ways similar to a laboratory in that all conditions (variables) other than the lights were kept virtually constant. Therefore if a behaviour was observed to change at the same time as the lights, it could be reasonably assumed that there was an association between them. It seemed reasonable to assume that it was the lights causing the changes in behaviour rather than the other way round, but to ensure impartiality of lighting changes, a computer-controlled sequence was used for the second cohort of children.

Observer Reliability in Recording

The question of observer reliability in the recording of quantitative data was addressed by re-analysing one of the sessions at a later date and comparing the second sets of data with the first. The results of these tests are given at the end of Chapter 10 page 167. Two levels of reliability were addressed:

Intra-Observer Reliability

To gain an estimate of the intra-observer reliability of the quantitative data, one session was re-analysed for flicking and rocking by the same observer several weeks later. The same procedure for recording was carried out for a second time on the video of the same session for Brian, though because of the considerable time involved it was decided that only part of the session would suffice. The results of this check are shown on the charts in *Chart 10.13* on page 168 which compare the original data with the intra-observer check repeat (data tables are given in Appendix 2 page xxxviii – xxxix).

Inter-Observer Reliability

Another essential aspect of checking the validity of the original results was to appraise them against those of another independent observer. Since the procedure of video analysis was so laborious only a small section of one session was chosen for analysis. It was decided to use the same section of the recording of November 4th 1999 for Brian as was used for the intra-observer check. It would show whether the three attempts at analysis were within the same bounds of general agreement.

The video was analysed for flicking and rocking by a colleague for the first 17 colour sections. She was shown other sections of video for Brian in order to ascertain what was considered to be hand flicking. She was then asked to record when she considered him to be

flicking. The method of analysis was exactly the same as in the previous analysis (video analysis recording sheets are given in Appendix 2 page xl - xli).

The results are given at the end of Chapter 10 page 172.

CHAPTER 9

THE CHILDREN INVOLVED IN THE PROJECT

There were 19 children in the project. The names used in this thesis are not their real ones.

Baseline Descriptions of the Children Involved in the Research

The special school where this research was carried out is described as a, '52-week per year residential school for children with severe and complex learning needs.' Furthermore those involved with the current research were part of a programme called the 'Integrated Education and Care Curriculum Approach' designed specifically for 'children at the profound end of the autistic spectrum who may present challenging behaviour'. (Phrases in inverted commas are taken from the school brochure.)

Therefore it can reasonably be assumed that all the children involved in the research had been assessed as having severe learning difficulties and were considered by the school to be 'at the profound end of the autistic spectrum'.

Tables are given on the next pages giving information on the individual children. The first cohort (starting in June 1999) is given first, then the second cohort (starting mainly in January 2000) and then the third (starting mainly in September 2001).

The children were selected for the project by staff at the school and not by the author of this thesis. Furthermore, for the first cohort, the time for which the children remained with the project was also in the hands of staff. It had been decided that the first cohort should remain with the project for approximately six months as reasonable length of time for a pilot phase,

after which the situation should be reviewed. Decisions were made as to who should stay after this period, based on two factors, as assessed by teachers and the psychology department. These were:

- The benefit to the child as assessed by calmness of mood following sessions and the degree of enjoyment shown by eagerness to attend.
- The ease or difficulty of transitions around the site.

There were, in fact, no reports of children in the first cohort finding the sessions themselves stressful though in one case transitions were difficult. Two were recommended to stay because teachers felt it would be beneficial (see Chapter 10).

The situation was similar for the second cohort except for one child who appeared uncomfortable in the colour room and therefore left the project early. Also, in the case of two children, the author of this thesis requested that they should remain after the allotted time (approximately 12 months) since they seemed to be making particular progress (see Chapter 12 and 14). In the third cohort all remained for the allotted time (approximately 15 months) except those where there was perceived to be a possible medical problem (see Chapter 14).

It is possible that this system of decision making about termination of sessions could affect the result since in general those who responded well tended to remain with the project for longer. However it had been decided on ethical grounds that children should only attend where it was thought to be beneficial and in particular, no unnecessary distress was to be caused. Therefore strict experimental procedures in terms of duration of attendance were intentionally sacrificed in favour of child welfare and in any case, since this project was considered to be an exploratory case study, this strategy was thought to be reasonable.

Notes on Tables Giving Baseline Descriptions of Children

1. The term ASD is used in this table to denote where a diagnosis of autism or Autistic Spectrum Disorder has been made.
2. S.L.D. stands for Severe Learning Difficulties.
3. 'Solitary' is used to describe a child who tends to remain isolated, does not naturally show awareness of or interest in peers and does not join in with games.
4. Assessments of Linguistic Level and Academic Ability are taken from teacher's reports as near as possible to the time of entry to the project.

(Information in 1.-3. is from the Statements of Special Educational Needs, 4. from teacher's reports. Where information is in inverted commas this has been quoted directly from the Statement of Special Educational Needs.)

Table 9.1 Personal Details and Baseline Abilities for the Children Involved in the Project

First Cohort

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Brian 16 years of age	10 years	Male	S.L.D.	ASD	Difficulty in understanding language and does not use words to communicate. Can repeat a few words echolalically	Pre-academic, is learning to match symbols	Solitary	
George 16 years of age	7 years	Male	S.L.D.	ASD	Non-verbal	Pre-academic, is learning to match symbols	Information not available	Fragile X Syndrome Epilepsy
Margaret 12 years of age	6 years	Female	S.L.D.	ASD	Non-verbal	Pre-academic, is learning to match symbols	Solitary	
David 16 years of age	4 years	Male	Information not available	ASD	Can use short sentences meaningfully	Pre-academic, but can match symbols and count to 20	Solitary	

First Cohort (continued)

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Christopher 17 years of age	6 years	Male	S.L.D.	ASD	Non-verbal	Pre-academic, is learning to match symbols	Solitary. 'Little understanding of any social context'	
Stuart 16 years of age	2 years	Male	Information not available	ASD	Verbal, but problems with comprehension and social use of language	Able to read, can do basic addition and subtraction	Solitary. Behavioural problems. Sometimes violent	Epilepsy
Mathew 17 years of age	2 years	Male	S.L.D. Emotional and behavioural difficulties	ASD	Communication difficulties. Can use single or grouped words	Pre-academic	Information not available	

Second Cohort

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Simon 12 years of age	I year when joined project	Male	'Complex learning needs'	ASD	Can copy a few words echolalically	Can write one or two words. Simple additions	Solitary	
Anna 9 years of age	I year when joined project	Female	'Severe and complex problems'	ASD	Reynell PVCS Score < lowest score	Pre-academic, is learning e.g. to sort objects by colour	Solitary	Down's Syndrome
Nicholas 13 years of age	I year when joined project	Male	'Complex special learning needs'	ASD	Does not use words, is learning to communicate through signs	Pre-academic. Can 'make marks on paper'	Information not available	Down's Syndrome
Edward 15 years of age	3years	Male	'Severe and complex difficulties'	ASD	No recognisable verbal communication	Pre-academic Can draw round a template. Difficulty distinguishing between large and small	Information not available	
Sean 13 years of age	5 years	Male	S.L.D.	Severe social, communication and behavioural difficulties	Non-verbal, but will use some Makaton symbols	Pre-academic, but can copy simple shapes	'Impaired social relationships'	
Susan 13 years of age	I year when joined project	Female	Information not available	ASD ADHD	Can use short sentences meaningfully	Can read familiar words	Solitary	

Third Cohort

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Colin 10 years of age	2 years when joined project	Male	'Significant difficulties'	ASD	Pre-verbal	Pre-academic, working at P levels 4 & 5	He is a 'withdrawn young man'	
Jane 11 years of age	2 years when joined project	Female	'Significant learning difficulties'	ASD	Significant difficulties in speech and language skills, but can pronounce words	Can read and write simple words. Can count to 50 and do simple additions and subtractions	Solitary	
Alan 9 years of age	1 year when joined project	Male	'Significant global delay. Complex needs'	ASD	Non-verbal	Literacy at P-level 4 & 5 Numeracy P-level 5 & 6	Solitary	Epilepsy
Benjamin 14 years of age	2 years when joined project	Male	S.L.D.		Problems 'in area of expressive language' Non-verbal	Pre-academic. Can match symbols to photographs Can distinguish 'one' and 'lots'	Information not available	Down's Syndrome

Third Cohort (continued)

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Richard 9 years	I year when joined project	Male	S.L.D.	'Severe communication and social difficulties'	Can use 'some single words'	Pre-academic 'Understands concept of 2'	Information not available	Epilepsy
Geoff 15 years	I year when joined project	Male	S.L.D.	ASD			Information not available	Epilepsy

In the following chapters where more detailed observations are given for individual children the appropriate line from the tables above will be repeated followed by a brief description of characteristic behaviours.

CHAPTER 10

OBSERVATIONS OF CHILDREN IN THE FIRST COHORT

During the early days of the project while the methodology was in the process of being worked out, the three main stages had not yet been developed so there was some inconsistency in observations at each stage for every child. In order to give a clear picture for each child a brief summary will now be given. (The tables of details and baseline descriptions were given in Chapter 9). For ease of reference the appropriate line will be repeated for those children where detailed observations have been made.

Brian stayed with the project for approximately nine months. A Colour Response Profile was obtained and he also took part in Colour Mood Dialogue. A detailed analysis of Brian's behaviours was made.

George stayed with the project for approximately seven months. A colour Response Profile was attempted but was largely unsuccessful due to his lack of any obvious behaviours to record. On his last day with the project Colour Mood Dialogue was attempted for the first time (this had not previously been developed as a technique) and his response was overwhelming. For the first time he was lively, engaged and vocal. An analysis was therefore made comparing his behaviour in non-responding and responding lights.

David took part in interaction with the adult from the start and will be discussed in Chapter 14.

Margaret took part in interaction with the adult from the start and will also be discussed in Chapter 14.

Christopher had problems in school and found transitions round the school site stressful. Staff found this difficult so many colour sessions were missed. After only four months he left the school so a detailed analysis will not be given. Some observations will be given at the end of the chapter.

Stuart was also with the project for only four months. Again a Colour Response Profile was not obtained as no suitable behaviours for analysis were seen, so a detailed analysis was not made. However, some observations will again be given at the end of the chapter.

Mathew left the school shortly after joining the project, so again a detailed analysis will not be given.

Detailed Observations and Analysis for Brian

A detailed account of Brian's behaviour is given in the following pages. The appropriate line from the table of baseline abilities is given again for reference, followed by a brief description.

Table 10.1 Personal Details and Baseline Abilities for Brian

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Brian 16 years of age	10 years	Male	S.L.D.	ASD	Difficulty in understanding language and does not use words to communicate. Can repeat a few words echolalically	Pre-academic, is learning to match symbols	Solitary	

General Description

Brian had no meaningful speech although he could pronounce words. He had a pleasant disposition and was co-operative in school though the level of achievement was limited. He would easily get over excited and would almost continuously flick his fingers over his eyes. He often made raucous singing sounds. He was chosen as the main subject for analysis because his habit of flicking gave something tangible to record as a response to the different colour conditions and because he was able to attend the colour room regularly.

Colour room sessions began in June 1999 and continued until February 2001. The video equipment was not installed until late September 1999 and therefore analysis did not begin until after this time. In order to give a fair overview of Brian's time with the project, a record of every session is given in Appendix 1 page ii.

Selection of Behaviours for Analysis for Brian

Hand flicking was chosen as the main behaviour to record. This was basically for three reasons:

1. It was something he did regularly.
2. It was relatively easy to assess from the video recordings.
3. It appeared from general observations of Brian and from reports from staff that his flicking levels were affected by his general state of arousal.

Rocking (usually from side to side) was also recorded, as this was also relatively easy to assess. It was reported by staff to give an indication of levels of arousal, tension or boredom.

Attentiveness, as assessed by watching the lights and not being distracted by anything else, was also recorded to give an indication of the difference in interest between interactive (CMD) and non-interactive lighting styles.

Selection of Sessions for Detailed Analysis for Brian

For an objective selection of sessions it would be desirable to take either a random sample or to use every one. Since there were very few video sessions in non-Colour Mood Dialogue (CMD) it was not possible to select a suitable sample using a table of random numbers. Therefore the second option was chosen. All non-CMD sessions were selected other than those where the video was cut off, lost or where the child went out of camera view. The only exception was the session of 18th November where Brian seemed unusually sleepy, almost unwell. It was decided not to produce a chart since this was atypical, but the observations made at the time and after video analysis were used in the discussion of the results. In all the CMD sessions the differences in attentiveness was so marked when compared to non-CMD that it was thought justified to choose two typical sessions for analysis and comparison. A

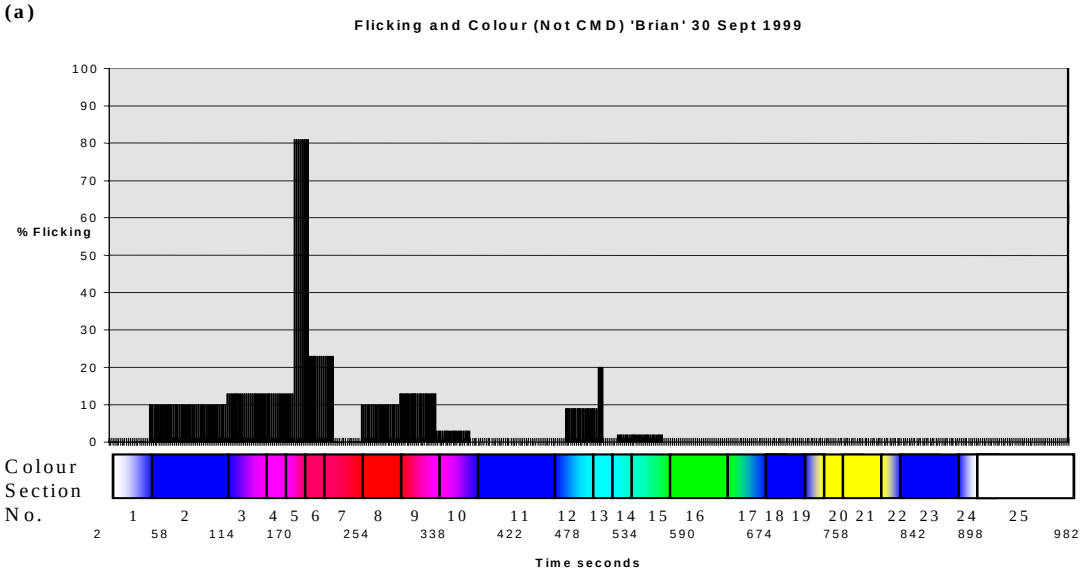
small section of a third was chosen for a detailed analysis (every second) of CMD to demonstrate the nature of the interaction between the child's movements and lights.

Results of Video Analysis for Brian

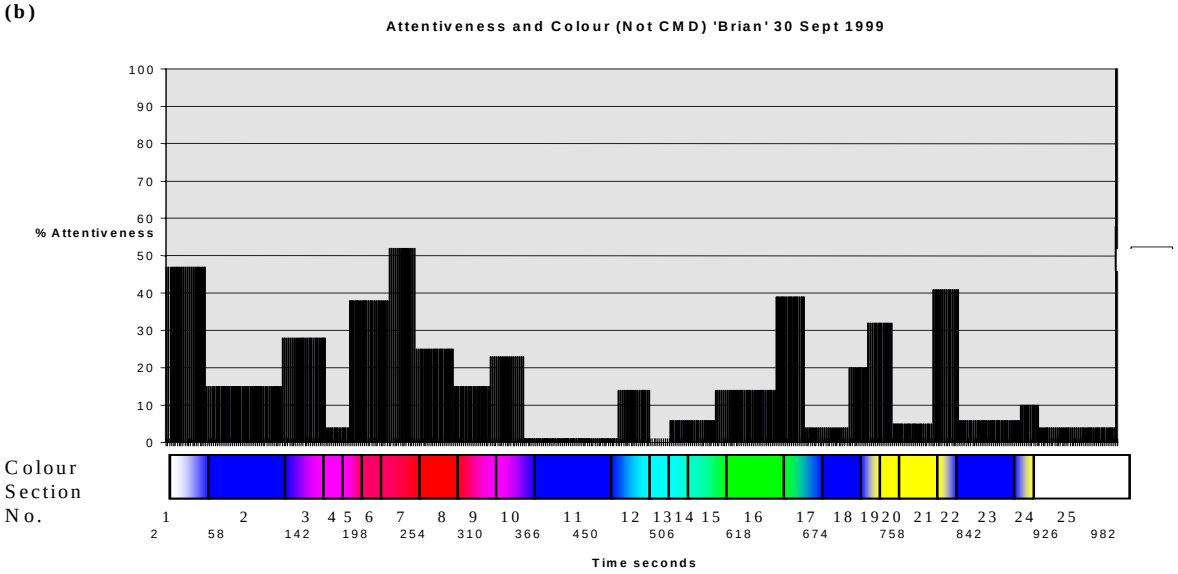
The video analysis recording sheets for each of the sessions selected are shown in Appendix 2 page xviii - xxix. The results, displayed on charts, are given in the next pages and each is discussed in turn. The charts are shown first, followed by the relevant discussion. First, all the charts pertaining to one session are displayed together to give an overall impression of the session. For each chart, only major trends that are considered to have relevance for more than one session have been considered in the comments.

Chart 10.1 **Charts of Session for Brian 30th September 1999**

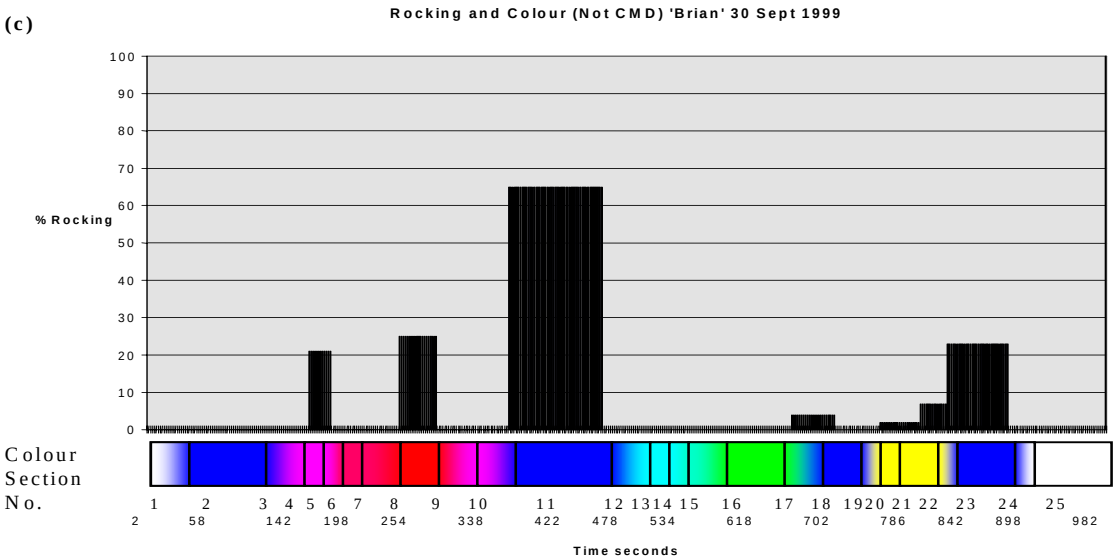
(a)



(b)



(c)



General Comments on Charts for Session of 30th September 1999 (See *Chart 10.1)*

This was one of the early sessions and the colour sequence had not yet been worked out. Yellow was used but was discarded in later sessions because it was easily confused with the white room lights that indicate the end of a session. It should be noted that yellow light mixed with blue in general gives white in additive colour mixing (depending on the exact shades of the blue and yellow) and not green as with subtractive mixing in pigments. Therefore, together with the blues, it could easily be mistaken for the room lights.

Flicking [See chart (a)]

It can be seen that there is marginally increased flicking in the reds and pinks. Generally there is less in the blues, greens and yellows (see later statistical analysis). There also appears to be a general decrease during the course of the session, possibly indicating a general calming effect.

Attentiveness [See chart (b)]

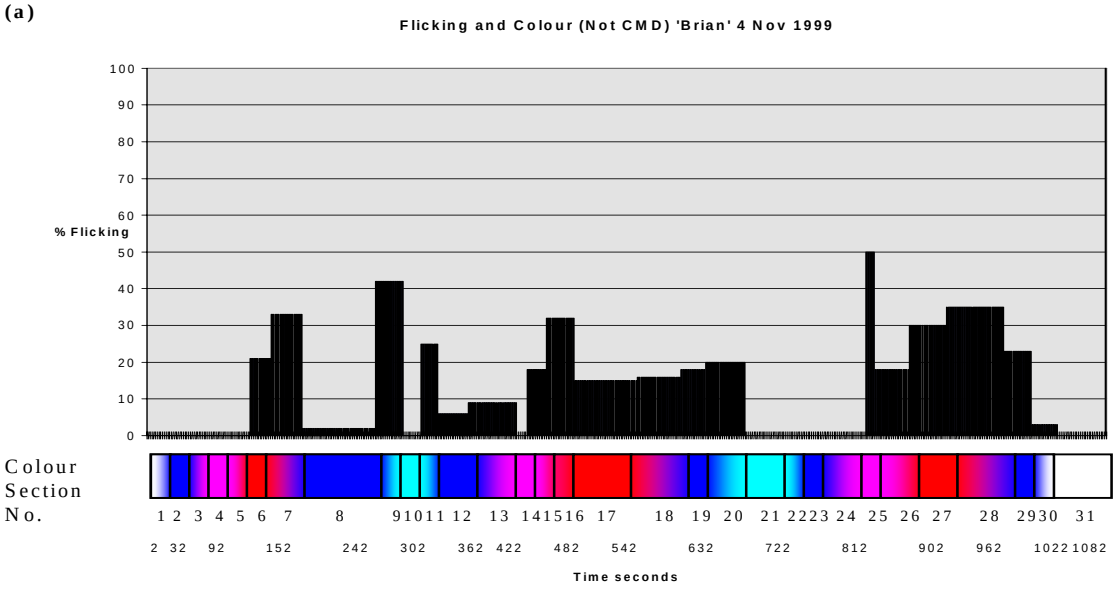
This was recorded with the purpose of comparison with Colour Mood Dialogue (CMD). Attentiveness appears to be marginally higher in the reds, (sections 3-10) than the rest and appears to slightly decrease during the course of the session.

Rocking [See chart (c)]

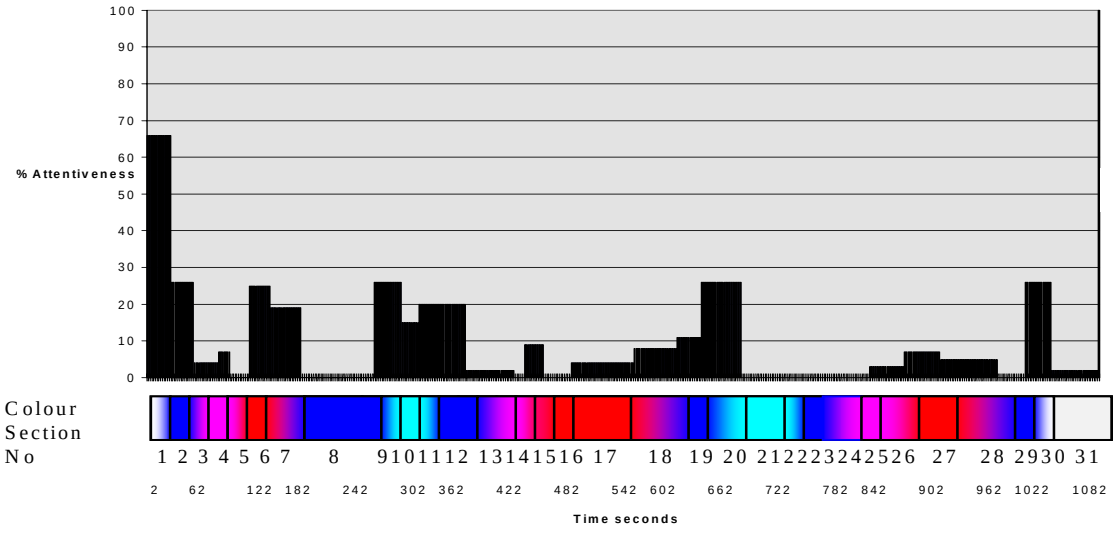
In this session there appears to be more rocking in the blues than in the other colours (sections 11 and 23). However, this has not been repeated in later sessions and has therefore not been the subject of a statistical analysis. It was noted at the time that attentiveness decreased and agitation increased towards the end of longer blue sections though this can only be shown on the charts as an average for the whole section. With the increased rocking in the blue, it might be that rocking indicates boredom or unease with too long an exposure to blue.

Chart 10.2 **Charts of Session for Brian 4th November 1999**

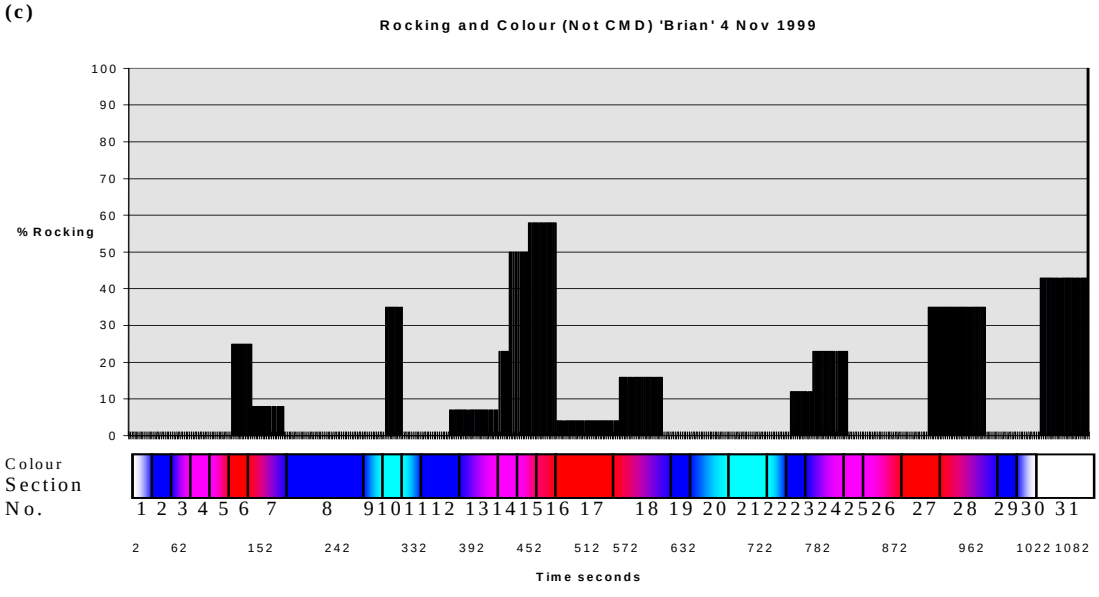
(a)



(b)



(c)



General Comments on Charts for Session 4th November 1999 (See *Chart 10.2***)**

This was also one of the earlier sessions and in this case there were no sections of pure green. It was an unusually long session, lasting over 18 minutes. This did however mean that there could be 3 major sections of reds to compare with the blues. This gives a better confirmation of the effect of the colour changes than shorter sessions where only two are possible. However a session of this length was thought to be too long from a practical point of view and was not generally repeated.

Flicking [See chart (a)]

There appears to be an increase in the rate of flicking in the reds as compared with the blues and blue/greens (see later statistical analysis). It is interesting to note however, that there appears to be a 'time delay' in the effect of the colour changes since the flicking starts to build up gradually after the reds have been brought up (sections 3-6, 13-18, and 24-27) and there is a similar delay in flicking reduction when changing back from the reds to the blues (sections 19-20 and 29-30).

Attentiveness [See chart (b)]

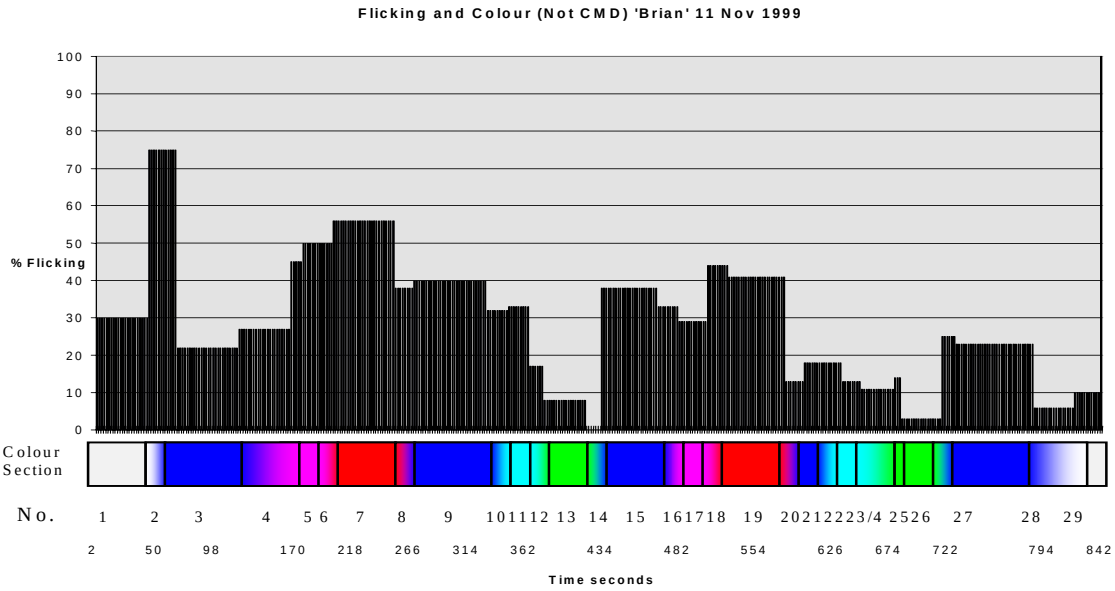
As previously stated this was recorded for the purpose of comparison with Colour Mood Dialogue (CMD). In this session there does not appear to be any clear relationship for attentiveness level between the major colours i.e. between the reds and blues.

Rocking [See chart (c)]

In this session rocking levels appear to be higher in the magenta/purple colours (sections 7, 13-15, 18, 24-25, 28) but this has not been repeated in other sessions. (In the session for 30

September, rocking was higher in blue.) This may be of importance as an indicator of the child's mood at the time, but it has not been possible to follow this up.

Chart 10.3 **Chart of Session for Brian 11th November 1999**



General Comments on Chart for Session 11th November 1999 (See *Chart 10.3*)

On this occasion Brian was unusually agitated and excited following an incident before the colour room session. It was noted at the time that he was both extremely active generally and reactive to the colour changes. An analysis for flicking and walking was carried out a few days after the session. Unfortunately the recording was accidentally lost soon afterwards so that a later analysis for attentiveness and rocking was not possible. After consideration of other recordings, walking was discarded as a behaviour to analyse since it was too infrequent.

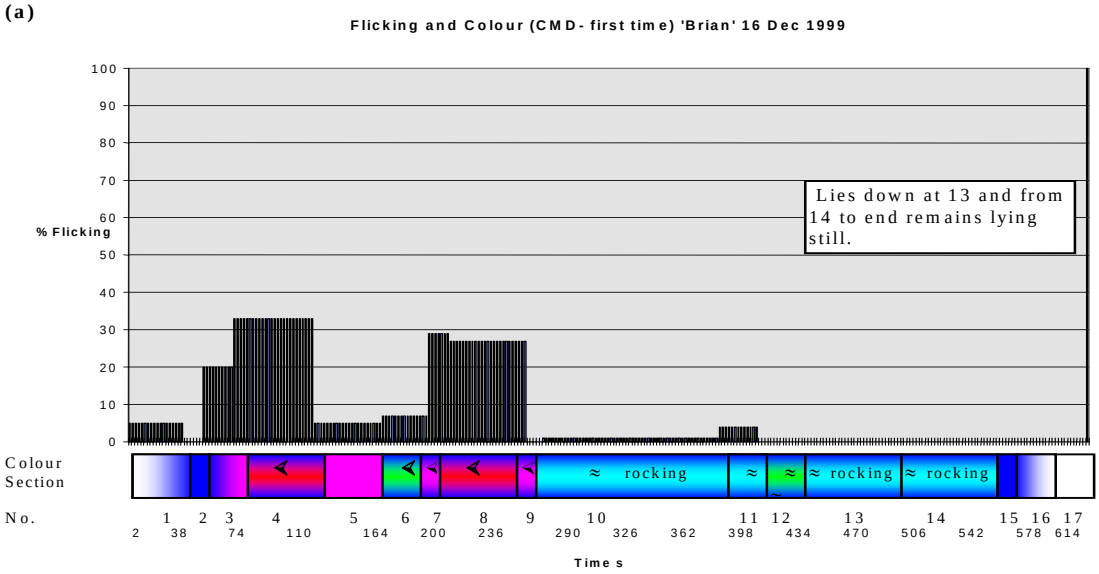
Flicking [See chart above]

In this session flicking levels appear to be higher in the reds, lower in the blues and considerably lower in the greens (see later statistical analysis). There also appears to be a general decrease in flicking levels during the course of the session, perhaps indicating an overall calming effect. The response to the different colours is particularly marked on this

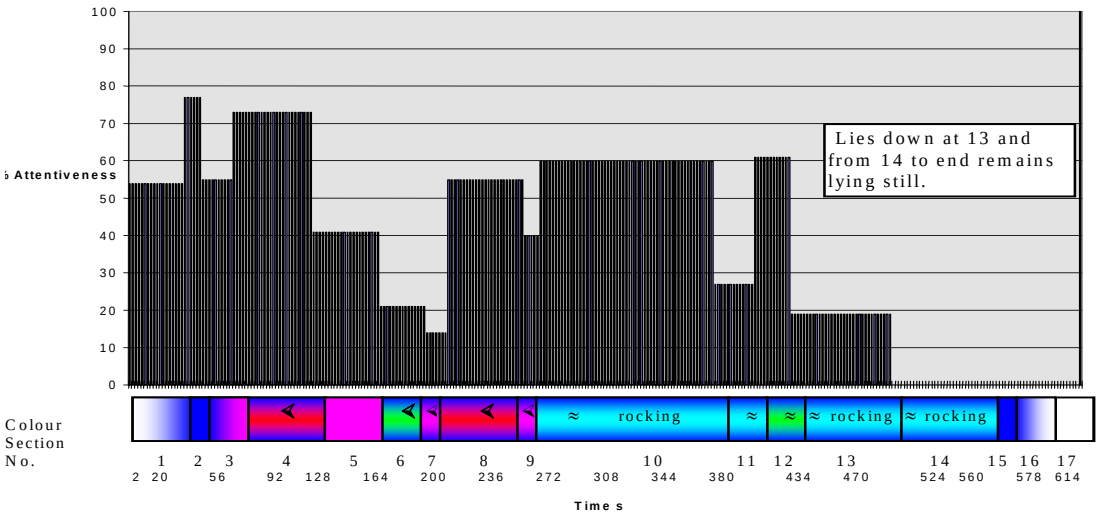
occasion and when considered together with the session of December16th there is an indication that Brian may be generally more receptive to colour the more ‘worked up’ he is (see later discussion).

Chart 10.4 Charts of Session for Brian 16th December 1999 (Colour Mood Dialogue)

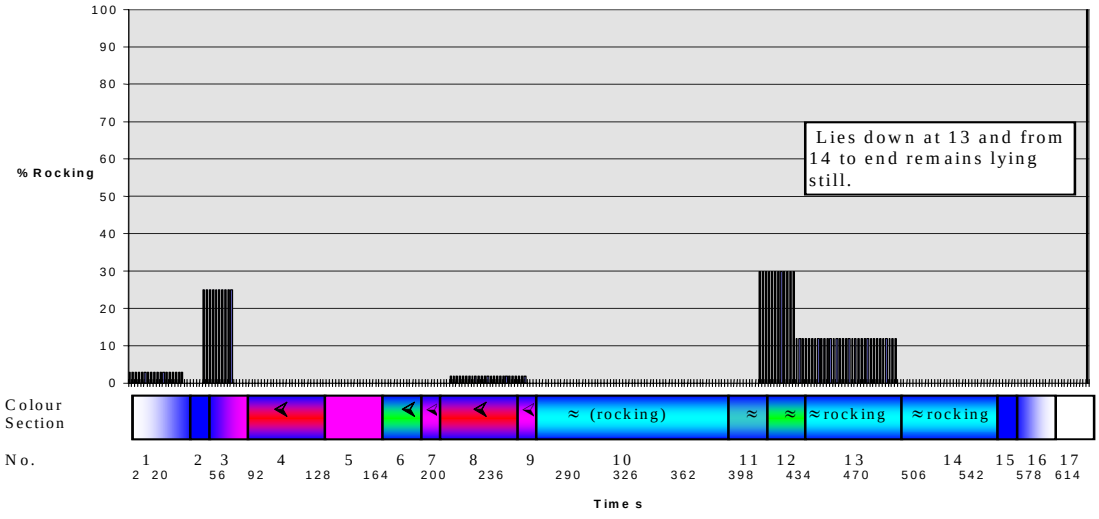
(a)



(b)



(c)



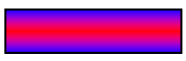
General Comments on Charts for Session 16th December 1999 (Colour Mood Dialogue)

(See *Chart 10.4***)**

This was the first Colour Mood Dialogue session for Brian. His Colour Response Profile was now to some extent known in that he tended to get more excited in red and to calm down in green. The reds were deliberately used to 'orchestrate' his excited mood (sections 4,7,8,9), and during the second part (sections 10-17) rocking blue/green was used to calm him down to the point where he relaxed and lay down. (Rocking blue/green means the blues and greens slowly follow each other up and down sequentially in a gentle rocking motion. See Glossary.)

Flicking [See chart (a)]

Flicking rates can be seen to be higher in the reds (sections 3,4,7,8 and 9) than in the rest. At this stage of the session his general excited mood appeared to indicate that he would respond positively to red light, so his flicking movements were 'answered' by flashing the reds. In turn he would then flick 'back' to the lights and this was considered to be Colour Mood Dialogue (CMD). The increased flicking levels in the reds is probably in part due to the effect of the reds themselves (see Colour Response Profile above) but also in CMD now due to the 'encouragement' to express himself in flicking produced by the responsive red lights.

(This fast up-fade and down-fade of the colours cannot be adequately shown in the colour section boxes on the chart. There may be up to about 15 up-fades/down-fades during one CMD section. As a compromise, this has been illustrated on the charts in the following way: for example,  which actually means a fast and often irregular sequence of red-blue-red-blue-red etc. A similar system has been used for other fast colour sequences.)

In the rocking blue/greens (sections 10-16) a deliberate attempt was made with the knowledge (see Colour Response Profile above) that blue/green had a calming effect, to relax him and cause him to want to lie down. There was a minimal amount of flicking in sections 10 and 11 after which he lay down (during 13) and remained peaceful and still until the end of the session.

Attentiveness [See chart (b)]

It can be seen that the level of attentiveness in sections 1 to 12 are high when compared with the levels in the previous non- CMD sessions (30 Sept and 4 Nov). It is therefore assumed that for Brian an interactive CMD session is more interesting and engaging than a non-CMD session. The significance of this is that CMD seems to be a form of interaction in which this boy with severe autism can willingly participate.

From section 14 to the end of the session a figure of 0 has been given for attentiveness. This is actually misleading. Although his behaviour does not conform to the criteria laid down for attentiveness, i.e. looking up and concentrating on lights etc., it must be remembered that he is lying down, very relaxed, and clearly not distracted by anything else. There is therefore not so much a lack of attentiveness, as a high level of response to intended effect, namely to calming down and almost falling asleep. Although somewhat misleading in terms of attentiveness levels, these last sections have been included in the charts in order to give a better overall impression of the sequence of events during the session.

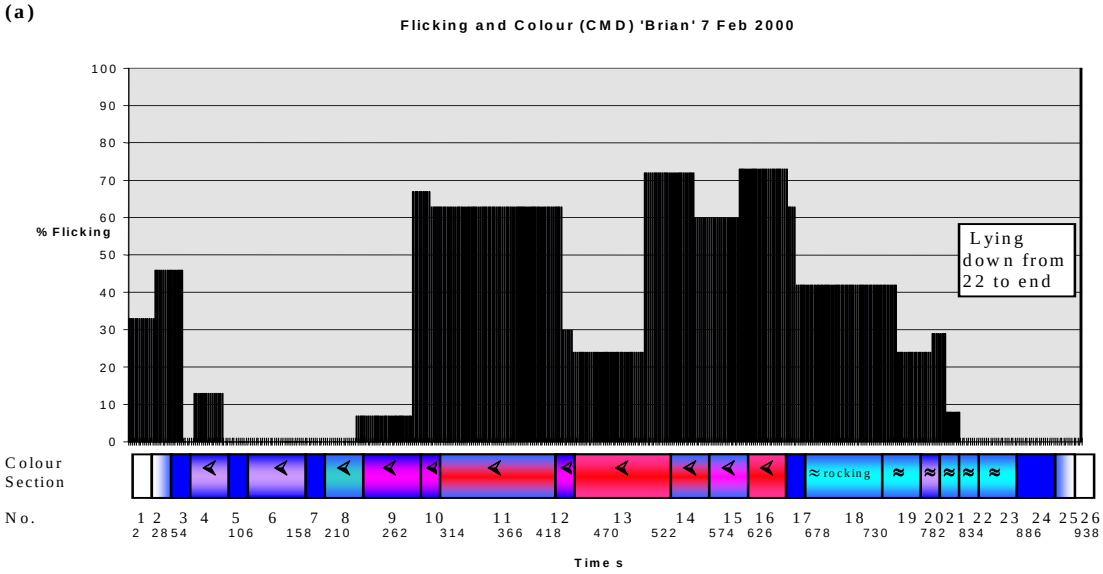
Rocking [See chart (c)]

Rocking levels are generally low compared with the non-CMD sessions. This is consistent with the view that rocking tends to occur as some sort of distraction or ‘comforter’. The

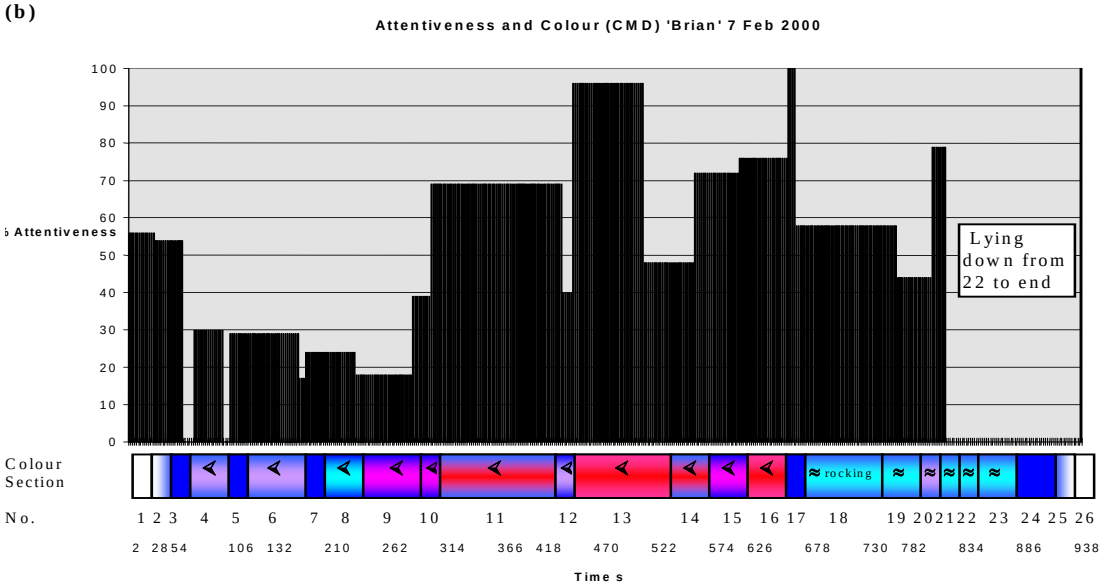
highest rocking levels (still low at about 10% and 20%) are in sections 12 and 13, perhaps indicating a relaxing gesture as he becomes sleepy, and just before he finally lies down.

Chart 10.5 Charts of Session for Brian 7th February 2000 (CMD)

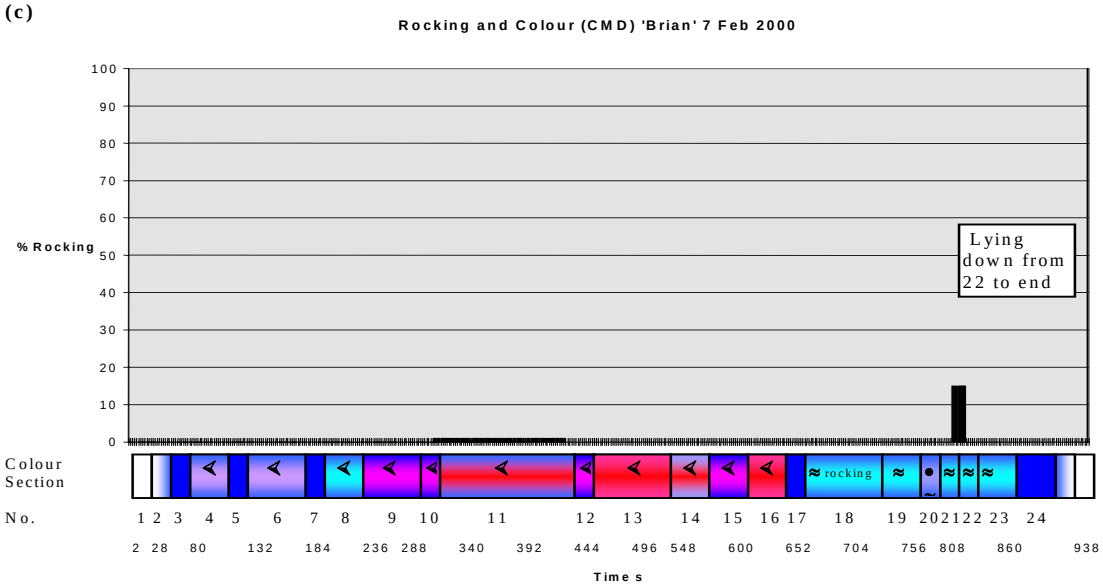
(a)



(b)



(c)



General Comments on Charts for Session 7th February 2000 (Colour Mood Dialogue)

(See *Chart 10.5*)

After a fairly calm start to the session Brian responded to the increasing reds after section 9 with intense flicking and vocalisation. This was 'encouraged' by responding with flashing reds and by section 11 he became very animated with laughing and brash singing sounds. The reds 'answered' his rhythmical singing and from sections 14-16 he was unusually active. Again a deliberate attempt was then made to calm him down with blue/green rocking and although it took some time for him to respond (sections 18-21) he did lie down by section 22 and remained lying peacefully to the end of the session.

Flicking [See Chart (a)]

Flicking levels were very high during the CMD in the strong reds. These were considerably higher than for any of the non-CMD sessions indicating that it is not only the effect of the reds themselves that excite him but also the enhancing effect of the fact that they are responding. At section 17 there was a deliberate attempt to calm him down as the lights changed to blue and then to rocking blue/green. At first he was still flicking fairly strongly (17-18) showing that he was still excited and not about to calm down anyway. However, flicking rates then reduced quite quickly (19-21) and by section 22 he lay down and remained relaxed and still to the end of the session. This is another example of a successful attempt to bring about relaxation by the use of the appropriate colours.

Attentiveness [See chart (b)]

Attentiveness levels were again very high during all of the active CMD part of the session. This again illustrates the high level of Brian's engagement in CMD and again supports the view that interacting changing colours are a source of pleasurable exchange for a boy with

autism. The misleading apparent lack of attentiveness at the end has already been discussed (see session of Dec 16th '99).

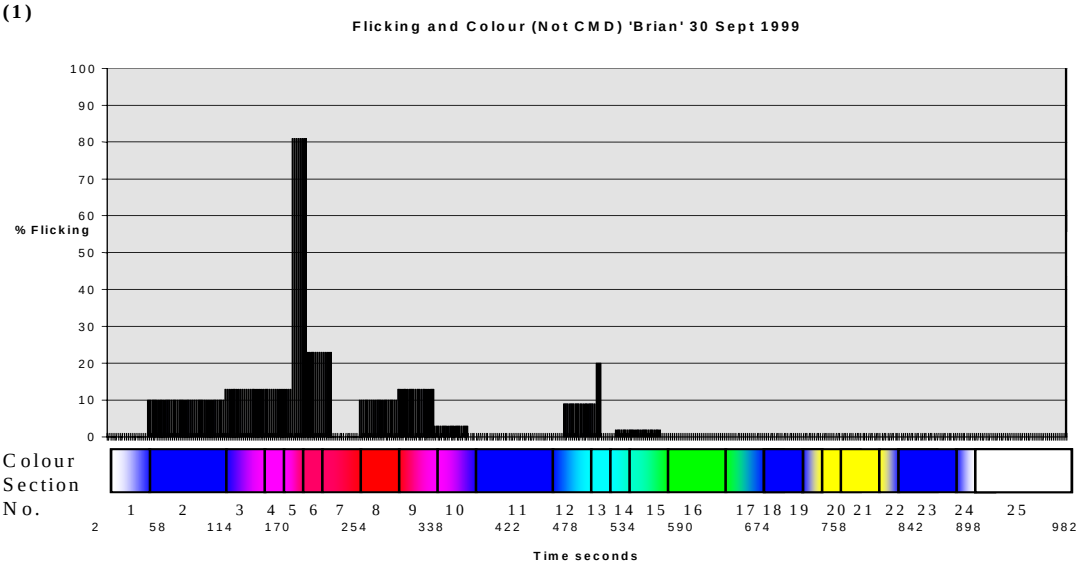
Rocking [See Chart (c)]

Rocking is in this session almost non-existent, except for a small amount in section 21, just as he is about to lie down. This is very much lower than for the non-CMD sessions and is again consistent with his high attentiveness levels.

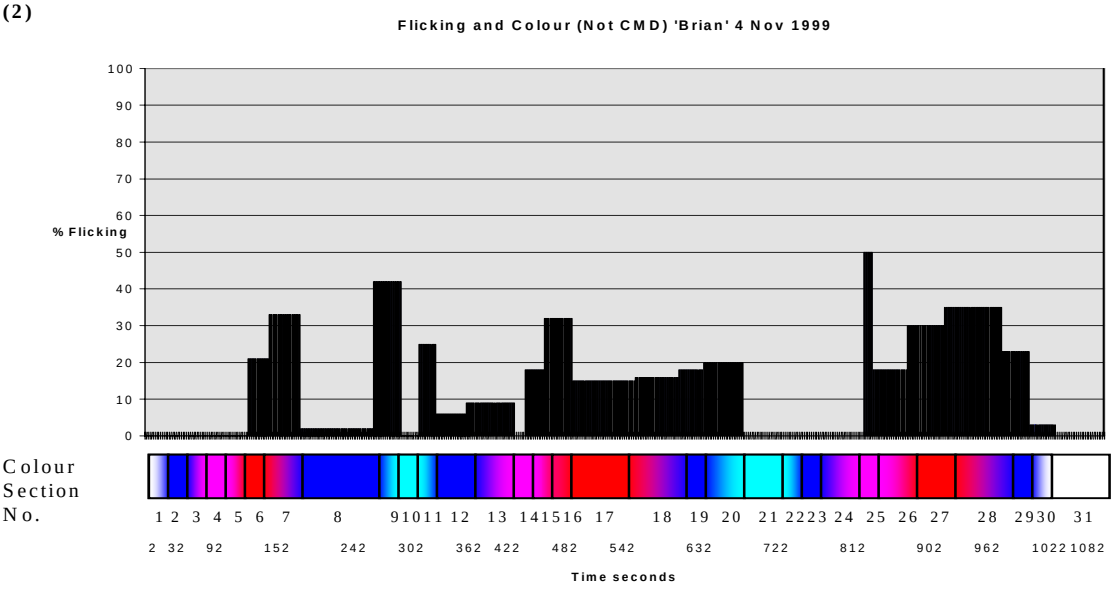
In the next group of charts flicking levels over all three sessions have been collected together and displayed on one page for ease of comparison. This illustrates the general effect of colour on flicking for Brian.

Chart 10.6 **Charts of Flicking and Colour for Brian for 3 Sessions**

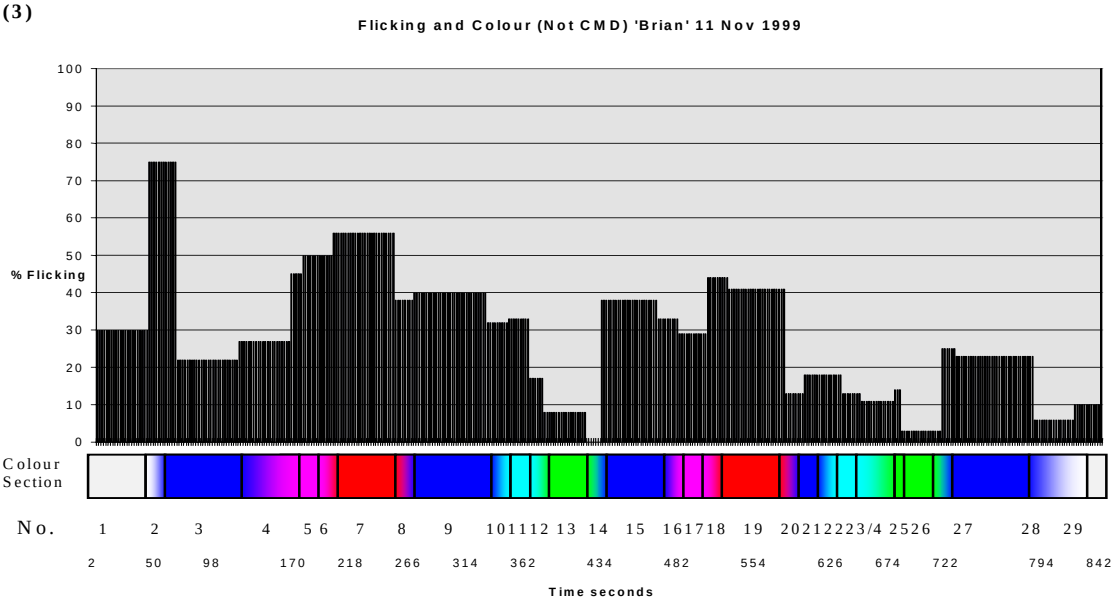
(1)



(2)



(3)



Discussion on Relationship of Colour to Flicking for Brian (See *Chart 10.6*)

For Brian, hand flicking was selected as the behaviour which was most consistently measurable and which seemed a good indicator of mood. Reports from care staff prior to colour sessions that warned of upset, agitation or excitement consistently coincided with increased levels of flicking on entry. Therefore it will be assumed that flicking levels are an indicator of levels of excitement and arousal generally.

The three charts shown on the previous page compare the rate of flicking in different colours over three separate sessions. Each chart has been discussed individually, but it can be seen that there is a trend to increased flicking in the red colours and a decrease in the blues and greens. (A fourth session on November 18th also indicated greater calmness in green.) The 'time delay' in calming down as the colour changes from red to blue/green can also be seen. It can also be seen that with a general increased level of activity, [Charts: (3) is greater than (2) and (2) greater than (1)] there is also an increased level of responsiveness to colour. It therefore appears that the more aroused and excited Brian's mood the greater the effect of the colour changes. At this stage of the research, and with only three sessions analysed, the sample size was too small for a satisfactory statistical confirmation to be made. However, an Analysis of Variance test was carried out (see overleaf) to check whether these results could be considered to indicate a possible difference in behaviour in the different colours. (Statistical tests are suggested as a useful adjunct in case studies by Gillham (2000), see Chapter 6.) Therefore this is only being put forward as a possibility and a pointer for further research

.

Discussion on Relationship of Colour to Rocking for Brian

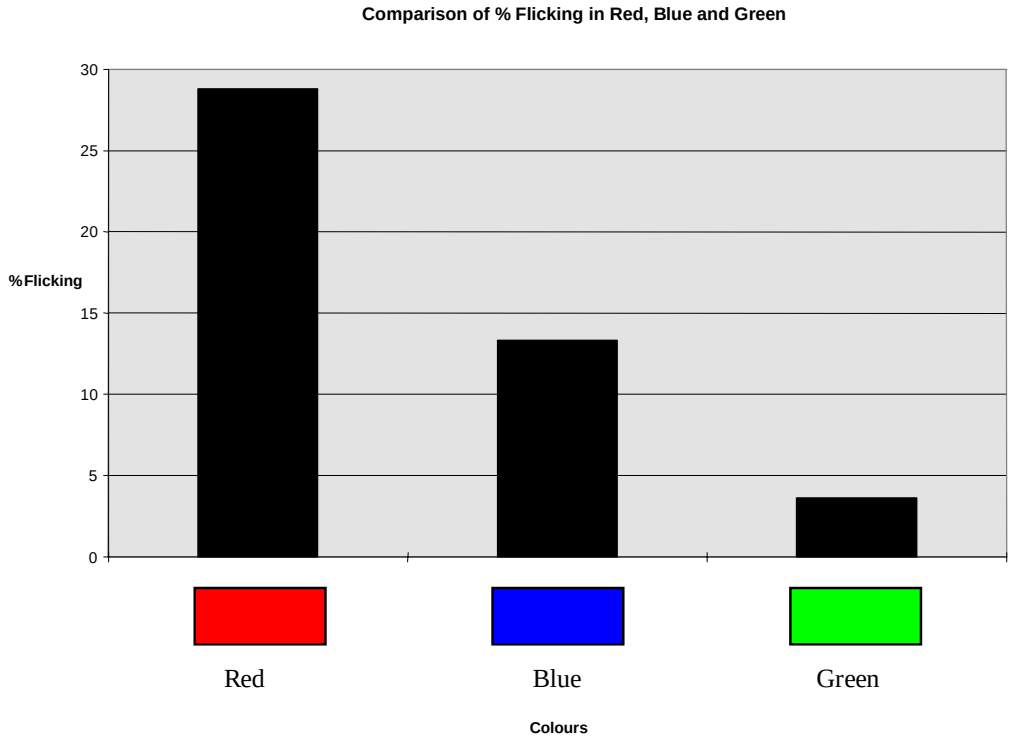
Rocking appeared sometimes to be associated with arousal levels, since fast flicking and excited-sounding vocalisations often coincided with fast rocking movements. However, Brian

also occasionally rocked when he was relatively calm (e.g. 16 December) though in this case the movements were relatively slow. When he was attentive, active and happy he virtually did not rock at all. A clear relationship between rocking and colour was therefore not easy to find but the impression was given that rocking may have had the effect of providing a distraction when Brian was either stressed or bored.

Comparison of % Flicking in Red, Blue and Green for Brian

Flicking rates in the primary colours of red, blue and green over all three sessions were then added up so that a comparison could be made (for table see Appendix 2 page xliv). The chart below compares the values for % flicking rate in the three main colours:

Chart 10.7 **Chart of Comparison of Mean Flicking Rates in Red, Blue and Green over 3 Sessions for Brian**



It can be seen *(Chart 10.7)* that flicking rate is highest in red, less in blue and greatly reduced in green. The Analysis of Variance (ANOVA) test showed that for these values there was a significant difference (at 5%) between the effect of Red and Green, and between Red and Blue but not between Blue and Green. However, as previously explained this has only been used as a guide and is not put forward as firm evidence. For data tables and statistical tests see Appendix 2 page xliv - li.

Discussion of Choice of Data

It must be stressed that although these results are significant and under the given conditions may be of real meaning, the conditions under which these data were obtained must be taken into account. Firstly, this was only one boy who happened to display a behaviour (hand flicking) that was relatively easy to assess quantitatively. Secondly, a choice of colours for display on charts and statistical analysis had to be made and a decision was made to use Red, Blue and Green. Other colours, or mixtures of colours or changing colours were not considered. This was because to use all the possibilities would have been too cumbersome to analyse and would be unlikely to 'lead anywhere'. A realistic start had to be made somewhere, and it seemed justified therefore to use the main and scientifically accepted primary colours for lights (Additive Primaries). Thirdly, there were insufficient data for a reliable sampling method for statistical tests. The real significance of these results can only be assessed when it is known whether or not they can be put to any therapeutic use and further research would be necessary.

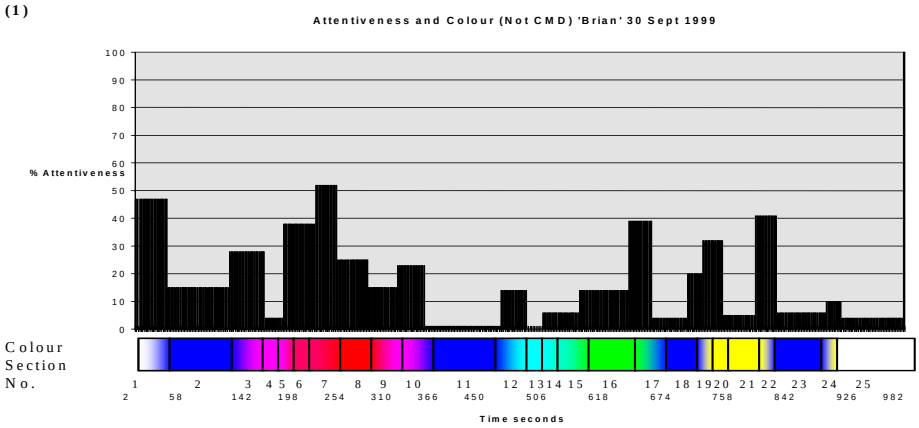
The preliminary Colour Response Profile for Brian was therefore: The effect of red was arousing and blues and greens were calming. Green may have been more calming than blue. This knowledge could then used during the Colour Mood Dialogue (CMD) sessions to attempt to deliberately calm him down.

Attentiveness and Colour for Brian

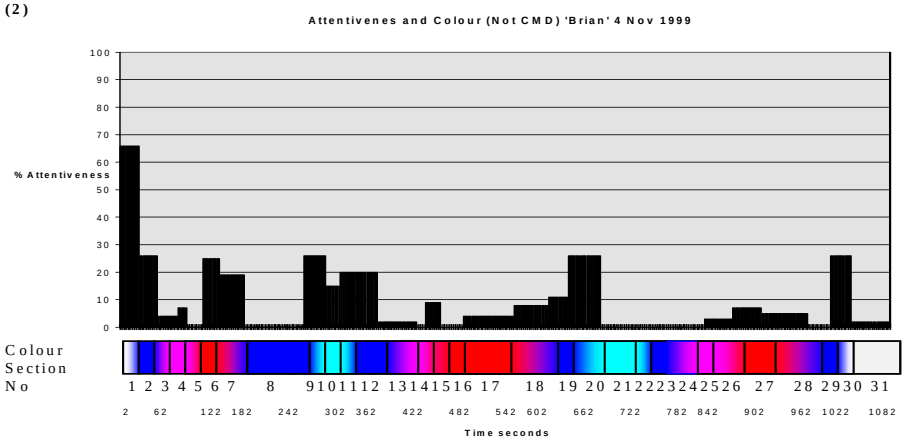
On the next page the four charts (*Chart 10.8)* illustrate attentiveness levels in four separate sessions, the first two being non-CMD [Charts (1) and (2)] and the second two CMD [Charts (3) and (4)]. These are laid out in this way for comparison of attentiveness in non-interactive and interactive sessions.

Chart 10.8 4 Charts Comparing Attentiveness in non-CMD and CMD for Brian

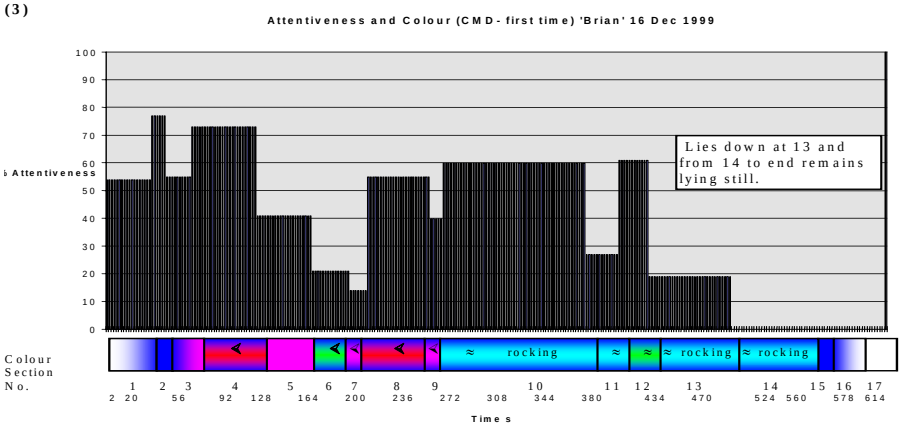
(1)



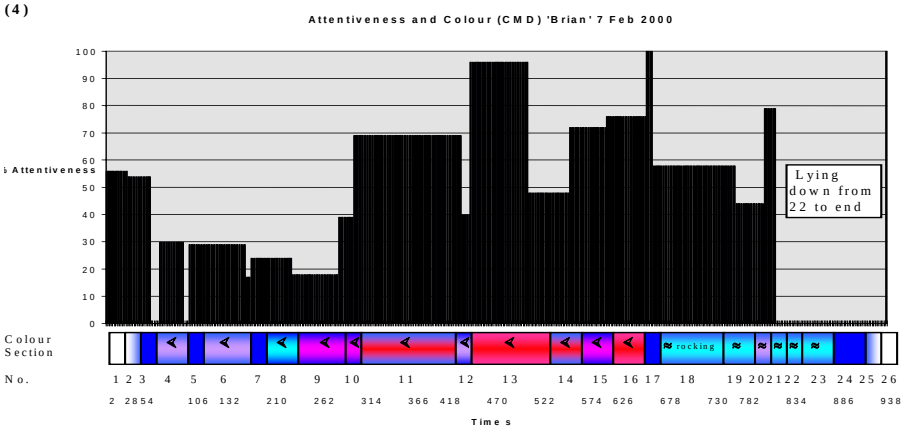
(2)



(3)



(4)



Discussion on Relationship of Colour to Attentiveness in Colour Mood Dialogue and non- Colour Mood Dialogue for Brian (See *Chart 10.8*)

Colour Mood Dialogue (CMD) sessions were introduced towards the end of the pilot phase with the first cohort. It immediately became clear, even during the first CMD session that Brian was behaving differently. His actions were more animated, his concentration appeared greater and his overall level of engagement and enjoyment increased.

It is was not easy to find a suitable quantitative method of analysis for his behavioural differences in CMD and non-CMD sessions, and in order to get a clear picture it would be necessary to view the video recordings. Despite this, an attempt has been made to encapsulate this different attitude quantitatively by recording 'attentiveness' levels. Brian was considered to be attentive when concentrating on the effect of the lights, usually by looking up at them, and not looking at or engaged with anything else.

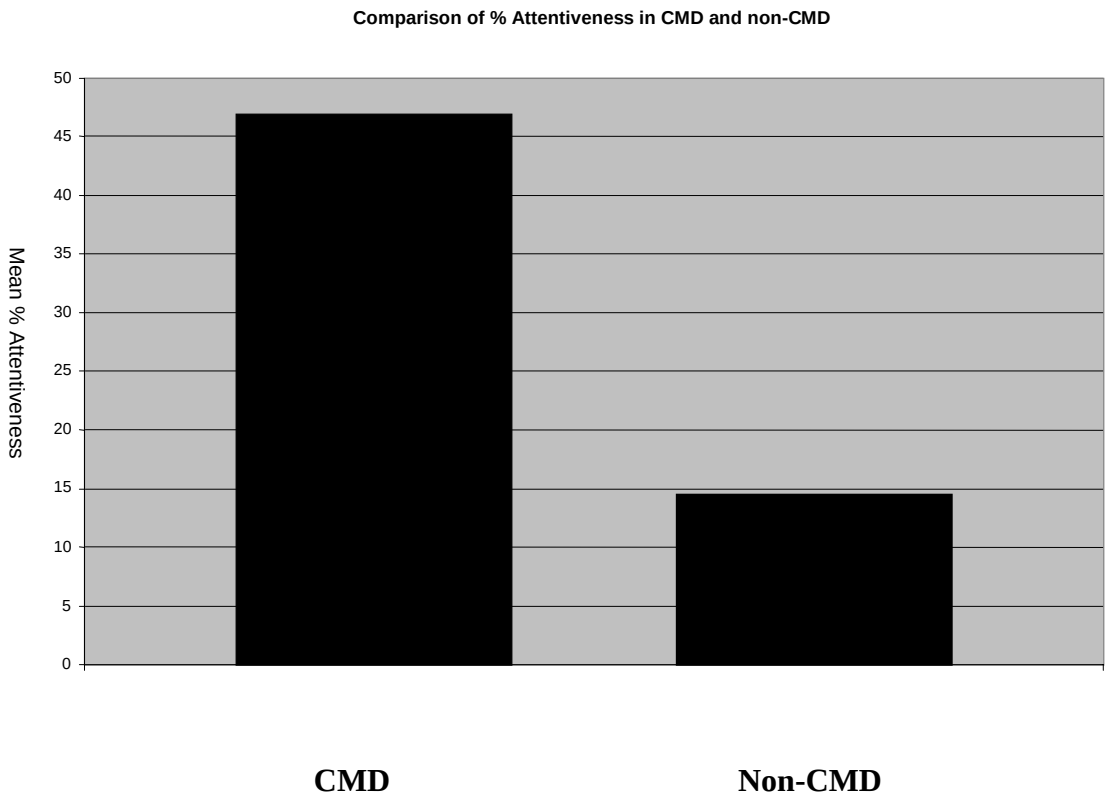
Attentiveness levels were therefore estimated from the video recordings in the same way as for flicking. Since this decision was not made until after several CMD sessions had taken place, and since the recording for 11 November 1999 had already been lost, attentiveness could not be recorded for this date.

Attentiveness levels can clearly be seen to be higher in the CMD sessions and for this purpose the last few sections when Brian was lying down and attentiveness could not be estimated, can be ignored (see previous discussion). Together with the direct evidence of laughing, gesture and vocalisation from the video, it is being put forward that CMD for Brian was an engaging and pleasurable form of interaction.

Comparison of Attentiveness in CMD and non-CMD Sessions for Brian

The chart below (*Chart 10.9)* shows the average (mean) values for attentiveness in the two non- CMD sessions and two CMD sessions illustrated in *Chart 10.8* for Brian (for tables and calculations see Appendix 2 page lii - liii):

Chart 10.9 **Chart of Comparison of Mean Values for Attentiveness in CMD and non-CMD over 4 Sessions for Brian**



It can be seen (*Chart 10.*9) that attentiveness levels in CMD are approximately 3 times as high as for non-CMD. Again, Analysis of Variance and Wilcoxon-Mann-Whitney Tests have been carried out (see Appendix 2 page liv - lx), and these indicate that the difference in the means is significant, but due to the small amount of data and therefore inadequate sampling procedure this cannot be put forward as incontrovertible evidence.

Detailed Observations and Analyses for George

Table 10.2 Personal Details and Baseline Abilities for George

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
George 16 years of age	7 years	Male	S.L.D.	ASD	Non-verbal	Pre-academic, is learning to match symbols	Information not available	Fragile X Syndrome Epilepsy

General Description

George had little understanding of language. He found all school tasks difficult. He had a habit of running away. He was reported to have temper outbursts and impulsive behaviours that could be a danger to himself and others. He did not show any of these problematic behaviours in the colour room though for the first few sessions he appeared frightened.

George was chosen as the second child for detailed analysis. Since he did not have a behaviour such as flicking that could easily be monitored, sessions were analysed for attentiveness levels only, as described overleaf.

Colour room sessions began in June 1999 and continued until December 2000. The video equipment was not installed until late September 1999. A summary of notes of each session is given in Appendix 1 page vi - vii. Every session has been included to give a fair overview.

Selection of Sessions for Detailed Analysis for George

For all but the last session (16 Dec CMD) George had not really been engaged with the colours. He often appeared bored or distracted and no particular patterns of response to colours had been detected. It was only on the last session when CMD was tried for the first

time that there was a completely different attitude. George was lively, engaged and happy. The decision to analyse George's sessions was made on the basis of the complete contrast in behaviour, observed at the time, between this and all the other sessions. Therefore this last session was chosen, plus two others that were judged to be typical of his previous behaviour. The notes of sessions in the Appendix 1 give an indication as to how this judgment was made. Random sampling techniques could not used since the CMD session was deliberately chosen on the basis of its different character, and there were no others to choose from. Because of this a statistical test was not carried out on the results. The analysis was carried out in order to illustrate the nature of the difference in attitude and behaviour between this one CMD session and all the others and therefore only attentiveness was recorded.

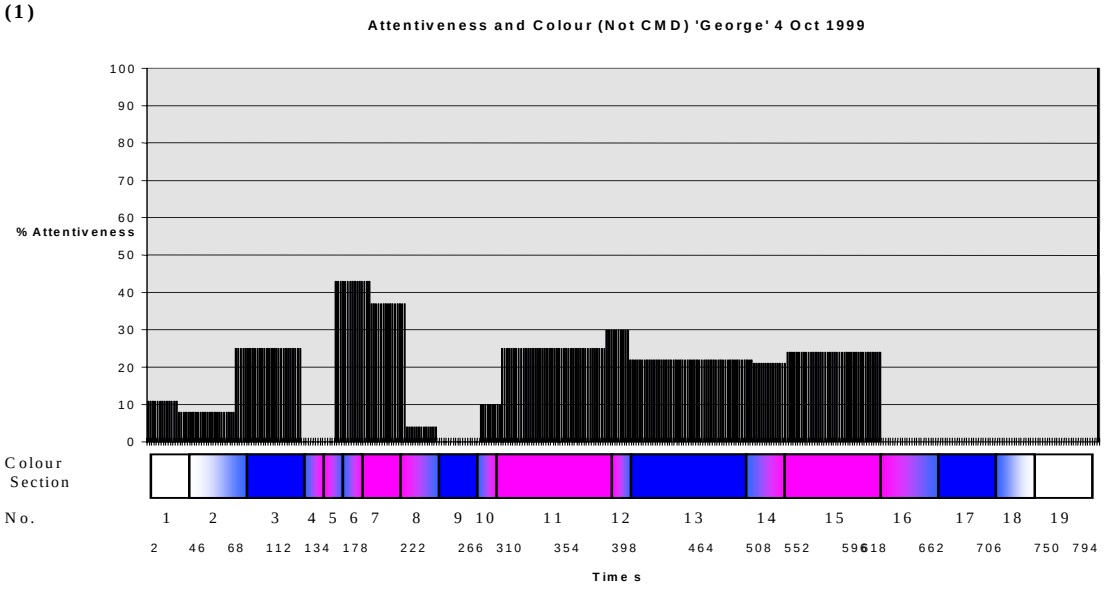
Results of Video Analysis for George

The video analysis recording sheets for each of the sessions selected are shown in Appendix 2 page xxx – xxxvii. The results, displayed on charts, are given overleaf.

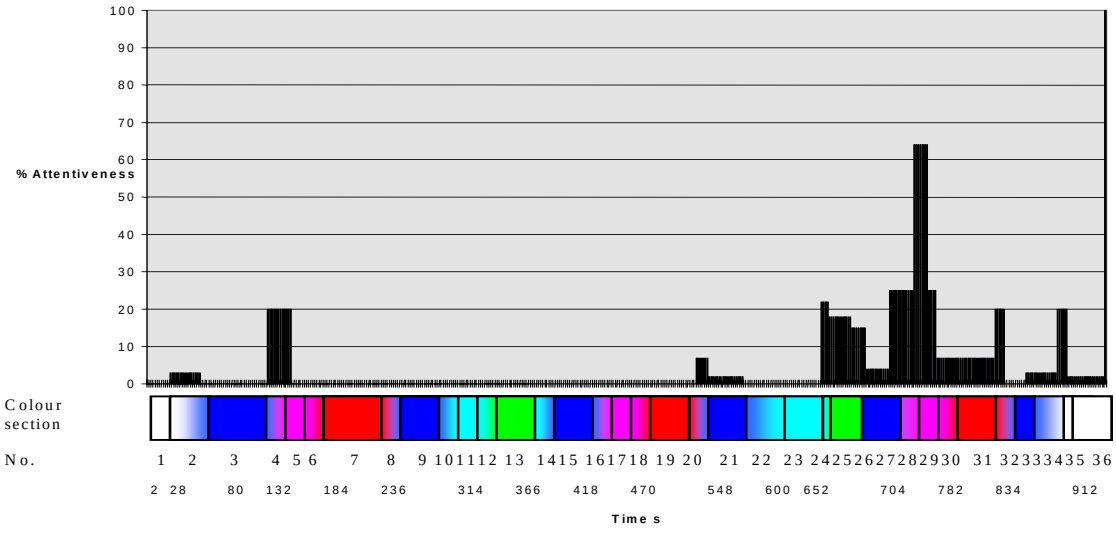
Since only one behaviour (attentiveness) has been investigated for the purpose of the charts the three sessions are displayed on one page.

Chart 10.10 Charts of Comparison of Attentiveness for 3 Sessions for George, (2 Sessions Non CMD and 1 CMD)

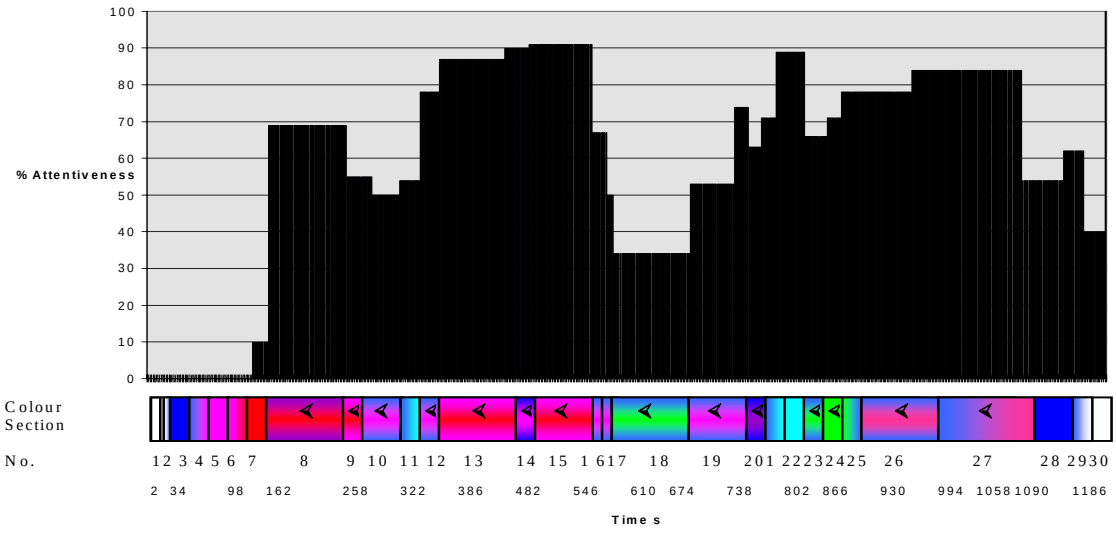
(1)



(2)



(3)

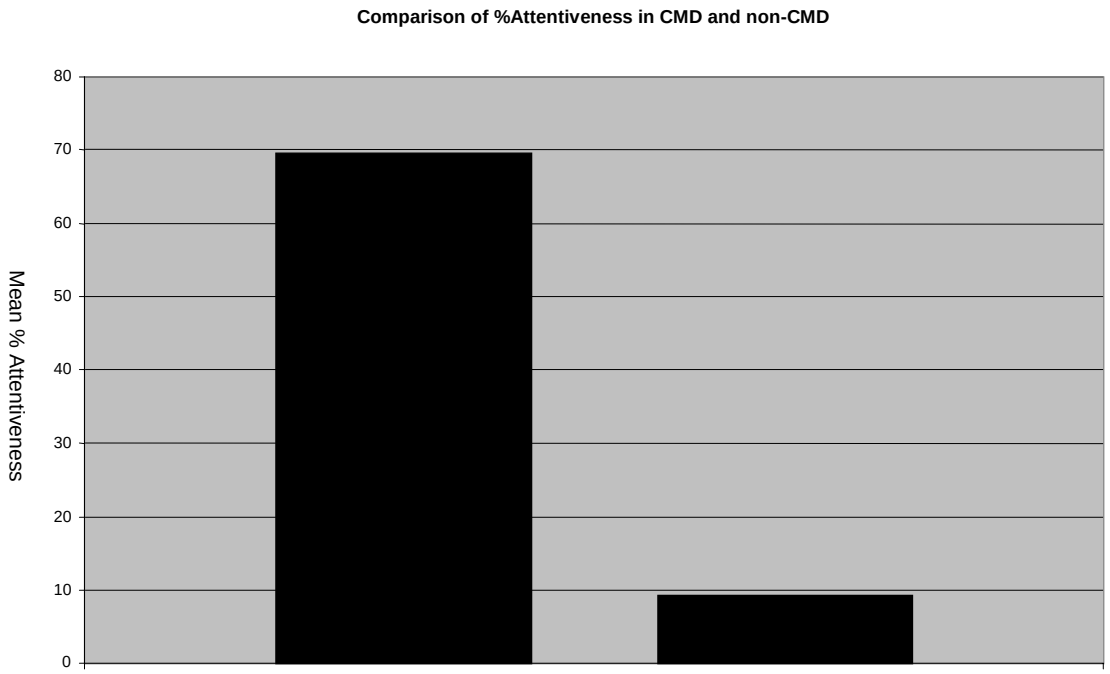


Comments and Discussion on Attentiveness Levels in CMD and non-CMD Sessions for George

It can be seen (*Chart 10.10)* that attentiveness in the CMD session of 16 Dec, [Chart (3)] is considerably higher than in the other two non-CMD sessions [Charts (1) & (2)]. In both of these it is marginally higher in the reds and pinks than the blues and greens, but this may not be significant since the difference is very small and the random variation is large. However, attentiveness is consistently and notably higher in CMD with less random variation. Colour sections where there was fast and responsive flashing from the reds show the highest levels of attentiveness (indicated by in the section on the chart).

The chart below shows the average (mean) values for attentiveness in CMD and non-CMD for these 3 sessions: (For tables and calculations see spreadsheet in Appendix 2 page lxi.)

Chart 10.11 **Chart of Comparison of Mean Values for Attentiveness in CMD and non-CMD over 3 Sessions for George**



CMD **Non-CMD**

It can be seen (*Chart10.11)* that there is a seven-fold increase in the level of attentiveness between CMD and non-CMD sessions. A statistical analysis has not been carried out on these data since the difference is so large and since there were insufficient CMD sessions for a proper sampling procedure to be carried out. Nevertheless the difference is so outstanding that it can be considered likely to be of significance.

This substantial increase in attentiveness when the lighting changes are deliberately responsive illustrates that George is also far more engaged when he 'realises' that he has a part to play in the interaction. Direct evidence from the video, showing his smiling, laughing, clapping and happy wrist banging, also supports the view that Colour Mood Dialogue is an engaging and pleasurable experience.

Detailed Analysis of Small Section in Colour Mood Dialogue (CMD) for Brian

Methodology for Analysis and Presentation on Charts

A small section of a CMD session (31 Jan 00) was selected for a more detailed analysis. In this session Brian was particularly animated. The purpose of this analysis was to establish whether there was a 'dialogue' between Brian and the lights. This was done by comparing the timing of his behaviours and the lighting changes to determine whether turn-taking between Brian and the lights was taking place. The blues were kept at full (100%) to keep the lighting levels high, and the reds were manipulated (and to a lesser extent the greens) in response to Brian's behaviours. The reds show up clearly over blue.

A short section of 90 seconds was chosen for analysis:

(1) Colour changes were estimated (as a percentage) for reds (red and pink lights), blues and greens every second over the chosen period. This was estimated by eye from the brightness of the colours on the video. For example a colour on full was given a value of 100%, half full 50% etc.

(2) Hand flicking intensity was estimated every second by observation using a scale of 1-3 as follows: 1 – Slow (1-2 flicks per second) and relaxed movements

2 – Intermediate speed (2-3 flicks per second) with more tension

3 – Fast (3-4 flicks per second) and tense movements

This was plotted on the graph by changing it to % values (i.e. 1=33.3%, 2=66.6% and 3=99.9%) in order to be compatible with lighting intensity values (*Chart 10.12*, Charts 1 and 2).

(3) Vocalisation intensity (loudness) was estimated and recorded in the same way (*Chart 10.12*, Charts 3 and 4). The value of 3 was given for his loudest sounds, 1 for the quietest and 2 for those intermediate between 1 and 3.

(4) During one short sequence (38-45 seconds) colour and pitch of voice was recorded every ½ second. Pitch was estimated as musical notes by comparison with a piano. This was plotted on the graph with the higher notes given a higher numerical value according to position in the scale: D=100%, A=70%, B=80%, C#=95%, again to be compatible with the % values for colour (*Chart 10.12,* Chart 5).

(5) The data were recorded on an Excel spreadsheet and is given in Appendix 2 page lxii - lxiii.

Accuracy and Reliability

Timing was done with a stopwatch, as there was no clock on the video camera. Also the video could only be played back at normal speed. This meant that recording was extremely cumbersome and not very accurate. An estimate of reliability by repeating gave a figure of about + or - 1 second but for critical sequences where recording was repeated 15 to 20 times to achieve a more accurate mean it was nearer to ¼ second. However, co-ordinating the recording of time, lighting levels and estimation of behaviour levels was still problematic. Despite this, these observations probably are sufficient to justify the interpretations that have been made. Direct observation of the video recording itself should also be seen as part of the evidence.

Charts Showing Detail of Flicking and Vocalisation in Small Section of CMD for Brian

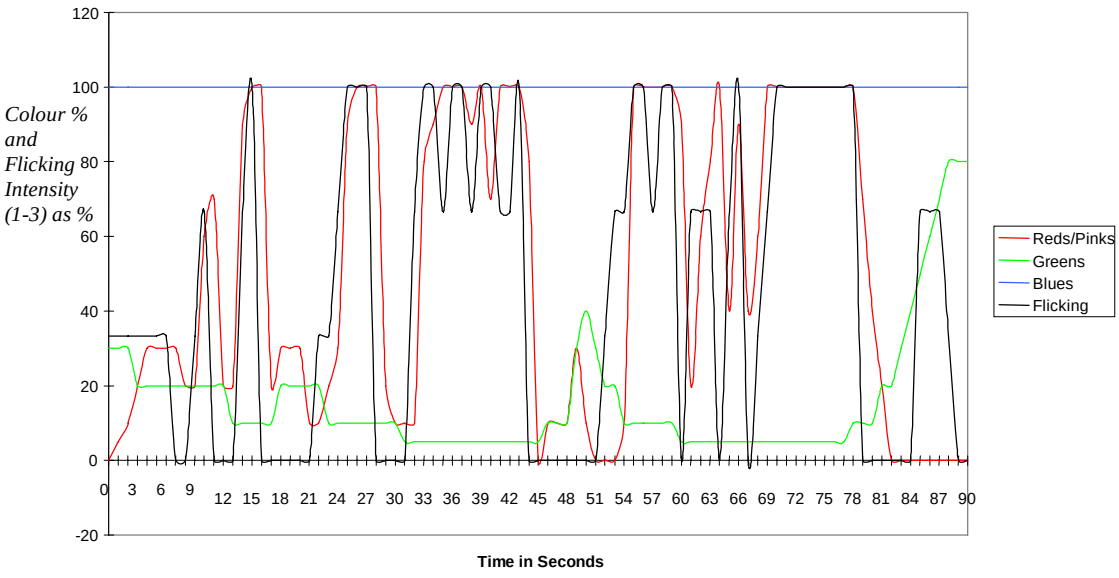
(*Chart 10.12)*

Charts (1) & (2) relate to hand flicking. They are both taken from the same set of data but chart 1 covers 90 seconds and chart (2) only 45 seconds. This is to expand the first part of the sequence to give greater detail.

Charts (3) & (4) are similar but relate to vocalisation.

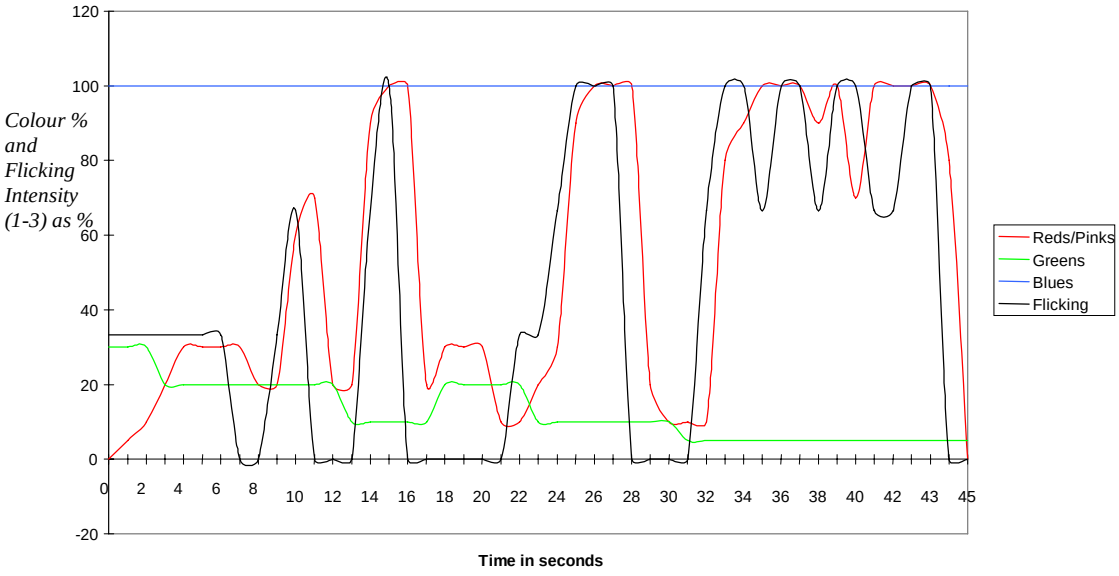
Chart 10.12 **Charts of Detailed Analysis of Small Section in Colour Mood Dialogue**

Chart (1) Relationship of Flicking to Colour Intensity in Colour Mood Dialogue



Note: The blues were kept at full (100%) to keep the lighting levels high, and the reds (and to a lesser extent the greens) were manipulated (see page 159).

Chart (2) Relationship of Flicking to Colour Intensity in Colour Mood Dialogue



Observations from Charts:

Charts (1) & (2) Flicking: It can be seen that the rise and fall in flicking intensity and red light intensity follow a very similar pattern. In general the lights follow the flicking. This was intentional. At 13-14 seconds the lights appear to be just ahead but this is probably not significant in terms of accuracy. However at 38-41 seconds the lights do lead and it appears from the video that this is a real effect.

At about 80 seconds the lights take the lead in changing to green (calming effect) and flicking rate begins to decline.

Chart (3) Relationship of Vocalisation to Colour Intensity in Colour Mood Dialogue

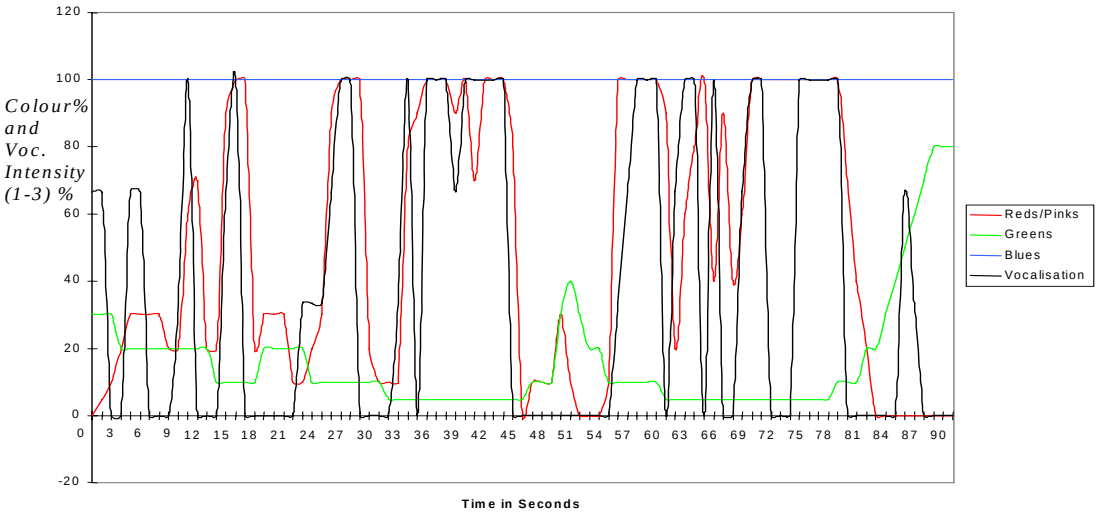
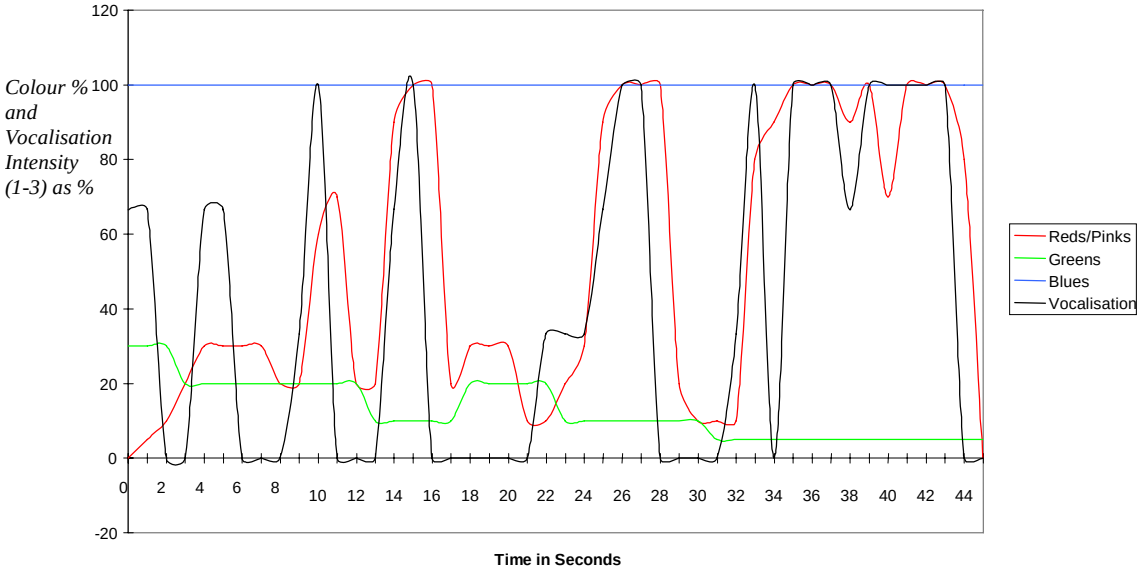


Chart (4) Relationship of Vocalisation to Colour Intensity in Colour Mood Dialogue



Charts (3) & (4) Vocalisation: These follow a similar pattern. The only significant difference is in the sequence from 32-45 seconds where at about 40 seconds the voice remains loud even though the colour intensity falls. However there is a significant change in pitch. [See chart (5)]

Chart (5) Relationship of Voice Pitch to Colour Intensity in Colour Mood Dialogue

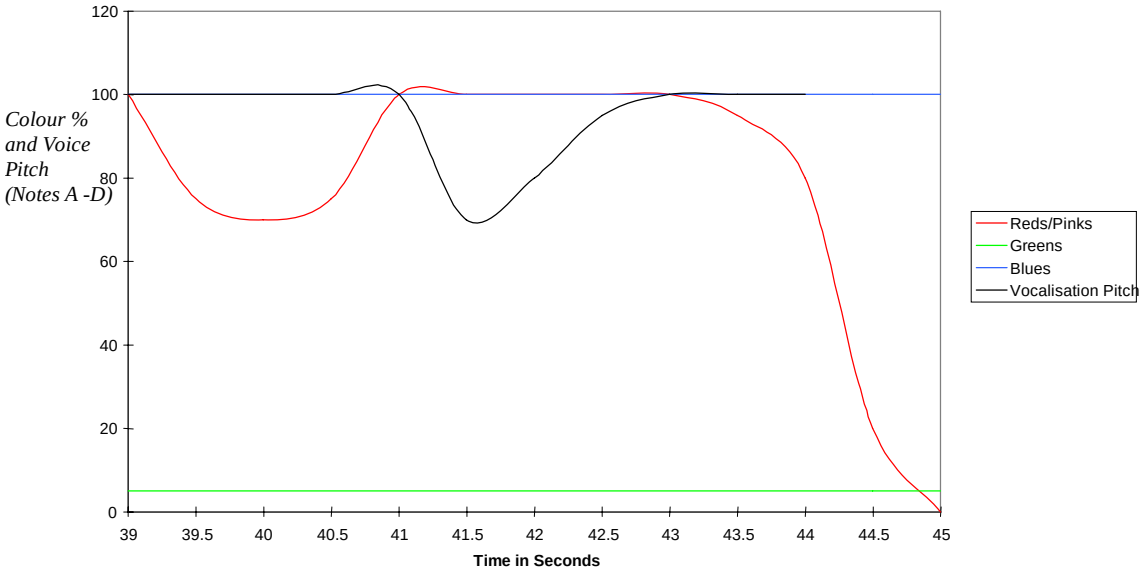


Chart (5) Pitch of Voice: This is intended to show a sequence where there appears to be a correlation between red light intensity and musical notes. Between 39 and 41 seconds the reds dip and rise again and this is immediately followed by a musical sequence of approximately the same timing and roughly following the notes: D down to A, followed by A to B to C# and back to D in a continuous change of pitch rather than separate notes.

Discussion of Detailed Analysis in CMD

In general, the lights intentionally followed Brian's lead. This was done to give him a sense of empowerment in the interaction. On each occasion, after he relaxes and the lights go down, he looks up at them again expectantly. It appears that he then deliberately resumes the behaviours in order to bring up the red lights again. Thus he seems not only to be aware that his actions have a direct effect on the lights but also to find this interaction desirable, as shown by the repeated sequences.

However, in the short sequence illustrated in chart 5 it appears that his response follows the lead of the lights. He seems to be giving a musical 'answer' to the dip in the reds. Also, for flicking (chart 2) in the sequence from 38-41 seconds, and in the change to green mood at the end (chart 1), it is the lights that take the lead, with Brian's flicking levels following. This would suggest that there is a degree of turn taking between Brian and the lights which could be taken to indicate that a kind of 'dialogue' is taking place. Therefore in this type of interaction a creative element is introduced since neither the lighting changes nor Brian's behaviours follow a fixed reaction pattern.

This creative 'improvisation' between Brian and light operator through the medium of changing colours is the essence of what is meant by 'Colour Mood Dialogue'.

Observations of Other Children in the First Cohort

Some brief comments on two of the other children in the first cohort will now be given. They were not singled out for detailed analysis for the reasons given earlier but some brief observations will be cited, taken from the notes made immediately after the sessions.

Christopher

Table 10.3 Personal Details and Baseline Abilities for Christopher

Christopher 17 years of age	6 years	Male	S.L.D.	ASD	Non-verbal	Pre-academic, is learning to match symbols	Solitary. 'Little understanding of any social context'	

Brief Notes for Christopher in the Colour Room

Although Christopher attended only relatively few colour sessions, it was noted on several occasions that the sessions had an overall calming effect. He would sometimes lie down at the

end and relax completely. The general impression was that he was more relaxed in the blues and greens than the reds. Also reports from his teacher stated that he was often considerably calmer following a colour session.

Stuart

Table 10.4 Personal Details and Baseline Abilities for Stuart

Stuart 16 years of age	2 years	Male	Information not available	ASD	Verbal, but problems with comprehension and social use of language	Able to read, can do basic addition and subtraction	Solitary. Behavioural problems. Sometimes violent	Epilepsy

Brief Notes for Stuart in the Colour Room

Stuart was unusual in that he had meaningful speech. He often talked a great deal during sessions, sometimes about the colours and sometimes about anything which came into his head at the time. Although he showed no obvious behavioural differences in the different colours it was interesting that he regularly asked for green and would then sit still for some time, comparatively calmly and contentedly.

Observer Reliability in Recording

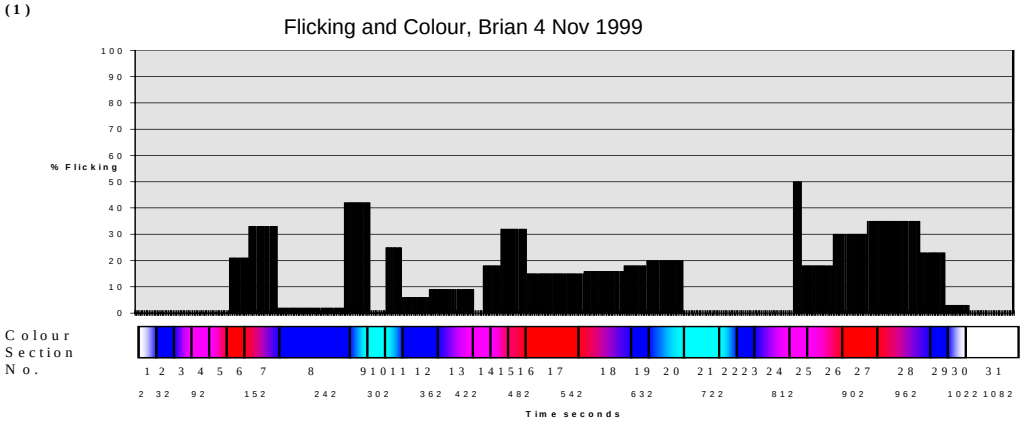
The methodology for observer reliability checks was given in Chapter 8**.** The results of these tests will now be given and discussed.

Intra- Observer Reliability

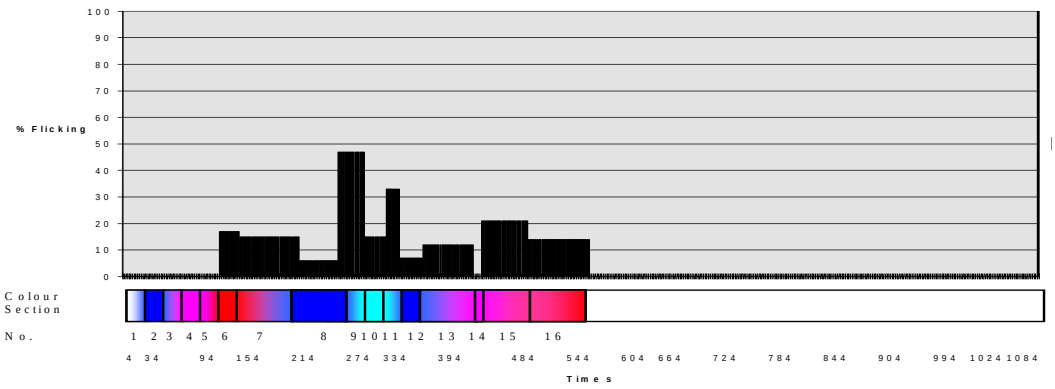
The results of this check are shown on the charts in *Chart 10.13* overleaf which compare the original data with the intra-observer check repeat (data tables are given in Appendix 2 page xxxviii – xxxix).

Chart 10.13 **Estimate of Intra-Observer Reliability: Charts Comparing Two Analyses for Flicking and Rocking on Separate Occasions (17th June & 8th July 2000) 4th Nov 1999**

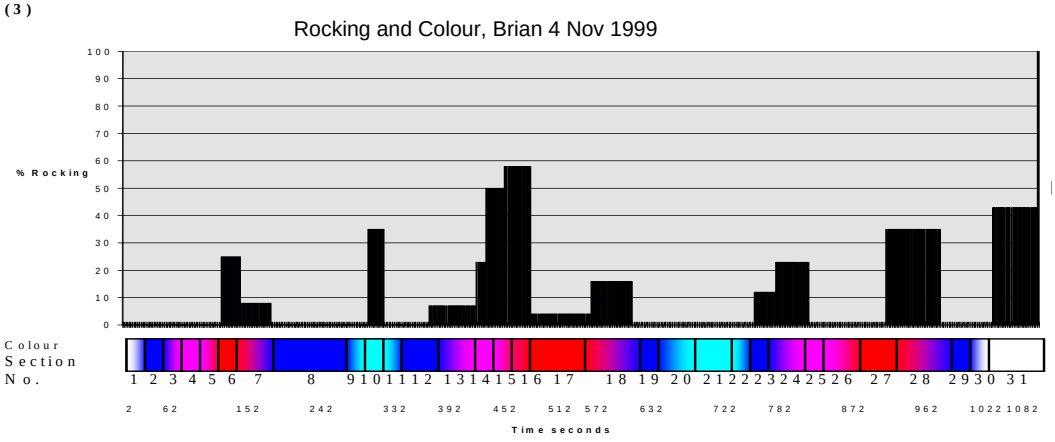
(1)



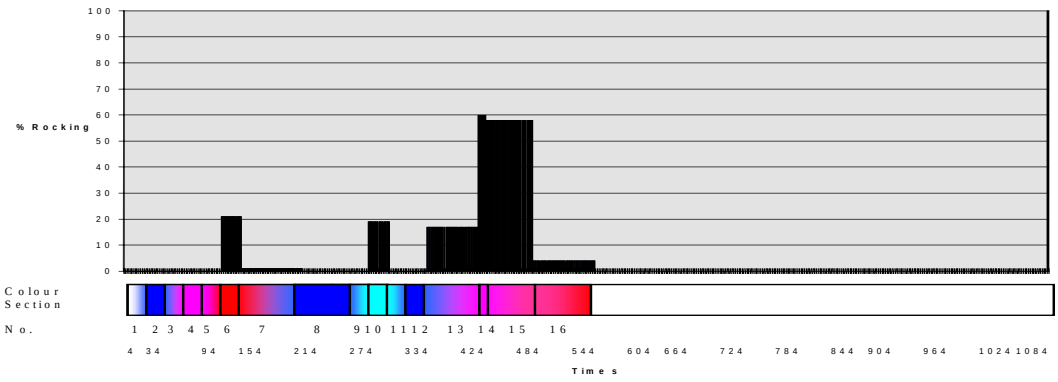
(2)



(3)



(4)



Comments on the Charts (See *Chart 10.13)*

In general the charts for the two analyses for flicking and rocking are similar.

The Two Charts for Flicking -Problems with Identifying the Start and Finish of Colour Sections

Firstly, it will be noticed that the length of the sections is not identical in the two charts. [*Chart 10.13,* (1) & (2)] They are only approximately the same. This reflects the difficulty of determining by eye exactly when the brightness of a spotlight begins to change. Particularly if the change is slow, identification of the exact start or end time is very difficult. This means that there is a certain amount of guesswork involved. The changes where the start and finish of sections is hard to identify are mainly those within a lighting band i.e. where the overall colour change is small as for example the change from increasing pink to static pink. In terms of the interpretations made this would make a negligible difference since they only refer to general colour bands. In the above example the whole of a section of increasing pinks and static pinks would be referred to as 'pinks' when discussing effect on behaviour. Flicking levels over this whole 'colour band' can be seen to be very similar for both analyses and this is what is important in terms of the purpose of this investigation.

To illustrate this more precisely, flicking levels have been calculated in sections 6-8 for both analyses. It will be noticed that section 7 (up-fade of the blues and down-fade of the reds/pinks) is smaller in the first chart than the second. This reflects the difficulty of telling just when the last remnant of purple from the reds/pinks has finally disappeared. Although this point determines technically when the section changes, the actual visual effect is unaffected, the appearance will be a dark violet/blue over the whole of the disputed area. This means that if the total value for flicking is taken over a major colour band e.g. all the red/pink

or all the blue/blue/green the result will be virtually the same wherever the separate sections start and finish. The actual technique of timing of the flicking is probably quite reliable.

Take for example the flicking activity in sections 6,7 and 8 on the first two charts. (9 starts at virtually the same time on both.) Overall the three sections add up to about the same length of time but individually they vary slightly.

To calculate the total amount of flicking, the 'area under the graph' i.e. the total amount of black is calculated (Blaikie 2003): (These figures are obtained for each section by multiplying the figures in the 'time of section' (x-axis) and '% flicking' (y-axis) columns in the data tables given in Appendix 2 page xx –xxii & xxxviii - xxxix)

Calculation of % Difference Between the Two Analyses (for 3 Colour Sections)

For the first chart: Section 6 Area = 21x24 = 504

Section 7 Area = 33x36 = 1188

Section 8 Area = 2x84 = 168

Total = 1860

For the second chart: Section 6 Area = 17x24 = 408

Section 7 Area = 15x71 = 1065

Section 8 Area = 6x47 = 282

Total = 1755

This works out at a difference of about 5.6%.

Therefore, although the shape of the sections is different the total amount of flicking is very similar if taken over the larger colour area. Since the inferences made, refer only to approximate colour bands e.g. ‘in the reds’ or ‘in the blue/greens’ and the levels are only general descriptions e.g. increased or decreased, the interpretations made can be justified.

Inter-Observer Reliability

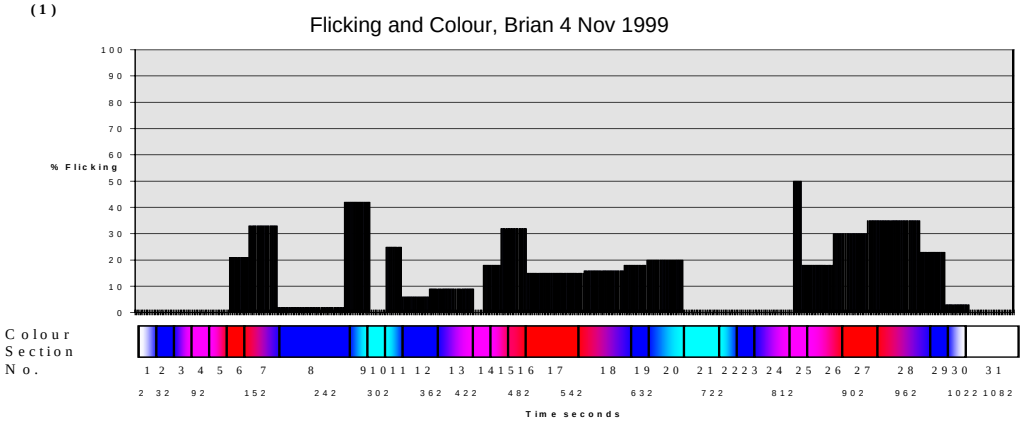
It was decided to use the same section of the recording of November 4th 1999 for Brian as was used for the intra-observer check. It would show whether the three attempts at analysis were within the same bounds of general agreement.

The method of analysis was exactly the same as in the previous analysis (video analysis recording sheets are given in Appendix 2 page xl - xli). The charts are displayed on the next pages for flicking (*Chart 10.14*) and rocking (*Chart 10.15*). The three charts on each page refer to (1) the original analysis, (2) the intra-observer reliability check and (3) the inter-observer reliability check.

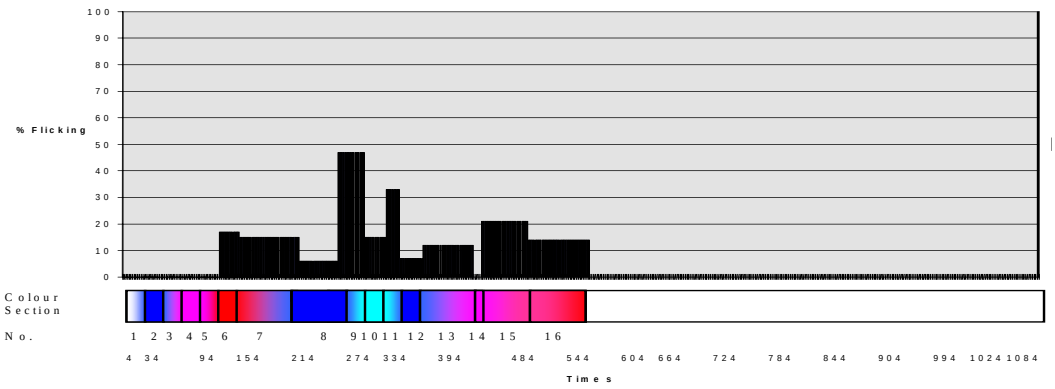
The sections chosen were not typical, with only a little flicking in the first red section and a considerable amount in the blue/green. Therefore if the second observer had been biased in her analysis because she was not naïve to the hypothesis of increased flicking in the reds, she might have tended to overestimate in the reds and underestimate in the blue/greens. In the event her results showed that this was not the case, and it can therefore be assumed that she was not influenced by being aware of the hypothesis of increased activity in the reds.

Chart 11.14 **Charts Comparing Intra-Observer and Inter- Observer Reliability for Flicking for Brian**

(1)



(2)



(3)

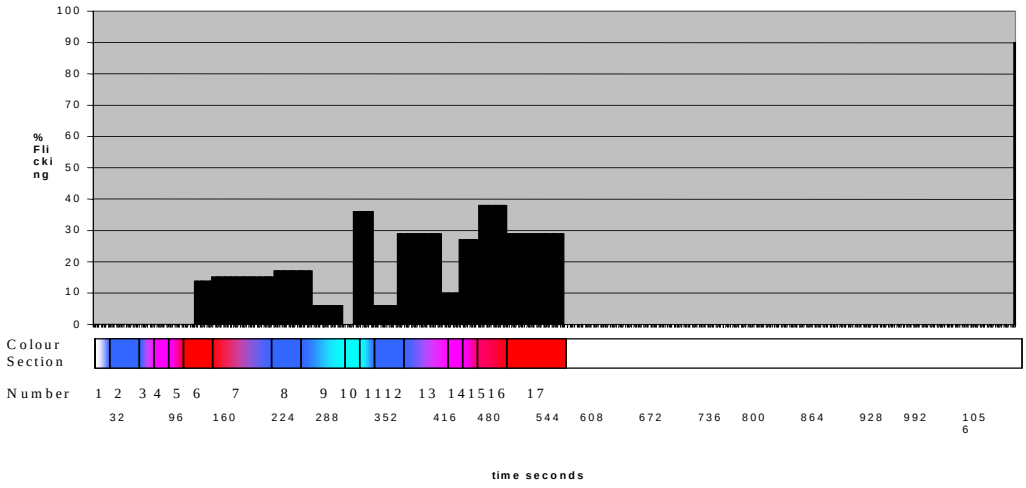
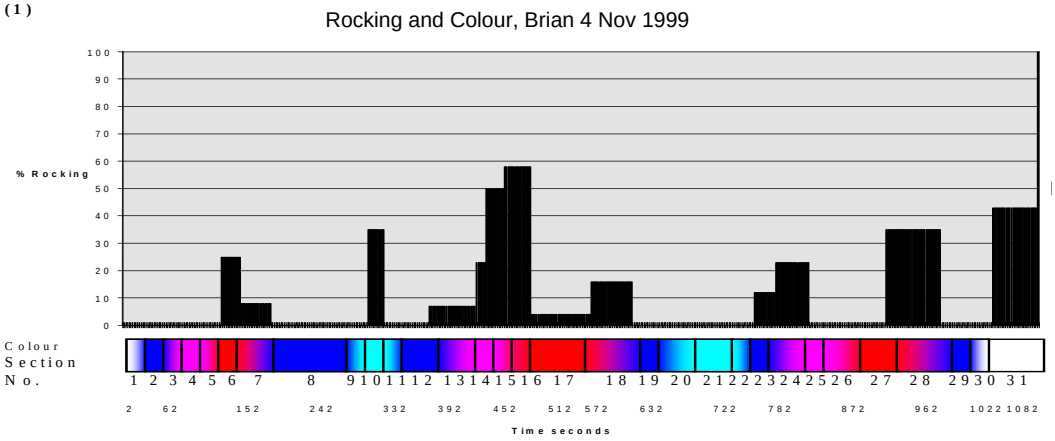
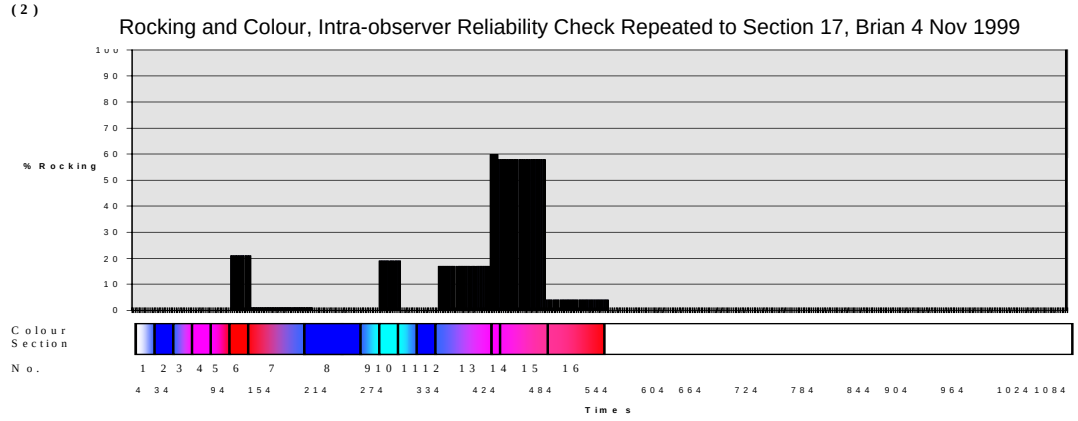


Chart 10.15 **Charts Comparing Intra- Observer and Inter - Observer-Reliability for Rocking for Brian**

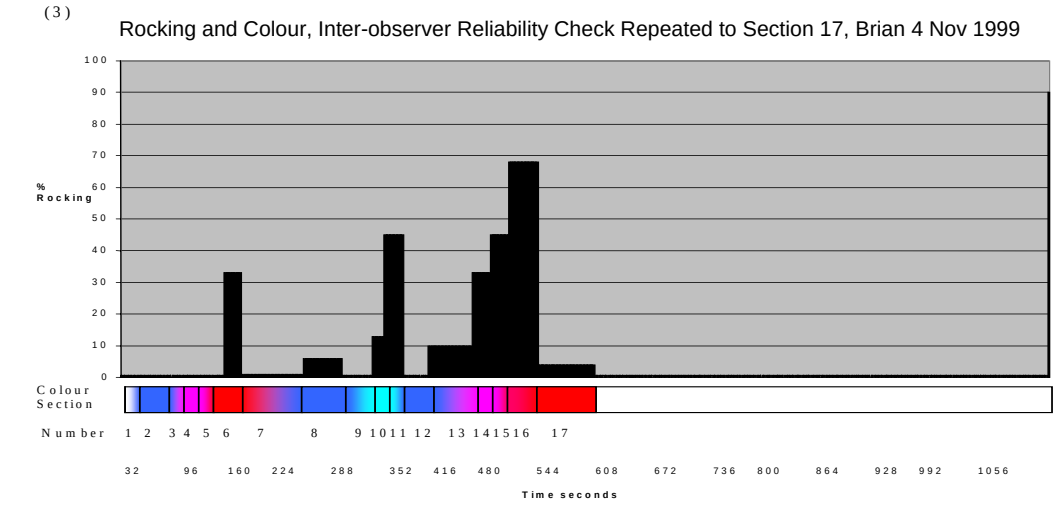
(1)



(2)



(3)



Comments on Charts

Flicking *(Chart 10.14)*

It can be seen that the overall shape of the third chart (independent observer) is broadly similar to the other two analyses (see note below). The minor differences which are apparent relate mainly to the problem in deciding on the start and finish times of the colour sections, as discussed in the previous section on intra-observer reliability. Again, if the area under the graph (total amount of flicking) is estimated over the larger colour bands it will be found to be similar though not identical in the three cases.

The results generally would indicate that within the bounds of agreement already discussed the method of analysis is transferable and reliable. Therefore the above checks verify that the data are sufficient for the broad generalisations (wide colour bands) of interpretation that have been made.

Rocking *(Chart 10.15)*

Again the overall shape of the three charts is broadly similar, indicating the same degree of reliability as discussed previously.

There are minor differences in estimation for both flicking and rocking:

In (*Chart 10.14)*, section 16 or 17 (red) the level of flicking does appear to be somewhat higher in chart 3 and this probably reflects a real difference in estimation, but it should be noted that without continuing the analysis on into the next sections it is not possible to tell whether some of this flicking would be included in the next sections on the other two charts.

In *(Chart 10.15)* at sections 10,11 and 16 there appears to be a small difference in estimation of rocking time. On re-checking the video it appears that in sections 10 and 11 the higher value is likely to be the more accurate result (second observer), and in section 16 it is the lower one (original). This would indicate a genuine minor inaccuracy in the recording. However this level is insufficient to invalidate the general findings.

Overall Comments on Observer Reliability

In the case of the minor inaccuracy level for flicking analysis, the problem would be unlikely to affect the statistical validity of the results since the calculated values of F are well above those in the tables. However, it should perhaps be taken as indicating that if numerical values for increased or decreased flicking were to be given as evidence, rather than just the broad general descriptions of levels, then further repeats of analyses would probably be necessary. Rocking analysis has in any case not been included in the first cohort conclusions.

Therefore since the conclusions from the first cohort involve only broad generalisations and since they are being put forward as only indicators for the next stage of the research, it is proposed that they have been sufficiently carefully checked to be considered valid.

(Note: One of the biggest difficulties in this method of video analysis was determining the length of the colour sections and then identifying them again when re-running the video for behaviour timing. This problem was rectified after the completion of the pilot phase (first cohort) by the addition of a time clock on the video recorder.)

Summary of the Outcomes of the First Cohort

This preliminary phase of the research into the effects of colour on children with autism suggests the following:

- In general red tends to produce arousal and excitement while blue and green have a calming effect. However, other factors such as overall disposition will also affect this response.

- The effect is more marked when the child is in a more aroused state to begin with.

- Prolonged exposure to any one strong and static colour causes unease and discomfort.

- For a child where it has been established that blue/green has a calming effect it is possible to use this knowledge to deliberately pacify a child and cause them to relax.

- For a child with autism, it is possible to use changing colour moods as a medium for interaction (not involving an interactive partner). Some will readily take part in a transactional reciprocal interaction directly with the changing coloured lights and appear to enjoy it.

It is realised that the sample of children in this first phase was too small to make any valid generalisations. Also a more objective means of controlling choice of colour and length of sections would be desirable. For the first cohort this was done manually, so there could always be the criticism that in non-CMD sessions the light operator was changing the colours according to the child's behaviour rather than the other way round. Although a genuine

attempt was made to be objective, this could be a valid criticism. For this reason a computer sequence was developed and used for the second cohort. (The question of construct and internal validity have been discussed in Chapter 8.)

Therefore, because of the nature of this first phase of the research these are only tentative conclusions and will need further verification before they can be put forward with confidence. However, as a pointer for possible further investigations and as a basis for the design of the next phase of the research they can be considered to be of value.

CHAPTER 11

REVISED METHODOLOGY FOR USE OF THE COLOUR ROOM AND OBSERVATIONS OF CHILDREN IN THE SECOND COHORT

Revised Methodology

For the second cohort of children, the programme was now developed into the three main stages as follows:

Stage (1): Observations of Children's Behaviour in the Main Colours.

The child's behaviour was observed and recorded on video during a sequence of the main colours. (i.e. red, blue and green with the cross-fade intermediate colours.) The support person was present but did not interact unless there was a problem. This was to determine the child's Colour Response Profile i.e. to find out how the child was affected by the main colours. The sequence of colours that had gradually been developed for the first cohort was now programmed into the lighting control computer so that it could be run independently of the light desk operator. This was done in order to make the trial more objective by eliminating the possibility of the operator altering the colours according to observed behaviour. Thus the child's behaviour could be recorded in a programmed sequence which could be exactly repeated a number of times. Details of the sequence are given on p 181.

Stage (2): Interaction Between Child and Colour Where the Light Operator Responds to the Child's Gesture and Vocalisations etc. with Changing Colours. (Colour Mood Dialogue CMD)

The intention was to create the possibility of an interaction that appeals directly to the senses and emotional mood and is independent of the intellect or spoken language. The knowledge gained from stage (1) was used to enhance and interact with the behaviours of the child. This was intended to by-pass the child's difficulty in bringing the inner life to expression through the normal communication channels by interacting directly at this 'lower' level of mood and emotion.

Stage (3): One-to-One Interaction Between Adult and Child Augmented by Changing Colour Moods.

The adult now shared the experience by copying and enhancing the gestures, vocalisations etc. appropriate to the colours. As the rapport was built up, this technique of colour enhancement of the mood could be added to story telling and role-play as language and conversation were gradually introduced.

Only two children from the first cohort (David and Margaret) and two from the second (Simon and Anna) continued to stage 3 and this will be described in the write up of the third cohort in Chapter 14. This chapter is concerned mainly therefore with repeating the work on Colour Response Profiles and colour Mood Dialogue in order to attempt to confirm the findings from the previous cohort in a more systematic way.

The Computer Sequence

The underlying intention of the sequence was to expose the child to the three main (primary) colours of red, blue and green and to the in-between colours of magenta and turquoise

(blue/green) for a fixed period of time. Yellow was not used because of its lack of any particular effect, and because of its confusion with the white room lights, which marked the end of a session, as described earlier. The exposure time for each colour had to be long enough to give the child time to acclimatize to the colour but not so long that it became uncomfortable. (One of the findings from the first cohort was that too long in any one strong colour tended to become uncomfortable.) From initial indications from the first cohort a time of 50 seconds was chosen. A time of 20 seconds for the cross-fades between the colours was chosen as a gentle but perceptible colour change. In order to find out whether after-images had any detectable effect, two more sudden changes (5 seconds) out of a strong colour were used. Following red, a greenish-blue after-image would be produced and following green it would be pink (see glossary of terms). Since the red and green were suddenly cross-faded out against blue, both after-images would be superimposed over blue. This was because blue was still being used as the safe 'home' colour. The whole sequence was repeated twice giving a session time of about 15 minutes. A summary of the sequence is given overleaf:

Table 11.1 Sequence for Computerised Lighting

Computerised Lighting Sequence

Cues 1^{st}, *2nd*	**Changes**	**Time**	**Description**
(1)	*1.* **Start W**	***Variable***	White room lights on.
(2)	*2.* **W↓B↑** ***←Start 'Go'***	**W↓ 20s. B↑ 15s.**	Cross-fade blues up, room lights down.
	*3.***B**	**B 50s.**	Blues on.
(3), (9)	*4.***BP↑**	**P↑ 20s.**	Pinks up-fade.
	5. **BP**	**BP 50s.**	Blues and pinks on.
(4), (10)	*6.***B↓PR↑**	**B↓ 20s PR↑ 15s.**	Blues down-fade, pinks stay, reds up-fade.
	7. **PR**	**PR 50s.**	Pinks and reds on.
(5), (11)	*8.***B↑P↓R↓**	**B↑ 4s. P↓ 5s. R↓ 5s.**	Sudden up-fade of blue, down of pink and red.
	*9.***B***	**B* 50s.**	After image point (blue/green) in blue.
(6), (12)	*10.***BG↑**	**B G↑ 20s.**	Up-fade greens, blues on.
	*11.***BG**	**BG 50s.**	Blues and greens on.
(7), (13)	*12.***B↓G**	**B↓ 20s. G**	Down-fade blues, greens on.
	*13.***G**	**G 50s.**	Greens on.
(8), (14)	*14.***B↑G↓**	**B↑ 4s. G↓ 5s**	Sudden down-fade of greens, up-fade of blues.
	*15.***B***	**B* 50s.**	After-image point (pink) in blue.

After cue (8) first time, go back to cue (3) now cue (9), and repeat to cue (8) now cue (14) then: (These will be changes 16 - 27)

(15)	*28.* **B↓W↑**	**B↓ W↑ 15s**	Cross-fade blues down, room lights up.
	29. **W……*end***	***Variable***	End with room lights.

**** After image point***

W = White room lights, B = Blues, P = Pink/ Magentas, R = Reds. G = Greens.

Recording of Data

Each session was video-recorded, a research diary was kept and notes were taken by two psychology assistants as described for the first cohort. Also informal interviews were held from time to time with care staff and teachers to monitor changes and progress.

Method of Video Analysis

This was also carried out in the same way as for the previous cohort except that different behaviours were chosen for analysis.

Calculations on Video Analysis Recording Sheets and Displaying Data on Charts

Again the same methods have been used as for the first cohort.

Overview of the Second Cohort and Selection for Detailed Analysis.

Although at the outset for this second cohort it was felt that a suitable methodology had been developed, there were many problems:

- Firstly the video recorder failed to work from March until September, which meant that a proper analysis of a large proportion of sessions could not be carried out.
- Several of the children missed so many sessions that there were little consistent data.
- Some of the children did not display behaviours that were easy to record quantitatively.

There were 6 children in the second cohort. Baseline descriptions have been given in the table in Chapter 9 but a brief report on each will now be given to summarise their time with the project and to indicate those children selected for more detailed analysis.

Simon

Simon remained with the project for nearly three years and continued on to the third stage. He has been chosen for detailed analysis of the first stage during the computer-controlled sequence.

Anna

Anna also remained with the project for nearly three years and she continued on to the third stage. Some of her sessions in Colour Mood Dialogue were chosen for detailed analysis.

Nicholas

Nicholas stayed with the project for about 11 months. His attendance was inconsistent due to transition problems and the video recorder was broken for several months. He was not therefore chosen for detailed analysis but his reactions to the colours will be mentioned at the end of the chapter.

Edward

Edward gave the impression of being uncomfortable and feeling claustrophobic in the colour room. He also missed many sessions, as transitions round the site were difficult. As it had been decided that if a child appeared to be unhappy in the room they should be allowed to withdraw, Edward was removed from the project. His behaviour in the colour room will be briefly mentioned at the end of the chapter.

Sean

Sean left the school soon after starting with the project and therefore a detailed report will not be given.

Susan

Susan was causing problems in class due to challenging behaviour and missed many sessions because of the difficulty of transition to and from the colour room. Therefore a detailed report will not be given, but a brief report will be given at the end of the chapter.

Selection of Simon and Anna for Detailed Analysis

As indicated in the previous pages these two children were the most suitable for detailed analysis because, for the reasons indicated above, they were the only ones who could attend regularly and remained with the project for any significant length of time. For a full overview of all the sessions see Appendix 1 pages viii – xii. Again, for each child the appropriate line from the table of baseline abilities will be repeated for reference and this will be followed by a brief description.

Simon

Table 11.2 Personal Details and Baseline Abilities for Simon

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Simon 12 years of age	I year when joined project	Male	'Complex learning needs'	ASD	Can copy a few words echolalically	Can write one or two words. Simple additions	Solitary	

General Description

Simon had no meaningful speech though he could repeat a few words echolalically. He would often ignore people and avoided eye contact though he had been reported to hug some of the female care staff whom he knew well. He was able to use a computer and was particularly skilful when cutting out with scissors. One report stated, 'He does not understand language.'

Overview of Simon's Sessions in the Colour Room

Simon attended sessions regularly. He was always willing to attend and seemed to enjoy the experience. An overview of all the sessions in given in Appendix I pages viii – ix. He always sat quietly and was very attentive to the changing colours. He would often hold his fingers around his eyes but otherwise he was very quiet and passive. It was originally thought that because he did so little there would be nothing clear enough to analyse. However, careful observation of the videos at a later stage showed a subtle and small change in posture in the different colours. This feature was used in the analysis described below. He showed little response to Colour Mood Dialogue. At the last session before he was expected to leave it was decided to try interacting with him on the shadow screen just to see what would happen. There was an immediate interest in the shadows and intense and unexpected engagement with the support person that led to the decision to continue with him on to the third stage which will be reported on in Chapter 14.

Choice of Behaviours for Analysis

Although Simon appeared at first to make practically no movements in response to the colours, when detailed observations of the video recordings were made it was discovered that during the computer sessions a very small and subtle effect of the main colours could be detected. It was noticed that in the reds and pinks he tended to look up more, often actually looking at the lights. Conversely in the blues and greens he would often look down. This was a very slight effect but nevertheless consistent. The difficulty due to the small size of the differences was compounded by the fact that he was sitting or sometimes almost lying down which meant that deciding whether he was really looking up or down was even more difficult. Despite this it was decided to attempt to assess this quantitatively. As with the previous cohort, there were not enough sessions to choose a random sample for analysis. Therefore the other alternative of using all sessions was chosen. All the computer-controlled sessions where

the video recorder was working were used. This amounted in the end to 4. It was also decided to record vocalisations in the different colours although no obvious effects could be picked up from a general viewing of the video.

Method of Video Analysis

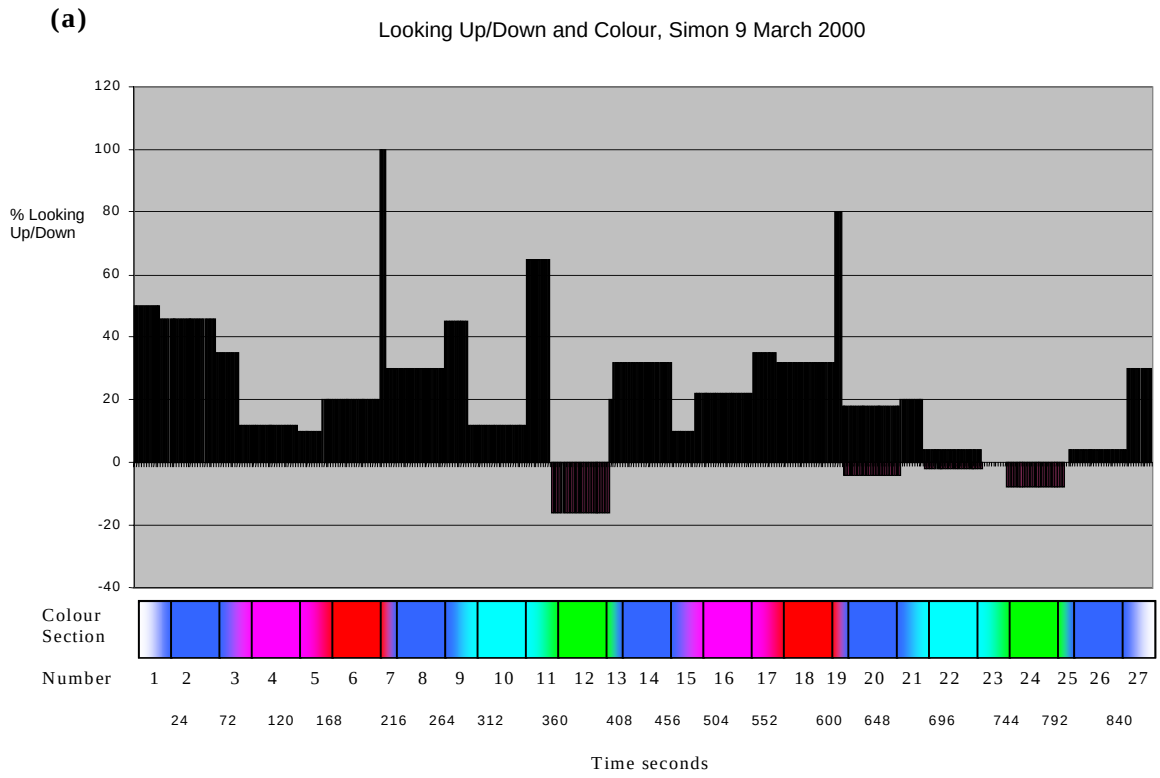
For each colour section an assessment was made as to whether he was looking up, looking level or looking down. Using a stopwatch, first the length of time for which he was looking up was recorded, then, re-running the video this was repeated for looking down. If he was not recorded as looking up or down it was assumed that he was looking level. Looking up and looking down time was then expressed as a percentage of the time of the section. (Data are given in the Video Analysis Recording Sheets in Appendix 3 pages lxiv - lxxi). It should be noted that he would often look up and down in the same section (but not at the same time). Similarly, the time for which he was making sounds (vocalisation) was recorded for each colour section and this was again expressed as a percentage of the section. (Data tables for a composite chart over all 4 sessions are given in Appendix 3 pages lxxii – lxxviii.) These data were then transferred to Excel as in the previous examples and charts of the results were drawn up. Values for looking up were taken as positive and for looking down as negative.

Results of Video Analysis for Simon

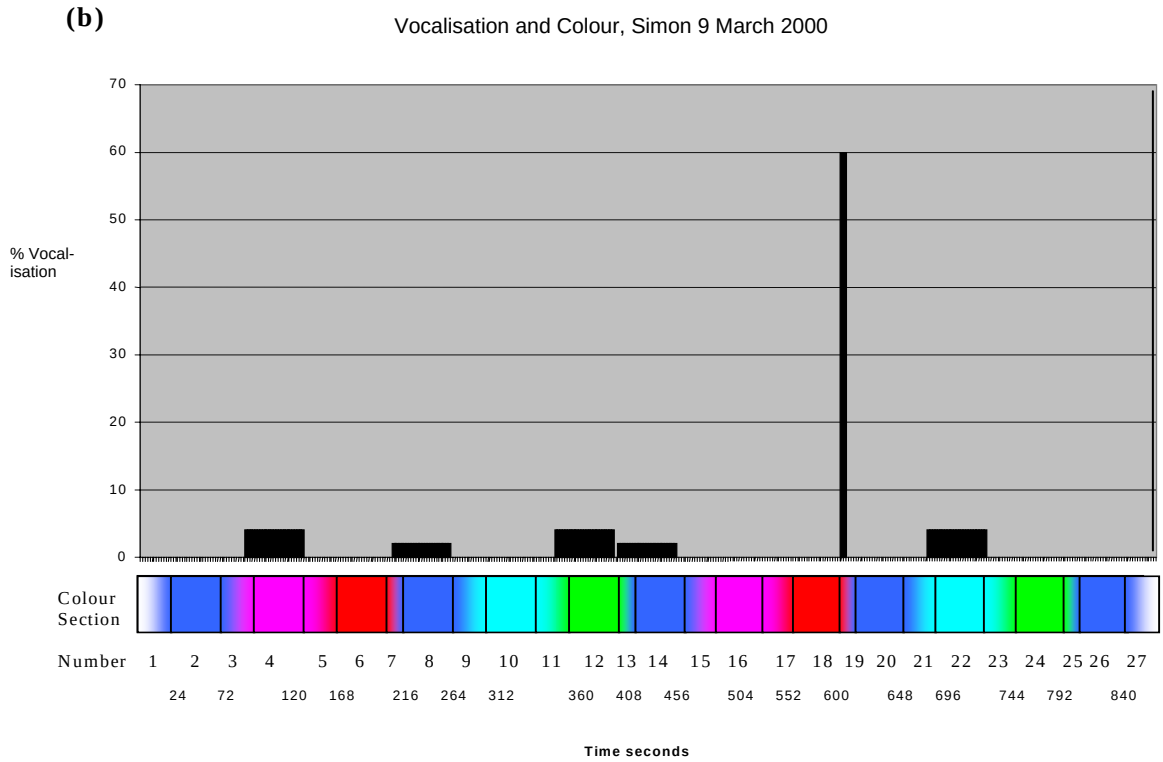
The data obtained from the video analyses were then displayed on charts, and these are given on the following pages and each is discussed in turn. First all the charts pertaining to one session are displayed together to give an overall impression of the session. Then the charts of looking up/down over all four sessions are displayed together and similarly for vocalisation.

Chart 11.1 **Charts of Session for Simon 9 March 2000**

(a)



(b)



Comments on Session of 9 March 2000

Looking Up/Down

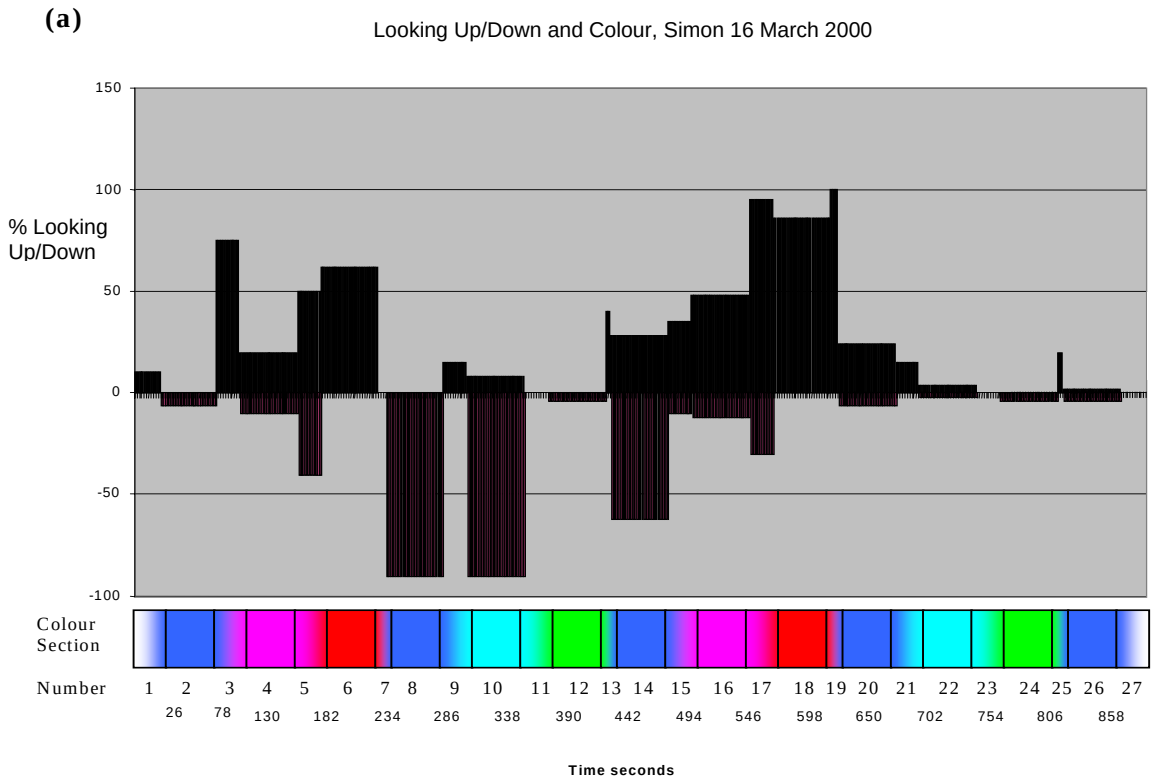
Firstly it can be seen that Simon looked up considerably more than he looked down. It appears that he looked up more at the beginning and end of the session, and this is not surprising as this is when he would be expected to be particularly attentive. It also appears that he looked up more in the reds and in the following transition to blue though this effect is not pronounced. However he does appear to have looked up less in the greens, and also in the blue-greens in the second cycle. More significantly however, he looked down only in the greens and blues and not in the reds.

Vocalisation

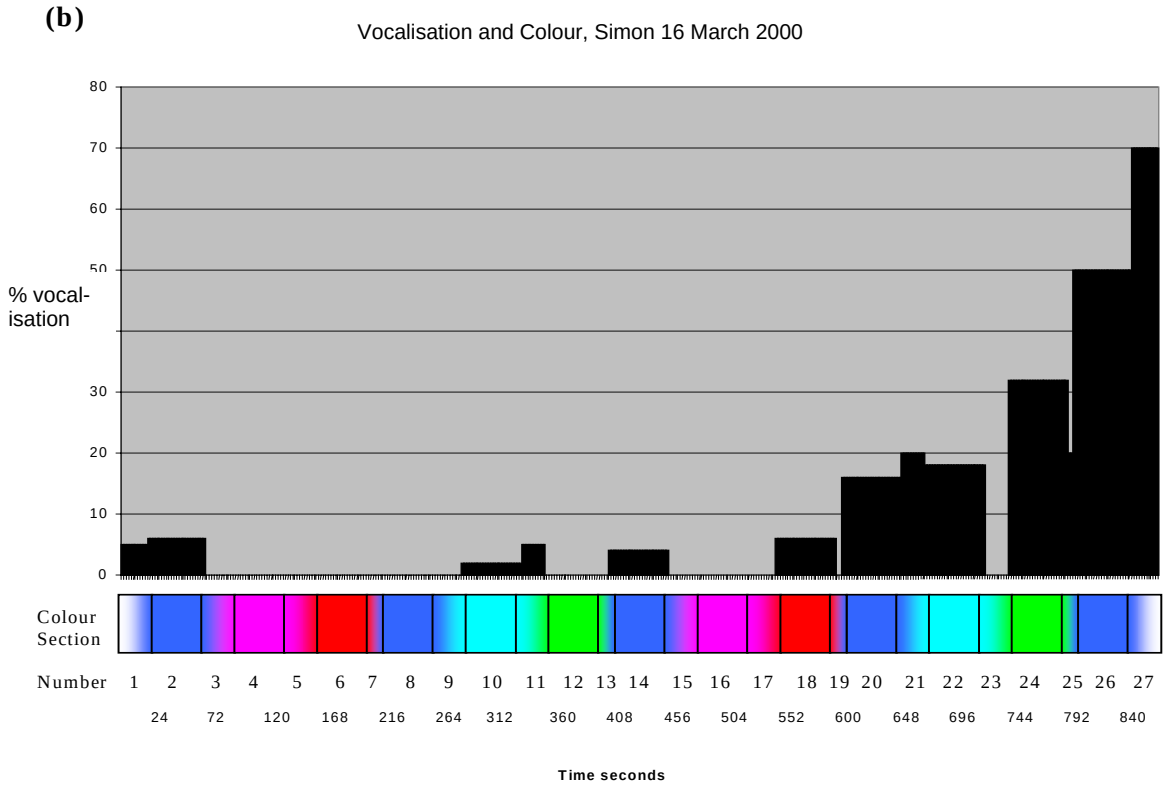
There was very little vocalisation in this session probably indicating that Simon was particularly calm on this occasion. Apart from the first red and the sudden change in section 19 he was generally more vocal in the blues and greens

Chart 11.2 **Charts of Session for Simon 16 March 2000**

(a)



(b)



Comments on Session of 16 March 2000

Looking Up/Down

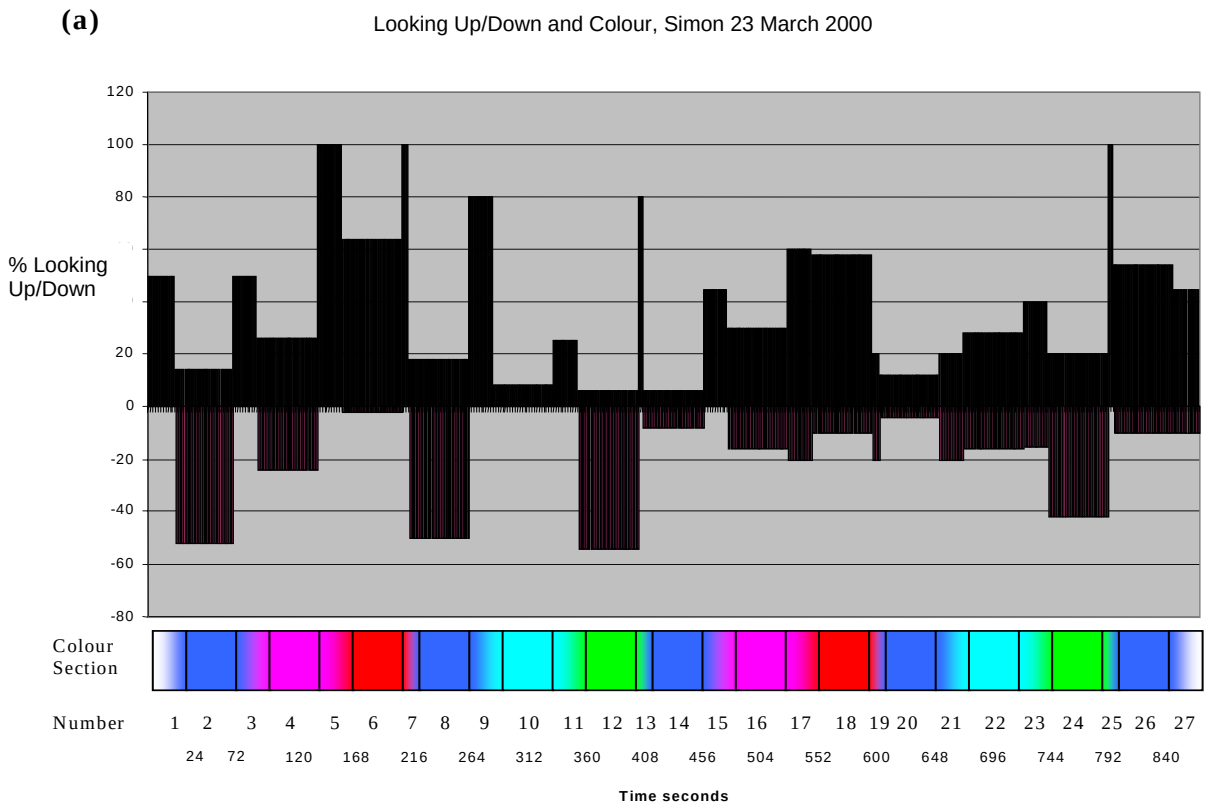
In this session Simon appeared rather more animated and the comments made at the time suggested that he was more attentive and more responsive than previously. He clearly looked up more in the reds than in the blues and greens, and also looked down more in the blues and greens. The differences were more pronounced than in the previous session.

Vocalisation

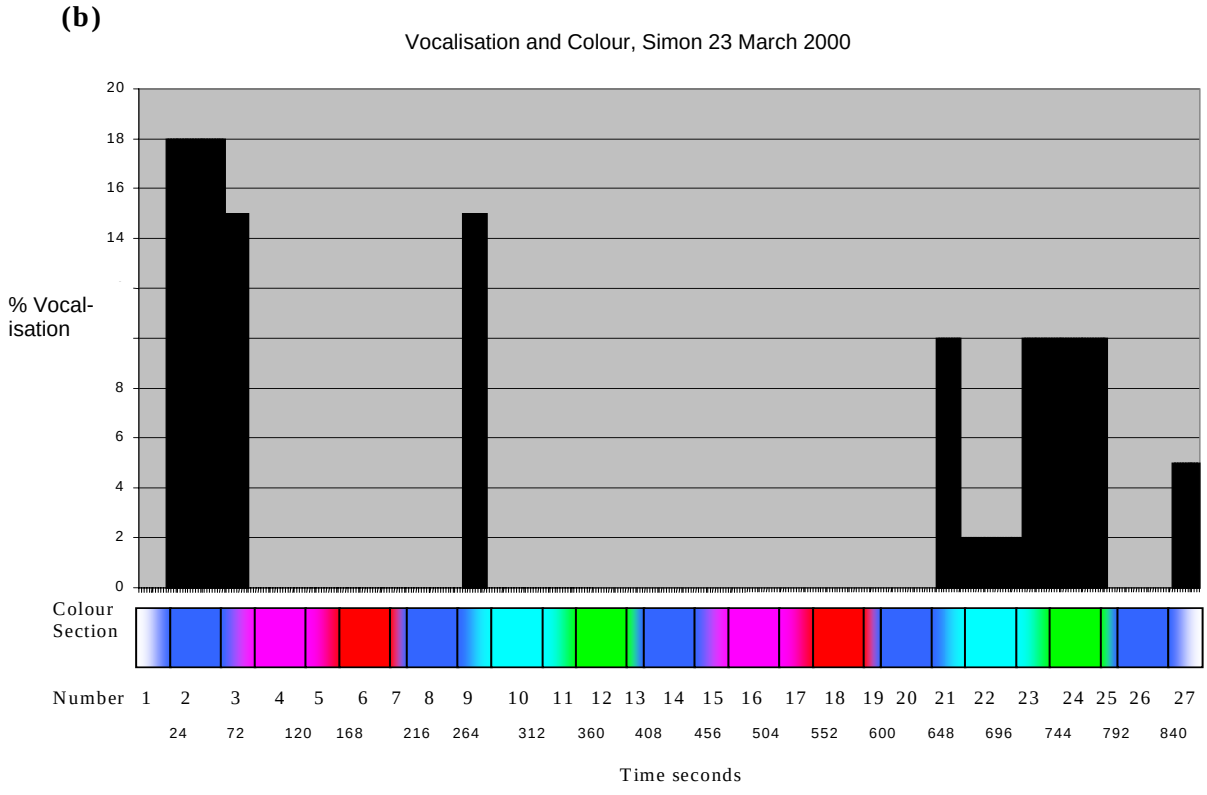
Although Simon appeared to be getting more worked up and vocal as the session progressed there was still more vocalisation in the blues and greens then in the reds.

Chart 11.3 **Charts of Session for Simon 23 March 2000**

(a)



(b)



Comments on Session of 23 March 2000

Looking Up/Down

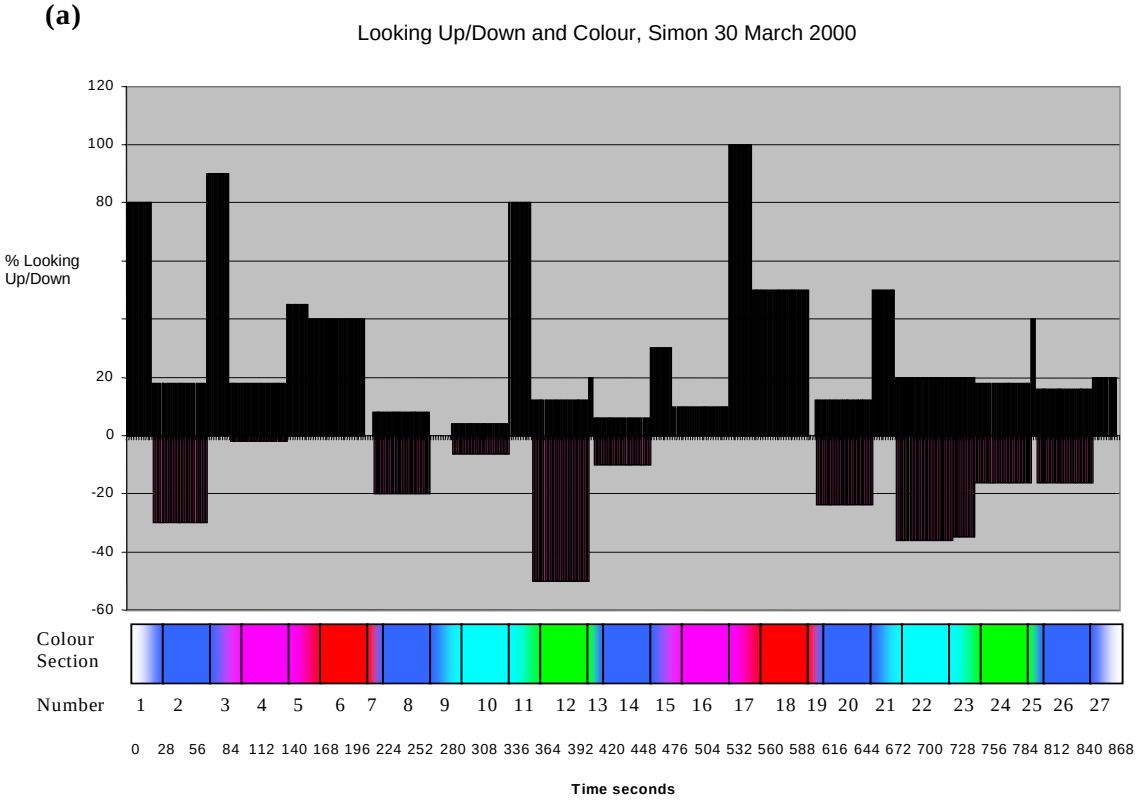
In this session Simon clearly looked up more in the reds than in the blues and greens, except for the end of the session when he looked up in anticipation of finishing. He also looked down more in the blues and greens.

Vocalisation

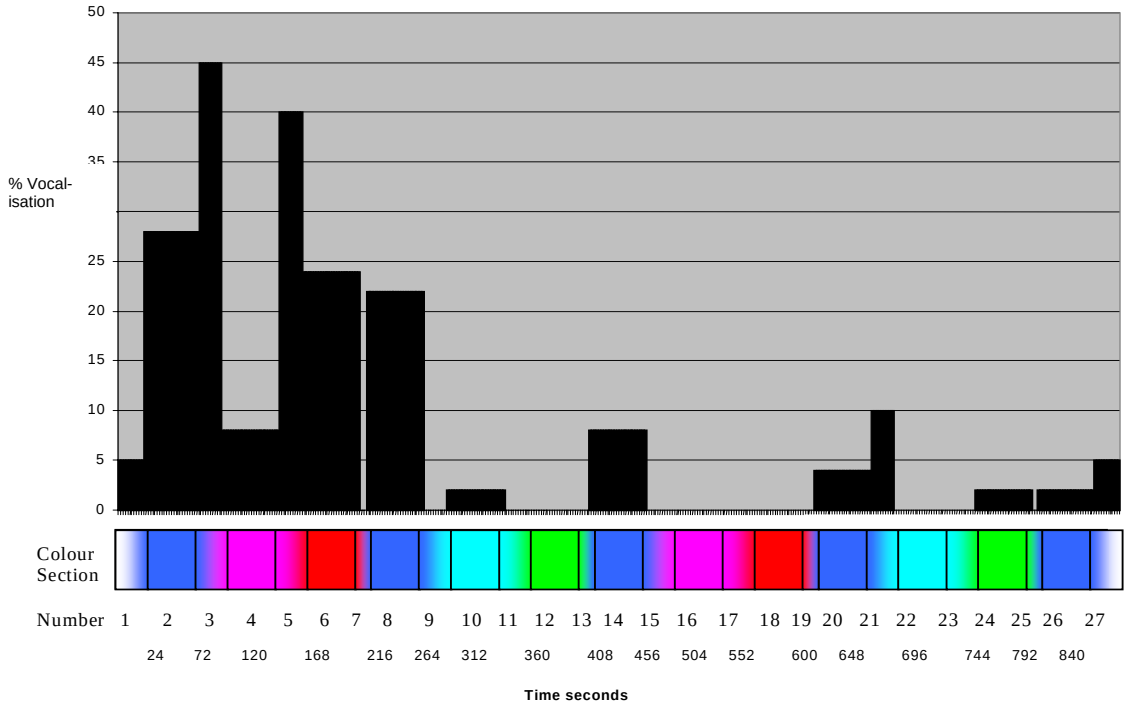
In this session vocalisation was taking place in each of the blue/green sequences and to a considerably greater degree in the second cycle. It was completely absent in the reds.

Chart 11.4 **Charts of Session for Simon 30 March 2000**

(a)



(b)



Comments on Session of 30 March 2000

Looking Up/Down

In general Simon looked up more in the reds and less in the blues and greens. However, looking down took place considerably more in the blues and greens and virtually not at all in the reds.

Vocalisation

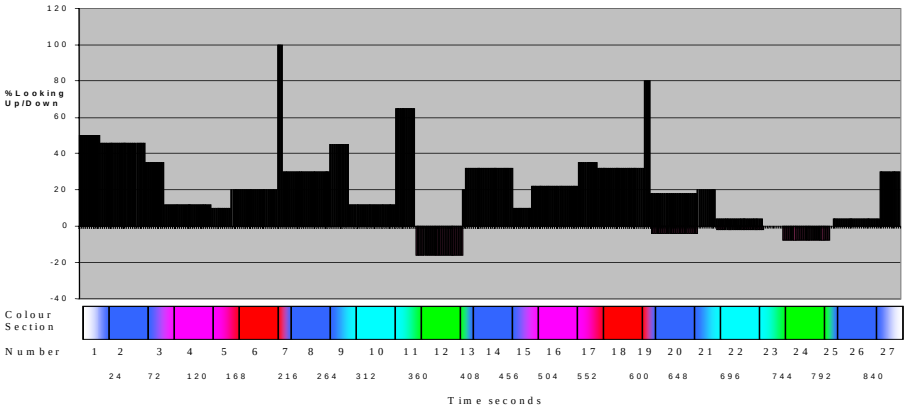
Vocalisation took place consistently in the blues and not at all in the second cycle of reds. However Simon did make quite a lot of sound in the first cycle of reds and this was the one instance where he is genuinely vocal in red.

Charts Overleaf

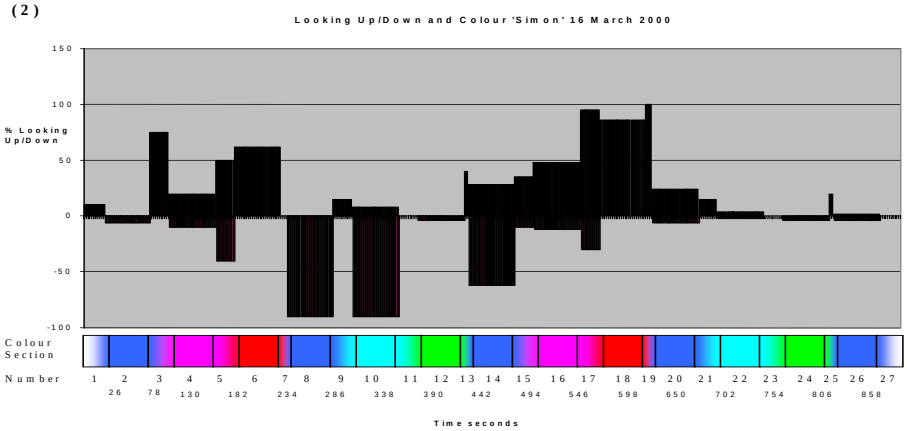
The charts for looking up/down shown previously are displayed on one page overleaf for ease of comparison.

Chart 11.5 **Charts of Looking Up/Down for Simon for 4 Sessions**

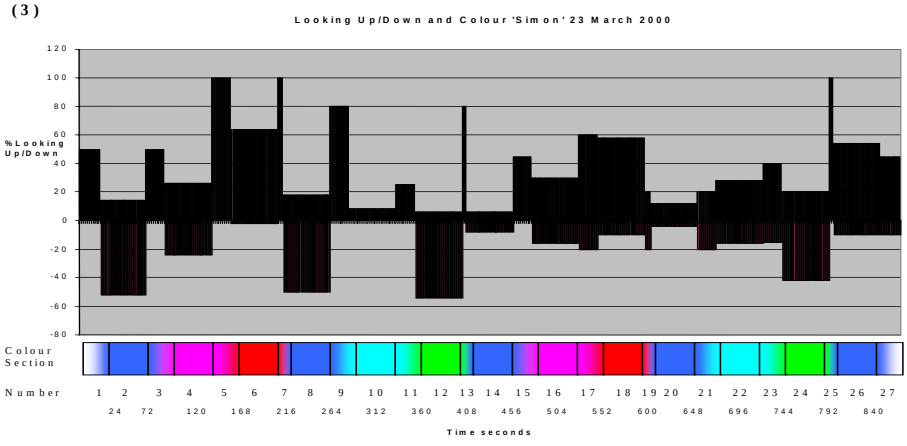
(1)



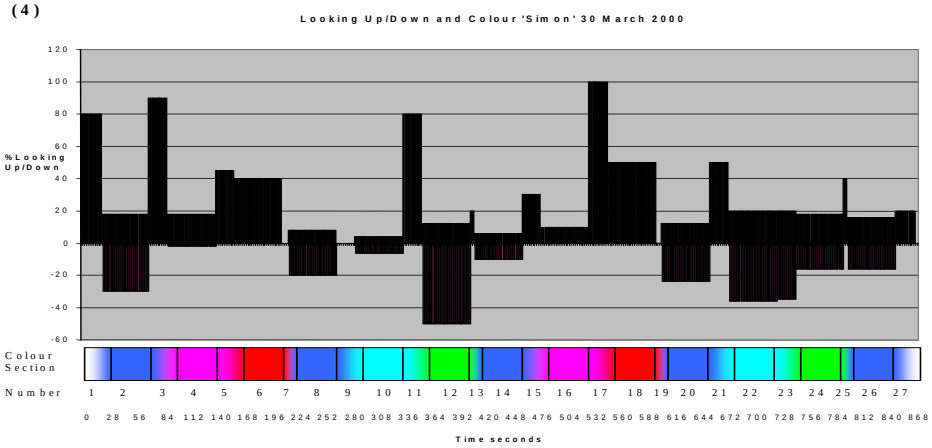
(2)



(3)



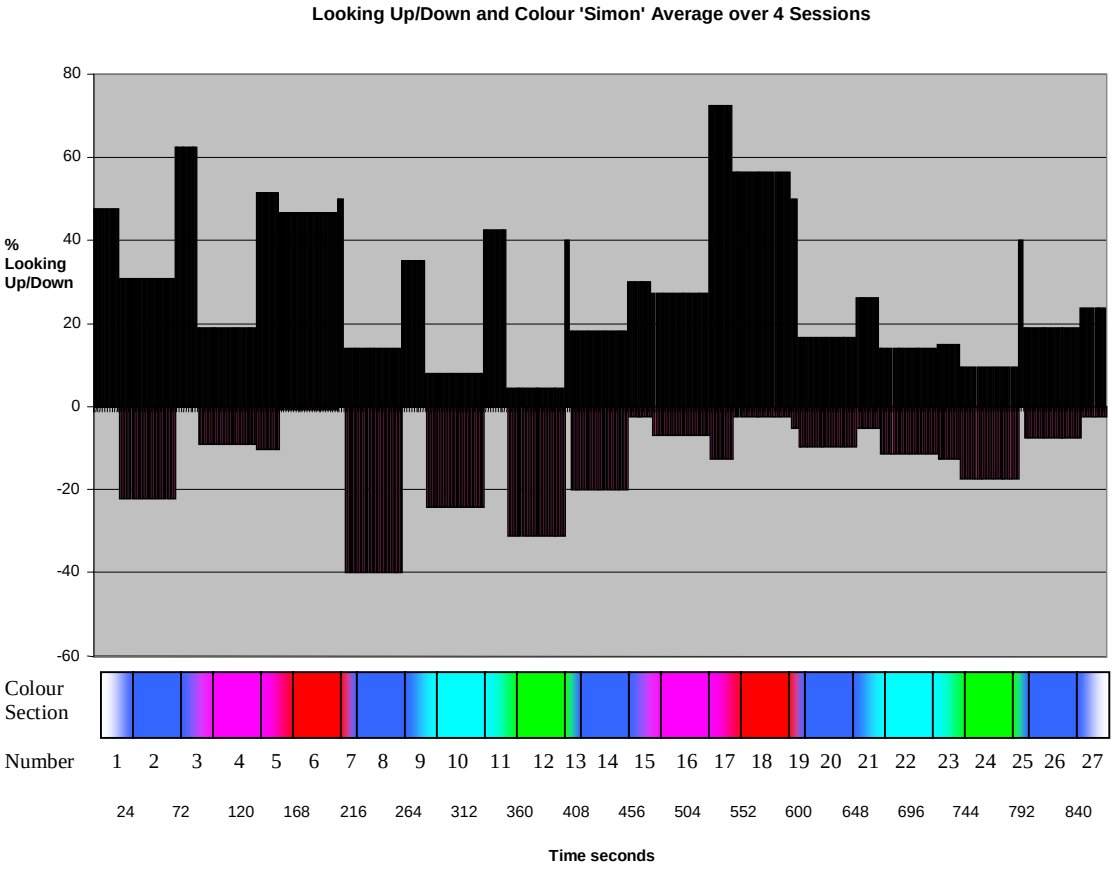
(4)



The chart below is a composite of the 4 sessions shown previously:

Chart 11.6

Composite Chart of Mean %Values for Looking Up and Down for Simon over 4 Sessions (Computer-Controlled Sequence)



Comments on Composite Chart

The chart above shows clearly the trends in Simon's response to the different colours. It can be seen that there is a greater tendency to look up in the reds than in the blues and greens. Also the tendency to look down is greater in the blues and greens than in the reds, though this is more marked in the first cycle of colours than in the second.

The charts overleaf give a summary (mean values) of the tendency to look up or down in the 3 main (primary) colours of red, blue and green over the 4 sessions analysed.

Chart 11.7 **Chart of Comparison of Mean %Values for Looking Up in Red, Blue and Green over 4 Sessions (Computer Controlled Sequence) for Simon**

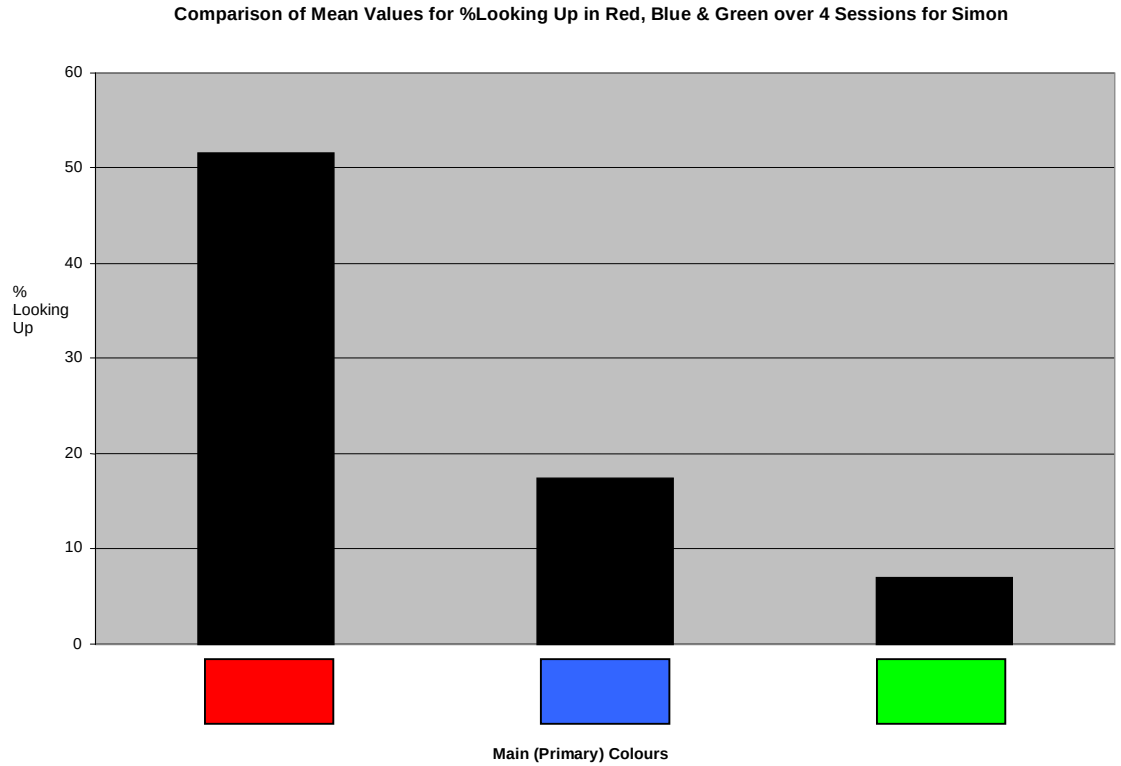
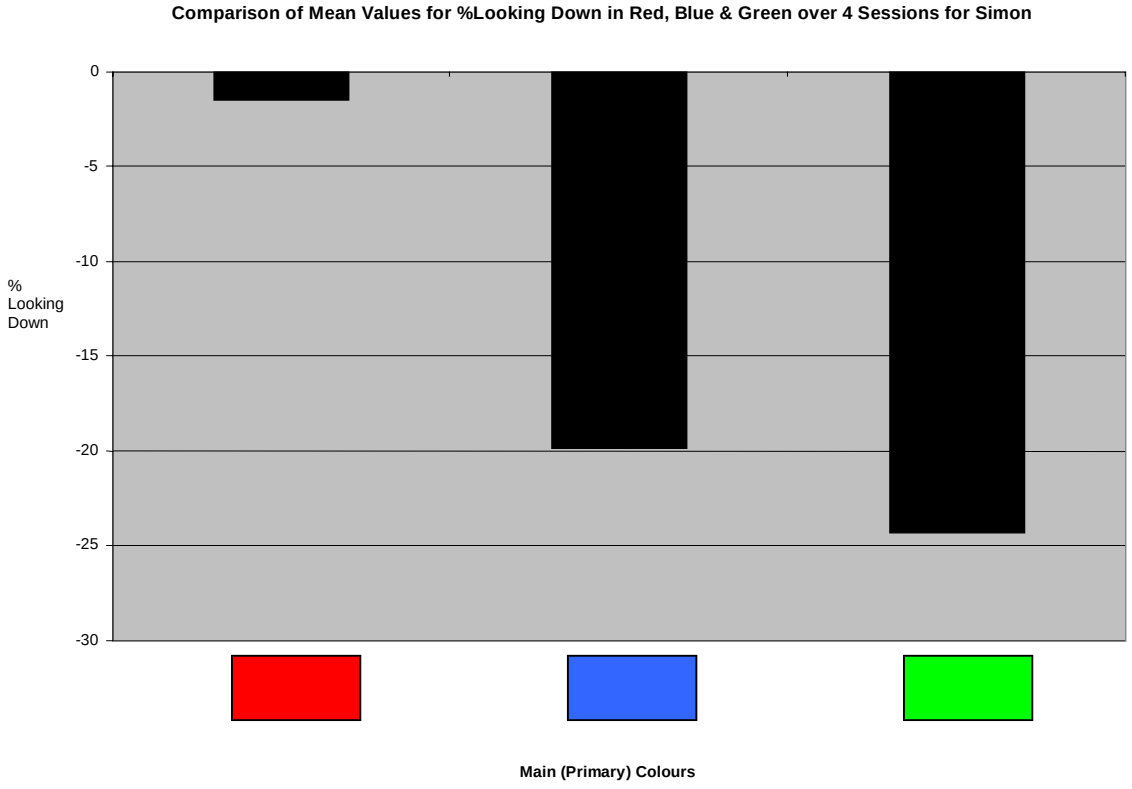


Chart 11.8 **Chart of Comparison of Mean %Values for Looking Down in Red, Blue and Green over 4 Sessions (Computer Controlled Sequence) for Simon**



Discussion of Results for Looking Up/Down and Colour for Simon

The charts on the previous page confirm the comments already made. It can be seen from the first chart that Simon looked up considerably more in red than in blue and green. He looked up slightly more in blue than green.

Similarly, in the second chart Simon looked down a great deal more in blue and green than in red, and slightly more in green than blue.

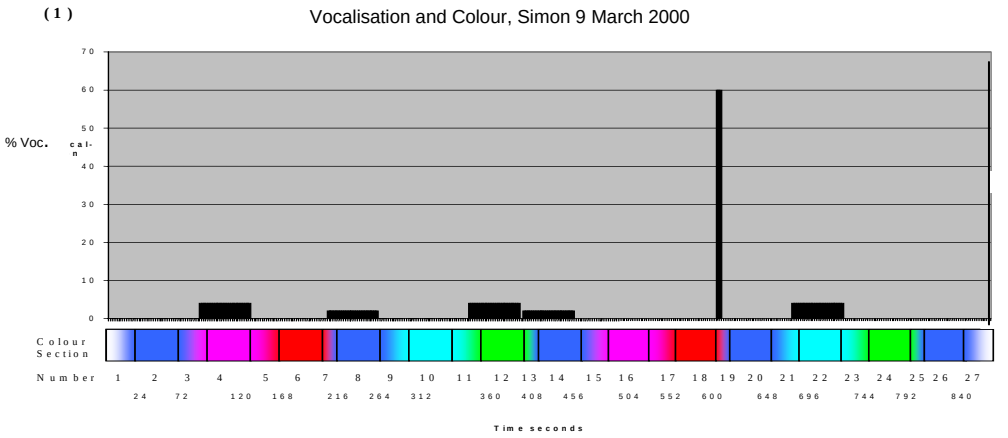
Analysis of Variance and Wilcoxon Mann-Whitney tests (see Appendix 3 page lxxix - lxxxii) have been carried out on these results. A composite figure representing looking up and down in red, blue and green has been obtained for this test by considering looking up as a positive value and looking down as negative, and subtracting where looking up and down takes place in the same section.

The Analysis of Variance test (and Wilcoxon Mann-Whitney) confirmed that there was a significant difference (at the 1% level) in the level of looking up and down between Red and Blue and between Red and Green but not between Blue and Green. Since, in this case, all the recorded sessions were analysed and since the colour sequence was consistent and computer-controlled, the result of these tests can be considered to be valid. However, since this investigation has more of the characteristics of a quasi-experiment than a true experiment because of the lack of controls, generalisations from this test cannot be made.

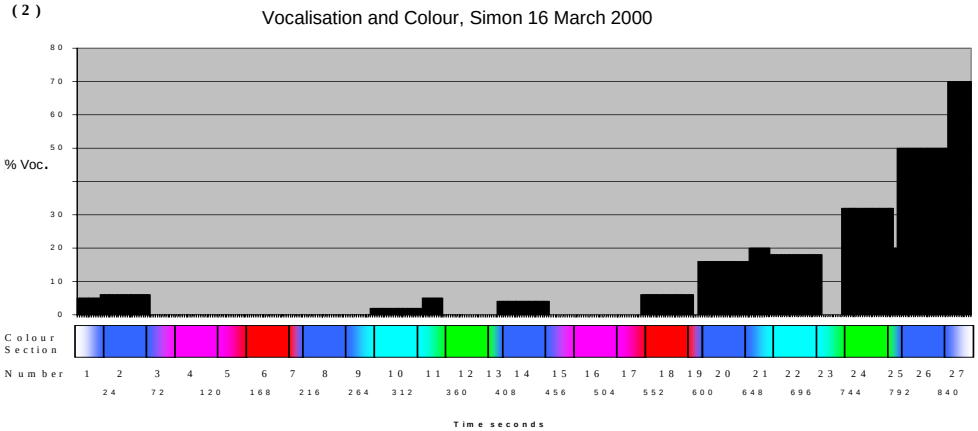
On the following pages the charts of vocalisation and colour are shown:

Chart 11.9 **Charts of Vocalisation for Simon for 4 Sessions**

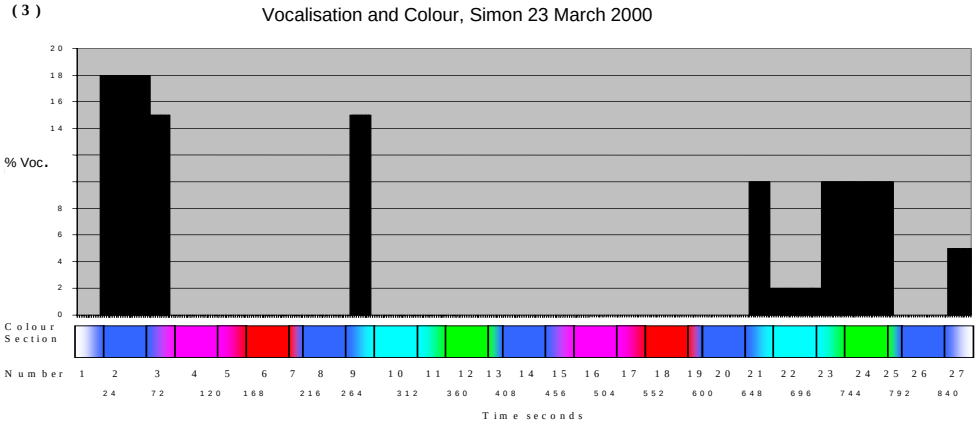
(1)



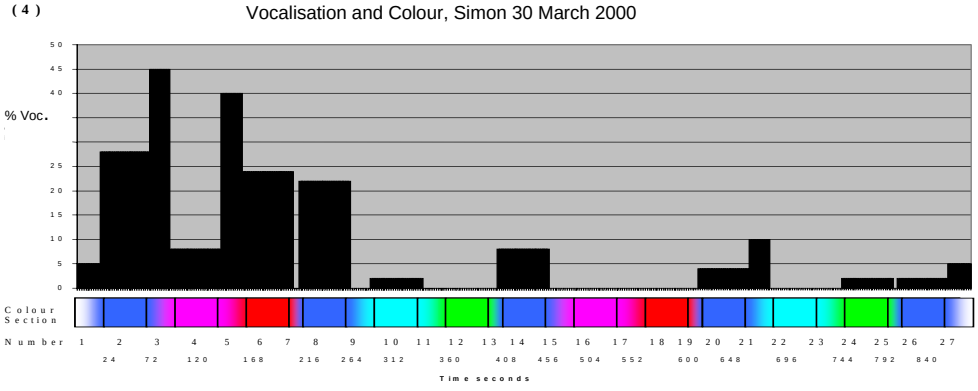
(2)



(3)



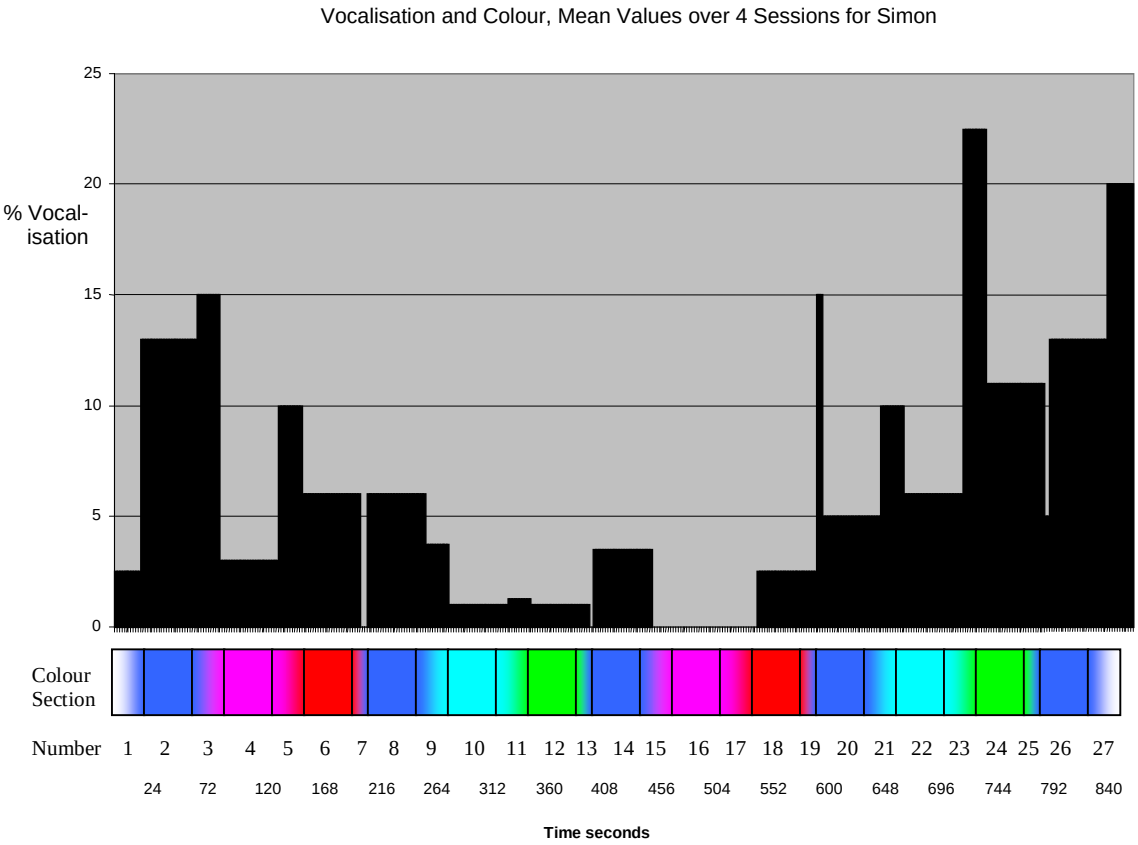
(4)



The chart below is a composite of the 4 sessions shown previously:

Chart 11.10

Composite Chart of Mean %Values for Vocalisation for Simon over 4 Sessions (Computer-Controlled Sequence)



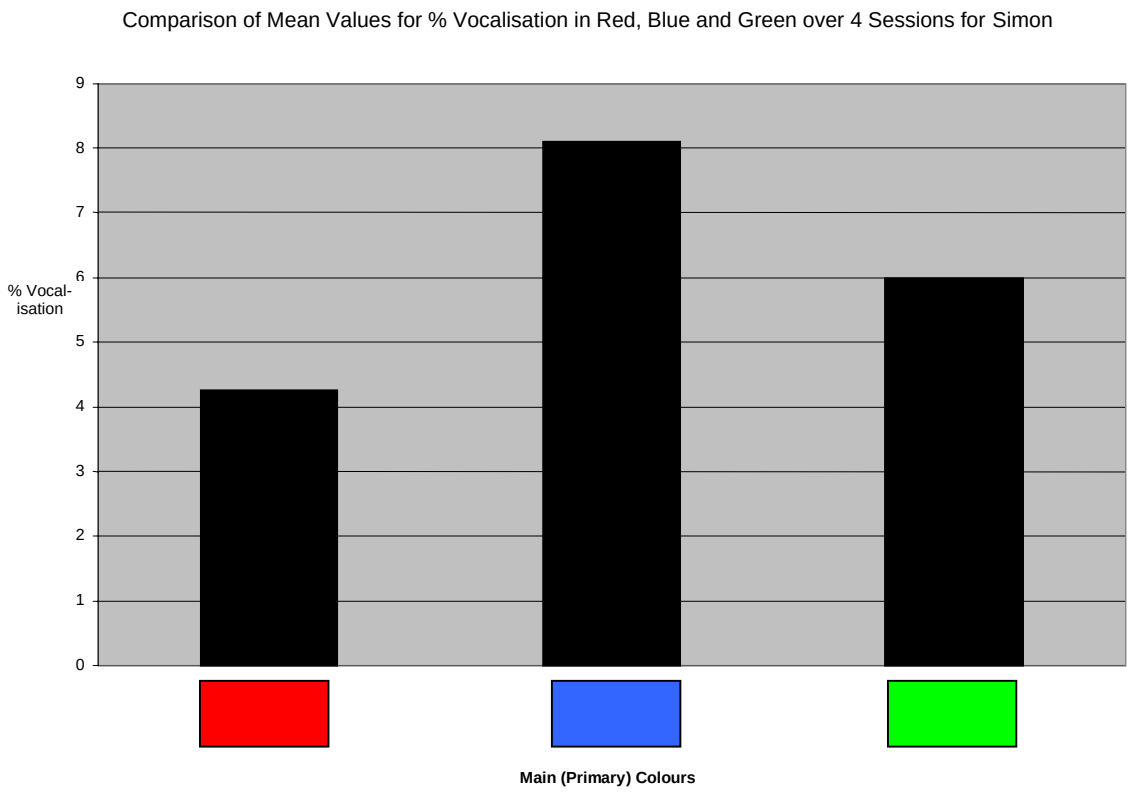
Comments on Composite Chart

It can be seen from the above chart that there appears to be more vocalisation at the start of the sessions, with a decrease towards the middle and then building up again towards the end. There also appears to be more in the blues and greens and less in the reds and pinks.

To show this effect more clearly the chart overleaf gives the vocalisation levels in the 3 main colours.

Chart 11.11

Chart of Comparison of Mean %Values for Vocalisation in Red, Blue and Green over 4 Sessions (Computer Controlled Sequence) for Simon



Comments on Chart

Again it can be seen that vocalisation is greatest in blue, least in red with the level in green somewhere in between. On re-examining the videos it appeared that Simon really was more vocal in blue than the other colours except for one occasion when he was particularly vocal in red. However, when an Analysis of Variance (see Appendix 3 page lxxxiv) was carried out on these results they were found not to be significant. This does not, however, necessarily mean that it is not a real effect, only that this statistical test does not verify it as statistically significant. Therefore although this cannot at this stage be put forward as a finding, it will be born in mind as a possible aid when in the third stage Simon is being encouraged to speak.

Psychology Assistants' Reports

The psychology assistants involved in the project carried out a brief qualitative analysis of the videos of Simon. The following are some of the comments they made:

- Simon was found to be most attentive to light changes, actively looking up at the lights as the change occurred and for a short period after the change.
- When the light was prolonged, he became fidgety or restless or sat still and became subdued.
- He was quietest in green.
- He was happiest and most vocal in blue.

Summary of Findings for Simon

Although, as has already been described, Simon's behaviours differed only in the smallest and subtlest of ways, there is evidence from these results that his bodily gesture for red was upward whereas for blue/green it was downward. Comparing this to previous findings of arousal and calmness then the upward gesture would probably be related more to arousal and the downward gesture more to calmness. If this is the case then these findings are compatible with those from the first cohort and confirm not only that colour does have an effect on behaviour but also that the effect of red is more 'upbeat' and arousing and blue/green more 'downbeat' and calming.

It should also be noted that Simon was always very happy to attend colour room sessions and was also particularly cooperative. He was also unusually attentive despite his relative inactivity.

Anna

Table 11. 3 Personal Details and Baseline Abilities for Anna

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Anna 9 years of age	I year when joined project	Female	'Severe and complex problems'	ASD	Reynell PVCS Score < lowest score	Pre-academic, is learning e.g. to sort objects by colour	Solitary	Down's Syndrome

General Description

Anna had no meaningful speech although she could sometimes repeat a word echolalically. She enjoyed rough and tumble play with adults, though only on her own terms, and she would sometimes hit out or bite, apparently if the adult did not perform as she wanted. She rarely made eye contact.

As in the previous case an overview of all the session for Anna are given in Appendix 1 pages x - xii.

Overview of Anna's Sessions in the Colour Room

Anna always seemed willing and happy to come to colour sessions. It was difficult at the beginning to obtain a Colour Response Profile because she would always want to initiate rough and tumble play with the support person and would rarely show any real reaction to the different colours of light. As the sessions progressed she became more willing to sit by herself and began to develop a rather charming 'chatter' using sounds like 'Ba Ba', 'Ge Ge', 'Go Go', 'Da Da', 'Br Br', Ya Ya', 'Gr Gr', 'Ha Ha' etc. She also usually rocked from side to side while making these sounds. For a few sessions she sat by herself and it was then possible to observe her reaction to the colours. She was already at the stage of Colour Mood Dialogue.

Choice of Behaviours for Analysis

In the three sessions where Anna was prepared to sit by herself it was possible to observe how the changing colour moods affected her behaviour. In the interacting reds and pinks she would continuously make her 'cross-sounding' chattering sounds whilst rocking from side to side. It could be seen from the video that gently rocking blue/green not only apparently calmed her down but also stopped or reduced her vocalisations. In one session, whilst Anna was in 'full flight' with her 'chatter' in the red, the lights were deliberately changed to blue/green with the gentle wave-like movements (detail of this lighting is given in the glossary and will be referred to as blue/green rocking) in order to see if this would calm and quieten her. After careful observation of the videos it was decided to make a detailed analysis of Anna's sounds and rocking movements. Since there were only 3 sessions where she was sitting alone these were all chosen for detailed analysis.

Method of Video Analysis

Since these sessions were in Colour Mood Dialogue there were no obvious colour sections as with the computer sequence. Therefore sections were selected where, although the lights were changing interactively, there was an overall preponderance of one main colour. They were also chosen according to the level of intensity of Anna's vocalisations (see below). These sections were timed with a stopwatch and recorded. By this time (November 2000) the video recorder had been fitted with a timer so identifying and timing of sequences was considerably easier.

The video was then re-run and within each colour section the level of 'crossness' and loudness of Anna's vocalisations was estimated on a scale of 1-3. This was not done as a percentage of the section for which the chosen behaviour could be seen, as in previous analyses, because this would have been too cumbersome with the continually changing

colours; instead an average intensity of vocalisation was estimated for the whole of that section, even if the sound was not completely continuous. Nevertheless since the sections were chosen according to both colour and vocalisation it was not difficult to assign a score to each section.

Operational measures used were:

1 – Few gentle sounding and quiet vocalisations

2 – Louder vocalisations

3 – Loud and ‘cross’ sounding vocalisations, continuous

Rocking intensity (frequency and amplitude) was also estimated on a scale of 1-3 in the same way using the same sections as shown below. Since rocking and vocalisation intensities tended to be related, it was possible to use the same colour sections for both.

1 – Slow gentle and small rocking movements (approx.1 per 2-3 seconds)

2 – Firmer movements

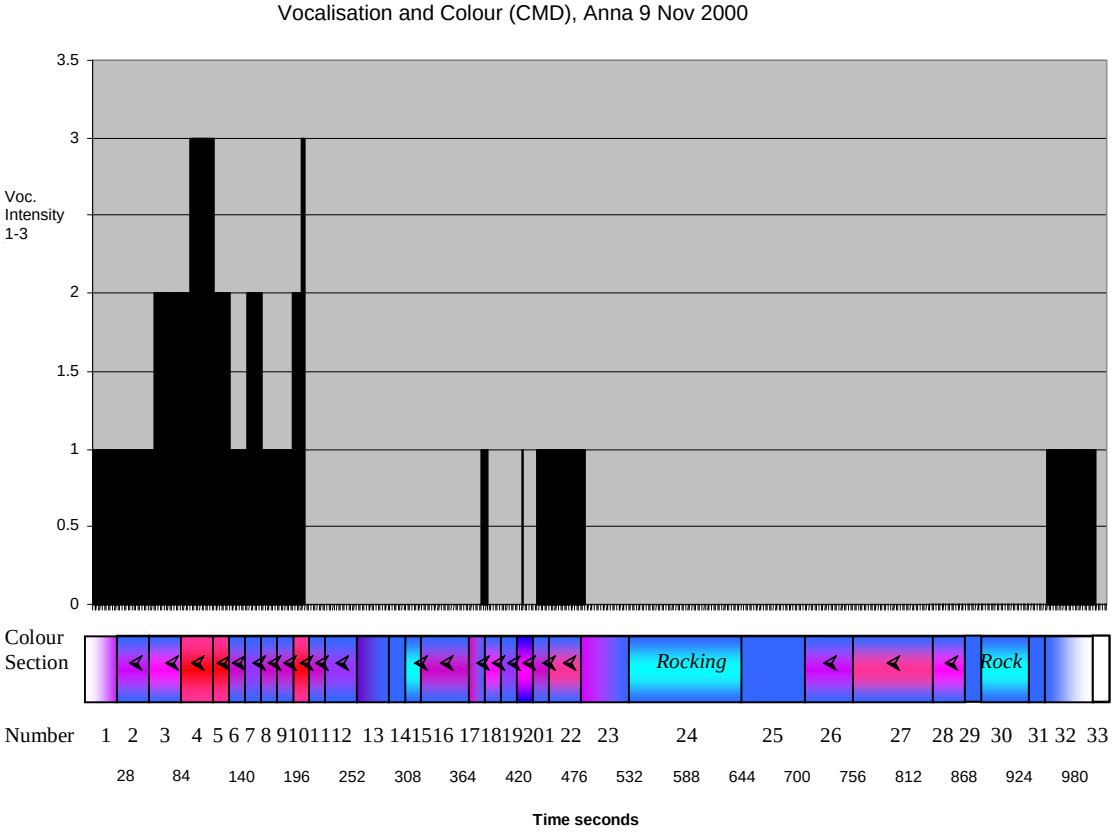
3 – Strong, fast and large movements (approx.1 per second)

Results of Video Analysis for Anna

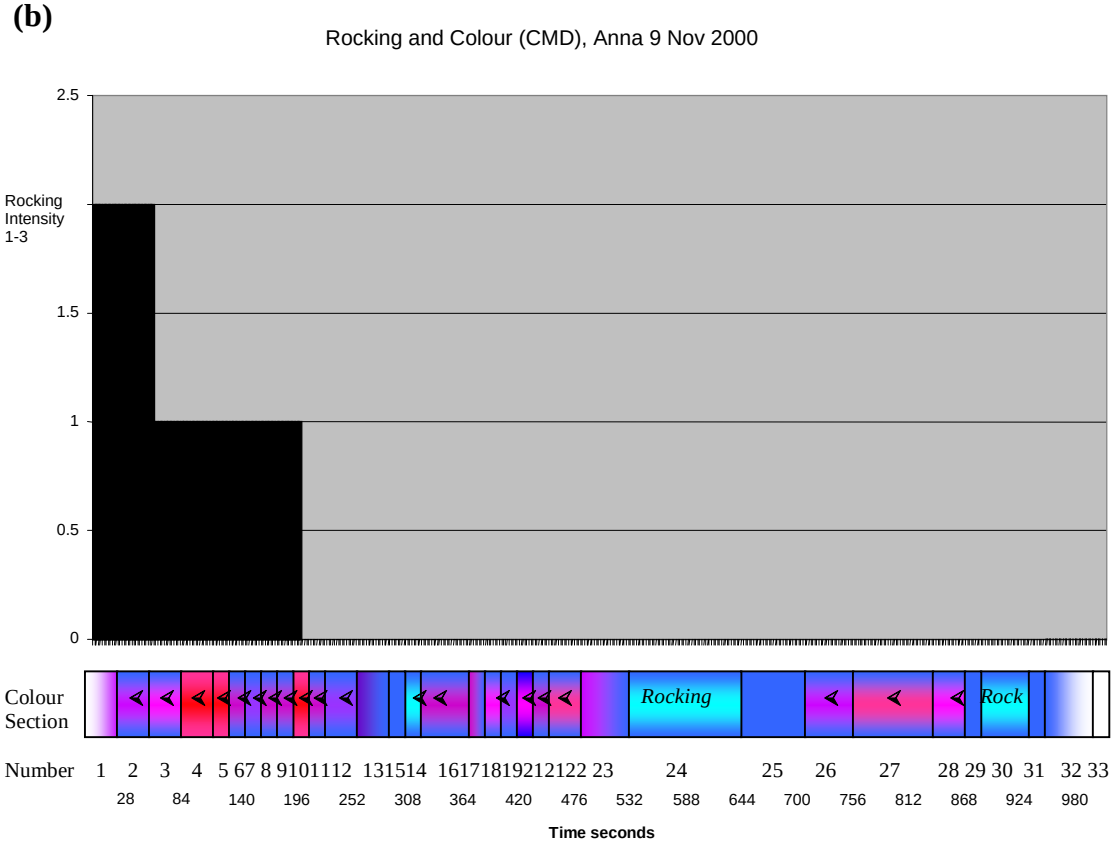
The video analysis recording sheets are given in Appendix 3 pages lxxxv - xciii. The results, displayed on charts, are given on the following pages and each is discussed in turn. First all the charts pertaining to one session are displayed together to give an overall impression of the session. Then the charts of vocalisation intensity over all three sessions are displayed together and similarly for rocking.

Chart 11.12 **Charts of Session for Anna 9 November 2000**

(a)



(b)



Comments on Session of 9 November 2000

Vocalisation

If the first part of the vocalisation chart [*Chart 11.12 (a)]* is examined (sections 1-10), it can be seen that the highest intensities (3) are in the reddest sections (4,5,and 10). Similarly the middle intensities (2) are mainly in the more magenta sections (3,6, and 9). The lower intensities (1) are more in the blue and blue/purple sections. Similarly, in the middle section (17-22) of the chart the only vocalisations are in the mainly magenta sections. The only other one is at the end where Anna was anticipating the end of the session. In the rest of the chart there is no vocalisation. This includes all the blue, blue-green and blue/green rocking. There is also some interacting magenta and purple in which there is also no vocalisation.

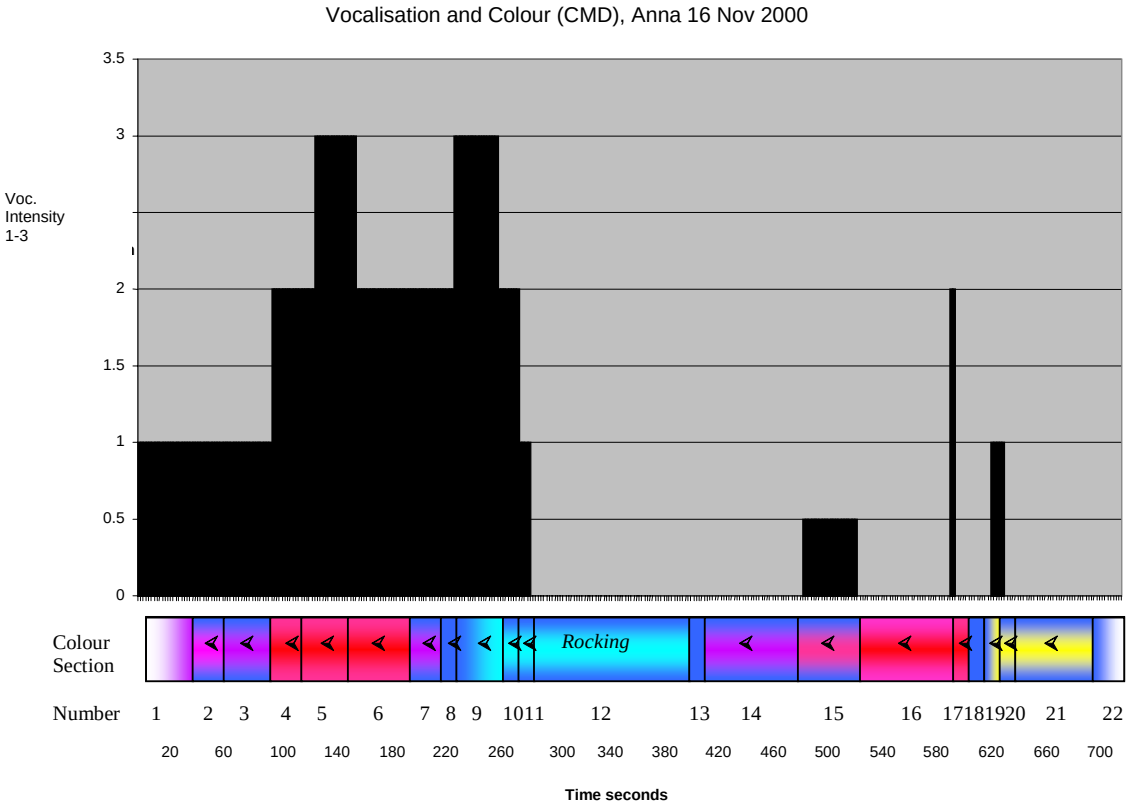
The overall impression is that there is considerably more vocalisation in the red and magenta colours with much less in the blues and purples and none in the blue- greens.

Rocking

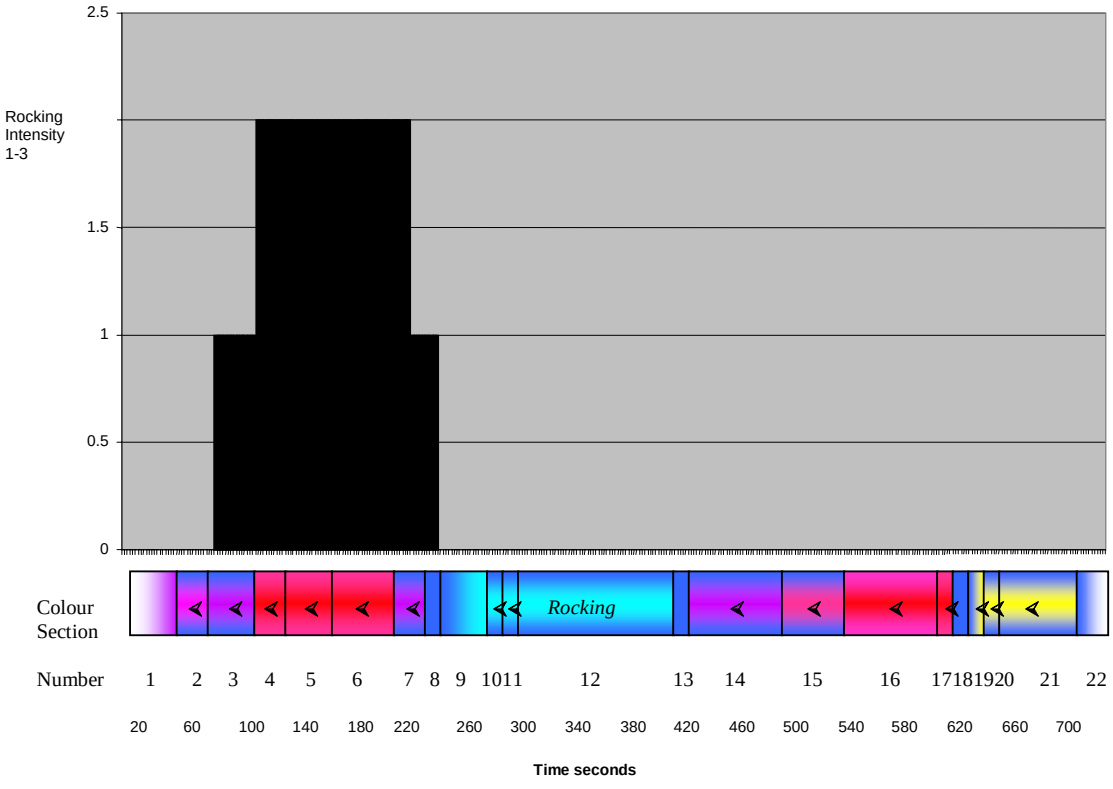
Here, [*Chart 11.12 (b)]* rocking is more intense at the start of the session and this includes most of the red and magenta sections where vocalisation was also most intense. It is unclear from this chart whether this rocking is due to the colours or simply because it is the start of the session.

Chart 11.13 **Charts of Session for Anna 16 November 2000**

(a)



(b)



Comments on Session of 16 November 2000

Vocalisation

In this the first part of this chart [*Chart 11.13 (a)*] it can be seen that in the interacting reds (sections 4,5 and 6) the vocalisation intensity is relatively high, (2 and 3). As the reds go down and the blues and blue-greens come up, so vocalisation intensity gradually decreases (sections 7-11). It then remains at zero during the blue/green rocking. It appears that there is a lag time after the reds have down-faded (and the blue-greens up-faded) before vocalisation correspondingly decreases.

There are minor vocalisations later in the session mainly also in the reds and magentas with one during the change from blue to yellow. (This last one is at the start of the interaction with the support person and probably has more to do with communication with the person than the colours.)

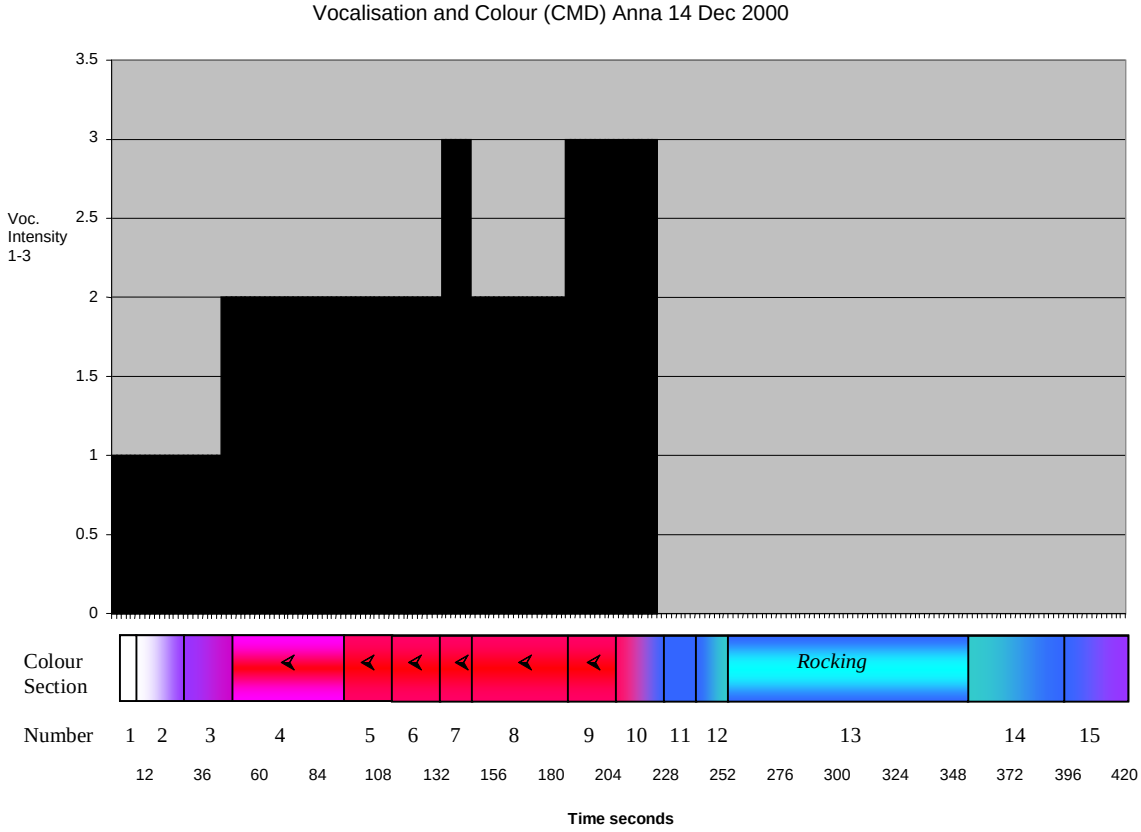
The overall effect therefore, is of a considerably higher vocalisation intensity in the reddish colours in general than the blues and blue-greens.

Rocking

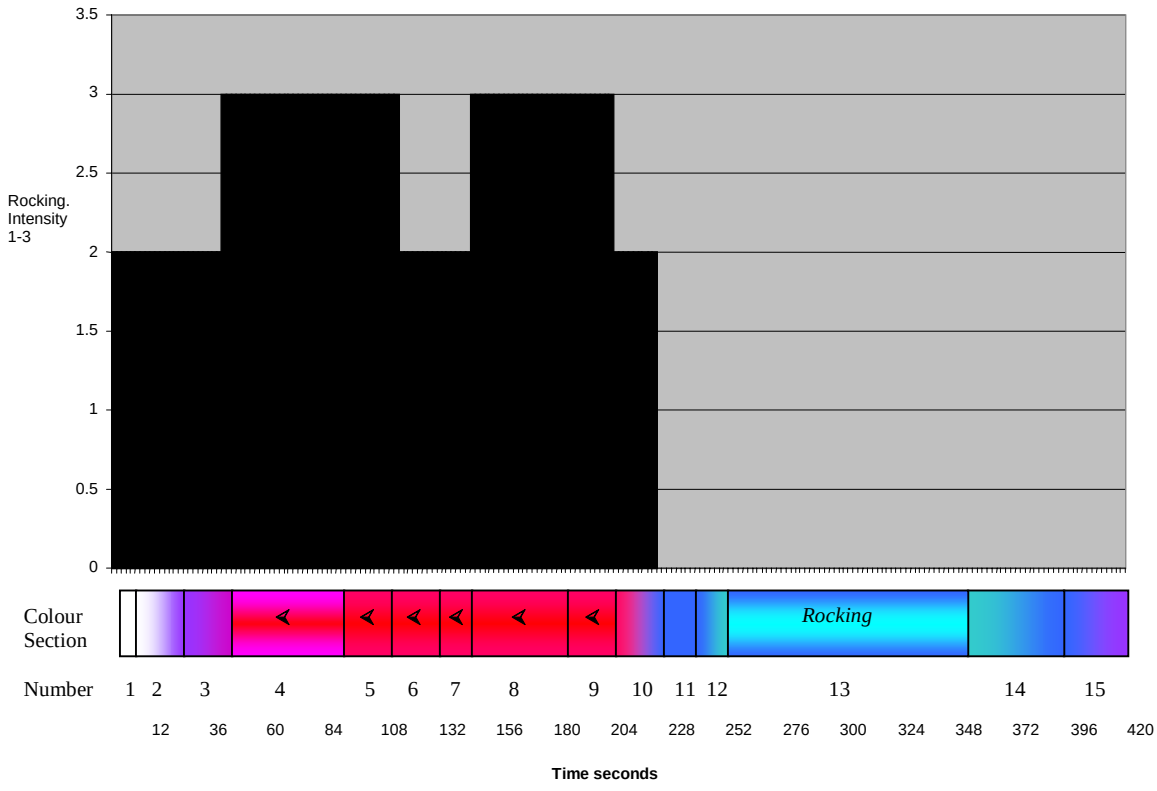
In this chart [*Chart 11.13 (b*)] Rocking appears to be highest in the reds, lower in the purples and zero in the blues and blue-greens. In the second sections of reds (16 and 17) there is no rocking. This may correspond with the lower vocalisation intensity at this stage of the session.

Chart 11.14 **Charts of Session for Anna 14 December 2000**

(a)



(b)



Comments on Session of 14 December 2000

Vocalisation

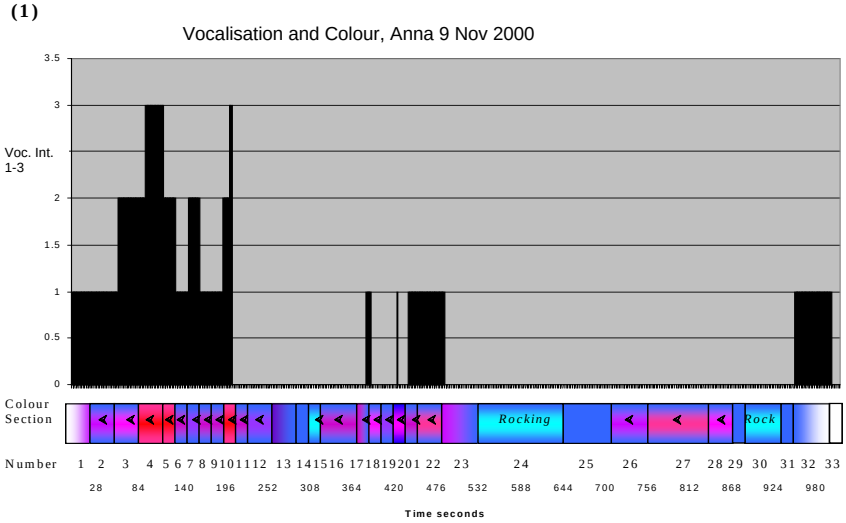
In the first part of this session Anna was encouraged to indulge in her 'cross-sounding' 'chatter' (high intensity vocalisation) by interacting with her with strong reds. Then, while in 'full flight' the colour was suddenly changed to the calming rocking blue/green in order to deliberately calm and quieten her. In [*Chart 11.14 (a)*] the vocalisation intensity is high and building up in the increasing interacting strong reds (sections 3-9). The colour then suddenly changes to blue, then blue-green and finally to a long section of blue/green rocking. The vocalisation intensity almost immediately drops to zero where it remains for the rest of the session. It can be seen (section 10) that the colour change occurred first and this was immediately followed by a dramatic change in behaviour. This appeared to be a case of gently rocking blue/green being used to calm and quieten a child.

Rocking

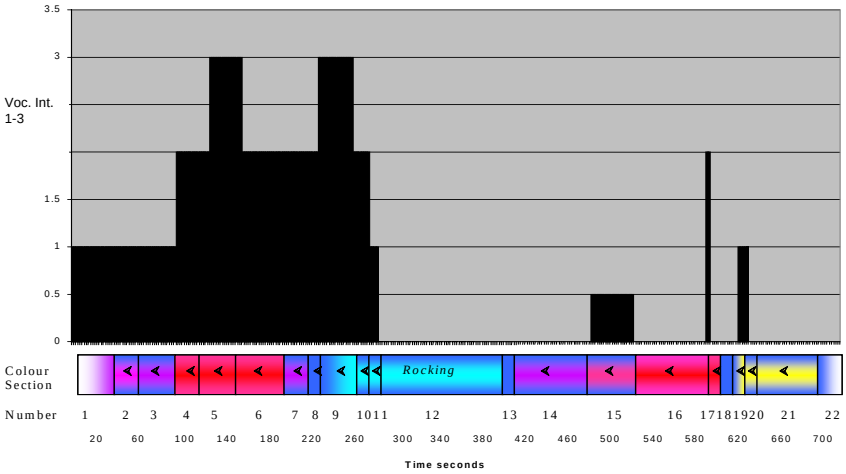
Rocking [*Chart 11.14 (b)*] shows a very similar pattern to vocalisation. Clearly the side to side rocking and the 'chatter' were part of the same behaviour pattern in interacting red lights, and both could apparently be reduced or stopped by changing to rocking blue/green.

Chart 11.15 **Charts of Vocalisation and Colour for Anna Over 3 Sessions**

(1)



(2)



(3)

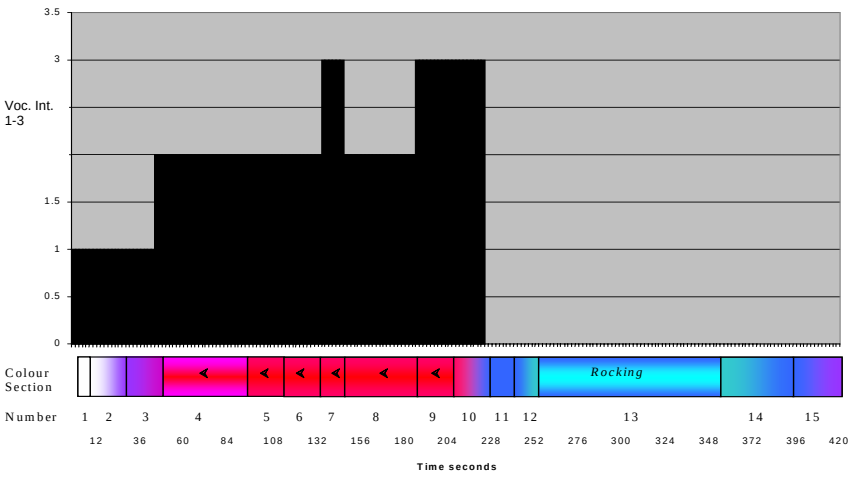
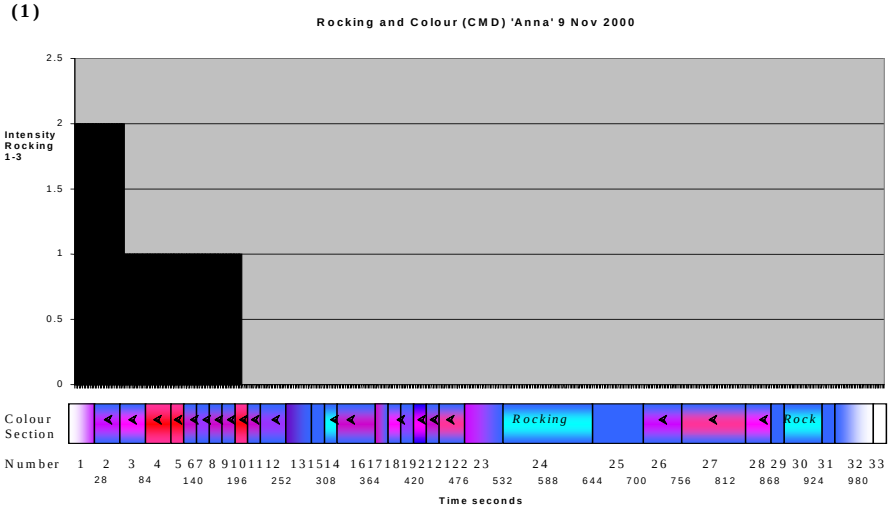
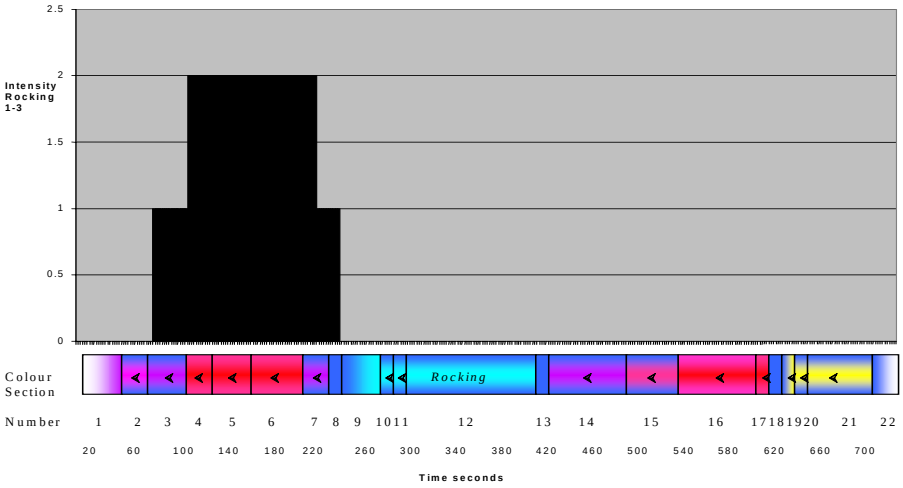


Chart 11.16 **Charts of Rocking and Colour for Anna Over 3 Sessions**

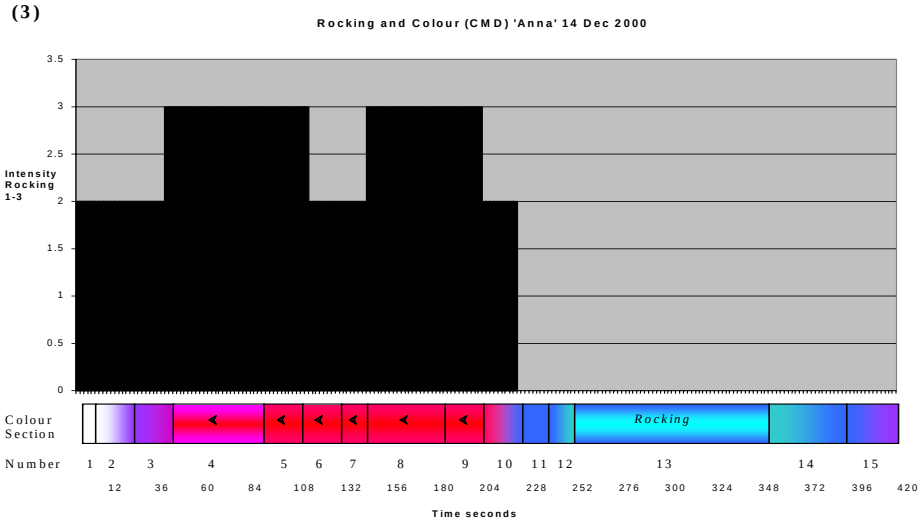
(1)



(2)



(3)



Comments on Charts of Vocalisation and Rocking for Anna

Vocalisation and rocking will be discussed together because they formed part of the same behaviour where Anna rocked from side to side making her animated and sometimes 'cross-sounding' but wordless 'chatter'. Her 'chatter' was strongest in the reds and greatly reduced in the blues and greens, particularly in rocking blue/green. The reds tended to come during the first half of the sessions and the blue-greens during the second half so there was some argument for suggesting that the calming was due to timing rather than colour. It could be, for example, that Anna was becoming tired or bored and this was the reason for the reduced chatter. However this would not be consistent with other earlier sessions and also in the 3rd session of 14 December the change in behaviour was brought about by deliberately changing from reds to blue/greens while Anna's chatter was at its strongest.

Psychology Assistant's Reports

Again an independent analysis of the videos was carried out by the psychology assistants and they reported that Anna 'tended to vocalise more when red and pink were on high percentage'.

In order to show the different behaviours in the reds and blue/greens more clearly the chart overleaf shows the mean values for vocalisation and rocking over the 3 sessions in the reds and blue/green. When the means are calculated the unequal time intervals for each colour sections are taken into account and the means are appropriately weighted. (The tables, calculations and explanation of the weighting of mean values are given in Appendix 3 pages xciv – xcv.)

Chart 11.17 **Chart of Vocalisation and Colour in Reds and Blue/Greens (Mean Intensity over 3 Sessions in CMD) for Anna**

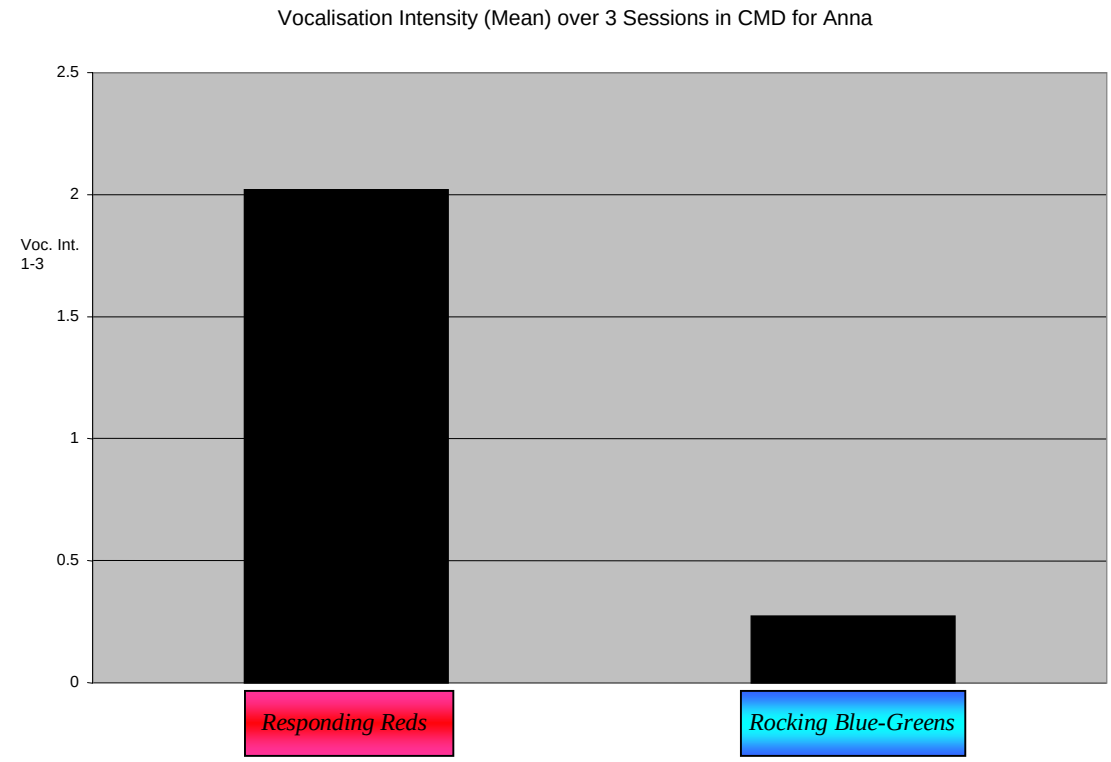
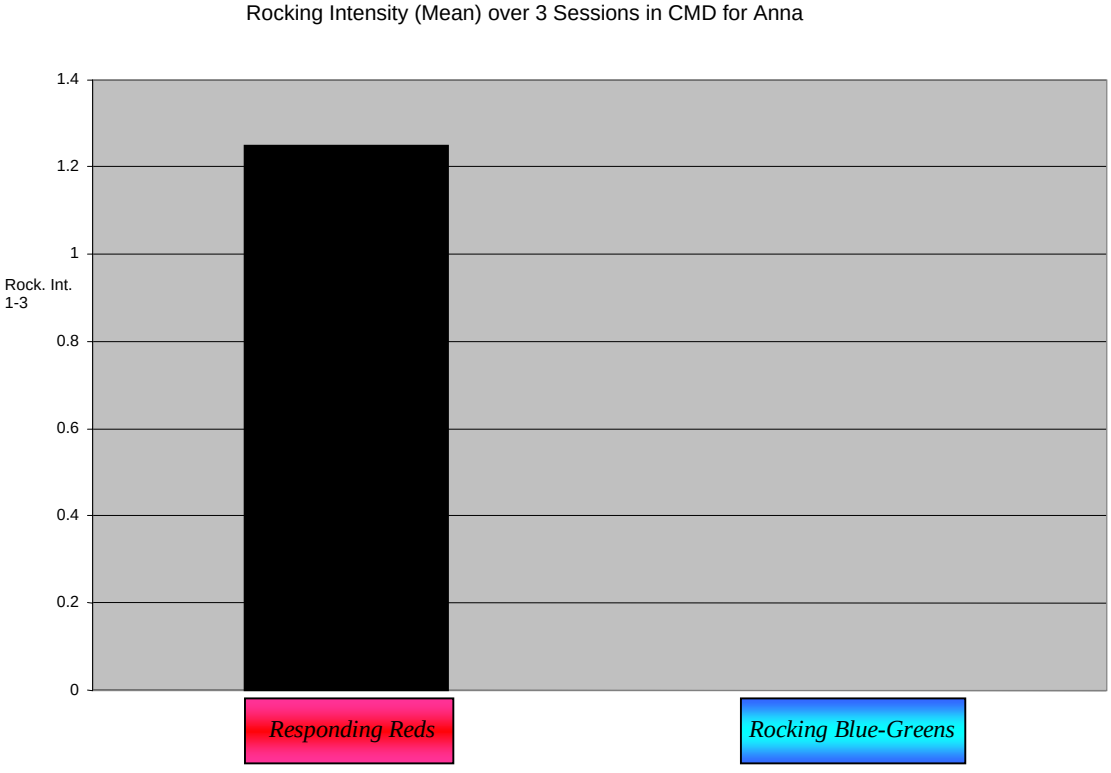


Chart 11.18 **Chart of Rocking and Colour in Reds and Blue/Greens (Mean Intensity over 3 Sessions in CMD) for Anna**



Comments on Charts of Mean Vocalisation and Rocking for Anna

(Charts 11.17 and 11.18)

The summary charts show the degree to which Anna's 'chatter' (vocalisation and rocking) was affected by colour. In the responding reds her 'chatter' tended to be loud and 'cross' sounding whereas in the rocking blue/green she calmed and quietened down. There was an approximately eight-fold reduction in vocalisation, and for rocking an equivalent figure is not possible because it was reduced to zero. The Analysis of Variance tests confirmed that the differences in vocalisation and rocking in red and blue/green were significant at the 1% level (see Appendix 3 pages xcvi & xcix). As with the first cohort, since sampling procedures were not really adequate due to the small amount of data, this test should only be taken as a guide. However, since in this case the difference in behaviour was so large, the results can be considered likely to signify a real difference.

Summary of Findings for Anna

In summary, the findings for Anna were that her behaviour, as assessed from rocking movements and vocalisation, was affected by colour. In general she was aroused in fast moving reds, with the intonation of her voice sounding harsh and 'cross', and relatively calmer, quieter and more relaxed in slow moving blues and greens.

Summary of Findings for Simon and Anna

The Effect of Red and Blue-green

The two children whose behaviour was analysed in detail showed differences in behaviour in the two opposite shades of colour, namely red and blue/green. In the case of Simon his general bodily posture was more upward orientated in the red as compared to blue/green, and for Anna her vocalisations were louder and more aggressive-sounding in the red compared to blue/green.

The Other Children in the Second Cohort

Although detailed analyses for the rest of the children will not be made a short report will now be given for each one.

Nicholas

Table 11.4 Details and Baseline Abilities for Nicholas

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Nicholas 13 years of age	I year when joined project	Male	'Complex special learning needs'	ASD	Does not use words, is learning to communicate through signs	Pre-academic. Can 'make marks on paper'	Information not available	Down's Syndrome

Brief Notes for Nicholas in the Colour Room

Nicholas had Down's syndrome as well as autism. He was non-verbal and often had difficulty understanding what was required of him. He could easily become agitated and could be quite destructive, throwing chairs etc. and ripping down curtains. Nicholas appeared to enjoy the colour sessions as shown by his willingness to come and by his reluctance to leave. He would often signal in Makaton for the lights to come on. In the reds he would often walk about, jump

up and down and smile whereas in the blue/greens he would more often sit calmly and would sometimes yawn. In one or two sessions this difference was quite marked indicating that the changing colours were likely to have had a considerable effect on him.

Edward

Table 11.5 Details and Baseline Abilities for Edward

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Edward 15 years of age	3years	Male	'Severe and complex difficulties'	ASD	No recognisable verbal communication	Pre-academic Can draw round a template. Difficulty distinguishing between large and small	Information not available	

Brief Notes for Edward in the Colour Room

Edward was considered by staff to be highly excitable. He would often jump up and down and make 'Tarzan' like noises. He would often run away or lie on the ground and refuse to move. He missed many sessions for various reasons. Examination of the videos showed several instances where, having been excited in the reds, he could apparently be calmed down by the gently moving blues and greens. A report from the psychology assistants also noted the arousing effect of red and the calming effect of blue, although they also noted that he would sometimes become agitated in prolonged blue.

Sean

Table 11.6 Details and Baseline Abilities for Sean

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Sean 13 years of age	5 years	Male	S.L.D.	Severe social, communication and behavioural difficulties	Non-verbal, but will use some Makaton symbols	Pre-academic, but can copy simple shapes	'Impaired social relationships'	

Brief Notes for Sean in the Colour Room

Sean had difficulty with transitions and could become violent towards staff, biting and kicking. Sean attended only very few sessions. He was attentive to the colours but became rather distressed when he had to leave. He left the school after very few colour sessions.

Susan

Table 11.7 Details and Baseline Abilities for Susan

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Susan 13 years of age	I year when joined project	Female	Information not available	ASD ADHD	Can use short sentences meaningfully	Can read familiar words	Solitary	

Brief Notes for Susan in the Colour Room

Susan was reported to be highly excitable and would jump up and down and run round the room. She sometimes attacked teachers and care-staff. When frustrated she would often bite or kick. She could use words and sentences freely though they were usually parts of songs or phrases repeated echolalically. She was causing great difficulty in class and missed many sessions because of the difficulty of transition to and from the colour room. She also easily

became agitated in the colour room and also appeared to get more worked up in the reds than blues though this was rather inconsistent.

Summary of Findings form Second Cohort

Although the individual children displayed different behaviours in response to the two colours, there were common overall tendencies. It appears that in general the children reacted in red light in a manner that can be described as more positive or aroused, and in blue/green as more reserved and calm. These findings add weight to the inferences from the first cohort and serve to confirm the general proposition that the effect of red is arousing and of blue is calming.

Effect of Using a Computer-controlled Lighting Sequence

The computer-controlled sequence was introduced for the sake of objectivity so that it would be clear that the behaviours were in response to the colours rather than the other way round i.e. it would eliminate the possibility that the light operator was altering the colours according to the child's behaviour. In this respect it was a successful strategy and the above observations from the second cohort contribute more reliable evidence for the effects of the colours.

However, as the work with the second cohort progressed a problem gradually became evident. Although satisfactory results with Colour Response Profiles were obtained using the computer sequence, the differences in behavioural traits was not as pronounced as had been hoped for. Furthermore, when it came to attempting Colour Mood Dialogue the responses of the children were far more reserved than had been expected from the results on the first cohort. This was disappointing.

The first cohort had started with interaction between child and support person before then going on to the more objective and impersonal Colour Response Profile investigations. The question now arose as to whether, inadvertently, in the first few sessions the children had been shown how to express their reactions to the colours. Perhaps this was why the colour response profiles were so relatively easy to obtain. When it now came to the second cohort where, without interference from the support person, the attempt was made to deduce the effects of the colours, there was so much less response from the children. Maybe the logical, objective and detached attitude was after all not as productive as had at first been thought.

There was also a second and perhaps more important detrimental effect of using the computer sequence. Again, in the first cohort, Colour Mood Dialogue was introduced to children whose first experience of the colour room was interaction with another person. Thus interaction was not unfamiliar and was relatively easily achieved again with the lights. For the second cohort this was not the case. In the cause of 'objectivity' they were subjected to many sessions of dull, unresponsive and insensitive computer-controlled lighting sequences. Maybe the effect of this was to deaden their interest and responsiveness to the lights because the 'message' would clearly be that their feelings and reactions made no difference to what happened. This would of course be diametrically opposite to what was intended for the second stage of Colour Mood Dialogue and may have been the cause of the comparative failure of this stage with the second cohort. It is interesting to note that the children appeared relatively contented with the computer controlled sequences which might be expected from what is known about individuals with autism feeling comfortable with 'sameness'. Nevertheless it did appear to reduce their responsiveness and the question arises as to whether 'security in the predictable' can in fact lead to 'learned helplessness' (Abramson, Seligman and Teasdale 1978).

Summary of the Outcomes for the Second Cohort

Below is a summary of the main findings from the children involved in the second cohort of children:

- Red tends to be arousing and ‘upbeat’ in its effect whereas blue and green tend to be more calming and ‘downbeat’.

- The calming effect of blue and green can in some cases be used to change a more aggressive behaviour to one which is more peaceful and relaxed.

- Lighting sequences that are controlled by a computer may have a ‘deadening’ effect on the responsiveness of the child.

- For a child to participate in Colour Mood Dialogue it may be helpful if there has been previous interaction with another person in the colours in order for the child learn how show self expression.

It is realised that these inferences are still derived from only comparatively small numbers of children and that ideally many more should be investigated. However, with the findings of the second cohort confirming those of the first, it is felt that there is now sufficient evidence to put forward with some degree of confidence the assertion that at least in some cases colour does affect the behaviour of children with autism and that the arousing effect of red and calming effect of blue and green is general. These findings will be formatted in Chapter 15 as answers to the first three research questions.

CHAPTER 12

METHODOLOGY FOR THE THIRD (INTERACTIVE) STAGE -INTERACTION EXERCISES

Some Movements and Exercises Used During and Following Intensive Interaction

The overall purpose of this work, as discussed previously, was to research ways of achieving quality interaction with children with autism. One of the fundamental premises was that the 'normal' social functioning of the human being involves more than just the intellect. Feeling and willing play their part, and these are intimately bound up with the function of the whole body and not just the mind. Colour was used as a facilitator for reaching this 'affective aspect' of the child.

This was taken into account in the interactive stage. Intensive interaction starts by sharing and developing what the child brings (this will be discussed in detail for each individual child) and because it is child led the actual nature of the interaction could not be specified beforehand. However, once the relationship with the adult was built up, various 'exercises' were then introduced which were intended to develop and coordinate feeling and will through whole body movements with the intention that the child could became more aware of its 'sense of self' (see Chapter 4, page 71).

Various movement exercises were used, some resulting directly from what the child did naturally and some directed by the adult. Movements very similar to those suggested by Sherborne (2001) (see p 69), were used together with some which had been developed during the course of this research. Also various eurythmy movements as indicated by Steiner (1983)

were used as he also stressed the importance of body movement for the healthy development of both body and mind.

Eurythmy Movements

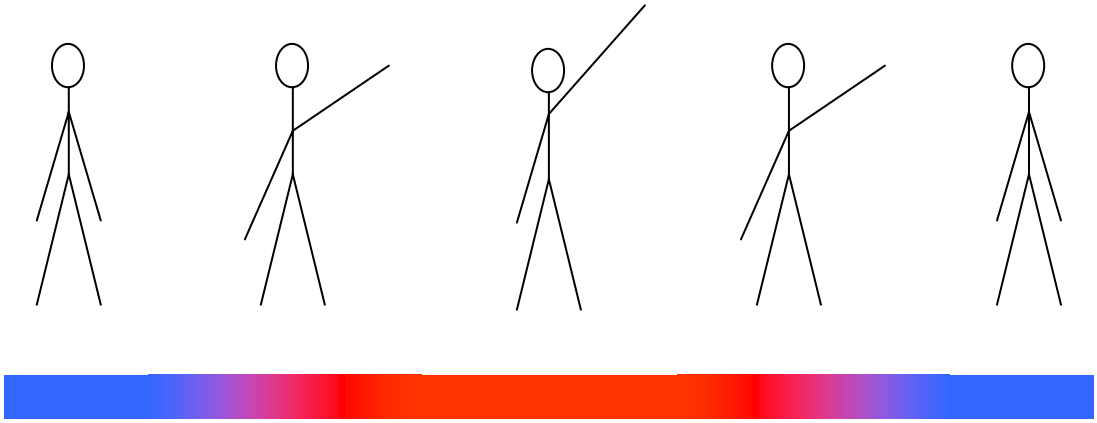
Steiner developed a new form of movement which he called Eurythmy. It is like a graceful form of dance where the movements relate to sounds of either speech or music. As an art form it is performed to poetry or music with stage lighting. According to Steiner (1984) there is an archetypal gesture or movement belonging to every sound of speech. When a sound is uttered from the larynx the air vibrates in a particular form and it is this form which is represented in the eurythmy movements. Some of these movements were used in the third stage, partly because of their gracefulness and free-flowing nature but also because of their relationship to speech. Steiner also gave indications as to how eurythmy could be used therapeutically (1983). The relationship between language and gesture has been discussed earlier (see Chapter 4 page 73).

Although in this work no claim is made that curative eurythmy as such was undertaken, there is one exercise given by Steiner (1983) which may be particularly relevant for children where the three faculties of thinking, feeling and willing are not properly coordinated as has been suggested might be the case in autism (see Chapter 3). Although he does not speak of autism as such, he describes how this lack of coordination is sometimes seen in children and how it can manifest in many different problems. He then goes on to suggest a eurythmy exercise which might help to bring these three more into ‘harmony’.

This particular exercise will be described. It concerns the gestures for three of the vowels. There is a problem in that this was given in the German language where the pronunciation is different from the English. The first is ‘I’ (pronounced ‘ee’ as in feet) the second is ‘A’ (pronounced ‘ah’ as in father), and the third is ‘O’ (pronounced ‘oh’ as in slow). He also gave suggestions as to which colours should be connected with each movement and described how one should allow the colours to ‘stream through the movements’ (Steiner 1984, 114). The gestures are illustrated in the diagrams below and an approximation for the colours is also shown:

Gesture for ‘I’

Figure 12.1 Diagram illustrating eurythmy movement for ‘I’ with colours



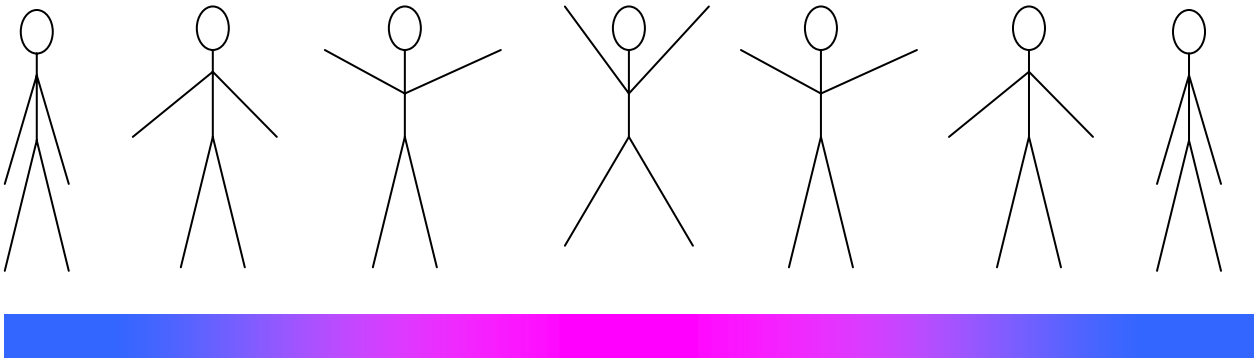
The person steps forward and stretches one arm (sometimes both) upwards.

Steiner’s suggested colour for this gesture is red-yellow-orange (1984). It is carried out in the colour room from the ‘home’ colour of blue.

‘I’ expresses self-assertion (Steiner 1984).

Gesture for ‘A’

Figure 12.2 Diagram illustrating eurythmy movement for ‘A’ with colours

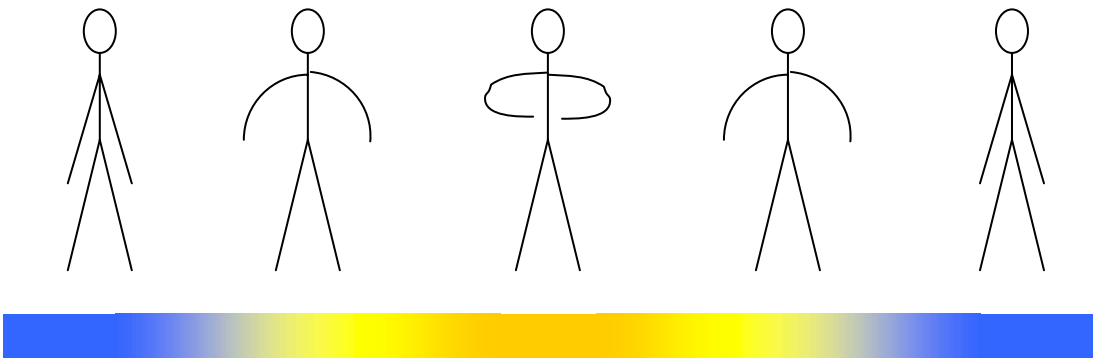


The arms are brought up gradually, palms up, and held in the higher position for a few seconds before slowly brought down again. The legs should also be placed further apart at the same time. Steiner’s suggested colour for this gesture is blue-violet (1984). It is again carried out from the ‘home’ colour of blue.

‘A’ expresses the feeling of wonder.

Gesture for ‘O’

Figure 12.3 Diagram illustrating eurythmy movement for ‘O’ with colours



The arms are formed into a circle.

Steiner's suggested colour for this gesture is reddish-yellow (1984). It is also carried out from the 'home' colour of blue. 'O' expresses the gesture of embracing, of being connected.

Steiner's exercise for helping to integrate the three faculties of thinking, feeling and willing is to make the 'I' movement first, followed by the 'A' and then by the 'O' (1983). This exercise has been used for many of the children involved in the current research. In some cases the children have spontaneously offered other sequences of vowel sounds, in which case these have been followed in addition to the 'I' 'A' 'O' sequence.

Whilst it is not possible to prove the efficacy of such movements in this research and therefore no particular claim is being made as to their precise effect, their use can also be justified on the grounds that any graceful 'dance' type movement, particularly if it is pleasurable to perform, gives a child confidence in its body and is therefore beneficial (see Sherborne 2001).

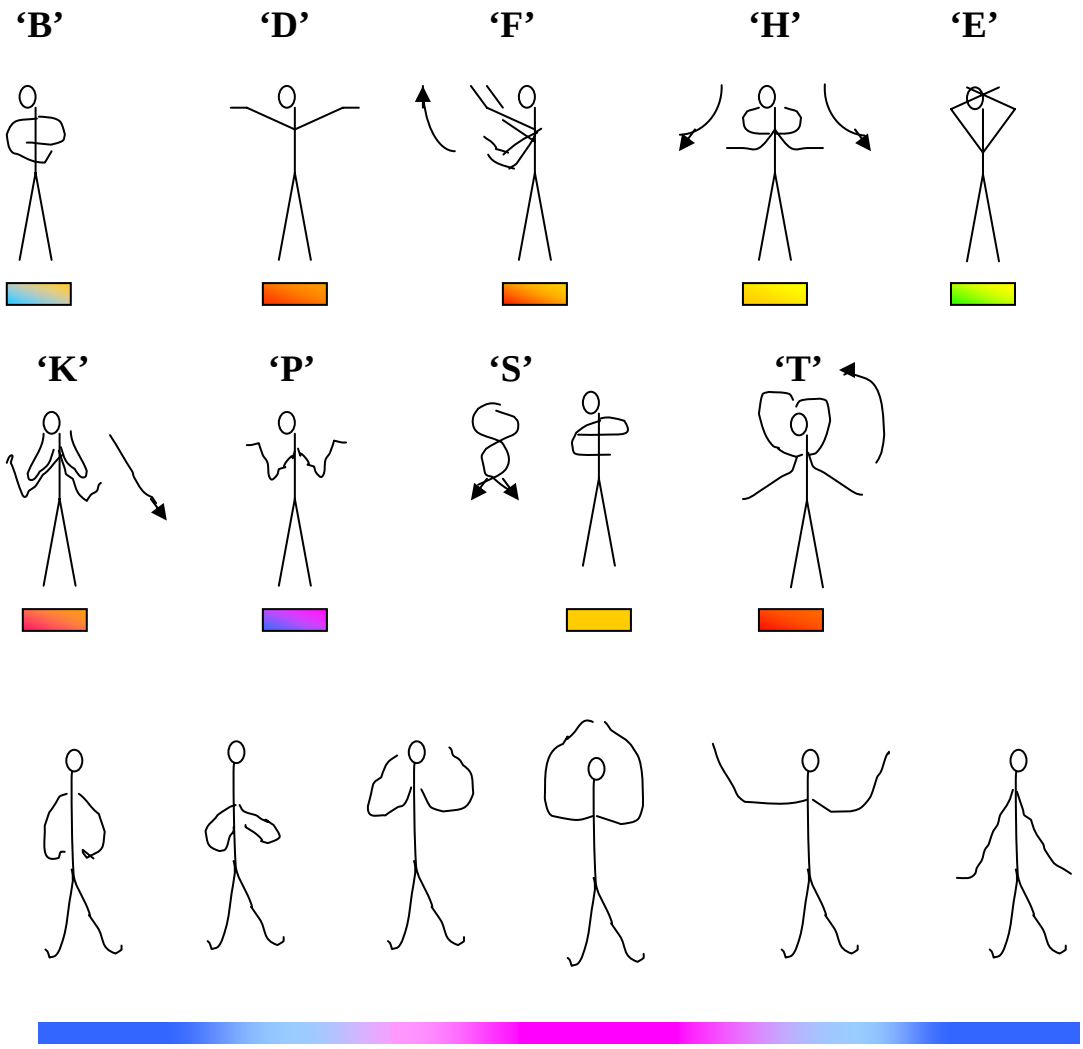
Eurythmy Movements and Speech

Because the eurythmy movements relate specifically to speech sounds they may have relevance for encouraging non-verbal children to speak. If the child can make the appropriate sound gesture it may then be possible go on to form equivalent movements with the mouth which, if the breath can be sufficiently controlled, may then lead to the appropriate sound being uttered. This will be described in more detail for individual cases. Simple diagrams of the movements are given overleaf.

Steiner (1983) relates how at an earlier stage of human development when speech was evolving, sounds were always connected to body movements. This has become less pronounced over the course of time as language has become more internalised, though the

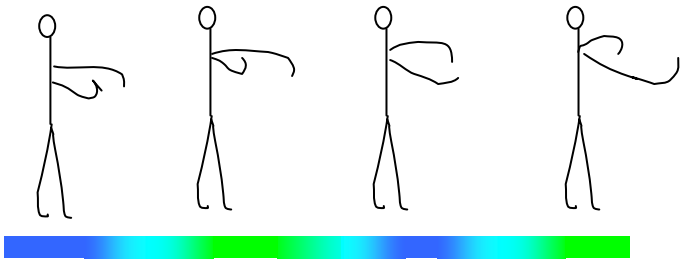
remains of it are still to be seen in the hand gestures accompanying speech. It could be argued that for those for whom speech is a problem, to go back to the fundamental movements could be helpful. It is interesting to note that Sherborne also recommends movement for encouraging speech: 'Children who are elective mutes often respond well to movement and dramatic play' (Sherborne 2001,105). Spinney (2000) mentioned earlier also suggests that gesture and speech are developmentally intimately connected (see page 73).

Figure 12.4 Simple diagrammatic sketches for eurythmy movements for speech sounds and colours



The circular patterns made by the arms start small and get progressively larger.

‘M’



Some of the Movement ‘Exercises’

Eurythmy Gestures and Sounds

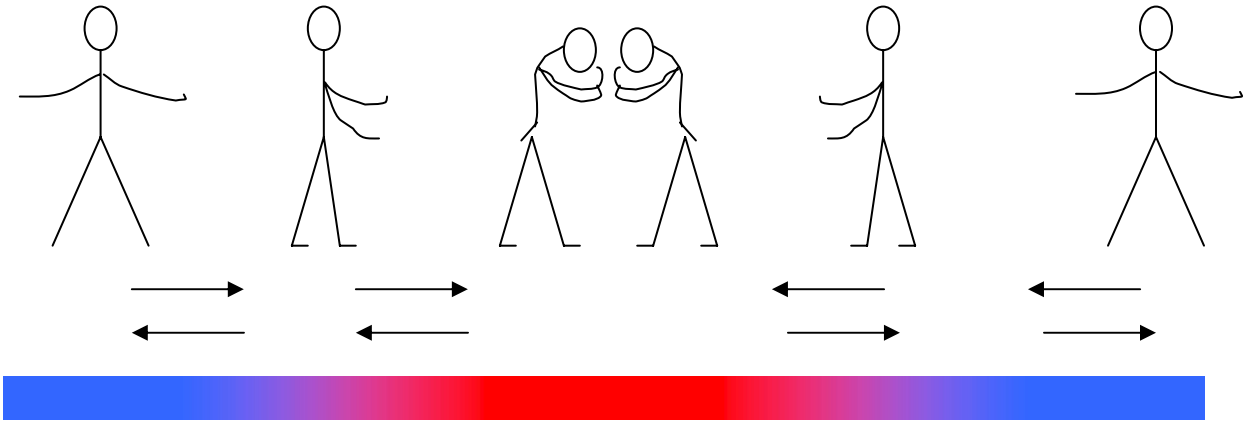
These have already been described. The ‘A’ movement was usually the first to be used since it is probably the easiest to carry out. It can be as simple as raising the arms and for some children it was first carried out sitting down. The sequence ‘I’, ‘A’ and then ‘O’ was then used. Other eurythmy gestures were used when introducing speech sounds to children with little or no verbal ability. These will be discussed for individual children but it is interesting to note that for several of the children their interest was engaged by the sounds only if accompanied by the gestures. This encouraged them to imitate both gesture and sound together to begin with, leading on eventually to being able to make the sound alone.

Other Movement Exercises

‘IN’ and ‘OUT’

This is related to breathing in and out and was first used for children who seemed to find difficulty in relaxing and breathing out. In the first stage of this work, red was found to be arousing and to stimulate upward gestures while blue was found to be calming, relaxing and to produce a downward gesture. Therefore red was chosen for the ‘in’ movement and blue for the ‘out’. It has also proved to be something easy to understand and carry out and for many it was also fun. The basic movement is illustrated in the diagrams overleaf:

Figure 12.5 Diagram illustrating the 'In' and 'Out' exercise

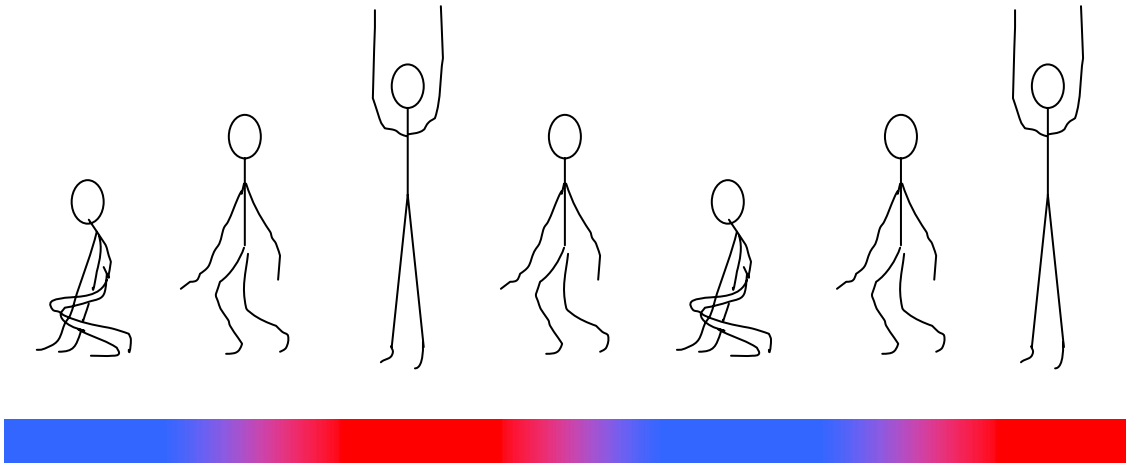


Using the word 'in' the adult and the child come close together and bring the hands up to the face while the lights change from blue to a strong red. This is carried out on an in-breath and the feeling is one of tension. Then, using the word 'out', adult and child walk backwards away from each other, the arms move down and out and the lights cross-fade back to blue. This is carried out on an out-breath and the feeling is one of relaxation. The 'in' 'out' movement can be repeated several times, and speeded up or slowed down.

'UP' and 'DOWN'

The child stretches up with both arms raised above the head and if possible stands on tiptoes. The lights cross-fade to a bright red. They then stoop down, bending the knees, and touch the floor. The lights now cross-fade back to blue. Once familiar with the movement they are encouraged to use the words 'up' and 'down'. The stretching up has similarities to the Eurythmy gesture for 'I' which encourages the experience of self- assertion. The basic movement is shown overleaf:

Figure 12.6 Diagram illustrating the 'Up' and 'Down' exercise



Starting from the 'home' colour of blue, a gradual cross-fade to red follows the upward movement of the arms and body and the reverse follows the downward movement. For some children this was done from blue to yellow.

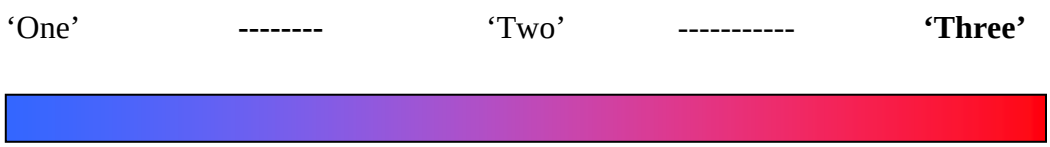
Stamping and Counting

This exercise was developed when it was noticed how the gait of some of the children gave the impression of being 'light' and 'purposeless'. It was felt that this might indicate their diffident expression of the self, discussed earlier (lack of awareness of their own 'I') so the act of stamping on the ground with force was felt might encourage a more 'wilful' self-expression. Donna Williams also suggests that what she calls 'stomping' a useful exercise for children with autism (Williams 1992) and she also indicates that rhythmic movements may be helpful in memorising and accessing information: 'The rhythm of repetitive jumping when used in association with rote-learned information seemed to assist in these things for me.' (Williams 1996a, 126).

The exercise was carried out walking round in a circle with the adult counting out loud and the child stepping in time to the counting. For example if a rhythm of 3 were used, they would

count 1 –2 – **3** with the emphasis on 3 and with the child stamping on 3. Other rhythms from 2 up to 5 were used. For verbal children this may help with both the concept of number and with learning the number sequences. Colours for this exercise were again blue and red, the blue cross-fading to red as the accent comes on the last number. Red was again used as the colour for self-assertion:

Figure 12.7 Diagram illustrating the colours for the stamping exercise



Push/Pull Exercises

Taking Turns to Pull

This exercise was used to encourage self-assertion and turn taking. It was often used as the first exercise where a demand was made on the child rather than just allowing play on their own terms. It was usually carried out starting from the sitting position and involved moving about on the floor. Sometimes it was done from standing. The adult takes the child's hand and using the word 'pull' the adult pulls the child towards them. The child is then required to pull the adult forward in the same way. The intention was that the child learns to feel strength and will in their limbs as they feel the resistance of the adult's body. It is also an exercise to connect thinking and will since the demand is made verbally and the response is made by a physical action. Further, it involves turn taking, and eventually the child is encouraged to use the word 'pull' as they carry out the action. Red was used for the pulling and blue for the relaxation in between.

A similar exercise can also be done, involving pushing rather than pulling. Both these exercises are very similar to those suggested by Sherborne (2001) except that she does not lay particular emphasis on the use of words at the same time and obviously she does not include colour.

Clapping

This is another exercise involving rhythm, turn taking and the resistance of the adult's body. It has usually been more successful when the child claps against the adult's hand as this is more interactive. Again red was used as the colour of assertion.

Other 'Sherborne' Type Movements

Various movements suggested by Sherborne (1996) have also been found useful. They were used as she suggested to enhance body awareness and body control and also to experience the different types of relationship with another person. These she described as 'with', 'shared' and 'against' relationships. For a 'with' relationship the child is 'looked after' or 'cared for' by the adult and calls for trust on the part of the child and sensitivity from the adult. Examples of this type of movement are cradling the child on the lap, riding on the adult's back or simply holding hands. For this type of movement the colour was usually blue, blue-pink or blue-green. A 'shared' relationship calls for an equal commitment from both partners. It requires trust, understanding and an awareness of working together. Examples are back-to-back rocking, or face-to-face swaying. The colours used varied depending on the movement but in general for gentle rhythmic movements blue-greens were used and for more assertive movements red or pink. The 'against' movements allow both partners to test their strength, but there must be no mood of aggression and a sensitivity of 'when to give in' is absolutely vital. Pushing back-to-back, or pulling like a tug of war are examples of this type of relationship. In general, strong red was used for an exercise involving the use of strength

while the exertion was happening, and this cross-faded back to blue as soon the exertion was over. Many of the previously described exercises fit in to Sherborne's classification of types of movement relationship.

Stories, Poetry, Role Play and Imaginative Games

At a later stage, short and very simple stories were told. The actions were illustrated with movements in which the child was encouraged to take part. The story was repeated over several sessions so that the child became familiar with the sequence of events (Sonders 2003) and was then able to join in with both the words and movements. This could lead on to role-play where the child took the part of one character and the adult another. The colours depended on the storyline but for example red was used for arousal or fire, blue-green for water and swimming, yellow and blue for sky and flying and blue for night and rest.

Short and simple poems were used to practise rhythmical speech. Colour sequences enhanced the mood and were also used to emphasise certain words. These will be discussed in more detail for individual children.

Imaginative games were also sometimes introduced at this stage. Symbolic pretend play is often difficult for children with autism and, as discussed earlier (Chapter 3), it was introduced to attempt to free up the imagination and encourage more flexible thinking. It is also a useful check on the level of understanding of the language. Successful examples of this were: playing a game of catch with an imaginary ball, pretend eating and drinking routines and acting out various scenarios such as driving a car, going swimming or shopping etc. Again these will be discussed in more detail for individual children.

‘Conversation’ with Real or Imaginary Words

After the movement exercises at the end of a session a sort of ‘conversation’ was sometimes attempted. Words could be real or imaginary, but the intention was to continue the relationship built up in movement into language. With real words this might for example involve a ‘conversation’ about food or drink and the eating and drinking actions would be acted out while using the appropriate words. Alternatively, for some children who could not yet use real words this might take the form of an animated ‘chat’ using ‘gobbledegook’ language. In either case it is way of building up towards spoken language and it normally proved to be a satisfying way of ending a session.

The details of how these exercises have been used and the learning outcomes are discussed for specific children in Chapters 14 and 15.

Procedure for the Third (Interactive) Stage

Once the Colour Response Profile had been obtained, the attempt was made to engage the child in Colour Mood Dialogue (described in Chapters 8, 10 and 11, but see below) With some children this was immediately successful, in that they readily engaged with the lights in gesture and vocalisation whereas with others they were much more reluctant. The form of the interaction stage depended on their response to Colour Mood Dialogue.

Children Who Engaged Readily in Colour Mood Dialogue

In Colour Mood Dialogue the child interacts with the light operator through the medium of changing colours. The interaction is child-led, with the lights responding to and augmenting the movements and vocalisations of the child. Once this was established an adult went into the room and gradually started to join in. This had to be done very gradually and sensitively so that the child felt encouraged to continue the routine already established. The intention was

that the child would come to realise that the adult was joining them in 'their world' and be willing to share it with them. A sort of spontaneous game or 'dance' developed, always changing, always new and unpredictable, but interactive, satisfying and fun. The games involved, for example, rocking from side to side or backwards and forwards, jumping, circling round and round, hand flicking and vocalisations of all sorts, but always starting from what the child initiated. The mood was created by the changing colours rather in the same way that music provides the medium for normal dance.

This phase was continued for some time (months) to establish the child's confidence, to practise the art of reciprocal interaction and turn taking and to give the child a sense of fun and achievement. Above all it established the adult as an interactive partner with whom it was possible to have a trusting and fun relationship. This phase has validity in its own right as a form of intensive interaction (Hewett 1996, and Nind and Hewett 2001) and in some cases was as far as it was possible to go. The actual details of this stage are discussed for each individual child in Chapter 14. A trusting relationship between child and adult which is based on enjoyment in each other's company could now form the starting point for further development.

Children Who Did Not Readily Engage in Colour Mood Dialogue

In this case the adult attempted to build on the indications on the behavioural effects of colour seen in the stage of determining the Colour Response Profile. An interaction routine was built up in the normal way starting from the child's own inclinations but not now as a continuation of their Colour Mood dialogue routines. Occasionally a child did not easily engage in active intensive interaction in which case the adult had to take the initiative in starting the 'game' and creating the style. Sometimes the exercises described above formed the starting point, and having taken part in these the child appeared to be 'freed up' and now able to engage in more

spontaneous and creative interactions. In every case the process was different and is described in more detail for each individual child.

Where Does Intensive Interaction Lead?

The question is often asked as to what the next stage should be once the child can take part in successful interactive sessions. Caldwell (2000) describes many instances where successful Intensive Interaction has led to greater contentedness and hence improved behaviour. Also it can be justified on the grounds that it brings pleasure and enjoyment in the company of others, which would often otherwise be unachievable. Thus Intensive Interaction can be justified as an end in itself. However in this research it is seen as a means of establishing a trusting and reciprocal relationship that can then form the basis for further development. Intensive Interaction leads to improved interpersonal relationships and this in turn leads to improved learning potential (Collis and Lacey 1996).

The next section describes the overall view as to what the next steps might be but again the detail depended on the individual child.

There is the possibility that with some children, interaction might remain at the level of fun play where the adult is treated more like a useful 'toy' that plays to the child's agenda than another person with wants and needs of their own. Although this may be a pleasurable experience for the child it might not necessarily lead on to further development. Eventually there has to be a change over to a genuinely 'social' interaction where there is a recognition of the humanity of the other. This could be thought of as a sort of 'eye of the needle' situation for the child with autism because they often do not naturally go on to this stage, and it will therefore depend on the skill of the adult to 'guide them through'. The attitude of mind of the adult will be crucial. They would need to attempt to 'exude' powerful elements of feeling and

will (see Chapter 3) in order to engage at the affective level but at the same time exhibit gentleness and a caring attitude. The exercises mentioned above were used; or sometimes others developed specifically for individual children. This sometimes involved asking the child to make specific movements, sounds or words. The details are discussed for individual children in Chapter 14, but in most cases it involved 'persuading' the child to move on to a level of greater sophistication in communicative interaction. It should be emphasised that although at this stage the adult may now be leading the interaction and using considerable energy and will to direct the actions of the child, it is felt that the eventual empowerment gained through being able to communicate more effectively outweighs the temporary loss of control over the interaction during sessions at this stage. Examples of where this led to sort of a 'freeing up' which enabled the child to enjoy affective interaction with the adult are given in Chapter 14.

Use of the Shadow Screen in Introducing Interaction

In the case of some children who did not readily engage in Colour Mood Dialogue the shadow screen formed a useful intermediate stage between experiencing the colours passively and one-to-one interaction with an adult. They showed interest in making coloured shadows and soon started to invent their own movements to make patterns on the screen. If the adult could then join in with these movements to make an attractive colour display the child would be able to experience taking part in a socially creative and fun process. This formed a useful 'bridge' to one-to-one interaction.

Intensive Interaction, Stereotyped Behaviours and High Arousal

The starting point for Intensive Interaction is usually the child's own natural behaviours. When this involves 'problematic' behaviours such as head or back banging or intense hand flicking etc. the question arises as to whether it is sensible to join in with these on the grounds

that it encourages what is undesirable and may also do nothing to avert states of high arousal. In the experience of Caldwell (2002), it is actually an effective way of calming the child down. (Much of her work concerns adults where this is also effective.) First the adult joins with the highly aroused stereotyped behaviour and allows the interaction to follow the pace of the child. Then, once a working relationship is established and a coincidence of expression is achieved, it is possible for the adult to take the lead and gradually slow the pace down and so produce the desired tranquillity. After dealing with numerous such cases, in her experience this method has never failed to work. Prevezer (2002) reiterates the same principle and is also not afraid of 'going with' highly aroused and excited states because it is virtually never a problem to 'bring it down again'. In this research the same thing has been found, in fact this has been found to be a far more effective and lasting way of producing calm than attempting to instruct the child to calm down or to attempt to forbid the undesired behaviour. Nind and Hewett (2001) are also of the opinion that moments of high arousal may be desirable, if contrasted with consequential moments of calm. This has been discussed in Chapter 4. Again the details of actual sessions are discussed for individual children in Chapter 14.

Edited Video Clips (DVD)

The two videos presented with this thesis show some of the exercises described above. Different styles have been adopted for different children according to the perceived needs of each child. However, two overall themes can be seen to be common to all the various activities.

Firstly, the attempt is always made to 'get into the child's world' and share their activities with them in their way. This was to enable them to recognise the adult as someone with whom they could identify and in whom they could feel trust. Secondly, the many and various exercises all have in common the attempt to share elements of feeling and willing (as well as

cognition), often with the adult purposefully and deliberately ‘projecting’ their own feeling or will toward the child, to enable the achievement of something new.

A Note on the Use of Colour in the Intensive Interaction Stage

It was noted in the observations from the first stage (Colour Response Profile) that when colour did have an effect on behaviour there was often a delayed effect. In the case of both Brian and Anna (see Chapters 10 and 11) there was a delay (very short for Anna) in the calming effect of blue/green following the more aroused states in red. It might be questioned as to how colour changes can be thought to be effective in the interactive stage where they occur very rapidly as an accompaniment to a ‘game’ or ‘dance’ sequence when their effect on behaviour was shown to take time. The argument is as follows: The early investigations of Colour Response Profile were essentially to show that colour does have an effect on mood and behaviour. If they were to be used as an aid to behaviour modification, then this question would be valid, and it would be reasonable to suggest that changing the colour to alter behaviour could be expected to take some time to be effective. However, this is not the purpose of colour in this (interactive) stage of the research. It is much more a matter of trying to enhance and augment the child’s existing mood and to give it some sort of external and more perceptible form. For children who are not easily aware of their own emotional states, an external colour that matches it and can move and change with it may help to bring it more into consciousness (see account by Lawson, Chapter 5 page 81). For this reason, particularly during the child-led interactions, the fast changes of colour mood were not thought to be a problem. However, if for example, following states of high arousal or excitement during an interaction, a calming mood was required then time was allowed after the lights had changed before a change in behaviour was expected and sufficient time in the calming colour was given to allow it to take effect.

It should also perhaps be emphasised at this point that the changing colours were there to help the child to experience affective states (feelings) which would in turn lead to greater competence in social interaction. Once this capacity has been learnt, the colours may then become unnecessary. They are seen as a means to an end i.e. to achieving social competence which, once achieved can stand 'on its own'.

The Question of the Role of Colour During Interaction with an Adult

As already discussed in Chapter 6, for a case study of this nature, control groups to separate out the various contributory factors are not appropriate. The two main factors contributing to the creation of affect would be the intervention of the adult and the changing colours. It might have been useful to find out how the children would have responded in interaction with an adult without colours, as this would have given information about the relative contributions of the two. Had it been possible to set this up as a fair comparison test so that the same child could be observed interacting with the same adult with and without changing colours, it might have been possible to tease out the level of contribution to the creation of affect from the two factors. However, setting up such a comparison test would have been problematic on a number of levels and since this was an exploratory case study and not an experiment it was decided to investigate colour-mediated interaction as a 'whole package'.

However, two sessions with two different children were held where interaction in the absence of changing colours was carried out. Although these provided only anecdotal information the outcomes were nevertheless interesting. These are described in Chapter 14 pages 316 and 322).

CHAPTER 13

METHODOLOGY (INCLUDING A LITERATURE REVIEW) FOR REPORTING AND ANALYSING INDIVIDUAL CASE REPORTS FOR THE THIRD STAGE

Methodologies for Reporting and Analysing Case Studies – A Literature Review

There are various examples of individual case studies or case reports in the literature which will now be briefly surveyed before developing a suitable methodology for the reporting and analysis of the third (interactive) stage of the colour project.

In relating her experiences of Intensive Interaction with people with severe learning difficulties, Caldwell (1996) gives brief narratives for several individuals, illustrating the essential elements of the observed behavioural problems, her own interactive responses followed by the consequent changes and improvements in behaviour. She then picks out the common elements and gives a succinct explanation of the principle on which the interventions were based. Although her narratives are comparatively short (referring often to only one or two sessions), the technique of giving a general description of events followed by highlighting the key points and principles is one which might usefully be applied to the third stage of the colour project.

A longer narrative, covering the events during several months of Intensive Interaction, is given by Smith (1998) when describing the case of a boy with autism and challenging behaviour. Data had been collected in the form of video recordings, note taking and record

sheets. At the end of the narrative she summarised the learning outcomes according to the following four categories:

- Social skills
- Communication skills
- Cognitive abilities
- Emotional well-being

Within each category she described in a few sentences what had been achieved over the course of the intervention. A similar approach was taken by Peters (1998) in reporting an individual case study on the effects of Intensive Interaction with a young and severely disabled girl. Video recordings were again used and notes in the form of a recording sheet for each session were made. Categories for recording included such things as:

- Eye contact
- Turn taking
- Vocalisation
- Initiative
- Imitation
- Use of gestures

For each she simply rated them on a four-point scale from poor to excellent. To summarise the case, at the end of the narrative she wrote a short paragraph describing changes in each category as a way of showing what progress had been made over the course of the intervention.

Another example of case studies of individual children with severe learning difficulties undergoing Intensive Interaction is reported by Watson (1994). Briefly, the intervention took place over a period of several months and again data took the form of video recordings and evaluative note taking. Here, a slightly different method from the above was used in presenting the findings. A brief summary of the main features of the study in table format is given for all the children. This lists the child's age and sex etc. and then in two columns gives brief notes firstly on the child's original state and then on later school reports once Intensive Interaction had been introduced. Two children were then selected as 'illustrative examples' for a more lengthy report (Watson 1994, 153). The narratives basically summarise the sessions and remark on any events that were thought to be unusual or to show significant progress. This is then followed by a general conclusion relating to changes in communication, social awareness and responsiveness, observed in all the children in the study. There appears to be no particular justification for choosing the two children for the more detailed reports, they are simply described as 'illustrative examples'.

Another aspect of recording interactive sessions with children with severe learning difficulties is considered by Ware (2003, 45). In discussing the choice of events and behaviours to record she suggests that there needs to be 'some way of selecting those that provide the most useful focus for development'. She puts forward the following:

- Behaviours that can easily be developed into conventional communication such as vocalisations that might lead to speech or gesture that might become signs.
- Those which are easy to observe, since they are more likely to attract a response.
- Behaviours that occur frequently.

These appear to be sensible and practical guidelines and would be especially relevant where it is intended that the interaction will lead on and develop into more sophisticated skills.

Two types of behaviour only, were assessed in a study to evaluate the effectiveness of Intensive Interaction by Elgie and Maguire (2001). The case was that of a woman with severe learning difficulties who was described as withdrawn. The two outcome measures used were:

- Hand contact (touching the therapist's hands)
- Vocalisations.

These were chosen because it was felt that initiating hand contact was a sign of being 'accessed' and that vocalisation was a sign of attempting to communicate. The findings were presented on charts showing the levels of the two measures over time in relation to the application of the intervention. It is interesting that only two measures were used compared to the higher numbers in the previous examples but in this case quantitative data could then be obtained by counting all instances of the chosen behaviours in the video record, something which might have been thought to be too time consuming with the larger number of measures.

In the next example, peer interactions were chosen as the behaviours to assess when evaluating the efficacy of an intervention, in this case music therapy, in a study by Hooper (2002). A positive peer interaction was considered as a simple acknowledgement of someone, for example

- Making eye contact
- Sitting alongside
- Greeting by name or saying or signing 'hello'

Two individuals with learning disabilities were observed together over a period of time. Music therapy was given after a suitable baseline period and the number of interactions recorded. Numbers were recorded in a table so that scores before and after the intervention

could be compared and a discussion and conclusion followed. Although music therapy rather than Intensive Interaction was the subject of this study, it is interesting to note that its efficacy was estimated from looking at very similar types of behaviour to those in the previously mentioned studies.

Nind (1999) cites various examples of case study investigating the appropriateness of Intensive Interaction for learners with autism. The first is a single in-depth study of one boy, which took place over an 18-month period. The intervention started after a 5-month baseline period. Briefly, assessments were made from observations, video analyses, and various formal behavioural assessment tests, so that comparisons could be made for pre and post intervention periods. Results were displayed on charts. In the discussion she picks out various examples of new developments of behaviours for which she considers it plausible that Intensive Interaction was responsible. These were: 'moving closer to the teacher; turning his posture towards her; starting to look at her face and vocalising and smiling contingent on her activity.' Further examples are, 'increases in joint attention; a more frequent *interested* watching of people; regular engagement in one-to-one conversations of *meaningless* sounds and moulding and relaxing when cuddled' (Nind 1999, 99). These behaviours have been mentioned since they are useful examples that have been used in the assessment of progress associated with interaction for learners with autism. She then mentions two narrative case studies where there were no structured observations but where the reflective account gives rich descriptions of events over periods of years. She points out that despite not actually proving anything, these accounts do provide illustrative examples of what can happen and add to the body of empirical evidence about the efficacy of Intensive Interaction.

Lastly Graham (2002, 23) gives a useful list of behaviours that can be responded to during interaction. These are:

- Laughter
- Smiles/signs of pleasure
- Other facial expressions
- Eye contact
- Looking in the direction of the interactive partner
- Body movements
- Sounds
- Manipulation of objects

He suggests that when examining records of interactive sessions these may be suitable behaviours to pick out.

Quality of Interaction

In this study, quality of interaction will be evaluated. Nind and Powell (2000, 98) use the word in a general way to indicate the degree of accomplishment in an interaction as in: 'Emphasis is on the quality of the interactive process rather than pre-specified objectives'. On the other hand Nafstad and Rodbroe (1999, 53) give a more specific definition for quality. For them a quality interaction is one where, 'the relationship is balanced between being symmetrical and confirming and being challenging and/or inviting'. This implies that there should be a balance in the interaction between keeping the activities at a level where the individual is confident and able, and presenting more challenging tasks which would raise their attainment to the next achievement level. In the following discussions the word quality will be used in a general descriptive way as in Nind and Powell (2000) but a 'quality

interaction' would be one where the child is comfortable, happy and confident in what they are doing but at the same time is progressing towards a more sophisticated or formal level of communication.

The Colour Project Case Reports

Data were collected in the form of video recordings, a research diary, a 10-minute pre and post session observations carried out by psychology assistants in the classroom and small-scale informal interviews and conversations with staff. For each individual child, a reflective rich description narrative, similar to the example given by Nind (1999) above, will be given detailing the main events as they occurred over the time with the project, made up from these three sources of information. The observations will not be structured because the sheer volume of video time would make such an undertaking extremely cumbersome. Also, pre-determined structured observations would limit the scope of possible observations and would not allow sufficient flexibility to encompass unexpected or one-off events. Furthermore, on looking at the video record, it was realised that the quality of picture (from a small permanently mounted security camera) was insufficient to give more than a general indication of details such as eye contact or facial expression and this would have made the collection of exact quantitative data difficult and inaccurate. Also, because there were parts of the room that were out of camera view, some of the information would be missing. Therefore a general descriptive narrative will first be given for each child. The length of this narrative will depend largely on the length of time for which the child was with the project. This will then be followed by a summary table that will highlight the essential features of quality (Nafstad and Rodbroe 1999) of interaction. The features or attributes chosen will be similar in nature to those suggested by the various authors above, but modified to suit the particular cases and to pick out points which might be relevant to the research questions (see Chapter 6). They are

listed below in ascending order of achievement level and a brief justification is given for each one.

Attributes Chosen for Analysis from the Narratives

Eye Contact

It is generally accepted that interpersonal social engagement is difficult for individuals with autism. Person to person eye gaze is recognised as a sign of engagement so this is generally accepted as a positive sign during an interaction. Many authors (e.g. Peters 1998, Hooper 2002, Graham 2002) list eye contact as a useful pointer and it would therefore appear to be an appropriate feature to consider.

Engagement, Body Posture, Touch

As part of being socially 'disengaged' individuals with autism are often reluctant to face the interactive partner directly, or to lean towards them. Physical touch is also often found difficult. They are inclined to keep at a distance or to turn away. Therefore when an individual does turn towards the partner, comes close or touches, this can usually be taken as a sign of social engagement. Body posture or position is monitored by Graham (2002), Hooper (2002) and Nind (1999) and will also be used in this account.

Signs of Affection

The reluctance of individuals with autism to show affection is also well known. If it is expressed during interaction, it can be taken as a sign of social bonding. It is less commonly monitored than some of the other features, but will be considered in this account because of the specific interest in the affective aspect of engagement.

Reciprocal Responses

The fundamental principle of intensive interaction is contingent reciprocal responding between interactive partners to build up a spontaneous and creative playful game, as described earlier. Although this does not come as naturally to children with autism as to those who are typically developing, it has nevertheless been shown to be possible (Nind 1999). Since such routines in early childhood are thought to form the basis for the future development of more sophisticated communication skills (Hobson 2002), the ability to reciprocate in social interaction is considered to be a fundamental developmental skill. It is not always easy to assess in an interaction, but over the course of time it is possible to see its development through features such as turn taking, sense of timing, and building on or subtly changing the last response of the partner.

Sense of Fun, Laughing

An important aspect of intensive interaction is that it should be pleasurable. It follows that good quality interaction will be fun and will therefore produce smiles and laughter. Smiling or laughing are mentioned by Graham (2002) and Nind (1999) as significant and will therefore be used in this account.

Imitation of Movements

This is not generally considered as a feature of Intensive Interaction. However in this research the aim was to encourage the child to express affective states through gesture and voice, and as with learning speech, imitation is a precursor. Therefore the ability and willingness to copy body movements was considered to be one of the milestones along the path of development.

Initiation of Movements or Games etc

One of the tenets of Intensive Interaction is that the learner should be able to take the lead and be creative in the activities (Nind 1999). Where the child is able to initiate a new activity or direction in a routine it can be considered a successful development which adds to the quality of the interaction. This research is particularly concerned with the child becoming aware of his or her own sense of willing (or agency) as expressed through deliberate bodily actions (Russell 1996). Therefore taking the lead and intentionally initiating new movements or games will be considered as a sign of improved quality of interaction, not only because of the learner being in control but also because it can be considered to demonstrate a sense of agency.

Sharing of Affective States in Exercises

By this it is meant that the child and the adult together build up and share the experience of an affective state such as excitement, anticipation, tension, relief etc, or even sadness or compassion. This is felt to be important since one of the main purposes of the research is to explore the effects of engaging at this affective level. The degree of emotional involvement will be ascertained from facial expression, tension of vocalisations and body gesture.

Learning of Words Through Action

According to Russell (1996) normal development requires that the child acquires a sense of self and for this he claims that the ‘knowing’ and ‘willing’ components must be coordinated and integrated. The idea of for example learning the meaning and use of the word ‘pull’ while actually involved in active pulling against the interactive partner is that the word becomes connected to a first hand experience of agency expressed through the body, i.e. the understanding (knowing) is integrated with the doing (willing). Therefore it is thought

relevant to pick out examples in the case records where new words have successfully been learnt by this method.

Symbolising, Pretending or Acting

Lack of imagination and failure to symbolise are considered important features of autism (e.g. Wing 1996). Hobson (2002, 271) is of the opinion that the ability to symbolise is dependent on the infant being 'drawn into the feelings and actions of others'. By working in this realm of feelings and will (action) it may therefore be possible to further the ability to symbolise and pretend. Therefore symbolising, acting and pretence are features that will be picked out as indicative of progress.

Imitation of Words

This has been considered relevant for the same reason as imitation of movements above but at the more sophisticated level of speech.

Use Words Independently and Appropriately

Only relatively few of the children were at a level where this was a possibility. However it was decided to be a relevant attribute because expressive language could be taken as an indication of the acquisition of improved communication skills referred to in research question 5 (see Chapter 6).

Expression of Emotion through Gesture/Language

This final attribute was chosen to pick out cases where emotional states had become sufficiently conscious that they could be deliberately expressed. Expressing an inner emotional state to another individual was thought to be indicative of a relatively high level of achievement in social and communication skills.

Changes in Behaviour, Social/Communicative Skills Reported Elsewhere

This was included as it was thought important to know whether changes seen in the colour room were being carried over into other areas of the school.

Overall Progress Made

This was felt to be important because different children in the project had different baseline abilities and simple attainment criteria would not be indicative of progress. For example with Anna (see Chapter 14), although she achieved only a few words, against a baseline of being virtually non-verbal this was in fact a considerable achievement.

Choice of Children

Since the interactive stage of the project involved only a relatively small number (10) of children, choosing a random sample was not an option so all the children will be reported on. They could perhaps be considered as 'illustrative' examples of individual cases (Watson (1994). However, since some of them (three) remained with the project for only a very short time their accounts will in consequence be very brief. These three are not counted in the diagram of 'main' children overleaf.

The diagram overleaf *(Figure 13.1)* shows a summary of the relationship of stages of progress and cohorts of children and gives the names and dates for the main participating children.

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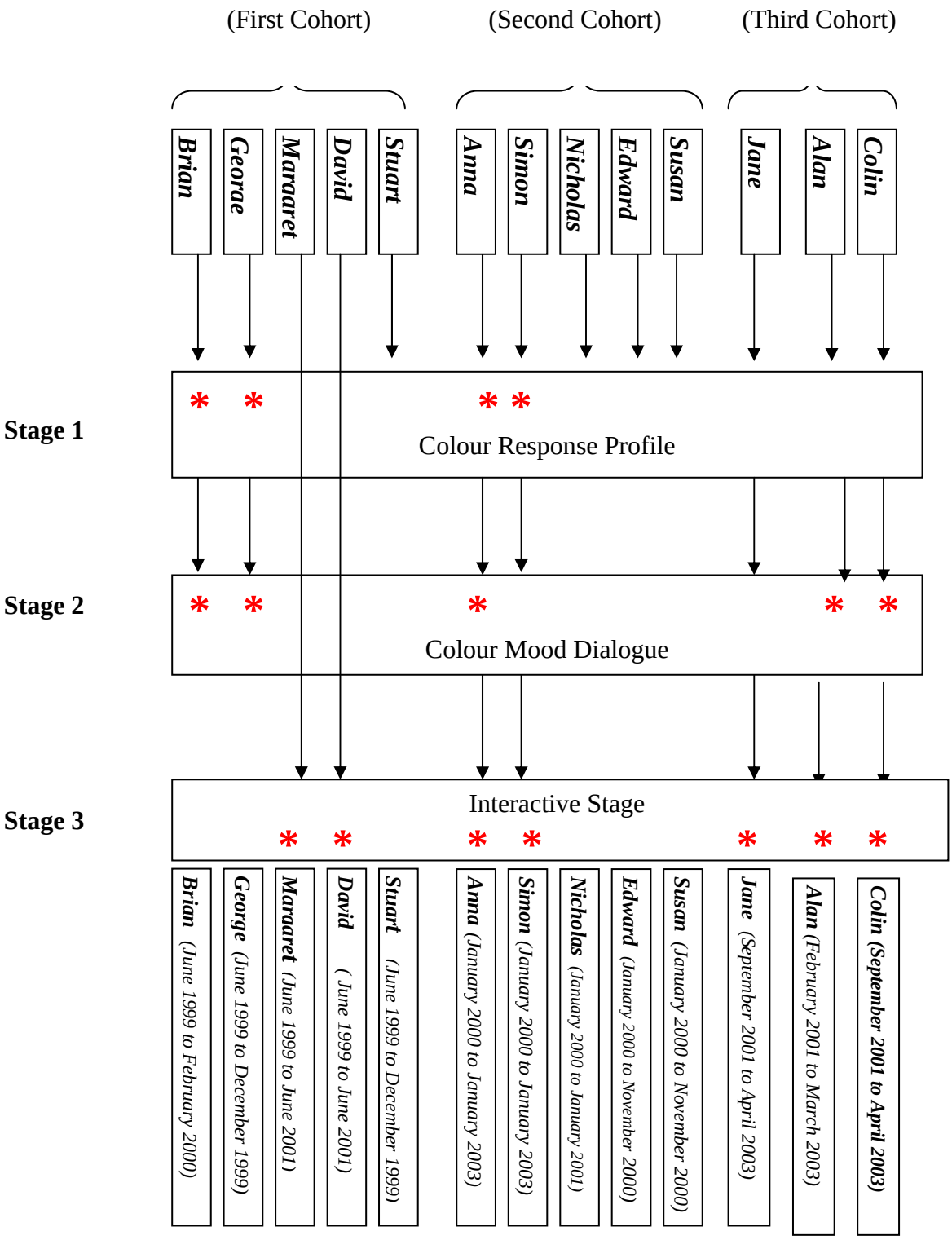
Relationship of Stages of Progress and Cohorts of Children

The diagram below illustrates how the various stages of the research, and names of the main participating children are related (* indicates analysis).

Figure 13.1 Diagram Illustrating Relationship of Stages and Children



CHAPTER 14

CASE REPORTS FOR INDIVIDUAL CHILDREN IN THE THIRD (INTERACTIVE) STAGE

Children Involved in the Third (Interactive) Stage

The two from the first cohort who went on to the interactive stage were:

David and Margaret

Those from the second cohort were:

Simon and Anna

And those from the third were:

Alan, Colin, Jane, Richard, Geoff and Benjamin

(Note: Richard, Geoff and Benjamin remained with the project for only a very short time, and will be considered at the end of the chapter.

Tables of baseline abilities were given in Chapter 9, pages 123-127. For ease of reference the relevant line will also be repeated at the start of the case report for each individual child, followed by a brief description of the child's personality and behaviour. Information was obtained in the form of notes and verbal reports from teachers and care staff. Some of this information for the first and second cohorts has already been given in the first stage but for ease of reference it will be repeated. This will then be followed by the narratives for each child as described in the previous chapter. The initials DP will be used to denote the author of this thesis. Finally a summary table of the attributes discussed in the previous chapter will be given. These will be analysed in Chapter 15.

Case Report for David

Table 14.1 Personal Details and Baseline Abilities for David

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
David 16 years	4 years	Male	Information not available	ASD	Can use short sentences meaningfully	Pre academic, but can match symbols and count to 20	Solitary	None reported

General Description

A brief portrait of his personality and behaviour will now be given. In school David was usually cooperative and could successfully carry out simple tasks such as matching, colouring in and copying shapes as presented through 'structured teaching' as in the TEACCH programme (Schopler, Mesibov and Hearsey 1995). He could draw, though in a very fixed and stylised way, and could also form letters, though he was unable to read or write. His speech was monotone and mechanical and often echolalic. However, he could use language to express simple needs such as toilet or food and drink. He had a strange habit when distressed of saying 'peas and sweet corn' even though this would be totally inappropriate to the situation. He would often become fixated on things, for example he loved anything to do with electricity and could remember brand names of washing machines which he liked to watch endlessly. He rarely expressed emotion though he could occasionally become violent and had been known to cause considerable injury to staff. It was not possible to have a real conversation with him, as what he said (apart from answering straightforward questions) bore little or no relation to what had gone before. He would just make a statement 'out of the blue'.

Descriptive Case Report for David

A general narrative describing sessions and progress with approximate dates will be given. He was one of the first cohort and the three stages had not yet been properly developed. He was not given time on his own in the colour room to enable a Colour Response Profile to be worked out and he did not take part in Colour Mood Dialogue. An interactive approach was taken straightaway with the general aim of trying to get him to share and express emotions more freely. The stage of copying his own behaviours to enter 'his world' and engage with him was missed out because at this stage it was not thought to be acceptable within the school culture. However, his case will be discussed since several of the exercises used later were pioneered with David and in many ways, since he was one of the more able individuals, he achieved more than most of the other children in this study.

David first came to the colour room in June 1999. He attended once per week. Sessions lasted about 20 minutes increasing over the months to about half an hour. At the first session he sat down, knees up and head down so that his arms covered his face. For the first few weeks he always started sessions in this position and this will be referred to as his 'closed up' position. It is illustrated in the sketch below (*Figure 14.1)*:

Figure 14.1

Sketch illustrating David's 'closed up' position

He looked up every now and again but returned to this position regularly. It was thought that this might in part have been because the lights were sometimes too strong for him. Red light in particular appeared to be too much, as he often grimaced before returning to his ‘closed up’ position. It was decided at keep the lights fairly dim to begin with. For the rest of June 1999 he was observed in blue and pink light. In general he seemed to relax more in blue, often lying down but would look up more and become slightly more restless in pink. A note was made from a session in July 1999 that he lay down with his eyes closed in blue but started a high pitched humming in red. In pink he seemed reasonably comfortable but also more alert. David was always cooperative but there was little eye contact and he seemed rather ‘disengaged’. He would often rock backwards and forwards at the beginning of sessions and appeared to be quite tense.

In September 1999 an exercise called the ‘Pink Flower’ was introduced. It was really the ‘A’ gesture but adapted so that the movement would naturally emerge out of his ‘closed up’ sitting position. DP would start by sitting facing David, also in his ‘closed up’ position, from which she would initiate the movement. Copying the gesture from DP, he would gradually unfold his arms, look up and lift his arms up and out. This was described to David as a pink flower which starts by hiding under the soil and then gradually lifts itself up, unfolds and opens up to the sun. This is illustrated in the diagrams overleaf *(Figure 14.2)*:

Figure 14.2

Sketches illustrating the 'Pink Flower' exercise moving from the 'closed up' position to the open 'A' gesture

The purpose of this exercise was to start by making a simple movement to encourage him to come out of his 'closed up' position through a bodily gesture of opening up. Starting in blue, this upward movement was accompanied by gentle up-fading of the pink lights as the 'flower' unfolded. He would then gradually bring his arms down and in again as he 'folded up' back into his 'closed up' position. This would be followed by the down-fading of the pink lights. In this case it was felt that something was needed to encourage David to 'open up' more to the world of human relationships and this exercise was made up as an artistic expression for this through intuitive feeling rather than through scientific derivation. It was about at this time that the results from other children showed the reds/pinks to have an arousing effect while the blues were calming (see Chapter 10 page 176).

Towards the end of September 1999, as he was becoming more familiar with the colour room and with the 'Pink Flower' exercise he began to relax more, made more eye contact and began to repeat some of the words used by DP to describe the exercise. By October 1999 he could do the exercise by himself and at the same time give a verbal commentary. He was still tense for much of the time however, and often rocked between exercises. Retrospectively, it might have been beneficial to join in with the rocking as a means to engage with him, and had he

been one of the third cohort this would certainly have been done, but at the time, as has been explained, joining in with stereotyped behaviours was not thought to be acceptable within the school culture.

In November 1999 the 'I' and 'A' gestures were introduced. He could make these movements gracefully and well, and seemed pleased with the achievement as he began to smile a little more often. At about this time he also began to initiate 'games' and ideas of his own such as hand or leg movements, clapping, humming or singing. DP joined in with these interactive initiatives, much to David's amusement and gradually a more animated interactive style began to evolve. In December 1999 the rhythmical stamping exercises were introduced. Moving side by side with DP, David would be encouraged to walk in a 2 or 3 time rhythm, stamping on the final beat (see Chapter 12 page 232). David was able to do this quite well from the outset and it is interesting to note that he had a sense of inner rhythm and was also able to speak.

In mid December 1999 he was involved in an incident where he hit and injured a member of staff and although in colour sessions there were no problems, a very gentle approach was adopted and nothing new was attempted. When sessions began again in January 2000 David seemed rather tense again, rocking intermittently and sometimes saying 'Not cross?' as a way of checking whether he was doing the right thing. Exercises included the 'Pink Flower', the eurythmy 'I', 'A' and 'O' and the rhythmical stamping. All of these he could do well.

An interesting observation was made at about this time. After David was exposed to strong red/pink light for some minutes he closed his eyes and said 'Green'. When asked about it, he said again, 'See green'. This would seem to be a very clear indication that he could see after-images since green is the after-image to red/pink (see glossary).

In February 2000 story telling was introduced. The stories were always made up spontaneously, were very short and straightforward, and usually followed the same pattern. Basically a boy who lived in a little house went for a walk, saw various things such as the sun shining, animals, flowers or people and then returned to his house. The narrative was always sequential (as suggested by Williams 1996) to make it easy to follow and the repeated formula meant that he could feel familiar and secure in knowing more or less what was going to happen (Sonders 2003). The lights were blue for the security of the 'house' and up-faded to pink or red for actions, yellow for the sun and yellow/blue for things he saw. David listened well, made good eye contact and repeated words willingly even if in a rather dull and monotone voice.

At this stage the shadow screen was also introduced. He seemed interested and initiated many 'shadow' movements. He was amused to point to his own hair, nose, ears etc. and seemed surprised to see them in three-colour relief. He often made quiet and gentle vocal 'comments' (not actual words) while making shadow movements and would also often hum.

Throughout March 2000 the stories were continued. As the same formula was always used David became familiar with the boy seeing various animals and was soon able to make these up for himself. For example if DP said 'And what did the boy see?' David might reply, 'A cow and a sheep' or 'A bird which goes 'tweet tweet''. His voice was becoming a little more animated and he was growing in confidence to offer ideas of his own. On one occasion when asked 'What did he see?' he said, 'He saw a squirrel running up and down a tree.' Saying this was clearly not easy for David as he screwed up his eyes with the effort of getting the words out. However this was seen as real progress as he was not only making things up for himself i.e. using imagination but also using complete sentences. On the shadow screen he made a flapping wing shape and said 'butterfly'. On another occasion he twirled a shoelace to make

shadows and said ‘worm’. It could clearly be seen from the videos at this time that there was now much more sustained eye contact, his voice was stronger and a little more animated, and he seemed generally to be more engaged, often now leaning forward towards DP.

After 6 months on the project, it appeared that David had begun to use his imagination more freely. His language was less echolalic and he was more able to use it to express his own ideas.

There were no sessions during April and May 2000. Sessions in June resumed with many of the same exercises and it was noted that he initiated humming and singing interactions where he would often lead a simple improvisation. At this stage a simple poem was introduced. It was felt that he was ready to use longer sentences and it was thought that the rhythm of a poem might help to bring more expression to his voice. The children’s poem ‘I see the moon…’ was chosen because of its simplicity and straightforward rhyme. It also contained the concepts of ‘self and other’ which was thought might be useful. The colours yellow and red were used over a background of blue. On the word ‘moon’ the yellow lights would come on to represent the moon and he would be encouraged to point upwards, and on the word ‘me’ the reds would come as he pointed to himself to emphasise the concept of self. This is illustrated in *Figure 14.3* below:

Figure 14.3 Lines and colours for the poem ‘I see the moon’

‘I see the moon

And the moon sees me.

God bless the moon

And God bless me.’

He was very willing to speak the words and soon learnt the poem, though his voice was still rather lacking in expression.

Sessions in July 2000 followed much the same pattern. The walking and stamping was continued and gradually he developed more depth and strength in his voice at the same time as producing more force in his stamping. He was also beginning to achieve more rhythm and expression in the poem. In the story telling he was encouraged to begin to act out the events. In general, if the mood was one of activity or aggression the lights were red, if it was calm or sad they were blue and if happy and fun they were yellow. One of the stories involved meeting a friend and included the throwing and catching of an imaginary ball. This he managed to do very convincingly, demonstrating that he had sufficient imagination to engage in proper pretend play. He was also introduced to glove puppets at this time and could act out simple scenarios. One interesting example will be described: Two animal puppets were having a 'conversation' and his puppet appeared to get cross and then hit the other one. He acted out a surprising amount of aggression in this scene but was interestingly able afterwards to offer consolation to the other puppet. It was hard to tell whether this was an example of genuine empathy or whether it was simply copying something he had previously seen, but it appeared he did understand the idea of giving comfort. He then related how he had broken some glass, saying this was wrong and describing how he had cleared it up with a dustpan and brush. This was later checked out and found to be true.

After the summer break the sessions in September and October 2000 continued with similar exercises, stories and role-play. He willingly took part and his degree of expression increased, although there was still considerable stiffness in his voice and movements. He now very rarely rocked and did not keep asking, 'Not Cross?' showing that he was feeling much more secure. At one point he suddenly began to talk about car washes. He described the brushes

going round and round and copied the sound of the water. This was then developed into a game where DP and David took it in turns to get down on all fours and be the car, while the other acted out the brushes turning to wash the car. He seemed to understand this and had no difficulty with alternating the roles. November and December 2000 were similar but more emphasis was put on the concepts of 'you' and 'me'. If he was told, 'You do this…' he would do it with no problem. However if it was 'You do this…while I do that…' he would often get in a muddle as to which he should do. He also became stressed if he was asked to describe something. He could give simple answers to questions such as 'what colour is this', but found it stressful if asked what happens next in the car wash. However when asked, 'What happens next to the washing after the washing machine has finished, he said, 'Put it in the dryer'. Thus he was capable of simple conversation, but he still found it an effort and sometimes began to rock again.

In January and February 2001 the stamping exercises were adapted to encourage him to use the word 'I' appropriately. DP and David would take it in turns to stamp and would say, 'I stamp' as they stamped. This he learned to do but it was hard to be sure that he really had got the concept of 'I'. If asked who was whom by pointing he could always give the right name but would always refer to himself as 'David'. When, with three people in the room, each took it in turns to stamp and say at the same time, 'I stamp' he found it very difficult to say 'I' at the right time. Various modifications to this exercise were used in March and April 2001 to encourage him to say 'I' appropriately. By the end of April he managed to carry out an action and say 'I am …' at the right time. However he never learnt to generalise this sufficiently to use 'I' reliably in conversation, though he did manage it sporadically.

Picture books were introduced in April and May 2001 and he was encouraged to try to remember the storylines. With the prompting of the pictures he often could manage this

though only short sections at a time e.g. ‘The birds came’ or ‘He got up’. For this kind of exercise specific colours were not used as it was felt that he had now come far enough to interact effectively without the enhancement of mood by the colours.

Sessions in the colour room finished in early June 2001. By this time he was relatively easy to engage in simple conversation, was willing and able to act out simple scenarios and could remember short story sequences. There were no further instances of violent behaviour.

The summary table to show progress over time is given overleaf. It highlights the attributes or features discussed in the previous chapter.

Table 14.2 Summary Table of Progress for David

Total number of sessions	49 (over 24 months, all with DP)
Attribute	**Observations over time with project**
Eye contact	Made eye contact rarely at start increasing to willingly and consistently.
Engagement, body posture, touch	Shy and detached at first. Progressed to being willing to engage, sit close and touch.
Signs of affection	Had polite outlook and regularly smiled. No overt signs of affection.
Reciprocal responses	Became willing and able to respond in games and speech. Capable of turn taking
Sense of fun, laughing	Shy and serious at start. Smiling levels increased, with occasional laughter.
Imitation of movements	Willing and able to imitate movements. Developed good sense of rhythm
Initiation of movements or games etc.	Although rather inhibited at start, progressed to being creative and inventive with multi-coloured shadow screen movements, clapping games and humming.
Sharing of affective states in exercises	These exercises had not been developed until after he left the project.
Learning of words through action	Not applicable, he could already use words.
Symbolising, pretending or acting	After about 13 months he was able to throw and catch an imaginary ball and to act short scenarios with glove puppets.
Imitation of words	Not applicable, he could already use words.
Use words independently and appropriately	Could use words to express simple needs at start. Often echolalic. By end could take part in simple conversation using short phrases
Expression of emotion through gesture/language	Did not show or share emotion at start. Later, occasionally showed emotion such as regret or amusement.
Changes in behaviour, social/communicative skills reported elsewhere	Good progress reported in schoolwork. No further instances of violent behaviour reported in final year. Teacher's report expressed improvement in his ability to communicate i.e. to 'get through to him'.
Overall progress made	Considerable progress made in ability to respond socially and appropriately, to show originality and to express ideas verbally.

Case Report for Margaret

*Table 14.3 Personal Details and Baseline Abilities f*or *Margaret*

Name and Age when Joined Project	Time in school	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Margaret 12 years	6 years	Female	S.L.D.	ASD	Non-verbal	Pre academic. Learning to match symbols	Solitary	None reported

General Description

In school Margaret varied between being willing and cooperative to being stubborn, refusing to take part in activities and being violent. When in a good frame of mind she would sit at her desk and work patiently at tasks such as posting and matching colours, threading beads or completing puzzles. She had not reached the stage of learning to read or write and did not take part in any formal communicative exchange with other people. When her behaviour was difficult she would attack staff, throw objects round the room, take all her clothes off or simply sit down and refuse to move. She was generally very difficult to engage socially, though she liked sitting in the corner and having her feet massaged and this was often done as a last resort when she could not be persuaded to engage with anything else.

Descriptive Case Report for Margaret

A descriptive narrative of sessions and progress with approximate dates will now be given. She was also one of the first cohort and the three stages had not yet been properly developed. She was not given sufficient time on her own in the colour room to obtain a Colour Response Profile, neither did she participate in Colour Mood Dialogue because at this stage neither procedure had been developed as part of the methodology. Instead, as with David, DP started to interact with her after the first few sessions with the intention of finding out how this might

be affected by different colour moods. In a way the work with Margaret was to 'feel the way' into how to interact with non-verbal individuals with autism within the medium of colour.

Also there were several problems during her time with the project. Firstly, the video recorder failed to work for several months and secondly she had to miss many sessions in the autumn of 2000 because of her difficult behaviour during transitions from one part of the site to another.

Margaret began sessions in the colour room in June 1999 when there was no video recorder. The following accounts are taken from notes in the research diary, taken immediately following each session. At Margaret's first session she came in willingly, sat down and held the support person's hand for reassurance. She was observed in weak blue, followed by weak pink. She sat contentedly, glanced at the lights and then just sat still. For the next few sessions, blue and pink were used. She would sit some distance from the support person (3 – 4ft away) and sometimes watch the lights but often would sit sucking her thumb and looking blankly down at the floor.

At the end of June 1999 DP started to work with Margaret in the colour room. She would generally sit facing DP, also about 3-4ft away. It was noted at this early stage that she seemed to require about this much personal space, since if DP moved towards her she would move back. There was virtually no engagement and no eye contact. The eurythmy 'A' gesture was then regularly attempted (lifting the arms up with the movement tracked by up-fading and down-fading the pink lights). This was chosen as it was considered to be the easiest task for her to follow. Intensive Interaction (Nind and Hewett 1994), taking the lead from her behaviours was not carried out, partly because there were no obvious behaviours to mirror and partly because it had not yet become part of the methodology for the project. Retrospectively,

it might have been more effective if such an opening had been found, since this would probably have brought about quicker and more enjoyable engagement.

By late September 1999 the video was in operation. Margaret could be seen sitting facing towards DP, still about 3-4ft away, sitting upright in a rather detached manner. In pink light there appeared a degree of restlessness whereas in blue she would normally sit relaxed and still. However this is only a general impression as a proper Colour Response Profile without any interaction was not obtained. During October 1999 she began to respond to requests to lift her arms up by briefly lifting one arm, sometimes to touch DP's hand. Her overall body gesture was one of detachment and lack of engagement and there was still no eye contact. Sessions in November continued in much the same way. It was noted again that there appeared to be more restlessness in pink than blue. On one occasion she started to take her clothes off, something she was doing regularly in school. However this behaviour was not repeated after this in the colour room despite its continuation in school.

Towards the end of November 1999 an accidental incident at the end of a session caused a major change in Margaret's attitude. She was sitting against the wall, and having had a pleasant session she indicated that she wanted more colours and was not ready to leave the room. DP tried to coax her out but she refused to move (characteristically). She then hit out at DP. The next time she went to hit out, DP gently hit her hand back and Margaret responded to this by hitting again, but deliberately catching DP's hand to develop a sort of clapping game. This she did with considerable force, but rhythmically, and it soon developed into a kind of play routine. It suddenly became clear that a 'game' with another person had been found that was stimulating, fun and achievable. The lights responded with strong reds moving in time to the clapping rhythm. This was to give a mood of arousal and assertiveness. Suddenly there was eye contact, 'purposeful' sounding vocalisations and a feeling of real engagement for the

first time. A new and clearly satisfying game had been invented and this changed her whole attitude for the better. After this she was willing to leave the room, giving the impression that she felt satisfied with the achievement.

For the rest of November and December she looked far more engaged, sitting much closer to DP, leaning forward for much of the time and making far more regular eye contact. The clapping game now became a regular feature of her repertoire, and was usually initiated by her. She would also often interact standing up, something she was previously unwilling to do. Since she could now clap forcefully and in rhythm, the attempt was made to get her to stamp in rhythm but this she could not do, instead she walked rather 'floppily' around the room. She also managed to lift both arms up (instead of just one) for the 'A' gesture. As she began to achieve more she also began to smile more.

From January to March 2000 Margaret's progress continued. A greater proportion of each session took place standing up, concentration and engagement continued to improve and she often initiated both the clapping game and the 'A' gesture. She would now lift her arms up well above her head, and make a slow, purposeful and graceful movement. This is interesting because it had been noted from a previous educational assessment that she was 'unable to lift her arms above shoulder height'. When sitting down she was now always close to DP, usually leaning forward and she often initiated physical contact. Sometimes she would touch foreheads with DP. A new game of touching each other's feet caused great amusement and she laughed properly several times. At the end of March she suddenly realised that raising her arms was connected with the up-fading of the pink/red lights and would often now deliberately carry out the movement in order to bring up the lights.

From April to September 2000 the video camera failed to work so no analysis of video recordings was possible. The few sessions in the spring of 2000 continued in much the same way but it began to become apparent that her behaviour in school and around the site was deteriorating and transitions were getting more and more difficult. During September and October 2000 colour sessions were cancelled for this reason and because of staff shortages.

In November 2000 colour sessions resumed. She remembered all the previous exercises well and was generally cooperative and affectionate. At this stage she was introduced to the shadow screen. She immediately started making movements with her arms while watching the 3-colour shadow effect on the screen. She developed a characteristic wrist movement that made a spiralling/circling/swirling shadow effect on the screen and this was copied by DP, making a colourful and attractive two-person 'hand dance'. Sessions in December 2000, January and February 2001 continued in a similar manner with extensive use of the shadow screen. She clearly enjoyed it and it enabled her to experience a new socially creative act with another person.

In March 2001 a new step was taken in the telling of a story. It was a very simple story involving a girl going for a walk and seeing a dark cave (lights dark and blue), followed by a river in which she swam (swaying blue/green), followed by birds flying (blue with yellow) and a fire burning (flickering yellow/orange/red). For each of these she was asked to copy the appropriate gestures. She listened with surprising concentration and made a good attempt at the various gestures. This simple story was repeated for the next few sessions during April and May 2001 so that she knew what was coming next and could anticipate the movements. She appeared to listen well and could usually anticipate the timing of the appropriate movements. Concentration was surprisingly high and she seemed to enjoy the experience though it was hard to estimate how much she actually understood. The same words were

always used at the same stage of the story to make understanding and imitation easier, but she never managed to repeat any of them although she did make what appeared to be more purposeful and meaningful vocalisations.

During this period reports generally indicated that Margaret was getting on well in school and in the house where she lived and there was far less challenging behaviour. Sessions finished in June 2001 and she left the school some months afterwards following another episode of deteriorating behaviour. A teacher who had watched her in the colour room reported that far more social engagement had been achieved in colour sessions than she had seen elsewhere in the school.

Summary Table

As a summary of progress table, highlighting the attributes or features discussed in he previous chapter is given overleaf.

Table 14.4 Summary Table of Progress for Margaret

Number of interactive sessions	43 (over 24 months, 40 with DP)
Attribute	**Observations over time with project**
Eye contact	Virtually none at start, increasing consistently. Regular good eye contact at end.
Engagement, body posture, touch	At start kept 3-4ft.distance. Progressed to leaning forward and sitting close. Enjoyed physical touch after first few weeks.
Signs of affection	No indication of affection at start. At end would often smile and initiate touch. Did not spontaneously hug.
Reciprocal responses	At start was unresponsive. At end would take part in interactive games (e.g. rhythmical clapping) with engagement and turn taking.
Sense of fun, laughing	Smiling increased consistently, occasionally she really laughed. Though she had a good sense of fun, she did not demonstrate a sense of humour.
Imitation of movements	Very poor at start. By the end had achieved a limited number of arm movements.
Initiation of movements or games etc.	Reluctant to interact in movement routines at first but after 6 months would initiate e.g. clapping games. Was particularly inventive making multi-coloured shadow movements with her arms.
Sharing of affective states in exercises	Not achieved
Learning of words through action	Not achieved
Symbolising, pretending or acting	Not achieved
Imitation of words	Not achieved
Use words independently and appropriately	Not achieved
Expression of emotion through gesture/language	Not achieved
Changes in behaviour, social/communicative skills reported elsewhere	Reports of improved schoolwork and less challenging behaviour after about 30th session to end.
Overall progress made	From a low baseline, she made substantial progress in her ability to take part in pleasurable interactions

Case Report for Simon

Table 14.5 Personal Details and Baseline Abilities for Simon

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Simon 12 years	4 years	Male	'Complex learning needs'	ASD	Can copy a few words echolalically	Can write one or two words. Simple additions	Solitary	None reported

General Description

Simon did not easily relate to people and normally ignored anyone who entered the classroom. He usually avoided eye contact but sometimes initiated contact through hugs. He did not have emotional outbursts but did sometimes get upset and cry. He did not imitate except through the use of a mirror. Simon flapped his hands when excited and would often manipulate his face with his hands. He did not play with toys, though he had been reported to have symbolically 'flown' an airship round the room. He could use scissors precisely. He often covered his ears and could become distressed if noise levels were high. One report said he was slow to respond to verbal instructions whilst another said he did not understand language and picture symbols were the most suitable way to communicate. He could however repeat words or phrases echolalically. His main autistic symptoms were felt to be in the areas of communication and social skills.

Descriptive Case Report for Simon

An overview of all the sessions from January 2000 to December 2000 are given in Appendix 1, page viii. These sessions have been analysed, his Colour Response Profile worked out and the findings reported in the outcomes for the second cohort (see Chapter 11). The overall finding was that although his behaviour changed very little in the different colours there was a

small but significant alteration in his body gesture; with a clear upward shift in the reds and downward in the blues and greens.

A descriptive narrative will now be given, following Simon's progress during the third (interactive) stage. Because Simon remained with the project for a considerable length of time (three years), this report will be given in some detail. The interactive stage began on 14th December 2000 during what was to be his last session. Simon was introduced to the coloured shadow screen. He immediately began to make movements with his hands and was clearly interested in the multiple overlapping shadow effect. He then rocked from side to side and again watched the effect on the screen. DP then joined in with this rocking motion, standing behind him. He seemed very comforted by this and continued for some minutes, watching the effect on the screen intently and appearing to enjoy the sharing of this rocking movement with someone else. At the end of this sequence he sat down and took DP's hand, inviting her to sit beside him. He continued to squeeze her hand for several minutes and smiled, and it was this warmth during interaction which formed the basis for the decision to continue on into the third stage. He attended the colour room once per week for sessions of approximately twenty minutes to half an hour.

Because there had been very little success with the Colour Mood Dialogue stage this could not form the basis on which to start the interactive stage. Instead, the exercises and movements described in Chapter 12 were started. On 11 January 2001 the 'A' gesture (increasing pink following the upward arm movement) was first attempted. Apart from being an easy movement to start with, it has the upward gesture associated with pink which was similar to Simon's own natural response to pink and red. Simon was sitting down and although fairly attentive he would not at first imitate the movement. After about six attempts he eventually raises his arms. For much of the session he was inattentive and wandered round the room, sometimes fiddling with the curtains. Towards the end of the session he took DP's

hand again and squeezed it, and then initiated a clapping game. During the next session he seemed unusually tense, walking about the room making agitated vocalisations. He was reluctant to imitate any of the movements and was also hardly interested in the shadow screen.

The two sessions in February 2001 began with a changing colour wash from blue through purple to red, and then back through blue to green. Simon was very aroused and lively when he came in, and although he seemed quite happy he was generally rather inattentive and unwilling to interact. However he did seem pleased to do his rocking game in front of the shadow screen. Blue/ green was used again at the end of the session and this seemed to calm him. The post session report from the classroom indicated that he was considerably calmer after the session and more willing to concentrate on his structured teaching tasks.

When he came in on 1st March 2001 it was clear that he had been crying. He covered his eyes and made 'crying' sounds. This was taken to be an attempt to communicate a feeling of sadness. Rather than try to cheer him up it was decided to try to share this feeling with him so that he could live through the experience more consciously and so perhaps learn more how to come to terms with it. The intention was to give him a more objective experience of his own emotion by emphasising the mood both through the adult expression of sadness and through the use of darkness and blue/violet colours. He seemed content to share this mood for some time and wanted to be hugged as would be expected for a typically developing child. There could be little doubt that he knew that he was unhappy and that he was consciously looking for comfort from the adult. After a little while he seemed to get over it and began to cheer up. Yellow was then introduced to exemplify the happier mood, after which a more normal

session could commence. What was interesting was that when he was upset on succeeding occasions he used the word ‘crying’ and ‘sad’ and now wanted and expected to share his feelings and to find comfort from another person. This was the first example of where a deliberate attempt on the part of the adult to project the child’s own feelings back towards him to enable him to have a more conscious experience of his own emotional state appears to have had a lasting effect.

When the shadow screen was opened Simon played his rocking game satisfactorily but with less enthusiasm than before. He then very deliberately pulled the curtain over the screen and went and sat down. This was taken to indicate that he no longer wanted the screen and it was not used again. It had formed a useful ‘bridge’ between the unaccompanied and the interactive sessions but with Simon it did not lead any further. Towards the end of this session a simple story was introduced for the first time. It comprised a linear sequence of events (as recommended by Williams (1996)).

Basically a boy leaves his house, goes for a walk sees various things and returns to his house and goes to sleep. When first introduced he just saw a river with flowing water but gradually over the course of several weeks it built up to seeing fish in the river and then swimming, to also seeing a fire and to seeing birds flying in the sky. For the darkness of the little house, dark blue was used. For the flowing water, blue and green were alternated in a wave-like form to give an impression of water and for the swimming movements up-fading and down-fading green was used to follow the breaststroke like movements of the arms. For the fire, strong reds and yellows were used which flickered in a flame-like motion and gave a feeling of heat and energy. Bright yellow over blue was used for the birds in the sky to signify sun and blue

sky and a cheerful mood. On returning to the house, dark blue was again used to indicate a feeling of home and rest and to show that the action was over. On this first occasion he appeared to be listening and concentrating well, and there was considerable eye contact. He attempted to copy the gestures for flowing water, and also repeated the words ‘house’ and ‘sleep’.

On 8th March 2001 he came in saying, ‘I’ll huff, and I’ll puff…’ from the little pigs story. An attempt was immediately made to make this into a role-play game with the wolf and the pigs but he did not understand this and it was only moderately successful.

The session of 15th March 2001 commenced with the blue → purple → red → blue → green colour wash. He seemed excited and was quite verbal, particularly in the reds. He then imitated the eurythmy gestures for ‘I’, ‘A’, and ‘O’ though he found the rounding of the arms for ‘O’ rather difficult. During the story, which now included the river with fish and swimming, and the fire, he listened well and attempted to make the movements for swimming and for the flaming fire. On returning to the house and making the sleep gesture DP began to sing the Brahms lullaby. Simon suddenly started to join in, showing clearly that he knew the tune, and singing it well and accurately despite a rather loud and boisterous style. This was rather a touching moment and showed a sensitive and appropriate understanding of when and how to take part in role-play.

On 22nd March 2001 the session followed a similar pattern. There was a slight improvement in his ability to make the eurythmy gestures and he also became a little more willing and able

to join in with the story. The rhythmical counting and stamping was introduced at this stage. On 29th March 2001 Simon was rather unresponsive and was reluctant to get up and take part. He seemed to be playing 'hard to get'. During the story when the boy comes out of his house to go for a walk he would not get up. This was developed into a 'will he, won't he' game which was fairly successful in getting him to start to interact though on this occasion he never really 'got going'.

On 5th April 2001 during the blue → purple → red → blue → green wash sequence he showed clear restlessness in the reds and equally obvious calmness in the blues/greens. When the interaction started with DP he initiated an arm lifting game (followed by the pinks). This was a step forward because Simon was not usually able to be creatively original. During the story he seemed to be more engaged with the actions than before and his smiling and laughter appeared to indicate that he was enjoying it.

During May 2001 the sessions followed a similar pattern. They would usually start with the eurythmy gestures for 'I', 'A', and 'O', then there would be stamping in rhythms of 1 – 2, 1 – 2 – 3, and 1 – 2 – 3 – 4 etc. Then the story would be told, with Simon joining in progressively more. On 24th May 2001 the 'In/Out' exercise was introduced. This he managed reasonably well once he got the idea, though he did not at this stage use the words. There was significant progress with the story on this occasion. He took part willingly and competently and made a swishing sound when making the movements for the fish. He used the words, 'house', 'walk', 'river', 'water', 'swim', 'fish', 'birds', 'fly', 'fire', 'hot', 'sleep' and 'end of story' unprompted and at the appropriate time in the story.

Another important step forward was also made in this session. During the sequence with the fire, he spontaneously made a gesture to imitate being burnt by suddenly withdrawing his hands, holding them to his chest and making a sudden in-breath. At the same time he offered the word 'hot'. He then put his hand down and made a sort of 'crying yelp', perhaps pretending to have burnt himself. The whole short sequence was full of emotional content and was very effectively and appropriately acted out. He also offered a 'tweet, tweet' sound when the birds were mentioned. At the end of this session as he was being led out of the room, he suddenly turned round and said clearly and out of his own initiative, 'thank you, thank you!' It was hard to tell how to take this comment but the opinion of the psychology assistants who were present was that this was a genuine expression of his happiness and appreciation.

During June 2001 there were various changes in staff and sessions were rather disjointed. Much the same pattern was used but no significant progress was made.

On 5th July 2001 Simon realised for the first time that he could control the lights by his hand movements. It was during the 'swimming' sequence of the story and as he made the breaststroke-like movements he saw that the greens were following both the speed and up/down movement of his arms. He was clearly watching the lights, and experimenting with altering their speed and amplitude. He also seemed to want to share this discovery as he turned to DP to make sure she had seen what he was achieving. He then ended by making the lights flicker by rapid finger movements. He did something similar with the 'fire' sequence though it was not quite so convincing.

In the session of 12th July 2001 he made several other steps forward. In the 'In/Out' exercise he started to use the words 'In' and 'Out' for the first time, and enjoyed speeding up the pace of the exercise by speaking the words faster and faster. He also used the words 'One' and 'Two' in the rhythmical stamping exercise.

During the story he achieved an original acting sequence for the second time. While 'swimming' in the river, he suddenly and spontaneously clasped his arms to his body, drew in his breath and made shivering sounds and movements. He clearly had a memory of water being cold from his experience of the swimming baths and was able to bring this out of his imagination into a pretence action. Not only was there a cognitive memory but also an ability to engage with a remembered feeling and then to act it out. The 'affective' style in his acting was impressive. He also remembered to 'conduct' the lights during the swimming and fire sections of the story. It is interesting to note that this took place immediately after considerable 'pressure' was put on him by DP to say 'swim' when he was quite reluctant to do so. This is one of the examples where a 'success' in the form of a child's ability to initiate something original follows the deliberate projecting of the adult's will (see Chapter 3, page 48).

At the beginning of the session of 19th July 2001, during a sort of wordless 'conversation' of sounds in blue/pink light, he suddenly said, 'orange juice'. DP immediately turned this into a pretence drinking game and using fists as glasses they both began to drink their imaginary glasses of orange juice. Simon acted the drinking well and was willing to 'drink' from DP's imaginary glass. When DP asked Simon for a drink from his 'glass' he took a long time to understand what was wanted but eventually and after much persuasion he offered his 'drink'

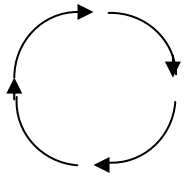
to DP. He was clearly delighted with the achievement, and also amused, as he laughed while he held DP's head with one hand while giving her a 'drink' with the other. This was another good example of a child with severe autism being able to use his imagination and to communicate it to someone else. A gentle pink/blue colour was chosen for this because, as mentioned previously, it seemed to provide a mood of alertness without excitement. The rest of the session followed the pattern described above with Simon taking part willingly in the activities.

During the summer holidays of 2001 Simon had moved into a different house. This appeared to have caused considerable distress and he had started to rip his clothes, both in school and in the house. When he entered the colour room on 10th September 2001 he immediately started to rip his shirt. The lights were immediately changed from white to the soft blue/pink he was used to and from then on he never attempted to rip clothes in the colour room again. He was very friendly and seemed happy to be back and repeated the words, 'Nice to see you!' He was however, rather excited so it was decided to sit calmly in his favourite colours and have a simple wordless 'chat' for the rest of the session. The post session report on Simon stated that he returned to school in a much calmer mood. However it should be mentioned that the ripping continued elsewhere and eventually became so severe that since it was impossible to keep any clothes on him at all in school he had to remain in his room for several months and could rarely attend school. He was also sometimes violent towards staff and bit or attempted to bite when he was unwilling to cooperate. This major difficulty in behaviour forms the backdrop for much of the colour work for the next few months. It should be stated that none of this ever showed itself in the colour room but the fact that he could not attend school and that many staff were frightened of him inevitably affected everyone's attitude towards him. Reports from psychology assistants and care-staff indicated that in their opinion Simon's

ripping behaviour was a means of avoiding school, but since he enjoyed the different approach of the colour sessions he did not do it.

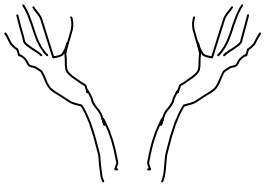
On 17th September 2001 there had been some damage to the room (while being used for soft play) and it had been decided to cancel the session. However there was persuasion from the psychology assistants and teachers to allow him to attend because they said, 'He likes to come and it calms him down'. He attended the session and was more relaxed than previously and several of the exercises used the previous term were carried out with reasonable success. By 4th October 2001 the reports from house and school were deteriorating. In the session he was very receptive. He did the 'In/Out' exercise and the 'I', 'A', and 'O' movements well and during the story he was willing to repeat many of the words. Towards the end of the session while sitting down for a 'chat' he talked about the minibus and cars. He also unexpectedly offered the sound 'O' and made the following pattern in the air with his finger:

Figure 14.4 Sketch of Simon's finger pattern for the speech sound 'O'



He then said 'A' and made the appropriate shape with his hands:

Figure 14.5 Sketch of Simon's hand gesture for the speech sound 'A'



He repeated this several times and seemed very pleased to show that he had understood the concept of a gesture for a sound. At the end of the session when DP said, 'Time to finish' he said, 'No finish', clearly indicating that he was enjoying it and did not want to leave.

An observer (a care assistant) who was watching the session remarked that in blue his concentration seemed to be weaker and he was looking around more. In the reds and pinks he was more focussed and more willing to give his attention.

For the rest of October 2001 sessions followed a similar pattern. He performed the various exercises well, and was able to remember and anticipate many of the sequences of the story. He again made hand gestures to imitate the eurythmy gestures and made the appropriate speech sound vocalisations. He had not only made the connections but was also keen to communicate his discovery to DP. He seemed very happy during the sessions at this time despite the continuing difficulties in the house where he lived and in school.

On 6th December 2001, having completed the 'I', 'A', and 'O' movements, and the rhythmical stamping exercises well, Simon was introduced to the simple poem, 'I see the moon…' The colours were those used previously for David, but will be briefly described again. It was thought that a poem might help to bring more expression to his voice. This poem was chosen because of its simplicity and straightforward rhyme. It also contained the concepts of 'self and other' which was thought might be useful. The colours yellow and red were used over a background of blue. On the word 'moon' the yellow lights would come on to represent the moon and he would be encouraged to point upwards, and on the word 'me' the reds would come as he pointed to himself to emphasise the concept of self**.**

Figure 14.6 Lines and colours for the poem 'I see the moon…'

'I see the moon

And the moon sees me.

God bless the moon

And God bless me.'

Simon spoke the first two lines satisfactorily, first from sitting and then from standing. He seemed pleased with his achievement as when DP congratulated him, saying 'well done', he said 'splendid'. Eye contact during this session was good and he seemed happy, as there was a great deal of smiling.

On 13th December 2001 Simon came into the colour room and immediately gave DP a big hug. He then sat down and said, 'crying'. He put his hands over his eyes and showed real emotion, his eyes were red and there were tears. He was clearly expressing sadness, and was aware of his emotion and able to express it with the right word. He also was clearly looking for comfort. There was constant eye contact and DP felt an unusual degree of empathy in the interaction. Eventually he was persuaded to stand up, but due to ill-fitting trousers, which kept falling down, very little could be achieved.

At the session of 17th January 2002 DP was warned that Simon had been violent and was biting staff. She proceeded with caution, but with no sign of difficult behaviour the 'I', 'A', and 'O' exercise was carried out. He then spontaneously offered the sounds 'E', 'I', 'A', 'O' and, when DP showed him the gesture for 'E', he carried them out unusually well. (It was later checked as to whether this was an attempt to recite the vowel sounds learnt in class, but his teacher reported that he had not been taught anything like this.) Later in the session he did the 'L' gesture for the first time and when asked to recite the moon poem, he spelt out the

letters, ‘M’ ‘O’ ‘O’ ‘N’. This he had learnt in class. From now on he quite often spelt out words and seemed pleased to be able to generalise from school to the colour room. Although his behaviour in school was still very difficult, he was making great strides in reading and also in arithmetic.

On 24th January 2002, while doing the ‘moon’ poem there was some confusion of identity when DP said ‘Simon say it’. This was then developed into a pointing game where Simon had to say the correct name depending on where DP was pointing. After a very few attempts Simon understood and could correctly identify himself and DP. Towards the end of this session he suddenly and spontaneously said ‘Mars’ and then spelt it out. This was then developed into an eating and drinking game involving Mars bars (something he liked). He could now easily act out pretence eating and drinking and not only understood what it meant but also he found it fun. All this was carried out in soft pink/blue light as previously described.

For the next few sessions at the end of January and beginning of February 2002 there was considerable anxiety generally around the school about Simon’s behaviour, and colour sessions proceeded with great caution. There were in fact no problems in the colour room and he carried out the various exercises described above quite adequately. A meeting about him with all staff concerned on 21st February 2002 concluded that he was generally frustrated and unhappy and his clothes ripping was a means of avoiding school. However all agreed that things were still going well in the colour project and it was decided that from now on he should attend twice instead of once per week.

For the rest of February and the beginning of March 2002 Simon’s attendance was rather erratic due to difficulties in school and with transitioning round the site. When he did come he

behaved quite adequately though progress was slow. On 7th March 2002 he achieved the rhythmical stamping in 3-time and managed to do it on his own with DP standing in the middle of the circle. This was a considerable step forward because it had been noted that for most of the children on the project it is very difficult for them to find any sense of inner rhythm. He also could do the 'In/Out' exercise well and was using the words correctly. However, when he and DP stamped alternately he still had difficulty in correctly naming the person who was stamping.

The session on 11th March 2002 was unusually successful, despite the fact that he had just been ripping his clothes again in school. New eurythmy gestures and sounds were tried and these were carried out well and with enthusiasm. They included. 'E', 'I', 'A', 'O', 'S', 'W', 'M', 'H', 'P', 'T' 'F', and 'B'. Three new identity exercises were carried out during this session. These involved Simon and DP alternately jumping, clapping and pulling each other. Each time he was able to identify the activity and name it correctly while carrying it out. He could also identify and state who was doing it as in, 'Simon jump, Di jump' or 'Simon pull, Di pull' etc. This was again felt to be an important achievement since it involved connecting a bodily movement (carrying out of a willed action), with the cognitive act of naming it. This was an attempt to connect the child's thinking and will and this whole aspect is connected to the question of agency and the sense of self (see Chapter 3). Other sessions in March 2002 were again missed due to behavioural problems around the site.

At the beginning of the summer term in April 2002 a new game was attempted which involved Simon making imaginary choices. On 18th April he had again spontaneously started to name various sweets including 'Mars', 'Twix' and 'Snickers'. It was clear that he liked these, so it was decided to make an imaginary choosing game involving the naming of these

sweets. The following rhythmical chant was made up which built up to a climax. The colours were chosen to build up the tension and anticipation to the point where Simon would know and feel that he now had to make the choice himself. Starting from the 'home' colour of blue it would gradually build up through violet and purple to magenta and finally as he had to make the choice it would be strong red. The moment he had successfully made the choice the tension was 'released' by quickly changing to yellow/white, the cheerful and 'light mood' colour. This is illustrated below:

Figure 14.7 Lines of the chant for the 'choosing sweets' game with colours

'We're going to choose some sweets,

We're going to choose some sweets,

And what is it going to be?

And what is it going to be?

We're going to choose a ……..'

Although this first time some prompting was needed he soon 'got the idea' and seemed to feel the anticipation build-up. He managed to say, 'Mars' and 'Twix'. He also smiled and relaxed as soon as he had taken the appropriate action. The intention of this exercise was not only to stimulate the imagination but also to encourage affective states such as anticipation, suspense, the 'pregnant pause' and build up and release of tension. It appeared to be successful in this respect because Simon was unusually engaged and concentrated, and also showed great pleasure in the achievement of making an original and personal choice.

On 25th April 2002 he came to the colour room straight from the house where he lived as he would again not remain dressed in school. Care staff reported him eager to come to the colour room. Although a little slow to get started he soon became engaged and after some of the

preliminary exercises the ‘choosing sweets’ game was attempted again. He remembered it well, was properly engaged and after prompting the first time he then, completely of his own accord said the second time, ‘A bag’ and the third time, ‘A biscuit’. When the game was altered to, *‘We’re going to choose a drink’*, he immediately and without any prompting said, ‘Orange juice’ This showed that not only did he understand the nature of the game but he was also able to generalise it from sweets to other foods to drinks. He seemed to be very happy with this session and when DP said it was time to finish he said clearly, ‘No!’

For the rest of April and the beginning of May 2002 this game was successfully repeated with various sweets and confectionary being named. By mid May he was not attending school at all, and was also ripping clothes in his house, and although willing to come to colour sessions he was rather restless at the start and hard to engage. Because he had once spontaneously offered the expression, ‘How do you do!’ this was used for a ‘hello’ game where as he walked restlessly round the room DP would do the same and as their paths came together DP would put out her hand, shake hands with Simon, and then continue walking round the room. The ‘home’ colour of blue was used for the walking but as they came together it was changed to pink/ red for the greeting and then back to blue as they continued walking. This exercise was fairly successful as a way of getting him started and engaged.

On 23rd May having started with the, ‘How do you do!’ game Simon began to sing a strange whining and sad-sounding sort of plainsong. The lights followed with a bluish/purple colour. When DP joined in with this sound Simon said, ‘Di crying’ and laughed. He repeated ‘Di crying’ and seemed highly amused. He then stroked DP’s head and acted out giving comfort while all the time smiling. This was an interesting reaction. It was clear from this amused reaction that he did not actually think DP was crying, but he presumably realised that it sounded a bit like crying and was able to make a joke of it. This was an unusually

sophisticated interaction, for not only was he able to pretend something to be the case which he knew was not but he was also able to see the funny side of it and share it with someone else. In terms of expected autistic behaviour this was felt to be a considerable step forward.

On 10th June 2002 Simon gave DP a big hug on entering the room. He was clearly affectionate and happy to be in the colour room. The session started with an unplanned sitting back-to-back rocking game. Simon and DP alternately pushed the other forward with their back and used the words 'Simon push' or 'Di push' as appropriate. He got the idea very quickly and could relate the action to the named person carrying it out. Again this was an example of attempting to connect a willed bodily action with cognition and language. To emphasise the effort, reds were used every time someone was pushing and blue for the relaxation in between.

Having done some of the previously described eurythmy exercises well, a role-play story was acted out. It involved going by minibus to the swimming baths (a regular school trip), swimming, getting dry and coming home. He had great fun walking round the room, pretending to drive the minibus, holding an imaginary steering wheel and making engine sounds and screeching of brakes. For the livelier parts red was used, blue for the calmer. Swimming involved making breaststroke arm movements accompanied by green as in the story and drying with the towel, again in soft pink/blue. After a lively drive home the colour calmed to blue as he went back to his house. He acted this story well, he clearly understood what it was about and it appeared could relate it to his actual experience of such a trip. He used several words appropriately during the game.

At this stage certain problems began to arise because of Simon's over-affectionate behaviour. Where embracing and hugging were thought to be in order for a young boy it was now not thought to be appropriate since he was now at puberty and becoming more of a young man. It was decided in a meeting that shaking hands was a more appropriate form of physical contact and this unfortunately meant rejecting many of Simon's attempts to show affection. Although sessions continued quite successfully after this for a while the 'life' or 'fire' in the relationship began slowly to die down. This seemed rather unfortunate and it is impossible to be certain whether this would have happened naturally following puberty or whether it was because of the constant attention to 'appropriate behaviour'.

On 13th June 2002 Simon was again rather hard to engage at first. The 'How do you do?' game was fairly successful but with the other exercises he was rather 'hard to reach'. Towards the end of the session became more connected and during a game of imitating animal sounds and gestures, when the word 'dog' was used he put his hands below his chin and began to pant like a dog. He then imitated a cow chewing grass. The session ended with a pointing game where he had to identify by name who was being pointed at. Again the tension and anticipation was built up by increasing reds with the words, 'This is …..' Then DP would point either to herself or Simon and he would have to give the correct name. He did this extremely well and made no mistakes in naming.

For the rest of June 2002 Simon was in a very responsive and affectionate mood. At the start of sessions he always wanted to embrace DP and this had to be rejected, albeit in friendly way with his need for physical touch re-directed to hand shakes. Besides the regular exercises he initiated a hand tapping game, a sneezing game culminating in his saying, 'Bless you!' and a pretence horse riding game. Several sessions then had to be cancelled, as he had no clothes.

On 15th July, during the 'Choosing sweets' game he chose 'chocolate ice cream' and when acting out eating it he said, 'cold' and shivered. He then shared his imaginary ice cream with DP. In the 'Who is this?' game he managed well but interestingly when he had to make the choice himself, he always chose himself and never DP. When at the end of the session DP said, 'Time to finish' he again said, 'No!' This was the last session of the summer term.

During the autumn term of 2002 there were still many difficulties with behaviour in school and in his house and many colour sessions had to be cancelled. When he did come he was always friendly and well behaved but he was getting more and more difficult to engage. Since very little progress was made during this time only a brief summary will be given. He was often able to express that he was unhappy and on one occasion after saying he had been 'crying' he then said he was 'frightened'.

Towards the end of the term he regularly asked for the lights to be turned off by saying either, 'Off' or 'Dark'. When it was dark he would say. 'Good' and sit quietly and peacefully, sometimes in silence and sometimes singing quietly to himself. Although he had progressed a great deal in his ability to express his needs and feelings, he had become much less willing to interact and it was decided to end his time with the project after Christmas, a few weeks before it had originally been intended.

Although it had been noted in his colour Response Profile that Simon may have been slightly more vocal in blue than red, this was not something which showed up with any degree of significance in the third stage.

The Pre-Verbal Communication Schedule test had not been carried out for Simon in 1999 so this could not be used, but an informal vocabulary understanding test indicated only a small

increased level of achievement. The speech and language therapist who carried out the tests indicated that the second one was done at the time when Simon was ripping off his clothes and this had made formal testing for him particularly difficult. Evidence for his achievements during his time with the project would therefore have to be taken from the video record.

The summary table is given overleaf.

Table 14.6 Summary Table of Progress for Simon

Number of interactive sessions	77 (over 24 months, all with DP)
Attribute	**Observations over time with project**
Eye contact	Avoided eye contact at start. Increased to regular and consistent.
Engagement, body posture, touch	Engagement poor at start and often turned away. Later took part in close face-to-face interactions, attentive and liked touch.
Signs of affection	Was inclined from the start to like to hug, but by end showed affection by smiling, touching, embracing, and use of words.
Reciprocal responses	Changed from being apathetic towards social interaction to being forthcoming and active, for much of the time.
Sense of fun, laughing	A sense of fun and of humour developed, with regular smiles and laughter.
Imitation of movements	Reluctant at start, but would copy willingly and accurately by end.
Initiation of movements or games etc.	This developed slowly at first but by the end he was quite inventive, and original.
Sharing of affective states in exercises	Later in the project there were several outstanding examples of expressing and sharing of feelings
Learning of words through action	Achieved in several exercises such as the 'in/out' and 'up/down' exercise.
Symbolising, pretending or acting	Again, later in the project there were some outstanding examples of expressing inner states through acting.
Imitation of words	Could already imitate a few words at start though became more willing and able with time.
Use words independently and appropriately	Speech was mainly echolalic at start. Later there were many clear examples of the use of words independently and appropriately.
Expression of emotion through gesture/language	Simon achieved several instances of using words to express inner emotional states e.g. sadness, compassion and humour.
Changes in behaviour, social/communicative skills reported elsewhere	Simon' s habit of removing his clothing outside the colour room continued to cause problems. However, his level of academic achievement and communication in school was good.
Overall progress made	Simon made great strides in his ability to engage socially, to express his inner emotional state and to use language appropriately.

Case Report for Anna

Table 14.7 Personal Details and Baseline Abilities for Anna

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Anna 9 years	4 years	Female	'Severe and complex problems'	ASD	Reynell PVCS Score < lowest score	Pre-academic e.g. sorting objects by colour	Solitary	Down's Syndrome

General Description

Anna enjoyed rough-and-tumble play with adults, but avoided eye contact. She also liked to climb onto the lap of adults. She was occasionally able to imitate gross physical movements and could sometimes manage vocalisations echolalically, but only after some delay. When tested using the Developmental Language Scales (Reynell and Huntley 1977), she was found to have virtually no formal communication skills. Her attention span did not allow the test to be completed and her receptive and expressive scores fell below 1.09 years, the lowest score on the scale. Another report stated that she had no meaningful speech. The results of further tests are discussed at the end of this account. Her body often became rigid for no apparent reason and she sometimes made intense and bizarre movements. It was reported that for this reason it was difficult for her to communicate non-verbally through pointing and gesture. She also did not respond to the non-verbal communication of others. When agitated she banged doors, kicked, hit and scratched. Anna showed many of the traits of autism in regard to difficulty in non-verbal communication through body gesture. Although she would engage in rough-and-tumble play this was always on her terms and she would move from adult to adult regardless of whom they were.

Descriptive Case Report For Anna

Since Anna stayed with the project for three years and showed considerable progress, a record of every session is given in note form in the Appendix 1 page xiii to give more complete overall account of what actually happened.

At the start of this stage (January 2001) it had already been established that Anna was more aroused in red colours and more relaxed in blue/green (see Chapter 11). When alone, her tendency when aroused was to rock sideways and 'chatter' in an animated but wordless fashion. This 'chatter' was often very expressive, even to the point of sounding angry, but it never seemed to be directed towards another person. When the support person was in the room she often wanted to initiate rough-and-tumble play, but always on her terms. She would easily become over excited and could then become quite rough, scratching hitting or head butting.

Between January and June the objective of the adult support person was to encourage her to play more gently and calmly. In January 2001 she could be seen on the video to be playing lively games, clapping, running and chasing etc. but with a considerable amount of rough behaviour such as hitting and head butting. When the games were lively the mood was enhanced with red, and when calm and relaxed blue/green was used. Very little eye contact could be seen. For several sessions during February 2001 she was encouraged to play with a piece of white chiffon as it was thought this might enhance the intensity of colour and so accentuate the colour mood. She enjoyed swirling it about in the red colours and pulling the support person round the room with it, and appeared to move more slowly in the blue/green. However, the support person did not encourage her to stay relaxed once she had calmed down so there was not much distinction between aroused and calm play. During the active play her expression was often intense, with her face 'screwed up' as though trying to express

something. Sometimes she made sounds that sounded communicative though no actual words were used. During March 2001 the support person started using words such as ‘run’ and ‘crash’ with the appropriate movement though Anna did not imitate.

During April 2001 a report was received from her parents describing how if she woke up with the sun shining into the bedroom through red curtains she would often immediately get up and hit her sister. The mother thought this behaviour might be connected with the redness of the room.

The sessions in May 2001 continued in much the same way and although Anna did not seem particularly engaged with the support person she did appear to attempt to say the word ‘run’. However this was not very clear and it did not appear to be directed particularly to the adult.

On the 28th June 2001 the adult support person left the project and DP took over as interactive partner. DP held Anna’s hands and joined in with her rocking from side to side. The pink/red lights gently faded up and down in time with the rocking movement. The more lively and fast the movement, the more red the colour. Side to side rocking appeared to be one of Anna’s most characteristic behaviours and in order to attempt to ‘enter into her world’ (see Caldwell 2000), joining in with this seemed to be an appropriate place to start. Since it was a fairly lively movement, the reddish colours were chosen. The ‘rocking’ of the colour was intended to accentuate the movement and to give an externally perceptible form to the rhythm. At this stage there was no eye contact and no proper face-to-face engagement.

During July 2001 the sessions comprised other games as well such as pushing and pulling, ‘galloping’ round the room etc. These were also examples of Anna’s natural behaviours and were joined in with for the reasons given above. Again, the more lively and active the game,

the more red the light. Rocking seemed to be something she would always come back to between other movements. There was now occasional eye contact. The attempt was made several times to get her to lift her arms to make the 'A' gesture but she was generally unwilling. This was the beginning of the adult's trying to 'will' the child into carrying out an action.

The sessions in September 2001 continued with similar movements with occasional attempts at the 'A' gesture. On 13th September, following a rocking sequence in pink and blue, Anna suddenly embraced DP. This sort of affection had not been seen in the colour room before. In October 2001 the shadow screen was tried but Anna seemed uninterested and would only look at DP, and not the coloured shadows on the screen. A favourite position for Anna now became sitting between DP's legs. She began to enjoy rocking sideways like this. This would usually be accompanied by pink light over blue, fading up and down in time to the rocking. A new and significant development began to take place at this time. Anna would sit down with her back to the wall, face to face with DP and offer a sort of 'chat' with animated and purposeful sounds directed at DP. There were no actual words, but there was now considerably more eye contact. DP now requested Anna to put her arms up (in pink light) for the 'A' gesture. This attempt to 'will' the child into an action now became stronger to try to increase the level of engagement. It was noted at this time that there was still only very little eye contact and no real engagement. During some of the playful games it was noted that there may have been attempts at the words 'rock', 'sit', and 'careful'. However these were still very unclear and again not directed to the adult, they were more in the nature of a passing comment.

November 2001 saw a new and significant development. She had continued with the running and rocking games and still sometimes would hit out of she wanted something different.

However she was becoming more willing to do the arms up 'A' movement when requested and on one occasion she said the word 'Up' clearly several times. On 22nd November, after doing the 'A' gesture, she sat down in her favourite position with her back to the wall face-to-face with DP, and started to watch the lights intently for the first time. Then, suddenly, and quite unexpectedly she started to shake her head from side to side and made funny 'Brrr…Brr…' noises. DP immediately copied both the head shaking and the sound and Anna began to laugh and continued the game with great joy and energy. This was the first time there had been real laughter and fun. There was excellent eye contact and a real feeling of engagement for the first time. It is interesting to note that this followed a fairly intense attempt to 'will' Anna into making a gesture and that immediately prior to the engagement she had taken proper notice of the lights for the first time. It is not possible at this point to be sure of cause and effect, but it should be noted that the sudden major step forward in social engagement did follow this intense projection of 'will' on the part of DP and this was done with the specific intention of 'freeing up' her own will to enable her to carry out a desired action.

Surprisingly, during December 2001 she did not repeat this but her mood seemed to have improved considerably and there was in general a lot more smiling. A big step forward was made during a session where Anna and DP were jumping. Each time either DP or Anna jumped the mood was enhanced by animated use of the word 'jump' accompanied by strong red light. DP's energy and effort was directed towards getting Anna to use the word. Suddenly she said 'jump' loudly and clearly. She showed tremendous joy in the achievement and repeated it many times. This was another similar example of the use of the adult's will being directed towards producing an action in the child.

The first few sessions in January 2002 consisted mainly of running, circling round and round and jumping etc. She did not use any real words although she did make many expressive vocalisations. Her behaviour was gentle and very cooperative. At the end of January Anna was introduced to the 'In/Out' exercise. It was chosen at this point because it was felt that the previous step forward was connected with the introduction of adult-led work, and this particular exercise was chosen because it was one of the simplest, with short and easy words. At first she did not quite understand what was required but as soon as she began to get the idea, she became animated, amused and began to laugh. Clearly she was delighted by the 'game' and also very pleased at the achievement. In the same session she repeated her face-to-face head shaking 'Brrr…Brrr…' game, again with lots of laughter and amusement. Looking back to earlier videos what became obvious now was the previous lack of fun and laughter. This sheer joy in the interaction meant that a 'new' and charming personality was beginning to emerge which had previously not been seen.

Progress continued in February 2002 with Anna becoming proficient at the 'In/Out' exercise. She still found the exercise fun and very soon was able to say 'Out' at the appropriate moment. She also performed the 'A' gesture when asked. She still did the round and round, rocking and jumping games but now the hitting, head-butting and scratching was virtually absent.

March 2002 saw the next major break through. Sitting face-to-face she started her head shaking game. Her attention was good and eye contact was excellent. DP now made the eurythmy 'S' gesture together with the sound. Again the attempt was made to 'will' Anna into the action by projecting as much 'affective engagement' as possible towards her. Anna smiled, then laughed and then began copying the head and hand movements. Moments later she made a clear 'S…S…S' sound. Full of laughter she then successfully copied the gestures

and sounds for ‘P’ ‘ ‘F’ and ‘T’. Here was a completely different Anna. She was fully engaged with the adult. Eye contact was continuous. She was smiling and laughing all the time and was not only willing but also able to quickly and correctly copy several of the sounds of speech. In the next session she initiated the ‘S’ expression and with lots of laughs completed the sounds of ‘I’, ‘K’ and ‘F’. A note was made at the time that at last it was felt that one was ‘getting through’ to Anna.

It should perhaps be questioned at this stage as to why the sudden leap in progress was made. Looking back, it seems that the head shaking game she initiated was the turning point where fun and laughter appeared for the first time. Possible reasons why it occurred at this time have already been suggested but what does seem clear is a new recognition of DP as an interactive partner took place at this time. Once this had been achieved, it was then possible to ‘ask’ Anna to perform other tasks which she now could and would attempt to carry out. The deliberate and strong use of the adult will to ‘compel’ her into the required action seemed to have an ‘enabling’ effect on Anna. This was clearly not a power-led form of coercion where obedience was obtained under duress, since the outcome was joy and pleasure in the achievement and eagerness to repeat the activities. It is tentatively being suggested that she had been enabled to direct her own will with her thinking and that this gave her a great sense of accomplishment.

For the rest of March 2002 similar exercises were carried out with consistently good eye contact, eagerness and success at making speech sounds. She played gently and well and all violence had disappeared. On several occasions Anna would initiate activities. On 18 March an interesting observation was made. DP went up to Anna to wipe her nose and Anna mistook this for the hands close to the face gesture of the ‘In/Out’ exercise. She offered the word ‘In’

of her own accord and initiated the exercise herself. During the same sequence she spontaneously said ‘Hello’.

On 21 March the ‘horse riding’ game was introduced for the first time. DP got down on all fours and pretended to be the horse. Anna immediately got the idea and laughed as she ‘rode’ round the room. She used the word ‘horse’ several times. Part of the game was that the horse got tired and had to ‘fall down’. Anna found this highly amusing and after the second time she knew what was coming and appropriately used the word ‘off’ just before the fall. This is important because here she was using an appropriate word that was not copied or cued and she was using it to convey a future event. The anticipation and excitement could also clearly be seen, something not normally associated with autistic behaviour.

Sessions during April and May 2002 continued in much the same way, always with fun and laughter. In June 2002 the ‘I pull, you pull’ game was introduced. Joining hands with DP Anna was encouraged to pull. Strong red light accompanied her effort on pulling to enhance the mood of exertion. The idea was to use the word ‘Pull’ and to connect it to the deliberate and conscious exercise of will on her part applied to the physical exertion of pulling. The game also introduces the idea of turn taking.

After the summer holidays Anna took a few sessions to get back into ‘the swing’ of the interactions. Much of the time her characteristic rocking, circling, galloping and jumping games were performed. At the beginning of October 2002 she use the word ‘Rock’ for the first time whilst sitting between DP’s legs and rocking from side to side. She also played the ‘Row the Boat’ game, giving the appropriate scream at the end of the second verse when a crocodile is mentioned. Based on the gesture for the letter ‘P’ a song and game came into being where Anna would shout ‘Per… Per… Per…’ loudly and rhythmically. At the end of

the session she said ‘Finish’ appropriately. It was noted on 7 October that when the attempt was made to engage Anna in repeating some of the speech sounds without the appropriate eurythmy gestures she showed little interest and did not make the sounds. Interestingly, as soon as the gestures were made she became animated, copied the gestures and then also the correct sounds. Also in October, having appropriately used the word ‘Rock’ during a sitting together rocking session, she moved to the side of the room, said the word ‘Rock’ and pushed her head from side to side with her hand. This appeared to show that she understood the meaning of the word and could generalise it to a rocking movement in another situation. Also in October 2002 she imitated dog, cat and lion sounds and enjoyed a fun game with DP, ‘barking’ and ‘roaring’ at each other. For this game the colour was predominantly bright yellow to give a mood of light heartedness and fun.

During one of Anna’s rocking sequences in October 2002 she suddenly started to push against DP’s hands. This was taken up and made into a ‘pushing’ game. With red light to emphasise the physical effort Anna was encouraged to push against DP and to use the word ‘Push’. This she succeeded in doing several times. When running round and round DP encouraged use of the word ‘Round’ but Anna did not manage it.

In November 2002 the ‘pulling game’ was re-introduced. Again, strong red light was used to augment the effort of pulling and Anna was able to use considerably more force than she had previously. On 18 November she could clearly be seen to be trying to form the word with her mouth although she did not succeed in saying it. This was repeated the next week, at first without saying the word, but on the second attempt she successfully and clearly said ‘Pull’. Further progress was made in December 2002 when Anna initiated the pushing game with the word ‘Push’. She also initiated jumping with the word ‘Jump’ and pointed to DP’s nose and said ‘Nose’. When hugging DP she said spontaneously ‘Kiss’. Clearly she was now able to

use words appropriately and spontaneously to point things out and also to indicate her choice of interactive games.

In January 2003 the horse riding game was re-introduced with the idea not only of having fun but also of encouraging Anna to use words as an instruction. When she wanted the 'horse' to go she would normally bounce up and down. At this point DP used the word 'Go' and when she stopped, the word Stop'. After a few attempts Anna managed to say 'Go…Go…Go…' to get the 'horse' move forward. Colours for this game were yellow/white to give a bright and sunny mood. Although this was a lively game and Anna was encouraged to get quite excited there was no sign of physical aggression and it seemed that she had naturally 'picked up' an understanding of the boundaries of acceptable social behaviour.

As affective communication became more possible so the use of the coloured lights could be reduced. Now that she was beginning to be able to share the natural changes in emotional mood the enhancement of the colour was becoming less and less necessary. The intention had always been that the colours should provide a pathway for the child to engage with its own affective state and once this had been established the colours would no longer be so important. Thus it was becoming more and more possible for Anna to enjoy social interaction in ordinary natural circumstances.

During the rest of January Anna was now using many words spontaneously and appropriately. She could recognise movements such as push, pull, round and round, and would say 'hello' and 'goodbye'. She could say 'toilet' when needed and could name eyes, nose and mouth etc. when pointed to.

During her last month on the project (February 2003) the emphasis was on conversation. Although Anna could only manage sentences of between 1 and 3 words she began to enjoy an animated 'gobbledygook' conversation which contained all the emotional ups and downs, loud and soft elements and expressive gestures of a proper conversation. Eye contact was excellent and there were many smiles. She appeared to be fully engaged with DP and enjoying the interaction.

Another very significant fact at this stage was her level and quality of interaction with other staff. It was very noticeable that when Anna was coming down the stairs to the colour room, she would usually now be talking, laughing, acting, joking or in some other way involved in social interaction with the staff accompanying her. On one occasion in February 2003 she came in full of smiles but pretending to cry. What had triggered this was not known but clearly she was not really crying, yet her voice expressed plenty of emotion and unhappiness and she certainly gave the impression that she understood that what she was doing was to give the impression of sadness. All the time she was cheerful and positive, and was relishing the amused reaction she was getting from the people around her. This was a very different situation to the one prevailing at the start of the project.

She finished on the project at about the planned time having made enormous strides forward in interpersonal skills and having made a very significant contribution to the research.

An interesting anecdote from about this time was a comment from a conference participant. A video of Anna was used at a conference on Down's syndrome and after watching it the participant said. 'This child is not autistic'.

Perhaps one of the most significant features of Anna's progress was her newfound ability to have real 'fun' with another person.

Results from the Pre Verbal Communication Scale Test

The Pre-Verbal Communication Schedule (PVCS) test (Kiernan and Reid 1987) was used for Anna, and although not autism specific it has been standardised on children with autism and is therefore an appropriate test. It was used by the school at the start and finish of the project and the results will be mentioned because they give some interesting results. The test was carried out by the school's speech and language therapist, originally in September 1999 and again in April 2003. The detailed scores are given in Appendix 4, (pages c and ci) but the overall outcome was that she had made major steps forward in both informal and formal communicative behaviours including achievement of communication through symbols and signs, understanding of vocalisation and speech and communication through speech (single words). In the Reynell Developmental Language Scale (Reynell and Huntley 1977) she was below the lowest score in 1999 and in April 2003 her score was equivalent to 2 years. The speech and language therapist who carried out the tests reported that, knowing the difficulties Anna had, she was surprised at the level of progress. Further, Anna's key worker reported improvements in communication, sociability and ability to play (see report in Appendix 4 page cii). As has been discussed previously, it is not possible to claim all the credit for the colour project; but it was the opinion of several staff members, having seen the videos that it played a major role.

The summary table is given overleaf.

Table 14.8 Summary Table of Progress for Anna

Number of interactive sessions	(over 27 months,10 with support person, 51 with DP)
Attribute	**Observations over time with project**
Eye contact	Virtually none at start, increased slowly for approx. 11 months, then suddenly improved rapidly. At end was regular and consistent.
Engagement, body posture, touch	Although would touch in play, body gesture at start was as though 'disassociated' from partner. Later face-to-face engagement, closeness and gentler touch were common.
Signs of affection	After approx. 9 months showed affection by spontaneously hugging. Continued to show affection through smiles, touch and hugs.
Reciprocal responses	At start play was on own terms with a kind of independence form partner. After approx. 12 months, developed into turn taking and building up of a transactional repartee.
Sense of fun, laughing	No smiles or laughter at start. After approx. 9 months, as social engagement improved, laughter became regular as she developed a sense of fun.
Imitation of movements	Very reluctant to imitate at start. Gradually became more willing and able to imitate e.g. eurythmy gestures. However, she never achieved being consistent and reliable.
Initiation of movements or games etc.	After a few months she often initiated movements or games such as rocking in the adult's lap, pulling, pushing, circling or clapping.
Sharing of affective states in exercises	After approx 12 months was able to share a sense of fun. Did not achieve sharing of states such as sadness or anticipation.
Learning of words through action	A very successful strategy for encouraging the use of new words. She learnt to say e.g. 'up' 'down' 'push' 'pull' 'round' while making the corresponding movement.
Symbolising, pretending or acting	Achieved on one occasion towards end, when on her own initiative she acted out crying with appropriate sounds and expression.
Imitation of words	After 12 – 15 months she successfully learnt to imitate many words.
Use words independently and appropriately	Towards end she could use single (sometimes more) words appropriately and independently e.g. 'hello' 'goodbye' 'toilet' 'eyes' 'jump'
Expression of emotion through gesture/language	This was not achieved.
Changes in behaviour, social/communicative skills reported elsewhere	Reports from school and care staff show consistent and marked improvement in social behaviour and language skills.
Overall progress made	Very significant progress made in ability to behave socially, to play appropriately and to use simple expressive language.

Case Report for Alan

Table 14.9 Personal Details and Baseline Abilities for Alan

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Alan 9 years	3 years	Male	'Significant global delay. Complex needs'	ASD	Non-verbal	Literacy at P-level 4 & 5 Numeracy P-level 5 & 6	Solitary	Epilepsy

General Description

Alan was an energetic and usually happy child. He often carried a soft toy which he violently flapped for much of the time. He was completely non-verbal though he did understand some language. He would push people or objects away if he did not want them. He liked a hug and cuddle with people he knew and would often put his face very close to an adult and stare fixedly into their eyes. Although this appeared at first to be good eye contact it was very intense and fixed and did not give the feeling of real recognition. He sometimes suddenly became distressed and cried or screamed and this was thought to be due to pain from digestive problems. If unhappy he would cover his ears and shut his eyes and sometimes would sit down and refuse to move.

Descriptive Case Report for Alan

Alan first came to the colour room on 8th February 2001. He attended once per week. He was a member of the third cohort of children so the first and second stages (Colour Response Profile and Colour Mood Dialogue) were covered fairly quickly as it was intended to concentrate on the third (interactive) stage. The findings from the first and second stages will briefly be mentioned. To obtain the Colour Response Profile Alan was encouraged to sit by

himself. Right from the start he seemed unusually interested in the colours and watched the blues and pinks over white as they were slowly up-faded and down-faded. At the second session of 15th February 2001 a sequence of blue → pink → pink/red → blue → blue/green was used. He watched the changes intently and seemed to flick his 'flappy' toy more violently in the reds than in the blues and blue/greens. This was repeated at the next session at the beginning of March 2001 with similar results. At the third session (8th March 2001) the main sequence worked out previously was used (blue → pink → red → blue → green, repeated twice). In the strong red and green there was an immediate reaction. This is illustrated in the sketches below *(Figure 14.8)*:

Figure 14.8

He had been sitting cross-legged with his back to the wall, watching the lights. When the strong reds came on he suddenly bent down on all fours, put his head on his knees and covered his eyes as illustrated in the sketch opposite

Sketch illustrating Alan's reaction to red

As the lighting sequence changed to blue he sat up. He then curled up again for a few moments and then sat up again and watched the lights.

Figure 14.9

Sketch illustrating Alan's reaction to green

When it became green he lay down on his back, and smiled up at the lights as illustrated in the sketch opposite (*Figure 14.9).* He seemed much more relaxed and content. This appeared to be a totally different gesture to that in the reds.

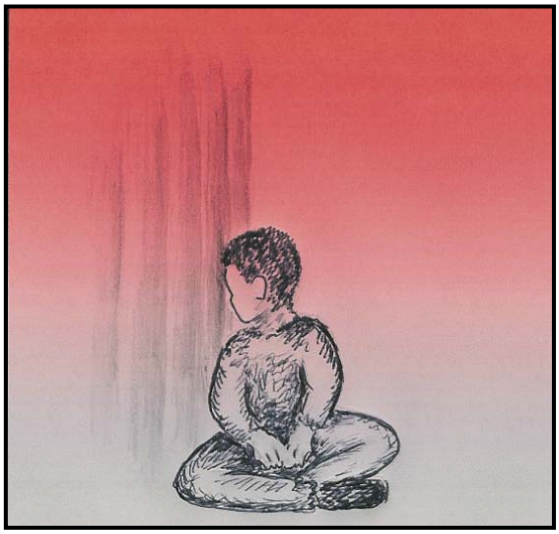
N.B. Although his hands were over his mouth he was not covering his eyes.

For the rest of the colour sequence he watched intently and seemed to be happy. This was repeated for the next two sessions in March 2001. Alan watched consistently, had a very open expression and smiled a great deal. He flicked his toy for much of the time but it appeared to be considerably more vigorous in the reds than the blues and greens. The overall impression was that he found the reds overpowering and was more relaxed and happy in blue/green. A detailed analysis of this flicking was not carried out because of time constraints but a careful examination of the videos appeared to indicate a real difference.

It was decided to pass on to the second stage of Colour Mood Dialogue after only a few sessions because detailed analyses of other children's Colour Response Profiles had already been done and Alan was clearly showing the same tendencies except for a more extreme and aversive reaction to strong reds. During a session at the end of March 2001 the reds were used to augment his more vigorous movements of running and jumping but again this seemed to cause some distress. When the reds were again used at the beginning of April 2001 he turned

his head to the curtains so that he could not see it as illustrated in the sketch below *(Figure 14.10)*:

Figure 14.10



Sketch illustrating a second reaction to red for Alan

Yellow light over blue was then tried and he immediately looked up and smiled. His gesture is illustrated in the sketch below *(Figure 14.11)*:

Figure 14.11

Sketch illustrating Alan's reaction to yellow

Alan looks up, smiles and seems happy in yellow. His bodily gesture is one of openness and lightness.

For the next few sessions in April 2001 the colours were restricted to blue, green and yellow. As he began to anticipate the yellow he started to gently shake his head from side to side. This movement was ‘mirrored’ by the yellows by gently up-fading and down-fading in time with his head movements. The intention was that he should come to realise that the lights were responding to his bodily movements. This was the beginning of a successful phase for Alan.

It is at this point perhaps worth mentioning this reaction of Alan. When the effect of colour on behaviour (Colour Response Profile) was being investigated for the first cohort, it was felt necessary to repeat such tests many times to validate the initial observations. However it had then been discovered that this had the effect of ‘desensitising’ the children to the effect they could themselves have on the colours (see Chapter 11 pages 220 and 221). Therefore at this stage of the project, when the emphasis was more on the achievement of interaction, it was decided to move quickly on to the Colour Mood Dialogue stage whilst Alan was enthusiastic and interested in the changing colours. There is an interesting point for discussion here with regard to the question of security in ‘sameness’ as opposed to interest and empowerment. Whilst the children seemed in general to be quite content to sit and watch the same sequence repeated again and again, it did nevertheless appear to lead to a lack of initiative and creativity. This leaves an open question as to the rightness of keeping them ‘secure’ in a predictable world as opposed to challenging them to cope with the unexpected.

During May 2001 Alan was full of fun and laughter in the colour room and made many happy vocalisations. He would often run, jump and ‘dance’ round the room. This was accompanied by following his movements with the yellows and sometimes with the greens (over blue), yellow being chosen for the more lively moments and green for the more relaxed.

During June 2001 Alan began to realise that he could control the movement of the yellow lights with his side-to side head movements and this was developed into a successful strategy for Colour Mood Dialogue. He seemed to enjoy this, often testing the speed and intensity of the colour changes by experimenting with different styles of head movements. Sometimes he would also experiment with alternately screwing up his eyes and then opening them again as a means of controlling the lights. Whatever he did, the lights always responded to anything which was felt could be taken as having interactive potential on his part. This was a good example of something which, though in its initial stages was not an intentional communicative act (with the lights), by treating it as though it were, soon actually became one. In this case it was the light operator who imputed intentionality rather than an interactive partner.

This successful Colour Mood Dialogue with the yellows was continued and developed during July 2001. Sessions were sometimes interrupted by bouts of abdominal pain but on the whole Alan seemed happy and enthusiastic at colour sessions at this time. It was decided that at the beginning of the autumn term DP would go in with him and start the third (interactive) stage by 'joining in' with this game.

Things were slow to start in September 2001 as Alan had several bouts of pain but the 'dialogue' with the yellows continued. During October several attempts were made to encourage him to use his arms as well as his head for this dialogue but it was largely unsuccessful.

Analysis of the video recordings in October and November 2001 showed the gradual entry of DP into Alan's game. During a session in October DP could be seen in the background imitating the head movements in time with Alan and it appeared that he was taking little or no

notice. Then he slowly turned his head towards DP and let out an excited shriek, as he appeared to realise that she was part of the same game. He then vocalised with a 'Yoi… Yoi…' sound in time with his head movements. DP then also joined in with this sound. Alan then gradually crawled towards DP, still making the head movements, she copied and approached him on all fours in the same style. This then suddenly developed into a spontaneous 'dance', still on all fours but involving bouncing up and down, spinning round and always coming back to a face-to-face meeting. The rhythm was maintained throughout and this was still accompanied by the yellows, the more vigorous the movement the stronger the colour. During the rest of November 2001 this 'dance' could be seen on video to develop. It always started with Alan sitting in the corner, making his rhythmical head movements followed by the yellows. The rhythm was nearly always maintained and sometimes it developed into a crawling game where as the two met face-to-face they knelt up and shouted at each other, sometimes they stood up and then ran round the room and then as they met they lifted their arms up and shouted. Sometimes it involved bouncing up and down on all fours and sometimes jumping, but still with the rhythm and still followed by the yellows. It was still very much child led but it was clear that DP was now a real 'partner' in the improvisation. It could also be seen from the shrieks of laughter that it was fun for Alan.

During late November and December 2001 these 'dance' sessions continued successfully. Alan became more and more affectionate and frequently at the end would come to DP for a cuddle. This he seemed to want more and more and would often curl up into a sort of foetal position and 'ask' to be held tight. He would lie still, quietly smiling in this position for some time and if DP tried to release him he would pull her arm back to regain the tight hold. Vocalisations continued during these sessions, and although there was no attempt at real words, the sounds were becoming much more expressive and varied.

By January 2002 it was decided that a sufficiently good interactive relationship has been built up to embark on interactive sequences with more adult input and involving turn taking. From January to March 2002 clapping games were introduced and also a ‘round and round’ game where DP would stand in the middle holding Alan’s hands while he ran round. As he ran faster and got more worked up the reds were carefully re-introduced and interestingly, if he was in a sufficiently aroused and active mood he seemed to be able to tolerate them perfectly well. The ‘In/Out’ exercise was also introduced at this time and he seemed pleased when he got the idea and became confident in knowing what to do. To introduce the idea of turn taking the ‘You pull, I pull’ game was used, where, sitting facing each other and holding hands, Alan and DP would take turns to pull the other towards them. It took a few sessions before he got the idea and he was reluctant to put much force into pulling for some time, but again he seemed pleased with the achievement once he could do it. During this time however there were several occasions where he came in upset, apparently due to abdominal pains and the sessions had to be abandoned.

Towards the end of March 2002 the speech sounds with the appropriate movements were introduced. On several occasions he made the appropriate mouth movements though no actual sound came out at this stage. Sessions in April and May 2002 continued in much the same way though they were regularly interrupted by bouts of abdominal pain.

In a session in June 2002 he suddenly started to make musical sounds and this was immediately developed into a singing interaction. Yellow lights were used with higher and happier sounds with pink/blue for slower and more melancholic notes. This was a very successful vocal interaction where Alan seemed particularly happy and would clearly indicate when he wanted more by initiating another sequence of sounds. There were several more successful musical sessions in June and July 2002 during which was able to imitate several

speech sounds when given as musical notes and following the general rhythm of the interaction. In September and October 2002 sessions continued in a similar way and gradually the main eurythmy gestures for the speech sounds were introduced. He managed on several occasions to make the sound ‘H’, ‘B’ and ‘A’ on request though it was always rather unreliable. However again many of these sessions were interrupted or cut short by bouts of pain and distress. By November it seemed he really was making progress with speech sounds and on one occasion was repeating ‘A’ clearly and consistently.

Several sessions in December 2002 and January 2003 were missed due to illness and unfortunately in February 2003 the occurrence of abdominal pain became so frequent that very little more progress could be made. Sessions finished in early March 2003 a few weeks before the planned finishing date of Easter 2003.

However it should be reported that in early March 2003 a trial was conducted to see what would happen if the colours were not used at all. Although not a true comparison test it is nevertheless it is interesting to relate what happened. Alan sat in his usual corner looking up at the lights and apparently waiting for something to happen. He simply sat still, doing nothing and looking alternately at the lights and at DP. After about 6 – 8 minutes with nothing happening, Alan got up and went towards the booth as if bored with waiting. At this point the colours came on and Alan immediately smiled and started running round the room and began his usual interactive games. Although this test cannot be taken as proof of the role of the lights in creating the mood, it certainly gave the impression that for Alan the colours formed an essential accompaniment to his actions.

The summary table is given overleaf.

Table 14.10 Summary Table of Progress for Alan

Number of interactive sessions	54 (over 18 months, all with DP)
Attribute	**Observations over time with project**
Eye contact	At start made intense eye contact, but staring, expressionless and not engaging. Gradually developed 'true' eye contact though never totally consistent.
Engagement, body posture, touch	At first kept distance from DP but after few months liked to be close, to touch and be cuddled.
Signs of affection	Liked to be comforted and cuddled and often smiled but only limited signs of real affection.
Reciprocal responses	After few weeks took part in many reciprocal, turn taking and spontaneous movements and games
Sense of fun, laughing	Had a great sense of fun from after the first few sessions, often laughed.
Imitation of movements	Unwilling to imitate movements at first, later achieved some of the eurythmy movements but inconsistent.
Initiation of movements or games etc.	After first few sessions was able initiate many lively and original movements, often became turn taking games.
Sharing of affective states in exercises	Not achieved.
Learning of words through action	Not achieved.
Symbolising, pretending or acting	Not achieved
Imitation of words	Was able to imitate speech sounds on 2 – 3 occasions but not words.
Use words independently and appropriately	Not achieved
Changes in behaviour, social/communicative skills reported elsewhere	No significant changes reported
Expression of emotion through gesture/language	Not achieved
Overall progress made	Good progress was made at first in reciprocal and creative interaction. This was not continued due to signs of distress, and the problem was thought to be mainly due abdominal pain.

Case Report for Jane

Table 14.11 Personal Details and Baseline Abilities for Jane

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Jane 11 years	3 years	Female	'Significant learning difficulties'	ASD	'Significant difficulties in speech and language skills', but can pronounce words	Can read and write simple words. Can count to 50 and do simple additions and subtractions	Solitary	None reported

General Description

Jane was a quiet, gentle and pleasant girl who was elegant in her mannerisms. She understood simple instructions and was always willing to do what was asked if she understood. She had very limited language, though she would repeat words and had learnt to say, 'Hello' back. Her voice was soft and very breathy. She carried out her structured teaching tasks efficiently and could write her name. Jane could be self-abusive. She would bang her head and bite her wrist and let out a lengthy high-pitched squeal. This tended to happen when she was confused or did not understand what was being asked of her. She was not abusive towards anyone else and avoided confrontational situations. She did not play with other children and seemed indifferent as to which member of staff assisted her. Although she liked to see her family she showed no physical affection.

Descriptive Case Report for Jane

Jane was also a member of the third cohort of children, so only a brief summary will be made of the first (non interactive) stage to give context to the later interactive stage. When she first

entered the colour room in September 2001, Jane sat down peacefully and watched the lights intently. Pink and blue over white was first introduced, followed by the main sequence of gradual changes from blue → purple→ magenta→ red → magenta→ purple→ blue→ blue/green→ green→ blue/green→ blue. Throughout September and October 2001 she appeared very happy in the colour room, smiling or even laughing when the lights changed. She would often sign in Makaton that she was happy. In general she seemed slightly more tense in the reds. She would look up more, straighten her back (something observed in other children) and fidget more. An observer said that she appeared more 'focussed' in red. In blue and blue/green she seemed more relaxed, stroking herself and fiddling with her shoelaces. Sometimes she would put her hands to her mouth and stroke her lips. It was reported that this could develop into lip scratching, finger biting or wrist biting. Therefore it was taken as an indication of possible tension or anxiety and caution was observed when this happened. There was possibly slightly more of this lip stroking behaviour in the reds but it never developed into anything abusive. By the end of October 2001 she was familiar with both the room and the colour sequences and appeared unusually happy for most of the time. Fast changes from red to blue caused great interest and amusement and it seemed likely from her expression that she was aware of the after-images (see glossary and account for David page 260).

Although a detailed analysis for Colour Response Profile was not carried out, general indications were that she was slightly more aroused and tense in red, and more relaxed in blue though this was not pronounced. Strong colours including red did not distress her, and she was interested and amused by sudden changes. On several further occasions she seemed particularly attentive at the time that after-images would be formed in the eye.

Colour Mood Dialogue was started in November 2001. The attempt was made to follow any movements or vocalisations she made with the lights. To begin with the pinks were used (over

blue) and later the yellows. She was highly amused and loved the changes (signing in Makaton) but she never really managed to take the initiative to deliberately cause the lights to change. However, the straightening of the back when the reds/pinks came up was observed on many occasions during this time.

In December 2001 it was decided that the support person should copy her movements or sounds in order to try to encourage her to take more initiative. This was still largely unsuccessful, as she seemed unable or unwilling to take the lead.

Therefore, in her case the interactive stage could not take its lead from her own behaviours in Colour Mood Dialogue so the initiative was taken to begin with by the adult. DP started to interact with Jane in January 2002. Exercises such as the eurythmy gestures for 'A', 'I', 'O' and 'L' were introduced. Although she was a little reticent to begin with, she soon gained confidence and was able to carry them out with grace and elegance. Her motor ability in this sphere was unusually good. She learnt to connect the movement to the speech sound very quickly and could soon carry them out on her own. The rhythmical stamping exercise was introduced at this stage and although willing to try she could not at first manage a consistent 2- or 3- time rhythm. Instead she would tend to try and copy what DP was doing, rather than being able to feel the rhythm inwardly. At the end of January 2002 the shadow screen was introduced. She was immediately interested and spent some time looking alternately at the screen and the three spotlights as though trying to work out where the shadows were coming from. She then made small hand movements of her own and watched the effect on the screen intently. At this point there were some short bursts of intense eye contact with DP.

Similar exercises were carried out in February 2002. Jane was consistently willing and capable though she was generally still reluctant to take the initiative, always looking to copy

exactly what DP did. However, with the shadow screen this was not the case; Jane would make all sorts or circling and twirling hand and arm movements and seemed happy for DP to stand behind her and join in, following her lead. This was probably one of the most successful uses of the shadow screen; the multiple and constantly changing coloured shadow shapes were pleasing for Jane and seem to encourage her to be creative in her own right, something which was unusual for her.

By March 2002 Jane could remember and form many of the eurythmy speech gestures, and gradually her voice was becoming firmer and less breathy. She also seemed to enjoy doing this as she would usually smile or laugh as she carried them out. Work with the shadow screen continued at this time and she continued to enjoy it. She would often indicate that she wanted to use it by approaching as soon as the curtains were pulled back, and she was becoming more and more creative. The stamping exercises were often carried out but although very willing and cooperative, Jane still could not find the inner rhythm to stamp in time. Eye contact and smiling were increasing all the time.

In April 2002 the story with earth, water, air and fire was introduced. Jane seemed to understand the narrative and was happy to copy the movements and gestures. After only the second or third occasion she was able to give the next word in the narrative when asked.

During May the ‘Who is this?’ game was introduced. She very soon understood what to do and when DP did the pointing she could always correctly name the person. Interestingly, when she was the one to do the pointing she always pointed at herself and never at DP. (The same thing was observed for Simon). By now she was also able, after the story, to answer simple questions about what happened. Sessions in June and July 2002 followed much to same pattern, with Jane still often signing that she was happy. Occasionally she would

suddenly spontaneously offer a little humming tune of her own. This was immediately taken up by DP to encourage a singing interaction, but it did not normally progress very far.

Towards the end of the summer term 2002 another simple test was carried out to see what would happen without the coloured lights. The session started as normal with the white room lights but these remained on and the usual up fading of the blues and pinks did not happen. Jane sat in her usual place and looked expectantly up at the lights. She continued to look up, every now and again glancing at DP as though for reassurance. She simply waited, and looked puzzled but did not do anything. After some minutes the lights were brought up, Jane smiled and relaxed and started to move. Although this cannot be considered a proper comparison test, it does indicate that for her the colours had become an integral and expected part of the process.

In September and October 2002 various new activities were introduced. She very quickly learnt the moon poem and although she had little difficulty in repeating it by herself her voice was still rather weak and breathy. She was also quick to get the idea of role play games and could throw and catch an imaginary ball and could act out being a dog retrieving a stick or be the person throwing it. The colours for these games were generally red and yellow for the action and back to blue when it was over.

During November 2002 she became more willing to sing and introduced her own sound which was a series of up and down notes in a minor third interval. DP would sing this back to her and then attempt to encourage this into an improvisation. Although she did respond and some new sounds were made up, it never developed very far. During these months the eurythmy sounds, story, stamping and acting games continued as before.

In December 2002, it was decided to try more to enter ‘her world’ by attempting to join in more with her most typical behaviours. This had not been done before because she did not have any behaviours which were obvious and easy to copy. What she would do was to stroke her lips, pat her head or fiddle with her shoelaces or clothes. They were always very tiny and delicate movements. An example of a striking effect was as follows: Jane was running her fingers along a crease in her trousers and DP copied her and ran her fingers along the same crease. Jane suddenly stopped what she was doing, smiled at DP and put her arms round her in a very affectionate embrace. This sort of show of affection was most unusual for Jane and this was felt to be an excellent example of the effectiveness of ‘getting into her world’ as described by Caldwell (2000). This approach was continued whenever a suitable occasion arose and it was nearly always successful in promoting a show of affection.

At a session in January 2003 Jane managed to find sufficient inner rhythm to stamp correctly in two time. She was then able to repeat a great deal of the story; she could remember the narrative and then act out the appropriate gestures. She seemed pleased with these achievements. She then suddenly and spontaneously started a game of her own creation where she would put out three fingers, one at a time starting with the first finger, while singing ‘one-two-three’ up the first three notes of a major scale. She developed this further with ‘four-five - six’, sometimes continuing up the scale and sometimes coming back down again. DP joined in, sometimes repeating Jane’s tune and sometimes developing it further. This was the first time Jane had brought something entirely of her own into an interactive situation. The lights were a soft pink/blue for this interaction. It is interesting to note that this sudden ability to create something out of herself came at the same time as a clear improvement in ability to remember imaginative events. These would have been her own memory pictures for which no external cue was given. It is a question as to whether both these two abilities are related to a developing sense of self.

For the rest of her time with the colour project during February, March and April 2003 the main aim was to encourage Jane to initiate and lead the interactions. This decision was made because although she was still very cooperative and capable she was none the less still very mechanical in her behaviour with no real ‘spark’ of her own personality. Any little sound, gesture or movement she brought out of herself was copied and developed with much praise. The lights responded with pinks, reds or yellows depending of the type of gesture. The mirroring of Jane’s movements was accompanied with the words, ‘Jane is doing this…’ Gradually she became a little more confident and inventive and over the course of a few weeks she was able to perform some original dance-like movements. This was a game she enjoyed and it was often accompanied by laughter and the sign for ‘happy’.

The summary table of progress is given overleaf.

Table 14.12 Summary Table of Progress for Jane

Number of interactive sessions	38 (over 16 months, 3 with the support person, 35 with DP)
Attribute	**Observations over time with project**
Eye contact	Rather shy and inclined to look away at start, but after only 1 month there were periods of good and intense eye contact. This continued.
Engagement, body posture, touch	Again tended turn away at start and was reluctant to touch. After 12 months, when joining in with her own behaviours she began to want touch and regularly embraced DP.
Signs of affection	Up to this time (12 months) she showed little affection. After this, affection was clearly demonstrated (embracing and smiles) and continued.
Reciprocal responses	At start was always willing to copy. She soon could take part in turn taking routines, but responses tended to be mechanical. Originality came at about 13 months.
Sense of fun, laughing	She always enjoyed the colour room, smiling and laughing at the colours. Gradually this sense of fun spread to include interactive games etc.
Imitation of movements	She was always skilled at copying movements and was unusually graceful in her movements.
Initiation of movements or games etc.	At start was rather mechanical in her behaviour and would only copy. After 13 months she began to be inventive and creative in interactive movements, games and tunes.
Sharing of affective states in exercises	At first she had a rather detached attitude and it was difficult to engage her emotionally. She did achieve a shared sense of anticipation to some extent in the 'Who is this?' game.
Learning of words through action	This was not done as she could already imitate, repeat and remember words
Symbolising, pretending or acting	She could act out simple scenarios form stories and could play imaginative games such as throwing an imaginary ball.
Imitation of words	She could already imitate, repeat and remember words
Use words independently and appropriately	At first she had fairly limited language, one or two words in answer to questions. This progressed to the use short phrases used appropriately e.g. in answering questions about the narrative of a story.
Expression of emotion through gesture/language	Towards end could express affection through gesture and smiles and pleasure, through laughter and use of Makaton.
Changes in behaviour, social/communicative skills reported elsewhere	Progress reported in schoolwork and independence skills. Less tantrums and self-abusive behaviour but another likely explanation is security provided by structured teaching system.
Overall progress made	Main areas of progress were in ability to have fun in interaction and in developing spontaneity and creativity.

Case Report for Colin

Table 14.13 Personal Details and Baseline Abilities for Colin

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Colin 10 years	4 years	Male	'Significant difficulties'	ASD	'Pre-verbal'	Pre-academic, working at P levels 4 & 5	Reported as a 'withdrawn young man'	None reported

General Description

Colin was usually a fairly contented boy who was rather passive in nature. When unsure he would cover his face with his arm so that he could not see. He was often seen being led around the site in this position. He rarely paid attention to other children though he would sometimes approach staff and lead them to what he wanted. He was non-verbal though he did sometimes sing or hum. He had an obsessive habit of blowing tiny threads, which seemed to absorb him totally and which made it difficult to gain his attention. In school he could do simple matching tasks and was learning to distinguish colours. In terms of social interaction, Colin was not forthcoming and it was very difficult to get any real response from him. Colin was still in nappies.

Descriptive Case Report for Colin

Colin was also a member of the third cohort so again the first (non interactive) stage will only briefly be mentioned. When Colin first came to the colour room in September 2001, he seemed happy to sit down quietly in the corner. The colours were gradually introduced, first blue, then pink, gradually leading up to the full sequence of blue → purple→ magenta→ red → magenta→ purple→ blue→ blue/green→ green→ blue/green→ blue. For much of the time

he covered his eyes with his arm which was his normal position when feeling insecure. This is illustrated in the diagram below *(Figure 14.12)*:

Figure 14.12

Sketch illustrating the typical position for Colin, covering his eyes with his arm

However, as Colin became more used to the room he began slowly, every now and again, to 'peep' out to see what the lights were doing. Gradually he spent less time with his eyes covered and seemed to gain more interest in the lights. The support person reported that his eyes were down more in the blues than in the pinks/reds and it was noticeable that he often straightened his back when the reds came on. As has been previously reported, this has been observed in several of the other children.

For most of the sessions in October 2001 Colin seemed to be covering his eyes more then before and it was realised that this might be due to the people watching from the booth. The TV monitor was therefore turned off to minimise the light in the booth and whenever he covered his eyes the general lighting was turned down. Gradually he began to 'open out' a little more often. For some time the procedure was followed that whenever he 'closed up' the

lights would immediately reduce to almost nothing and then as he ‘opened out’ again so the lights would slowly come up.

At the beginning of November 2001 he came in with his eyes covered and this procedure of turning the lights down low was followed. As he ‘came out’ the pinks came up and as he became more confident he suddenly started to sing a simple little 3-note tune. It seemed a light and happy sound so it was followed with the yellows. He responded by smiling and continuing with the tune for some time. This was the beginning of Colour Mood Dialogue. For the next few sessions the attempt was made to follow any vocalisations or movements with the lights. Several times he started to sing, always quietly, and always repeating the same short sequence of notes again and again. Depending on the ‘lightness’ of the tune either yellows or pinks were used. It seemed that the changing colours in time with his tune encouraged him to continue singing, but it was not clear whether he realised that the lights were responding to him. During a session at the end of November 2001 he did suddenly understand, only this time it was body movements to which the lights were responding. He was lying down on his back with his knees raised and suddenly he started to shake them. The red lights followed this rather quick and jerky movement and this seemed to get his attention. Several times he shook his knees and watched the lights responding, then he stopped and waited as the lights also stopped, and then resumed the process. It appeared that he had connected his knee movements to the response of the lights and seemed keen to repeat the interaction. He then started to experiment with other movements. First he raised his arms, with the lights again following, then he went back to the knee shaking, and then twice he raised one leg in the air. Although this was a reasonably successful ‘dialogue’ with the lights, Colin did not repeat this at the next sessions in December and it was decided to start the interactive stage with DP in January 2002.

For many of the sessions in January 2002 Colin was reluctant to ‘come out’ and sat for much of the time with his eyes covered. To begin with a very gentle and non-confrontational approach was taken with virtually no pressure on him to ‘do’ anything. This was in order to give him confidence and trust in DP. He would often indulge in his favourite habit of blowing a tiny thread and it was not long before he would allow DP to join in and blow the thread as well. Blowing gently on his hand gradually became acceptable and soon this became a successful strategy for ‘bringing him out’. By February he was becoming considerably more open so he was gently but firmly encouraged to do the ‘A’ movement in pink. Although very shy and inhibited to begin with, he did eventually manage to make the arm movements and surprisingly this seemed to ‘open the gates’ to engagement with DP. There was now good eye contact and many more smiles. Furthermore, he soon started to vocalise again and to make other movements and gestures, many of which could be used as a basis for interaction. Soon he was doing the ‘I’, ‘A’ and ‘O’ gestures and his movements were surprisingly graceful and elegant. At the same time he was much more forthcoming with his own spontaneous activities and so interaction, building on his own behaviours was becoming more and more possible.

This was another example of a ‘freeing up’ in the child following the adult’s directed will. Of course, cause and effect cannot be proved here, but it has been noted before several times that the breakthrough in the child’s ability to interact occurs immediately following a sequence where the adult puts a great deal of effort into ‘willing’ the child into a particular action. It is tentatively being suggested that what might be happening is that the child’s own will to express itself is somehow being ‘reconnected’ with its thinking through the action of the adult.

For the rest of February 2002 sessions comprised many of the eurythmy movements plus the ‘In/Out’ exercise and walking and stamping. The more he managed to achieve these, the more

spontaneous his social interactions. He invented a game with DP involving walking and circling round each other and for the first time there was real and clear laughter. By March he would often sit very close to DP and on several occasions would engage in 'Gobbledygook' conversations. Although there were no real words, there was no lack of animation, expressiveness and amusement.

Colin was now becoming rather sexually aware and unfortunately his affection was beginning to lead to rather inappropriate behaviour. This of course had to be responded to by some level of rejection and as is often the case the good relationship which had been built up was to some degree lost. For this reason progress was a little slow in May 2002.

By June 2002 this seemed to be less of a problem and things began to go forward again. Colin began to vocalise again, in particular he would often say 'Beep'. DP would respond by repeating this back. To make a change from the previous difficulties greens and yellows were tried for the interactions. He would often take DP by the hand and then stand up and soon the walking and circling games became possible again. His 'thread blowing' obsession was built on and developed into a game where Colin and DP would blow at each other and make a blowing gesture with the arms. For this, green was used at first, later it was changed to red/pink.

Sessions in July 2002 were generally lively and creative, with plenty of vocalisations and movement and the tentative beginning of making the speech sounds.

At the beginning of the autumn term in September 2002 Colin had just moved to a different house and this had caused considerable upset. When he came to the colour room he regressed right back to the stage of sitting in the corner with his eyes covered and taking little or no

interest in what was going on. He was often to be seen around the site at this time, walking along with his arm over his eyes, being led blindly along by a member of staff. Throughout September and October it was simply a matter of trying to gently coax him 'out of his shell'. Progress was slow but very consistent so that by the end of October he was beginning to interact successfully again. One of the strategies that proved to be very useful when direct face-to-face contact was too confrontational was to focus the interaction on for example his fingers. Instead of saying 'Will Colin do this…etc.' expressions such as, 'Will Colin's fingers talk to my fingers…?' and then play some sort of game with his fingers but with no direct eye contact. This type of strategy has successfully been used by Caldwell (2000). This often worked very well and with dramatic results; he would often quite suddenly, after such a finger game, look DP straight in the eye, smile and then cuddle close up to her. Somehow the attention to something other than the actual person could 'break the ice' and allow the relationship to begin to 'flow'. This strategy was often employed over the next few months and usually with considerable success.

During November and December 2002 he began to vocalise again. He had several short and simple tunes to which he would add a new one every now and again. Words for these tunes included things like, 'Loddle…Loddle…', 'Durber… Durber…', 'Beep… Beep…' and 'Largel… Largel…' DP would copy his sounds and tunes and then a simple improvisation duet, based on Colin's original sounds would then take place. The colours were usually pink over blue, with the pinks up fading as the notes went up or there was a crescendo. It seemed that Colin really enjoyed these musical interactions as he would not only smile, but would also give excellent eye contact and even hold DP's face or shoulders.

Sessions in January, February and March continued in much the same way. His repertoire of sounds and tunes increased and laughter and fun became a regular feature of the sessions.

During a session in March a foot-tickling game suddenly and unexpectedly developed into a ‘You pull, I pull’ game. Red light was used whenever he was making the effort to pull hard. Here Colin had to use real physical force to pull against DP, something he was not used to doing. Once he got the idea he really seemed to enjoy it. As he became more confident in what he was doing, he suddenly started to vocalise. DP was saying ‘You pull… I pull’ and the sounds he made were very close to an attempt to say ‘Pull’. This was the nearest he got to saying a proper word. Sessions finished at Easter 2003 as planned.

At about this time, the team leader from Colin’s house saw a video of Colin in the colour room and commented that he ‘had never before seen Colin socialising in this way’

The summary table is given overleaf.

Table 14.14 Summary Table of Progress for Colin

Number of interactive sessions	36 (over 15 months, all with DP)
Attribute	**Observations over time with project**
Eye contact	Eye contact was rare at start, as he usually was preoccupied with something else such as bits of fluff, or had his arm over his eyes. After about 12 months there was regular and good eye contact.
Engagement, body posture, touch	Would keep 3 – 4 ft. distance at start, usually turn away or sit with arm over face. Progressed so that in last few months would sit close, face-to-face, with interested and engaged posture. Also liked touch.
Signs of affection	After about 12 months his rather disengaged attitude changed to one of showing regular signs of affection through e.g. smiling, touch and embracing.
Reciprocal responses	Was able to join in with interactive games involving face-to-face transactional vocalisation routines and 'dance' like movements round the room.
Sense of fun, laughing	Progressed from no laughter at start to enjoying 'fun' games and routines with smiles, laughter and happy sounding vocalisations.
Imitation of movements	Reluctant to imitate at start, but by 12 months he was willing and able to copy many movements well.
Initiation of movements or games etc.	At first showed no inclination to initiate or be creative. In last few months was able and willing to take the lead in movement games and face-to-face vocalisation routines.
Sharing of affective states in exercises	In last few months was able to share feelings of anticipation, excitement and fun.
Learning of words through action	Although he did not achieve speech, he came very close to saying the word 'pull' during the 'pulling' game.
Symbolising, pretending or acting	Not achieved
Imitation of words	Not achieved
Use words independently and appropriately	Not achieved
Expression of emotion through gesture/language	Not achieved
Changes in behaviour, social/communicative skills reported elsewhere	No particular changes in behaviour were reported.
Overall progress made	Colin was 'disengaged' and aloof at start. By the end he was able to take part in lively and 'fun' social interaction.

As was mentioned earlier the next three members of the third cohort remained with the project for only a very short time, so they will not be given lengthy reports. Brief mention will be made of each one, describing how they reacted and giving reasons for their premature departure from the project.

Case Report for Richard

Table 14.15 Personal Details and Baseline Abilities for Richard

Name and Age when Joined Project	Time in School)	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Richard 9 years	2 years	Male	S.L.D.	'Severe communication and social difficulties'	Can use 'some single words'	Pre-academic Understands concept of 2	Information not available	Epilepsy

Brief Notes for Richard in the Colour Room

During the first stage Richard showed interest in the lights and tended to sit upright in the reds and relax more in the blues and greens. He took part in only 5 interactive sessions during which he enjoyed making patterns on the shadow screen. However, he then had several fits in school and it was decided by the psychology department that working with moving lights was not worth the risk so he was withdrawn.

Case Report for Geoff

Table 14.16 Personal Details and Baseline Abilities for Geoff

Name and Age when Joined Project	Time in School	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Geoff 15 years	2 years	Male	S.L.D.	ASD	Can repeat sentences, but shows little understanding	Pre-academic	Information not available	Epilepsy

Brief Notes for Geoff in the Colour Room

Geoff was with the project for some months but he was prone to temper tantrums and often could not be transitioned from class to the colour room. Therefore many sessions were missed. He showed slight signs of being uncomfortable in the reds and was inclined to lie down and relax in the blues. He soon learnt that he could bring up the red lights by raising his arms and would often repeat this. This was beginning to develop into an interactive sequence when he had a major fit in school and again after only about 8 interactive sessions, it was decided that he should be withdrawn.

Case Report for Benjamin

Table 14.17 Personal Details and Baseline Abilities for Benjamin

Name and Age when Joined Project	Year of Admission and Discharge (where applicable)	Sex	Cognitive Level	Diagnosis	Linguistic Level	Academic Ability	Sociability	Co-morbidities
Benjamin 14 years	1999	Male	S.L.D.	Down's Syndrome	Problems 'in area of expressive language' Non-verbal	Pre-academic Can match symbols to photographs Can distinguish 'one' and 'lots'	Information not available	

Brief Notes for Benjamin in the Colour Room

Benjamin had Down's syndrome but did not have ASD and was included in the project because it was thought that it might be useful to obtain some observations of a child who did not have ASD in the colour room. After a very few sessions he managed to get his hand through the wire mesh which protects the equipment and grab hold of the electrical wiring. Because Benjamin was tall and strong and was inclined to outbursts of temper, it was thought that this could have been potentially dangerous so it was decided to withdraw him from the project.

An analysis of these reports is given in the next chapter.

CHAPTER 15

DISCUSSION AND SUMMARY OF FINDINGS FOR THE THIRD (INTERACTIVE) STAGE AND OVERALL CONCLUSIONS

The various attributes summarised for each child in the tables in the previous chapter will now be discussed. They were chosen as indicators of quality of interaction (see Chapter 13). An attempt will be made to generalise across the 7 children who were involved in the third stage and to relate the findings where possible to existing knowledge.

It should be remembered that in all interactions a deliberate attempt on the part of the interactive adult was made to engage at the level of both feeling and willing (described in Chapter 3), so these do not appear as discrete categories of achievement, but must be considered as an integral part of the intervention as a whole. In the same way the colours were used continuously to enhance mood and atmosphere as described in the narrative so these also do not appear in the tables. Mention will now be made of some of the examples where progress could be seen following instances of the deliberate engagement of feeling or willing on the part of the interactive adult, and where the use of colour might have played a significant role.

The Role of Feelings and Empathy

As has already been described, the whole issue of feelings and mood was a key factor in this research. During all of the interactions whether they were games, story telling, exercises or conversation (real or imaginary words) there was always the endeavour to create mood in the

way the interactive adult behaved. Affective states attempted included: arousal, expectation, excitement, impatience, anticipation, building up of tension and its subsequent release, calmness, relaxation, relief, joy, fun, resonance, sense of timing, engagement and disengagement, experience of the 'pregnant pause' and pleasure in the child's achievement. It is hard to single out particular occasions where this was felt to be effective since all interactions included the 'projection' of feelings. However, a few unexpected and significant occasions will be mentioned. Although not unusual for children with autism to show emotion, it often has the character of being uncontrolled, and its expression is rarely for the purpose of conveying the inner state of feelings to someone else. What is perhaps unusual about the following examples is the fact that the children were consciously showing or acting emotion in order to share the experience. On the occasion when Simon came into a session having been crying, instead of trying to cheer him up, the mood of sadness was shared with stillness, dark blue/violets, and words of sadness with melancholic intonations. He could then accept and find comfort in a hug. Having experienced the act of sharing feelings he could then on future occasions express how he felt with the appropriate words such as 'sad' or 'crying' and then be comforted. A big step forward came some months later when as a joke he pretended that the adult's singing was crying and then himself gave comfort by hugging and making soothing sounds. In all this he clearly knew that he was acting. Although again it is not possible to say exactly what part of the intervention had what effect, what is clear is that following a deliberate attempt to share and experience feelings together, he was then later able to objectify them and understand them sufficiently to express them purposefully in another context. It might be argued that he was now better able to connect understanding (thinking) with feelings.

Although less sophisticated in her level of understanding, Anna achieved something similar when, towards the end of her time with the project, she came into the room pretending to cry.

Judging by the emotion in her voice, it appeared that she knew that she was trying to express sadness and distress, yet at the same time was enjoying the amusement from the ‘audience’.

Two examples of other ‘affective’ states will be mentioned. In the ‘Choosing Sweets’ game for Simon the tension was built up through the voice and gesture of the adult (projected feelings) and by increasing red light. This build up of tension appeared to help him to be able to act, by working both as a cue and by creating the right atmosphere. When he had succeeded, a feeling of relief and relaxation was then created. This moving, changing ebb and flow of mood was the underpinning of this activity. Exactly the same principle applied to the ‘Who is this?’ game for Jane. The ‘horse riding’ game provided something similar for Anna but in this case the emphasis was on anticipation. She knew that as the ‘horse’ slowed down and said ‘I’m tired’ it was the signal that it would soon fall over. Tension was built up as before, and it could be seen from the way Anna screwed up her face that she was full of anticipation, slight apprehension, and excitement in the moments before the ‘fall’. On one occasion she even used the word ‘off’ at this point, showing clearly that she anticipated and understood what was going to happen. The release of tension after the ‘fall’ was always expressed with lots of laughter. It is interesting to note that despite all this excitement and ‘rough and tumble’ she never once became rough and somehow had instinctively recognized the boundaries of acceptable behaviour.

There were numerous occasions where children expressed affection, in fact there were only very few who did not, and all of these were children who did not remain with the project for more than a few weeks. All of those whose cases have been described here regularly showed affection and all, without exception, liked and sought affectionate physical touch.

The Role of the Adult's 'Willing'

Mention has been made of the effect of the adult deliberately attempting to 'project' their will towards the child to enable them to carry out an action in Chapter 3. This is not the same as 'training' the child to be obedient. It is much more a case of 'enabling' children to do something they want to do but somehow cannot bring themselves to. There were several instances where this appeared to be happening and the result was more like a 'freeing up' to engage and take initiative for the child, rather than learning to perform a task. The most noticeable of these will be mentioned. For Margaret, where there had previously been little or no engagement, the 'will' of the adult projected towards her and expressed through the force of the hands led to a completely new relationship involving physical closeness, attention and affection. The 'breakthrough' for Simon when he achieved the acting out of being too cold and shivering followed a fairly firm and intense encouragement (this does not imply any physical action, only mental effort) on the part of the adult to get him to say the word 'swim'. Similarly Anna had recently been 'persuaded' into making the 'A' gesture just before she spontaneously did her head shaking and 'Brr… Brr…' game which later led on to the making of speech sounds. Also, having been 'persuaded' into doing the 'In/Out' exercise she immediately found great joy in the achievement and was thereafter often able to laugh and have fun in the colour room. Something similar was also noted for Colin who began to laugh and verbalise immediately following being firmly encouraged into doing the 'A' gesture. On the other hand with Alan, it was never possible to 'persuade' him in the way described because he so often showed signs of distress (presumed to be due to digestive troubles) that this meant it was always felt advisable to 'back off' rather than risk 'persuading' him. This may have been the reason why progress after the initial 'rough and tumble' interactive stage was rather disappointing. From an ethical point of view this was probably the right decision since it had been decided at the outset that this project should not cause the children any distress, but from the point of view of Alan's progress it may have been something of a

‘stumbling block’. It is probably well recognised in life that after making a particular effort there is often an accompanying sense of relief and pleasure, and what is being implied here is probably no more than this, other than to suggest that the child with autism needs particular help with making this effort of will in the first place. In any event the examples given above demonstrate this ‘freeing up’ effect following the ‘persuasion’, where the outcome often involved an achievement quite other than that for which the child had to be ‘persuaded’.

Expressing the ‘Will’ Through Movement

Various authors mentioned in Chapters 3 e.g. Alexander (1911) and Caldwell (2000) suggested that in order to become aware of possessing an individual ‘will’ towards an action, it is necessary to perceive the action carried out by the body. This is probably what is meant by the ‘sense of agency’ where one becomes aware of being personally responsible for bringing something about. These authors also imply that in ‘agency’, becoming aware involves a connection of the action (willing) to thinking (knowing) and Russell (1996) goes further and states that thinking and willing must work together in a fully integrated fashion. It was for this reason that in the current research movement played an important role. The deliberate attempt was made to connect a concept (sometimes a word) with a movement while the movement was actually being carried out so that the event was a real experience rather than just information. In a sense this was trying to connect thinking with willing when the will was being expressed as a body movement. There were several examples of this. Anna learnt the words for ‘push’ and ‘pull’ while involved in the strong physical exertion of pushing or pulling against another person. It is likely that the adult’s will and the strong red light will also have had an effect. Looking at the video it was possible to see the endeavour on Anna’s face as she pulled and her first attempt to mouth ‘pull’ appeared to be ‘part and parcel’ of the whole physical effort she was making. The situation was virtually the same with ‘rocking’, ‘jumping’ and ‘hugging’. The occasion when she showed no inclination to vocalise until the

eurythmy movements were included would also appear to support the idea of the need for movement. With Colin there were very few occasions when he would make a real physical effort but on the one occasion when he did, also during the pulling game, he came the nearest he ever did to saying a proper word. Alan achieved making a clear and repeated speech sound only once ('A'), but this occurred at the same time as making the appropriate eurythmy gesture. With Simon also, virtually all the words he learnt to begin with were associated with movement, e.g. 'pull', 'push', 'swim', 'fire', 'sleep' 'in' and 'out', etc. The turning point for Margaret, although not connected with speech, also involved strong physical movement when she initiated the clapping game. With Jane, her rather 'breathy' and weak voice became stronger and clearer as she mastered the corresponding eurythmy movements. Thus, although again inseparable from colour and interactive engagement in general, it can be seen that movement played an integral part on many of the most successful occasions.

Use of Colour to Enhance Mood in Story Telling

Changing colours related to the narrative formed an integral part of the experience of simple stories and poetry. Very often, during the story, a colour change could be seen to form a cue for the next part of the narrative, for example Simon and Jane would start to make the swimming movements or use the word 'swim' when the alternating wave-like blue/greens came on. Similarly Simon would say 'fire' with the flickering red/yellow. The darkening at the end would signal the actions and words for sleeping. With Margaret who was completely non-verbal it was very hard to tell how much of the story she could understand, but she did sit quietly and appeared to be attentive to both the lights and the words. From conversations with staff it was ascertained that story telling was not something that had been successful in school, so it seemed that the variation in the colours made the experience more meaningful for her. Similarly for David the up-fading of the yellows would catch his attention as a cue for the sun shining at which he would use the appropriate words. With the Moon poem David, Simon and

Jane would consistently look up to the yellows and point for the line, '…see the moon,' and emphasise '…me' in the reds with hands on the chest. Although it is not clear exactly what effect the colours were having it would seem reasonable to suggest that for the children they were an integral and attention-catching part of the experience. Another example of where the colour change formed the cue was when Anna recognised the reds as belonging to the 'In/Out' exercise and started the appropriate actions

In terms of the effect on the emotional state of the child, it is harder to ascertain what role the colours were playing. What can be said is that in the case of Simon, the two instances where he clearly expressed and acted an emotion on his own initiative (feeling cold and being burnt) were both at points in the story where the colours played a key role. It might therefore be a possibility that the colours were an aid to feeling the acted experience more deeply.

General Findings Relating to Quality of Interaction

A summary table of the various attributes discussed in the previous chapter as indicators of interaction quality is given in the table overleaf. This has been generalised from the summary tables for all the children involved in the third stage.

Summary of General Findings Regarding Quality of Interaction for the Third Stage

Table 15.1 Summary Table of General Findings for All Seven Children

Attribute	Observations over time with project
Eye contact	All achieved making regular eye contact
Engagement, body posture, touch	All changed to more positive attitude to the interactive partner as demonstrated by posture, position and touch.
Signs of affection	Every child showed signs of affection, some overtly.
Reciprocal responses	All managed contingent reciprocal responding, some with a considerable degree of inventiveness.
Sense of fun, laughing	All showed pleasure in the interactive stage through smiling and laughing.
Imitation of movements	All could imitate movements, some accurately and gracefully.
Initiation of movements or games etc.	All managed this to some degree, some were inventive and original.
Sharing of affective states in exercises	This was achieved by 3 of the children.
Learning of words through action	There were 5 children who could not speak. This proved a successful strategy for teaching new words to 3 of them.
Symbolising, pretending or acting	This was achieved by 4 of the children
Imitation of words	This was achieved by 5 of the children
Use words independently and appropriately	This was achieved by 4 of the children but significantly, 2 of these; Simon and Anna were virtually non-verbal at the beginning of the project.
Expression of emotion through gesture/language	This was achieved by only 3 of the children. For Simon this was a major achievement since his communication skills were very low at the start of the project.
Changes in behaviour, social/communicative skills reported elsewhere	Improved behaviour around the school generally was reported for 4 of the children.
Overall progress made	In all cases progress in ability to interact socially was made. Marked progress was seen in 6 of the children.

Discussion of Findings from the Table

All the children showed progress in the first seven attributes. These relate to the ability to take part in reciprocal interaction at a pre-verbal and informal communication level. For the expression of imagination and for more formal modes of communication, only four of the children were able to achieve this, but for two of them, Simon and Anna this was a major step forward since their abilities in this area were very much lower at the start of the project.

These findings would tend to suggest that in the particular case studied, when interaction takes place with the emphasis on engaging at the level of feeling and willing, and augmented by changing colours, improvements in the quality of interaction can be seen. Further, these improvements appear to correlate with the acquisition of social skills and for some children also with improved communication skills. However, the intervention must be seen as a 'whole package' and it is not possible to separate out the effects of e.g. colour from the interactive styles of the adult. It is also not possible to ascertain cause and effect from a case study of this nature (see Chapter 6).

As regards generalisation, two factors must be considered (Yin 1984). Firstly, consideration must be given as to how far this particular group of children could be considered typical; and secondly, if interaction style and colour are to be claimed as responsible, consideration must be given to any possible competing explanations. For the first factor, this group of seven children probably could be considered as fairly typical of children with severe learning difficulties who also have autism since their behaviours and achievements in other areas of the school do not appear to be significantly different from the norm, given that all children are individuals. For the second, competing explanations might include: input from teachers, care staff or parents, or simply growing up and developing; and none of these can be discounted. Support for the intervention being responsible might come from other studies on Intensive

Interaction e.g. Watson (1994), Caldwell (1996), Smith (1998) and Nind (1999) who all report favourable outcomes following Intensive Interaction sessions, albeit without the emphasis on feeling, willing or colour. Further, information from informal interviews suggested that in the opinion of several teachers and care staff it was the colour project which was to some extent responsible. Therefore it could be argued that the intervention might be a possible cause, but in the absence of an experimental investigation it cannot be claimed indisputably to be so.

Hence for an exploratory case study of this nature, it can only be concluded that the changes seen in the children occurred in conjunction with the colour/interaction intervention, and the question of separating out of the different aspects, and of cause and effect must be left to further investigations.

These findings (for the third stage) are summarised in the format of answers to the research questions in the next section. The findings for the first and second stages have been discussed in Chapters 10 and 11. An overall summary for the whole research project is given overleaf.

SUMMARY OF FINDINGS AND OVERALL CONCLUSIONS

Answers to the Five Research Questions

The following applies to the findings from this case study.

Questions and answers for the **first and second stages** of the research were:

For children with autism,

1. Does changing colour (of the surrounding environment) affect the child in a manner which is detectable through changes in observed behaviour?

For some children with autism colour does affect behaviour. Different colours have different effects on different children. The disposition of the child at the time also affects the child's reaction.

2. Are different trends in behaviour discernable for different colours?

As a generalisation for the children in the study, it was found that colours at the red end of the spectrum have an arousing effect whereas blues and blue/greens were calming.

3. When the lights are sensitively manipulated by the researcher, are there transactional responses between the lights and the child i.e. can a 'dialogue' be produced between child and lights?

Some children would engage in a 'Colour Mood Dialogue' by interacting with changing colours of light and found this a pleasurable experience (8 out of a possible 13 children).

Questions and answers for the **third stage** of the research were:

4. What observations can be made regarding quality of interaction when engagement is explored at the affective and conational level, with affect augmented by changing colours?

It can be stated that as an exploratory study, observations of improved quality of interaction could be made during the course of the intervention. The children's interpersonal abilities demonstrated progress according to the following:

- Increased engagement, including improved eye contact and the showing of affection.
- Increased willingness to take part in shared movement exercises, whether planned or spontaneously improvised.
- Increased ability to take part in games with an understanding of 'rules' such a turn taking and boundaries of behaviour.

5. Are there correlations between improved quality of interaction and the acquisition of social and communication skills?

Correlations could be seen, because together with this improved quality of interaction, progress was also observed in some children in both informal and formal communicative behaviours. These included:

- The learning of new words and concepts.
- The ability to use imagination in 'pretend' games.
- The ability to express emotion through gesture and speech.

- The development of ‘acting’ skills.

Evaluation of the Project

A very brief overall evaluation will now be given. As a case study, the colour project was intended to explore the effects of a colour-augmented form of one-to-one interaction.

As regards data gathering, the video record was found to be a very suitable method of recording observations, particularly since it made it possible to look back retrospectively when new or different items of interest became apparent. The research diary also proved to be a satisfactory method, but perhaps the interviews and conversations with teachers, care staff and psychology assistants would have been improved if it they had been on a more formal basis. It would also have been desirable to include more objective assessments of progress, ideally carried out before and after the intervention. The C.A.R.S. (Childhood Autism Rating Scale: Schopler, Reichler and Renner 1988) test was planned to be used for the second and third cohorts and in fact the second cohort had all been tested as a baseline assessment but unfortunately the psychology department at the school decided against its continued use. This might have formed a useful further method of data collection for the case study and would have complemented the assessments from the video record, research diary and interviews.

The limitations of case study methodology have already been discussed in Chapter 6 and the question of generalizability in this study has also been covered on page 345. As a single case study it could be considered to add to the general pool of empirical knowledge, but if it had been carried out on a larger scale or repeated in different conditions, a greater level of generalisation would have been possible.

As regards the first stage where the effects of changing colours on behaviour were assessed, the quantitative data demonstrated that although the sample of children was small the results were consistent enough to suggest a real effect, or at least to point to trends that would warrant further investigations. However, it should be pointed out that the statistical tests show only that there was a significant difference in behaviours, but they do not specify the magnitude or nature of the difference. For a more thorough investigation on colour these factors would have to be addressed.

Overall, this study can be considered as a reasonably successful example of an exploratory case study on the effects of colour-augmented interaction, the purpose of which would be to lay the foundations for further research.

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Appendix 1.

Appendix 1

Example of Note Taking for the First Cohort

The following are a brief summary of: (1) notes taken immediately after a session, and (2) notes made on viewing the video recordings. The initials J.E. denote the support person. Dates of sessions used for detailed analysis are shown in bold type, the justification for the choice being given in the text.

Summary of Notes Taken Following every Session for Brian in First and Second Stages

Colour room sessions began in June ’99 but the video equipment was not installed until late September ’99. Italic print has been used to denote note taking.

7 June 1999 *(1) 10-12 mins. Tense and excited. Jumping up to touch ceiling. Low intensity blues and greens. Calmer towards end.*

14 June 1999 *(1) 15 mins. Blue, Green and Pink. Some flicking. Slightly tense in green. Smiling. Taking J.E.’s hand and eye contact. (support person)*

21 June 1999 *(1) 15 mins. Blue, green, red, yellow. Flicking, more purposefully during changes. J.E. copied flicking movements, Brian amused and happy.*

28 June 1999 *(1) 13 mins. Excited and flicking. Rhythmical hand tapping on floor in yellow. J.E. copied. Indicated to continue when whites came on. Relaxed.*

8 July1999 *(1) 14 mins. Happy, laughing, interacting with J.E. hand games.*

15 July1999 *(1) In red, rhythmical hand banging on floor, in blue, slow stroking movements. Lay down at end.*

9 Sept 1999 *(1) Tense and distracted. Flicking, hands right over face. Humming sounds. No discernible effect of different colours.*

30 Sept 1999 *(1) Tuneful singing before start. Sat cross legged. More relaxed in blue, but got agitated if in blue for too long. Gritting teeth in yellow.*

(2) Singing before start. Attentive to colours. Perhaps more flicking in reds.

14 Oct 1999 *(1) Looking down in blue, up in red. Agitated when too long in blue, got up. More assertive movements but more relaxed in red.*

(2) Video cut off after few mins.

4 Nov 1999 *(1) Sweeps of colour between blue and red. Excited at start. Hands to head in red, to floor in blue. (Some reds on at start-very low, appears to be mistake.)*

(2) Calmer in blue/green. Becoming calmer during session. Rocking more during changes between red and blue.

11 Nov 1999 *(1) Agitated when came in. Informed that there had been an upset involving another student. Very vocal, flicking and would not sit down. Flicking clearly more in red and calmed in green both times. Used sequence.*

(2) Video lost immediately after first analysis before decision to analyse for attentiveness and rocking made.

18 Nov 1999 *(1) Calmer than previously. Sitting, attentive. J.E. reported relaxed in green. Restless if in blue for too long. Yawning.*

(2) ***Unusually calm.*** *Seemed almost sleepy. Attentive. Little action. Did not appear to be so clearly affected by reds but very calm in green. Not typical session.*

25 Nov 1999 *(1) Agitated. Lay down behind curtains. Seemed 'uncomfortable'.*

(2) Restless. Lay down twice. To booth & out of sight of camera.

2 Dec 1999 *(1) CMD for first time. Much more attentive. Could deliberately calm in green. Session cut short by visit to doctor.*

(2) Increased attentiveness in CMD. Excited and flicking in red, calm in green. Green effective to calm but session cut short.

Appendix 1

9 Dec 1999 *(1) CMD, flicking and active in red could deliberately calm in blue/green rocking.*

(2) Calm mood. Attentive. Flicking and mouth tapping in red, most of session sitting still and calm in blue/green.

16 Dec 1999 *(1) CMD. Expectant and happy, smiling at lights. Flicking in red, calmed in rocking blue/green. Lay down.*

(2) Excited. Vocal and flicking in red. Calmed in blue/ green. Lay down peacefully under curtain.

24 Jan 2000 *(1) CMD. Excited and worked up. Playing with curtains J.E. intervened. Calmed him down successfully with blue/green rocking and lay still for long period. Sat at end.*

(2) Playing with curtains. Deliberately calmed. Lying for much of session.

31 Jan 2000 *(1) Came in 'high'. Flicking. In red v. vocal & intense flicking, lower sound in green. After flicking , waited and then looked up at lights as though waiting for response. As red lights faded, quieter, then appeared to flick to bring lights up again. Very active session and appeared to have 'dialogue'. Tried to calm him down to lying down as in previous sessions but could not.*

(2) Sitting at start, then standing. Active when standing. Good CMD. Tried to calm with green, but although more relaxed, would not lie down, & still some flicking.

7 Feb 2000 *(1) Sitting at start, became active with flicking and sounds in red. Calmer in blue/green. Then stood up and v. active in CMD with red, seemed to be 'conducting' colours. Colours started following pitch and loudness of singing. Also followed beat with fast pulses of red. Seemed to be enjoying interaction. Then with change to blue/green rocking 'caused' him to lie down.*

(2) Fairly calm. Good CMD sitting down. Then standing, CMD and brash vocalisation. Lay down in blue/green rocking, calm humming. Then very relaxed.

14 Feb 2000 *(1) Alone for first time, J.E. into booth. Calm & some rocking. More flicking in red and calmer in blue/green. Attentive throughout and good CMD but was rather 'inhibited' perhaps because alone.*

(2) Calm but perhaps feeling insecure as J.E. not there. CMD but rather inhibited.

First Cohort (continued)

Appendix 1

Summary of Notes Taken Following every Session for George in First and Second Stages

Colour room sessions began in June '99 but the video equipment was not installed until late September '99. The following is a brief summary of notes taken immediately after each session during the first stage (Colour Response Profile) and second stage (Colour Mood Dialogue). All sessions are included in order to give an overall picture. Dates of sessions chosen for detailed analysis are given in bold type, again the justification for the choice being given at the end of the summary in the main text.

10 June 1999 *10 mins. Appeared frightened, holding J.E. Showed colours on screen. Then room blues. Stopped when wet himself. Asking for books (fixation).*

16 June 1999 10 mins. Gave white book for comfort and to see colours on. Was a distraction and took away. Blue / Pink. Happy sounds and wrist banging (pleasure).

24 June 1999 7-8mins. Restless on entry. Got into control booth twice, looking for books. Distracted. Persuaded to sit down for 1-2 mins., then stopped.

1 July 1999 More relaxed. Uncomfortable in blue.

12 July 1999 Lying down for part of session. Perhaps more tense in reds, seemed to like yellows. Session interrupted.

19 July 1999 Reported had been 'high' in classroom. Restless and tense again.

13 Sept 1999 Agitated, would not settle down. Tried to come into booth. Some more peaceful moments in pink.

27 Sept 1999 Calmer mood on entry. Lay down. Blue/ Pink. Looked up in pinks. More interest when colour changed.

4 Oct 1999 *Blue/ Pink. Lay down in blue. Then got up in pink. Lost concentration.*

11 Oct 1999 *Came in before room ready. Did not settle. Perhaps happier in pink. Poor session.*

Appendix 1

1 Nov 1999 *Blue Pink/Red Blue Green repeated. Better concentration, hands to eyes at after-image point.*

8 Nov 1999 *Very restless but more interest in lights, particularly changes.*

15 Nov 1999 *Blue Pink/Red Blue Green repeated. No particular patterns. Session interrupted.*

29 Nov 1999 *Lay down, looked up at changes. No particular patterns.*

13 Dec 1999 *Sat down, normal behaviour. Then, since was to be last session decided to try CMD. Immediately faster movements, watching lights. Happy and wrist banging in reds. (Wrist banging known to indicate pleasure.) More vocalisation than before, laughing, seemed to enjoy interaction. (J.E. reported feeling nauseous with fast changes.)*

Second Cohort

Appendix 1

Summary of Notes Taken Following every Session for Simon in First and Second Stages

The following is a brief summary of notes taken immediately after each session during the first stage (Colour Response Profile) and second stage (Colour Mood Dialogue). All sessions are included in order to give an overall picture. Dates of sessions chosen for detailed analysis are given in bold type, again the justification for the choice being given at the end of the summary in the main text. Italic print has been used to denote note taking.

24 Jan 2000 *Introductory session, room lights on. Walked round room. Sat down. Went to support person for reassurance. Seemed OK.*

31 Jan 2000 *Sat down, legs stretched out. Blues and pinks with room lights on. Watching lights. Slightly tense hand movements in pinks. Singing as went out.*

7 Feb 2000 *Sequence of pinks, blues and greens over white. Attentive and more relaxed. Slightly tense hand movements in pinks, lay down in blues.*

14 Feb 2000. Computerised Sequence. *Sat peacefully, legs stretched out. Attentive, but no obvious differences in behaviour in different colours. Often would put hands over face with first fingers above eyes and thumbs in corners of mouth.*

9 March 2000 Computerised Sequence. *Sat calmly next to support person. In reds eyes open wide alternating with screwing up face. More relaxed in blues. In greens crossed arms over chest.*

16 March 2000 Computerised Sequence. *Sat calmly copying position of support person. Looking up and watching in reds, eyes alternating wide open and screwed up. Looking down in blue.*

23 March 2000 Computerised Sequence. *More animated and independent than before. Open expression in pinks. Relaxed in blues. May be uncomfortable in greens.*

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30 March 2000 Computerised Sequence. *More lively and vocal. Hands to face more in reds, more attention to feet in blues.*

12 June 2000 Video not working. *Brief run manually through main colours after long break. Excited when came in but relaxed as session progressed.*

19, 22, 29 June 2000 cancelled as out on trip.

6 July 2000 Computerised Sequence. Video not working. *Relaxed in blue, more interested in pink. Excited at after-image point with arm waving.*

13 July 2000 Computerised Sequence. Video not working. *More relaxed in blues and blue-pink. Maybe finds reds oppressive. Excited sounds at after-image point.*

21 Sept 2000 Started CMD. *Sat calmly, hands sometimes over face as before. Tried to respond with pinks to looking up but don't think he got the idea.*

28 Sept 2000 CMD. *Tried flicking pinks/reds in response to singing or hand movements. Still don't think made connection. Keen to come to colour room and reluctant to leave.*

5, 12 Oct 2000 Sessions cancelled.

19 Oct 2000 CMD *Covering face less, but still no interaction with lights. Rocking blue/green calms him.*

9 Nov 2000 CMD. *Sat quietly and attentively but no obvious interactive response to lights.*

16 Nov 2000 CMD. *Slightly more animated and 'bird-like' sounds with yellows.*

30 Nov 2000 CMD. *More responsive. 'Twittering' sounds in yellows but little interaction. DP went in with him and tried shadow screen. Interested and made many animated hand movements.*

14 Dec 2000 CMD. *Tried yellows for interaction with vocalisation, some interaction but not much. DP went in, started slow arms up exercise with increasing pinks. Copied well and appeared to like it. Then shadow screen, lively rocking from side to side. At end invited DP to sit beside him and took hand and squeezed it with laughing and smiling. Decided then to go on to next stage.*

Second Cohort (continued)

Appendix 1

Summary of Notes Taken Following every Session for Anna in First and Second Stages

The following is a brief summary of notes taken immediately after each session. All sessions are included in order to give an overall picture. Dates of sessions chosen for detailed analysis are given in bold type, again the justification for the choice being given at the end of the summary.

20 Jan 2000 *Introductory session, room lights on. Sat down. Went to support person probably for reassurance.*

27 Jan 2000 *Blue and pink with room lights still on. Sat with support person and watched lights, some hand flicking. Then went to support person and tried to initiate interaction.*

3 Feb 2000 *Blue and pink sequence twice. Sat alone at start but then went and sat next to support person. More relaxed in blue, more vocal and animated in pink.*

10 Feb 2000 *Main colour sequence but manually. Sat next to support person. Relaxed in blue but then jumping, tense hand movements in pink.*

17 Feb 2000 *Computer sequence. Climbing all over support person wanting to initiate play. No obvious differences in behaviour.*

(3 sessions missed)

5 April 2000 *Computer sequence. Lay down in blue. More agitated in red/pink and more vocal. Assertive and cross sounds in red.*
(Sessions missed.)

22 June 2000 *Manual sequence. Active and singing but no obvious effects.*

29 June 2000 *Computer sequence. Maybe more 'oppressed' in red. Generally cross sounds. Perhaps getting bored.*

6 July 2000 *Start Colour Mood Dialogue (CMD). Followed usual grunting chatter with reds. Calmed in blue/green rocking.*

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13 July 2000 *Colour Mood Dialogue (CMD). Active and noisy. Followed her sounds and hand flicking with reds. Attentive, possible interaction. In blue/green rocking calmed and lay down.*

21 Sept 2000 *CMD. No sound on video. Followed hand flicking with reds, possible interaction.*

28 Sept 2000 *CMD. No sound on video. Interacting with sounds and flicking, jumping with reds.*

5 Oct 2000 *CMD. No video. Lively mood. Interacting with voice and hand flicking. Head movements from side to side, trying to see colours? Anna has tunnel vision. Also scraping fingers over head and around ears. Very attentive. Got up and walked with more purposeful gait. At end said 'Go to school' and in classroom asked for crisps. This is unusual.*

12 Oct 2000 *CMD. No sound on video. Agitated. Little interaction but mood affected by colours. Aroused in red, calmed in blue/green.*

9 Nov 2000 CMD *Sat down, very active 'chatting' responded with reds. In green, more relaxed and head and eye movements 'to find colour'?*

16 Nov 2000 CMD *Animated and jumping around. Agitated 'chatting' but not really interacting. In blue/green rocking calmed and went quiet after a while. Trying to 'find' colour with head movements. When changed back to reds, some 'chatting' again. Needed toilet.*

14 Dec 2000 CMD *Lots of rocking from side to side. Assertive vocalisation in reds. When in 'full flight' of aggressive chatting switched to blue/green rocking. Immediate effect. Sounds stopped and more relaxed, chin tapping started. Clear change in behaviour due to colour change. At end of session started to interact with support person.*

11 Jan 2001 *Immediately wanted to interact with support person. Decision made to start interacting.*

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Sessions from 18 Jan 2001 to 28 June 2001 (10 sessions) *Interacting with support person. Using white chiffon veil to play with. Lots of running, pushing and pulling, jumping. Intention was to cultivate gentler play and encourage words like 'jump' 'crash' 'pull' push' etc. Anna enjoyed games, became less rough and attempted some of these words.*

After this time the support person left the project and DP started to interact with Anna. This will be described in the write up of the third stage.

Appendix 1

Second Cohort (continued)

Example of Note-taking During the Third (interactive) Stage

In order to show how the data for the third stage were recorded an example from one child is included in this appendix. A summary of the notes for every session is included for the sake of an overall view.

Notes taken immediately following sessions for Anna

Sessions from 18 January 2001 to 28 June 2001 *Interacting with support person. Running, jumping, pushing and pulling. Use of white chiffon veil to play with and to augment colour effect. Anna often aggressive and would hit and head butt. Very little direct eye contact. Games always child-led. Intention was to cultivate gentler play and to encourage words like crash, run and jump. Anna enjoyed the games and became less rough. She also attempted some of these words.*

28 June 2001 *Tried to get Anna to sit alone but would not. DP went in and started to interact. Anna initiated rocking, holding hands with DP. Virtually no eye contact. Difficult to engage.*

5 July 2001 *Rocking together. DP asks Anna to put her arms up. Pushing led by Anna. Some aggression and hitting when wanted something different. Minimal eye contact.*

12 July 2001 *Had been ill and was in quiet mood. Some rocking. Pulling/pushing. Enjoyed 'galloping' together round room.*

19 July 2001 *Less boisterous than usual. More eye contact. Reluctant to push/pull or 'gallop'.*

13 September 2001 *Rather aggressive mood. Rocking, jumping and may have attempted words but unclear. Difficult to get good eye contact.*

27 September 2001 *Dull mood. Tried 'arms up' exercise but reluctant. Thought she had abdominal pains and may have said 'Ouch'. Problems getting her to leave room.*

4 October 2001 *Attempted 'arms up' exercise. Tried shadow screen but not interested. Difficult to engage.*

11 October 2001 *Wearing spectacles. Played more willingly: rocking, running, pulling. Still difficult to engage and little eye contact.*

18 October 2001 *In aggressive mood. Difficult to play nicely. Pushing, rocking etc but still difficult to engage, some good eye contact at end of session. May have attempted to copy words 'rock', 'sit', 'feet' 'careful'*

Appendix 1

25 October 2001 *In better mood though reports from house of biting. Did up/down, round and round, rocking. Looking at red lights for 'up'.*

8 November 2001 *Rocking, pulling, round and round. Some aggression and hitting. Did 'arms up' exercise well and said word 'Up' several times clearly.*

15November 2001 *Unwell and not on form. Unresponsive in interaction. No words. Problems getting her to leave room.*

22 November 2001 *Usual rocking, round and round etc. Pushed for 'A' movement. Sat in corner and really watched lights properly for first time. Then suddenly smiled, did face shaking from side to side and making funny 'Brrr…Brr…' noises. DP copying. Anna really happy and laughing for first time. Also hand banging on floor, DP copied and laughter. Video finished half way through session.*

29 November 2001 *Rocking, round and round etc. Stretching up exercise and said 'Up'. Easy mood.*

6 December 2001 *Session cancelled. Anna in hospital.*

13 December 2001 *In good mood, smiling. Round and round (doesn't seem to get giddy), jumping and said word 'Jump'. Lively session, not aggressive.*

17 January 2002 *In playful mood. 'Run', 'Round' and 'Jump' etc. Stamping in Red light. Would not do 'Up/Down' or 'Push' although understood what was required. Would only play on her own terms. The shadow screen was again tried but Anna showed not interest.*

24 January 2002 *In good mood. Happy to run, jump, round and round. No aggression and gentle. Making sounds but no real words.*

31 January 2002 *Good mood. Usual rocking and round and round etc. Tried exercise 'In/Out' . Anna very amused, only part understood what was required but willing to try and lots of laughs. Also did her 'Brrr…Brrr…' face -to -face head shaking. Sat between legs clapping.*

7 February 2002 *Session cancelled. Ana not in school.*

21 February 2002 *Anna had heavy cold. Immediately put fingers to back of throat. Almost sick. Phlegm came up. Continued to do this. Never really got going.*

28 February 2002 *In good mood. Playful, rocking, round and round, jumping. Did 'In/Out' again. Understood and did well. Laughs and smiles, and said 'Out' clearly as went back. Lifting arms up for 'A' gesture.*

7 March 2002 *Session cancelled. Anna ill.*

14 March 2002 *Started as normal with rocking etc. then sat down face-to-face and got her attention well. Made small eurythmy hand gestures for speech sounds and Anna attentive and*

attempting to copy. Particularly head shaking for 'S'. Made correct sounds. Repeated for 'P', 'F' and 'T'. Lots of laughing. Successful session.

18 March 2002 *Heavy cold and unsure if she needed toilet. Otherwise good mood. Usual rocking etc. to start but much more eye contact. When sat down she initiated the 'S' gesture and sound. Lots of laughs. Also did 'I', K' and 'F'. Did 'In/Out' exercise well. Played well generally and felt was 'getting through' to her more.*

21 March 2002 *Good mood but tired. Some sounds 'S' 'B' and 'H'.*
Then 'Horse riding' game for first time. First time hand-held video camera was used.

18 April 2002 *Started rocking etc ,attentive to lights, but immediately sat down and wanted to do sounds. 'S' particularly but also 'A' 'K' 'F' 'L'. Some 'In/Out' and 'Row the Boat' game.*

25 April 2002 *Rocking, then wanted sounds. 'S' favourite, also 'F' and 'H'. Lots of fun and laughs, good eye contact and cuddle. Started to get a bit rough. Enjoyed copying her chin tapping. 'Horse riding' game*

29 April 2002 *came unexpectedly. Good mood. Sounds 'S' 'I' 'A' 'F' 'D'. No video.*

2 May 2002 *Wearing spectacles. Good mood and quite engaged, good eye contact but more chin tapping.*

9 May 2002 *Session cancelled*

16 May 2002 *Laura reluctant to transition. Immediately wanted to do sounds. Lots of laughs and cuddles, full of fun.*

23 May 2002 *Good mood. Wanted to sit down and do 'S' sound. Developed a 'You follow me, I follow you' game. 'Up/Down' and 'In/Out'*

13 June 2002 *Lively session. Round and round, faster/slower. Sitting in lap and rocking. Started 'You pull, I pull' game.*

20 June 2002 *Responsive mood. Round, faster/slower Rocking between legs. Cuddly. Mostly gentle but one or two rough moments. New 'Ch…Ch…Ch…' sound and lots of laughs. Piggy game and Ducks.*

27 June 2002 *Session cancelled. Anna away.*

4 July2002 *In quiet, calm mood. Round and round, faster/stop. Pulling, would take turns. Pushing and said 'Push'. Other sounds. Sat between legs and squeezed. Said 'again' when wanted more.*

16 September 2002 *Rather quiet and subdued. Rocking, 'Up/Down'. Then lay on cushion.*

19 September 2002 *Rocking. Amused when blew with her chin tapping. Round and Round. 'In/Out' and said word 'Out'.*

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23 September 2002 *Rocking and round and round. Sitting did 'S and 'B'. Then developed into 'Ba…Ba…Ba…' game with head shaking. Then barking dog and roaring lion. Hugs, and laughter.*

30 September 2002 *Session cancelled. Anna away.*

3 October 2002 *Good lively mood. Rocking and used word 'Rock'. Sounds 'B' 'S' 'P 'etc. 'Row the boat'. Ended with own song/game based on 'P' Per…Per…Per…Ter…Ter…Ter…' Said 'Finish' at end.*

7 October 2002 *Rather subdued but affectionate Rocking on lap and said 'Rock'. Then 'Pa… Pa… Pa…' song and game. Sounds 'B' 'S' 'D' and Cat and Duck sounds. Did not engage properly with sounds until gestures used as well.*

14 October 2002 *Rather subdued but affectionate. Rocking and said 'Rock' several times. Lots of smiles, laughs and eye contact. Hugs and cuddles and not aggressive. Said 'This game'.*

21 October 2002 *Hand held video camera Good, responsive and talkative mood. Rocking and word 'Rock'. Sounds 'B' 'P' but not 'S' .Animal sounds Dog, Cat and Lion. 'Horse riding' game. Said 'Finish' at end.*

4 November 2002 *Hand held video camera Good responsive mood. Round and round and said 'Sit'. Pushing/pulling. Started 'faster/ slower'. Tried to say 'Hug' but failed.*

11 November 2002 *Friendly but unresponsive mood. Rocking, round and round etc. Said 'Hello' spontaneously to people in booth.*

18 November 2002 *Rocking and word 'Rock'. Pulling well but no word*

25November 2002 *Good mood. Several words. Repeated word 'Careful'. Pulling and used word 'Pull'.*

2 December 2002 *Lots of words used spontaneously. Nose, eyes or ears, mouth, kiss, house. Asked for 'Toilet' appropriately . At end said word 'Hurting' may be for tummy ache.*

10 December 2002 *Session cancelled. Anna 'flu.*

13 January 2003 *Awful cold. Very responsive and lots of smiles. Rocking and 'A' gesture with arms up. . 'Horse riding' game. To teach words go and stop: making 'horse' move. Successfully said 'Go*

20 January 2003 *Good mood. 'Row the Boat'. Also said 'Round' appropriately and 'Hug'. Tried 'Horse riding' game but wouldn't say Go.*

27 January 2003 *In good mood. Usual exercises In 'round and round' said 'Round'. In 'horse riding' almost said 'go' but not properly.*

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3 February 2003 *Before entering room could be heard to say 'Toilet' as a request. Then when washing her hands said 'Hot' for the hot water. Also very amused at acting crying and imitating crying sounds. Good friendly mood. Lots of wordless 'chat' , expressive and well engaged. 'This is Anna, this is Di' game. Said 'bye-bye' at end.*

10 February 2003 *Rather sexually aware and difficulty of where she was allowed to touch. Usual games. Started a new clapping game.*

24 February 2003 *Some lively galloping round and jumping. Used a few proper words appropriately. Good wordless conversation. Offered 'nose' pointing to DP.*

3 March 2003 *Visitors from Belgium. Good 'conversation'. Lots of expression. Then tried to show other games, Anna got over-excited. Should not have tried to perform for audience*

Appendix 2

Appendix 2. *Tables and Statistical Tests for the First Cohort*

Video Analysis Recording Sheet ***Sheet number 1***

Type of Session Normal *Date of session* 30th September 1999

Name of child *Brian* *Date of analysis* 17 June 2000

Light desk operator DP *Support person* JE

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flicking time(s)*	*Flicking % of sect.*	*Attent Time (s)*	*Attent. % of sect.*	*Rocking time(s)*	*Rocking % of sect.*	*Comments*
1	**B↑ W↓**	0	**0**	43	0	**0**	20	**47**	0	**0**	
2	**B**	43	**43**	81	08	**10**	12	**15**	0	**0**	Rubs chin, looks up
3	**BP↑**	2-04	**124**	46	06	**13**	13	**28**	0	**0**	
4	**BP**	2-50	**170**	24	03	**13**	01	**4**	05	**21**	
5	**BPR↑**	3-14	**194**	16	13	**81**	06	**38**	0	**0**	
6	**BPR**	3-30	**210**	26	06	**23**	10	**38**	0	**0**	
7	**B↓PR**	3-56	**236**	27	0	**0**	14	**52**	0	**0**	
8	**PR**	4-23	**263**	40	04	**10**	10	**25**	10	**25**	
9	**B↑PR↓**	5-03	**303**	39	05	**13**	06	**15**	0	**0**	
10	**BP↓**	5-42	**342**	35	01	**3**	08	**23**	0	**0**	
11	**B**	6-17	**377**	98	0	**0**	01	**1**	64	**65**	Singing at 6-40
12	**BG↑**	7-55	**475**	35	03	**9**	05	**14**	0	**0**	
13	**BG**	8-30	**510**	5	01	**20**	0	**0**	0	**0**	
14	**B↓1/2 G**	8-35	**515**	15	0	**0**	0	**0**	0	**0**	
15	**B↓G**	8-50	**530**	47	01	**2**	03	**6**	0	**0**	

Video Analysis Recording Sheet ***Sheet number 2*** *Appendix 2*

Name of child Brian *Date of Session* 30th September 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	***Time at start (s)***	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-ing % of sect.*	*Comments*
16	**G**	9-37	**577**	64	0	**0**	09	**14**	0	**0**	
17	**B↑G↓**	10-41	**614**	31	0	**0**	12	**39**	0	**0**	
18	**B**	11-12	**672**	46	0	**0**	02	**4**	02	**4**	
19	**BY↑**	11-58	**718**	20	0	**0**	04	**20**	0	**0**	
20	**B↓Y**	12-18	**738**	25	0	**0**	08	**32**	0	**0**	
21	**Y**	12-43	**763**	42	0	**0**	02	**5**	01	**2**	
22	**B↑Y↓**	13-25	**805**	29	0	**0**	12	**41**	02	**7**	
23	**B**	13-54	**834**	64	0	**0**	04	**6**	15	**23**	Rubs chin, looks up.
24	**B↓W↑**	14-58	**898**	20	0	**0**	02	**10**	0	**0**	
25	**W**	15-18	**918**	78	0	**0**	03	**4**	0	**0**	
26	**End**	16-36	**996**								J.E. gets up to finish.

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows.

↑=Up-fade, ↓= Down-fade

Note: When these figures are put into Excel for the graphs, values for the behaviours are given for every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

This therefore takes into account the apparent anomaly in the first line where the first section appears to end on the same figure as the start of the next one.

In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

Video Analysis Recording Sheet ***Sheet number 1*** *Appendix 2*

Type of Session Normal *Date of session* 4th November 1999
Name of child Brian *Date of analysis* 17th June & 5th July 00
Light desk operator D.P. *Support person* J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time s*	*Rock-ing % of sect.*	*Comments*
1	**B↑ W↓** *(Low Reds -mistake)*	0	**0**	29	0	**0**	19	**66**	0	**0**	
2	**B** *(Low Reds -mistake)*	29	**29**	27	0	**0**	07	**26**	0	**0**	*m*
3	**BP↑**	56	**56**	28	0	**0**	01	**4**	0	**0**	
4	**BP**	1-24	**84**	28	0	**0**	02	**7**	0	**0**	
5	**B↓PR↑**	1-38	**98**	22	0	**0**	0	**0**	0	**0**	*m*
6	**PR**	2-00	**120**	24	05	**21**	06	**25**	06	**25**	*m*
7	**B↑P↓R↓**	2-24	**144**	36	12	**33**	07	**19**	03	**8**	*Hands over head.*
8	**B**	3-35	**180**	84	02	**2**	0	**0**	0	**0**	*Vocalis-ation 'Ah Wah'*
9	**BG↑**	4-24	**264**	31	13	**42**	08	**26**	0	**0**	*Tapping nose.*
10	**BG**	4-55	**295**	20	0	**0**	03	**15**	07	**35**	
11	**BG↓**	5-15	**315**	20	05	**25**	04	**20**	0	**0**	
12	**B**	5-35	**335**	35	02	**6**	07	**20**	0	**0**	
13	**BP↑**	6-10	**370**	55	05	**9**	01	**2**	04	**7**	
14	**BP**	7-15	**425**	13	0	**0**	0	**0**	03	**23**	
15	**BPR↑**	7-18	**438**	22	04	**18**	02	**9**	11	**50**	*Rocking. Singing in time.*

Video Analysis Recording Sheet ***Sheet number 2*** *Appendix 2*

Name of child Brian *Date of Session* 4th Nov 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flicking time(s)*	*Flicking % of sect.*	*Attent.time (s)*	*Attent. % of sect.*	*Rocking tim(s)*	*Rocking % of sect.*	*Comments*
16	**B↓PR**	7-40	**460**	31	10	**32**	0	**0**	18	**58**	
17	**PR**	8-11	**491**	72	11	**15**	03	**4**	03	**4**	
18	**B↑P↓R↓**	9-23	**563**	51	08	**16**	04	**8**	08	**16**	*Rocking towards end of section*
19	**B**	10-14	**614**	28	05	**18**	03	**11**	0	**0**	
20	**BG↑**	10-42	**642**	46	09	**20**	12	**26**	0	**0**	
21	**BG**	11-28	**688**	39	0	**0**	0	**0**	0	**0**	*Very calm and still.*
22	**BG↓**	12-07	**727**	32	0	**0**	0	**0**	0	**0**	
23	**B**	12-39	**759**	26	0	**0**	0	**0**	03	**12**	
24	**BP↑**	13-05	**785**	40	0	**0**	0	**0**	09	**23**	*Rocking at start of section.*
25	**BP**	13-45	**825**	10	05	**50**	0	**0**	0	**0**	
26	**B↓PR↑**	13-55	**835**	40	07	**18**	01	**3**	0	**0**	
27	**PR**	14-35	**875**	43	13	**30**	03	**7**	0	**0**	
28	**B↑P↓R↓**	15-18	**918**	66	23	**35**	03	**5**	23	**35**	
29	**B**	16-24	**984**	31	07	**23**	0	**0**	0	**0**	
30	**B↓W↑**	16-55	**1015**	31	01	**3**	08	**26**	0	**0**	

Video Analysis Recording Sheet ***Sheet number 3*** *Appendix 2*

Name of child Brian *Date of Session* 4th Nov 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time(s)*	*Rock-ing % of sect.*	*Comments*
31	**W**	17-26	**1046**	53	0	**0**	01	**2**	23	**43**	
32	**End**	18-19	**1099**								

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows.

↑=Up-fade, ↓= Down-fade *(m. = masturbation)*

Note: When these figures are put into Excel for the graphs, values for the behaviours are given every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

This therefore takes into account the apparent anomaly in the first line where the first section appears to end on the same figure as the start of the next one.

In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

Video Analysis Recording Sheet ***Sheet number 1*** *Appendix 2*

Type of Session Normal *Date of session* 11 November 1999
Name of child Brian *Date of analysis* 15 November 1999
Light desk operator D.P. *Support person* J.E.
(Attentiveness & Rocking not recorded, video lost Nov '99)

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent % of sec*	*Rock-ing time (s)*	*Rock-ing % of sect.*	*Comments*
1	**W**	0	**0**	46	14	**30**					
2	**B↑ W↓**	46	**46**	24	18	**75**					
3	**B**	1-10	**70**	51	11	**22**					
4	**BP↑**	2-01	**121**	44	12	**27**					
5	**BP**	2-45	**165**	11	5	**45**					
6	**B↓PR↑**	2-56	**176**	26	13	**50**					
7	**PR**	3-22	**202**	52	29	**56**					
8	**B↑P↓R↓**	4-14	**254**	16	6	**38**					
9	**B**	4-30	**270**	61	25	**40**					
10	**BG↑**	5-31	**331**	19	6	**32**					
11	**BG**	5-50	**350**	18	6	**33**					
12	**B↓G**	6-08	**386**	12	2	**17**					
13	**G**	6-20	**380**	36	3	**8**					
14	**B↑G↓**	6-56	**416**	12	0	**0**					
15	**B**	7-08	**428**	47	18	**38**					

Appendix 2

Video Analysis Recording Sheet ***Sheet number 2***

Name of child Brian *Date of Session* 11th November 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-ing % of sect.*	*Comments*
16	**BP↑**	7-74	**475**	18	6	**33**					
17	**BP**	8-13	**493**	24	7	**29**					
18	**B↓PR↑**	8-37	**517**	18	8	**44**					
19	**PR**	8-55	**535**	49	20	**41**					
20	**B↑P↓R↓**	9-44	**584**	15	2	**13**					
21	**B**	9-59	**599**	33	6	**18**					
22	**BG↑**	10-32	**632**	15	2	**13**					
23	**BG**	10-47	**647**	28	3	**11**					
24	**B↓G**	11-15	**675**	7	1	**14**					
25	**G**	11-22	**682**	34	1	**3**					
26	**B↑G↓**	11-56	**716**	12	3	**25**					
27	**B**	12-08	**728**	65	15	**23**					
28	**B↓W↑**	13-13	**793**	34	2	**6**					
29	**W**	13-47	**827**	21	2	**10**					
30	**End**	14-08	**848**								

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows
↑=Up-fade, ↓= Down-fade

Appendix 2

Video Analysis Recording Sheet ***Sheet number 1***

Type of Session Colour Mood Dialogue (First Time) *Date of session* 16th December 1999

Name of child Brian *Date of analysis* 8 July 2000

Light desk operator D.P. *Support person* J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time (s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time(s)*	*Rock-ing % of sect.*	*Comments*
1	**B↑W↓**	0	**0**	37	02	**5**	20	**54**	01	**3**	*Laughs*
2	**B**	37	**37**	13	00	**0**	10	**77**	00	**0**	
3	**BP↑** *(Low)*	50	**50**	20	04	**20**	11	**55**	05	**25**	
4	**BPR** *Responding*	1-10	**70**	52	17	**33**	38	**73**	00	**0**	
5	**BPR**	2-20	**122**	44	02	**5**	18	**41**	00	**0**	
6	**BG** *Responding*	2-46	**166**	29	02	**7**	06	**21**	00	**0**	*Moving fingers, not really flicking*
7	**BPR** *Pink/Red low, Resp.*	3-15	**195**	14	04	**29**	02	**14**	00	**0**	
8	**BPR** ***Redder*** *Responding*	3-29	**209**	51	14	**27**	28	**55**	01	**2**	*Says 'Coffee'*
9	**BPR** ***Bluer*** *Responding*	4-20	**260**	10	00	**0**	04	**40**	00	**0**	
10	**BG≈** *Rocking*	4-30	**270**	114	01	**1**	68	**60**	00	**0**	*Rubs face, walks.*
11	**BG≈** ***Bluer*** *Rocking*	6-24	**384**	26	01	**4**	7	**27**	00	**0**	*Walks, then standing.*
12	**BG≈** ***Greener*** *Rocking*	6-50	**410**	23	00	**0**	14	**61**	07	**30**	*Walking. Yawns*
13	**BG≈** ***Bluer -end*** *Rocking*	7-13	**433**	67	00	**0**	13	**19**	08	**12**	*Sits, then lies down at 7-14*
14	**BG≈** *Rocking*	8-20	**500**	51	00	**0**	00	**0**	00	**0**	*Fiddles with curtain, then lies still*

15	**B**	9-11	**551**	7	00	**0**	00	**0**	00	**0**	*Lying still.*

Appendix 2

Video Analysis Recording Sheet ***Sheet number 2***

Name of child Brian *Date of Session* 16th December 99

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time (s)*	*Flick-ing % of sect.*	*Atten. time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-ing % of sect.*	*Comments*
16	**B↓W↑**	9-18	**558**	35	0	**0**	0	**0**	0	**0**	*Lying very still*
17	**W**	9-53	**593**	28	0	**0**	0	**0**	0	**0**	*Lying very still*
18	**End**	10-21	**621**								

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows.

↑=Up-fade, ↓= Down-fade = *Lights moving up and down. Rocking = Blues and Greens moving up and down sequentially B G*

Note: When these figures are put into Excel for the graphs, values for the behaviours are given for every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

This therefore takes into account the apparent anomaly in the first line where the first section appears to end on the same figure as the start of the next one.

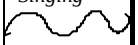
In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

Appendix 2

Video Analysis Recording Sheet *Sheet number* ***1***

Type of Session Colour Mood Dialogue
Name of child Brian
Light desk operator D.P.

Date of session 7th February 2000
Date of analysis 8th July & 15th July 00
Support person J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time s*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-ing % of sect.*	*Comments*
1	**W**	0	**0**	27	09	**33**	15	**56**	0	**0**	*Sitting Singing* 
2	**B↑W↓**	27	**27**	28	13	**46**	15	**54**	0	**0**	
3	**B**	55	**55**	11	00	**00**	00	**0**	0	**0**	
4	**BP** *Low*	1-06	**66**	30	04	**13**	09	**30**	0	**0**	
5	**B**	1-36	**96**	05	00	**00**	00	**0**	0	**0**	
6	**BP** *Low*	1-41	**101**	69	00	**00**	20	**29**	0	**0**	
7	**B**	2-50	**170**	06	00	**00**	01	**17**	0	**0**	
8	**BG**	2-56	**176**	49	00	**00**	12	**24**	0	**0**	
9	**BP** *Medium*	3-45	**225**	57	04	**07**	10	**18**	0	**0**	
10	**BPR** ***Reds low***	4-42	**282**	18	12	**67**	07	**39**	0	**0**	
11	**BPR** ***Redder***	5-00	**300**	130	82	**63**	90	**69**	1	**1**	*Laughing and shouting 6-06 to 6-12*
12	**BPR** ***Bluer***	7-10	**430**	10	03	**30**	04	**40**	0	**0**	
13	**BPR** ***Strong Reds***	7-20	**440**	70	17	**24**	67	**96**	0	**0**	
14	**BPR** ***Redder***	8-30	**510**	50	36	**72**	24	**48**	0	**0**	*Gets up*

15	**BP R** ***Bluer, low Pinks/Reds***	9-20	**560**	43	26	**60**	31	**72**	0	**0**	*DR out of sight of camera **

Appendix 2

Video Analysis Recording Sheet ***Sheet number 2***

Name of child Brian *Date of Session* 7th Feb 00

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time (s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-ing % of sect.*	*Comments*
16	**BP R** ***Strong Reds***	10-03	**603**	49	36	**73**	37	**76**	00	**00**	*Jumping 10-32*
17	**B**	10-52	**652**	08	05	**63**	08	**100**	00	**00**	*Sits down*
18	**B G** *Rocking.*	11-00	**660**	100	42	**42**	58	**58**	00	**00**	
19	**B G** *Rocking.* ***Bluer***	12-40	**760**	34	08	**24**	15	**44**	00	**00**	
20	**BP** *Pinks low*	13-14	**794**	14	04	**29**	11	**79**	00	**00**	
21	**BP G** *Rocking*	13-28	**808**	13	01	**8**	00	**0**	02	**15**	
22	**B G** *Rocking*	13-41	**821**	11	00	**0**	00	**0**	00	**00**	*Lies down*
23	**B G** *Rocking*	13-52	**832**	48	00	**0**	00	**0**	00	**00**	*Lying down*
24	**B**	14-40	**880**	34	00	**0**	00	**0**	00	**00**	*Lying down*
25	**BW↑**	15-14	**914**	12	00	**0**	00	**0**	00	**00**	*Lying down*
26	**B↓W**	15-26	**926**	12	00	**0**	00	**0**	00	**00**	*Lying down*
27	**W End**	15-38	**938**								

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows.

↑=Up-fade, ↓= Down-fade = *Lights moving up and down. Rocking = Blues and Greens moving up and down sequentially B G*

Appendix 2

Note: When these figures are put into Excel for the graphs, values for the behaviours are given for every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

This therefore takes into account the apparent anomaly in the first line where the first section appears to end on the same figure as the start of the next one.

In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

* Brian goes out of view of camera but can see his shadow to record flicking and rocking.

Appendix 2

Video Analysis Recording Sheet ***Sheet number 1***

Type of Session Normal *Date of session* 4th Oct 1999

Name of child George *Date of analysis* 3rd May 2000

Light desk operator D.P. *Support person* J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-Ing % of sect.*	*Comments*
1	**W**	0	**0**	27			03	**11**			*Sitting*
2	**B↑W↓**	27	**27**	49			04	**8**			*Sitting Stroking floor*
3	**B**	1-16	**76**	56			14	**25**			*Gets up, goes to J.E. Holds hand*
4	**BP↑**	2-12	**132**	8			00	**0**			
5	**BP↓**	2-20	**140**	20			00	**0**			*Walks away.J.E. indicates to come back*
6	**BP↑**	2-40	**160**	30			13	**43**			*Kneeling*
7	**BP**	3-10	**190**	30			11	**37**			*Kneeling*
8	**BP↓**	3-40	**220**	26			01	**4**			*Sits down*
9	**B**	4-06	**246**	33			00	**0**			*Lies down*
10	**BP↑**	4-41	**281**	19			02	**10**			*Lying Vocal droning. Sits up*
11	**BP**	5-00	**300**	88			22	**25**			*Sitting, happy sound clapping*
12	**BP↓**	6-28	**388**	20			06	**30**			*Happy Laughing & happy*
13	**B**	6-48	**408**	104			23	**22**			*rocking sideways. Flicking seconds*
14	**BP↑**	8-32	**512**	28			06	**21**			*Kneels up. More active*
15	**BP**	9-00	**540**	80			19	**24**			*Hands in praying position Walks, Lies down*

Appendix 2

Video Analysis Recording Sheet ***Sheet number 2***

Name of child George *Date of Session* 4th Oct 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time (s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-Ing % of sect.*	*Comments*
16	**BP↓**	10-20	**620**	45			0	**0**			*Lying down*
17	**B**	11-05	**665**	58			0	**0**			*Lying. Sits up. Lies again*
18	**BW↑**	12-03	**723**	29			0	**0**			*Lying down. Playing with mat.*
19	**W**	12-32	**752**	48			0	**0**			*Lying. Playing with curtains. Sits up expecting to finish.*
20	**End**	13-20	**800**								*Goes to J.E. Takes hand to leave.*

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows.

↑=Up-fade, ↓= Down-fade

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Appendix 2

Video Analysis Recording Sheet *Sheet number 1*

Type of Session Normal
Name of child George
Light desk operator D.P.

Date of session 29th November 1999
Date of analysis 3rd May 2000
Support person J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time (s)*	*Rock-ing % of sect.*	*Comments*
1	**W**	0	**0**	24			00	**0**			*Sitting with J.E. Holding hands*
2	**B↑W↓**	24	**24**	30			01	**3**			
3	**B**	54	**54**	63			00	**0**			*Walking about, JE indicates to sit down*
4	**BP↑**	1-57	**117**	25			05	**20**			*Holding JE's hand, fiddling with carpet*
5	**BP**	2-22	**142**	31			00	**0**			*On all 4's, then lies down. JE moves away*
6	**B↓PR↑**	2-53	**173**	19			00	**0**			*Lying on front, legs moving*
7	**PR**	3-12	**192**	49			00	**0**			*Legs banging together, vocalising*
8	**B↑P↓R↓**	4-01	**241**	15			00	**0**			*Lying on front, head on arms*
9	**B**	4-16	**256**	39			00	**0**			*Lying. Restless then still*
10	**BG↑**	4-55	**295**	22			00	**0**			
11	**BG**	5-17	**317**	13			00	**0**			
12	**B↓G**	5-30	**330**	08			00	**0**			
13	**G**	5-38	**338**	43			00	**0**			*Lying still. Looks forward, grunts*
14	**B↑G↓**	6-21	**381**	08			00	**0**			*Lying*
15	**B**	6-29	**389**	41			00	**0**			*Lying, Looks forward. Relaxed*

Appendix 2

Video Analysis Recording Sheet ***Sheet number 2***

Name of child George *Date of Session* 29th November 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flicking time (s)*	*Flicking % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rocking time(s)*	*Rocking % of sect.*	*Comments*
16	**BP↑**	7-10	**430**	19			00	**0**			*Lying still. Relaxed.*
17	**BP**	7-29	**449**	27			00	**0**			*Lying still. Relaxed.*
18	**B↓PR↑**	7-56	**476**	13			00	**0**			*Lying still. Relaxed.*
19	**PR**	8-09	**489**	42			00	**0**			*Lying. Legs move*
20	**B↑P↓R↓**	8-51	**531**	13			01	**7**			*Moves, notices sudden change*
21	**B**	9-04	**544**	34			01	**2**			*Lying. Then gets up. Walks.*
22	**BG↑**	9-38	**578**	37			00	**0**			*Playing with curtain. JE indicates to sit down*
23	**BG**	10-15	**615**	36			00	**0**			*Sitting with JE*
24	**B↓G**	10-51	**651**	09			02	**22**			*Sitting with JE*
25	**G**	11-00	**660**	22			04	**18**			*Waving arms*
26	**B↑G↓**	11-22	**682**	13			02	**15**			*Notices change and exclaims*
27	**B**	11-35	**695**	22			01	**4**			*Sitting with JE*
28	**BP↑**	11-57	**717**	24			06	**25**			*Sitting with JE*
29	**BP**	12-21	**741**	14			09	**64**			*Sitting alone, rocking*
30	**B↓PR↑**	12-35	**755**	08			02	**25**			

Appendix 2

Video Analysis Recording Sheet ***Sheet number 3***

Name of child George *Date of Session* 29th November 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time (s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time(s)*	*Rock-ing % of sect.*	*Comments*
31	**PR**	12-43	**763**	56			04	**7**			
32	**B↑P↓R↓**	13-39	**810**	10			02	**20**			*Gets up.*
33	**B**	13-49	**829**	20			00	**0**			*Looking into booth*
34	**BW↑**	14-09	**849**	31			01	**3**			*JE indicates to sit down. Walks*
35	**W**	14-40	**880**	10			02	**20**			
36	**End**	14-50	**890**	35			01	**2**			
37		15-25	**925**								

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows.

↑=Up-fade, ↓= Down-fade

Note: When these figures are put into Excel for the graphs, values for the behaviours are given for every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

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In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

Appendix 2

Video Analysis Recording Sheet *Sheet number 1*

Type of Session CMD (after section 8) (First Time) *Date of session* 13th Dec 1999
Name of child George *Date of analysis* 3rd May 1999
Light desk operator D.P. *Support person* J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-Ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rocking time (s)*		*Comments*
1	**W**	0	**0**	12			00	**0**			*Lies down, face down*
2	**B↑W↓**	12	**12**	26			00	**0**			*Lying face down*
3	**B**	38	**38**	22			00	**0**			*Lying face down*
4	**BP↑**	1-00	**60**	32			00	**0**			*Looks down, head jerking up and down*
5	**BP**	1-32	**92**	14			00	**0**			*Lying face down, legs moving*
6	**B↓PR↑**	1-46	**106**	27			00	**0**			*Vocalising*
7	**PR**	2-13	**133**	20			02	**10**			*Sits up at change to Pink/Red 'Says 'Ya Ya'*
8	**BP R** *Respond-ing*	2-33	**153**	98			68	**69**			*Opens hand. Excited sounds. Bangs wrists * Happy, rocking*
9	**BP R** *Respond-*	4-11	**251**	33			18	**55**			*'Ba Ba' Crescendo as gets redder, rocking*
10	**BP R** *Respond-ing* ***Bluer***	4-44	**284**	34			17	**50**			*Hands down in blue.'Eeh,Ya Ya' Sitting hands on knees*
11	**BG↑**	5-18	**318**	26			14	**54**			*Quieter*
12	**BG↓P**	5-44	**344**	23			18	**78**			*Quieter. Claps. High whining sound.*
13	**BP R** *Respond-ing* ***Redder***	6-07	**367**	83			72	**87**			*'Dee Dee' high singing, smiling laughing, banging wrists, heavy outbreath*
14	**BP R** *Respond-ing* ***Bluer***	7-30	**450**	30			27	**90**			*Wrist banging. Laughing. Quieter Points to lights*
15	**BP R** *Respond-ing* ***Redder***	8-00	**480**	80			73	**91**			*'La La' Sings as reds come up. Wrist banging, Claps hands to knees*

Appendix 2

Video Analysis Recording Sheet *Sheet number 2*

Name of child George *Date of Session* 13th December 1999

Colours					*Observations*						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time (s)*	*Flick-ing % of sect.*	*Attent Time (s)*	*Attent. % of sect.*	*Rocking time (s)*	.	*Comments*
16	**BP R** *Responding* ***Bluer***	9-20	**560**	18			12	**67**			*Quieter, hands down. 'Ooer' opens hand over mouth*
17	**BP R↓**	9-38	**578**	08			04	**50**			
18	**BG**	9-46	**586**	96			33	**34**			
19	**BR↑G↓** *Respond-ing*	22-22	**682**	55			29	**53**			*Points up to face. Laughing, singing. Excited sounds. Points up. Wrist banging*
20	**BP R↓** *Respond-ing*	12-17	**737**	19			14	**74**			*Singing lower. Points into palm of hand.*
21	**BG↑** *Greens low*	12-36	**756**	16			10	**63**			*Slower movements, whining, humming sound.*
22	**BG**	12-52	**772**	17			12	**71**			*Whining, humming, open mouth.*
23	**BG**	13-09	**789**	36			32	**89**			*Rocking, slaps knees Laughs.*
24	**BG**	13-45	**825**	29			19	**66**			*'Dee Dee' Quieter singing.*
25	**BG↓**	14-14	**854**	17			12	**71**			
26	**BP↑R↑** ***Pinks responding***	14-31	**871**	88			69	**78**			*Claps and vocal to bring up red. As reds crescendo he opens out hand.*
27	**BP R** *Bluer to start then pinker*	15-59	**959**	138			116	**84**			*Wrist banging. Clapping rhythmically. Follows red lights with 'La La'*
28	**B**	18-17	**1097**	52			28	**54**			*Points to lights*
29	**B↓W↑**	19-09	**1149**	26			16	**62**			
30	**W**	19-35	**1175**	25			10	**40**			

Appendix 2

Video Analysis Recording Sheet ***Sheet number 3***

Name of child George *Date of Session* 13th December 1999

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time(s)*	*Rock-ig % of sect.*	*Comments*
31	**End**	20-00	**1200**								

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens, Y= Yellows.

↑=Up-fade, ↓= Down-fade = *Lights moving up and down. Rocking = Blues and Greens moving up and down sequentially B G*

Note: When these figures are put into Excel for the graphs, values for the behaviours are given for every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

This therefore takes into account the apparent anomaly in the first line where the first section appears to end on the same figure as the start of the next one.

In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

* For this non-verbal child, banging his wrists together is known to denote happiness.

Note: The Pinks and Reds were flashed up and down in response to the child's happy and excited vocalisation and gestures. He then in turn responded with looking up and pointing at the lights, laughing, clapping, shaking his hands and waving his arms, wrist banging with high and happy sounds. In the blues/ Greens he was calmer and more relaxed.

This was to be his last session, and the Colour Mood dialogue was tried as an experiment after section 8 just to see what would happen. Until this session his response had been rather indifferent, but immediately the 'dialogue' was started his engagement and pleasure were outstanding.

Video Analysis Recording Sheet ***Sheet number 1*** *Appendix 2*

Type of Session Normal (Intra-observer Reliability) *Date of* session 4th Nov 99 2nd
Name of child Brian *Date of analysis* 8 July 00
Light desk operator D.P. *Support person* J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time(s)*	*Rock-ing % of sect.*	*Comments*
1	**W↓B↑** *(Low Reds -mistake)*	0	**0**	28	0	**0**			0	**0**	
2	**B** *(Low Reds -mistake)*	28	**28**	28	0	**0**			0	**0**	
3	**BP↑**	56	**56**	27	0	**0**			0	**0**	
4	**BP**	1-23	**83**	17	0	**0**			0	**0**	
5	**B↓PR↑**	1-40	**100**	20	0	**0**			0	**0**	
6	**PR**	2-00	**120**	24	4	**17**			5	**21**	
7	**B↑P↓R↓**	2-24	**144**	71	11	**15**			1	**1**	
8	**B**	3-35	**215**	47	3	**6**			0	**0**	
9	**BG↑**	4-22	**262**	32	15	**47**			0	**0**	
10	**BG**	4-54	**294**	26	4	**15**			5	**19**	
11	**BG↓**	5-20	**320**	15	5	**33**			0	**0**	
12	**B**	5-35	**335**	28	2	**7**			0	**0**	
13	**BP↑**	6-03	**363**	60	7	**12**			10	**17**	
14	**BP**	7-03	**423**	10	0	**0**			6	**60**	
15	**B↓PR↑**	7-13	**433**	57	12	**21**			33	**58**	

Video Analysis Recording Sheet ***Sheet number 2*** *Appendix 2*

Name of child Brian *Date of Session* 4 Nov 99 (Intra-observer Reliability)

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time(s)*	*Rock-ing % of sect.*	*Comments*
16	**RP**	8-10	**490**	73	10	**14**			3	**4**	
17	**B↓PR↑**	9-23	**563**								
18	**End**										

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens,

Y= Yellows.

↑=Up-fade, ↓= Down-fade

Note: When these figures are put into Excel for the graphs, values for the behaviours are given every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

This therefore takes into account the apparent anomaly in the first line where the first section appears to end on the same figure as the start of the next one.

In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

Video Analysis Recording Sheet ***Sheet number 1*** *Appendix 2*

Type of Session Normal (Inter –Observer Reliability) *Date of* session 4th Nov 99 3rd
Analysis done by J. E.

Name of child Brian *Date of analysis* 28th May 01

Light desk operator D.P. *Support person* J.E.

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flicking time(s)*	*Flicking % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rocking time(s)*	*Rocking % of sect.*	*Comments*
1	**W↓B↑** *(Low Reds -mistake)*	0	**0**	29	0	**0**			0	**0**	
2	**B** *(Low Reds -mistake)*	29	**29**	26	0	**0**			0	**0**	
3	**BP↑**	55	**55**	34	0	**0**			0	**0**	
4	**BP**	1-29	**89**	13	0	**0**			0	**0**	
5	**B↓PR↑**	1-42	**102**	19	0	**0**			0	**0**	
6	**PR**	2-01	**121**	21	3	**14**			7	**33**	
7	**B↑P↓R↓**	2-22	**142**	74	11	**15**			1	**1**	
8	**B**	3-36	**216**	46	8	**17**			3	**6**	
9	**BG↑**	4-22	**262**	35	19,2	**6**			0	**0**	*Figures after comma are*
10	**BG**	4-57	**297**	15	4,0	**0**			2	**13**	*Without nose-tapping*
11	**BG↓**	5-12	**312**	22	17,8	**36**			10	**45**	
12	**B**	5-34	**334**	30	18	**6**			0	**0**	
13	**BP↑**	6-04	**364**	52	15	**29**			5	**10**	
14	**BP**	6-56	**416**	21	2	**10**			7	**33**	
15	**BPR↑**	7-17	**437**	22	6	**27**			10	**45**	

Video Analysis Recording Sheet ***Sheet number 2*** *Appendix 2*

Name of child Brian *Date of Session* 4 Nov 99 Inter-Observer Reliability Check

Colours					***Observations***						
Colour section number	*Colour section descript.*	*Time at start (m-s)*	*Time at start (s)*	*Time of section (s)*	*Flick-ing time(s)*	*Flick-ing % of sect.*	*Attent time (s)*	*Attent. % of sect.*	*Rock-ing time(s)*	*Rock-ing % of sect.*	*Comments*
16		7-39	**459**	34	13	**38**			23	**68**	
17	**PR**	8-13	**493**	69	20	**29**			3	**4**	
18	**End**	9-22	**562**								

W= White Room Lights, B =Blues, P= Rose Pinks, R= Reds, G= Greens,

Y= Yellows.

↑=Up-fade, ↓= Down-fade

Note: When these figures are put into Excel for the graphs, values for the behaviours are given every 2 seconds. This is because Excel cannot normally plot histograms. The figure given for the start of each section is that shown in this table for even numbers and the next one above for odd numbers. The last number for each section will then be 2 seconds below the start of the next section.

This therefore takes into account the apparent anomaly in the first line where the first section appears to end on the same figure as the start of the next one.

In order to keep values on the y axis the same for all the graphs, values of 100% are added once to the end of each behaviour column in the Excel worksheets. This is to allow an easy comparison of behaviour levels between all the graphs.

Appendix 2

Example of Video Analysis Spreadsheet for Part of Session for Brian 4th November 1999 to Show How the Data were Formatted for the Charts.

Note: *The following 2 pages represent less than ¼ of the session, up to section 8.*

Video Analysis for Brian 4 November 1999, Analysis 17 June, Spreadsheet 13 Oct 2000

Section	Time s	Flicking%	Attent %	Rocking%
1	0	0	66	0
1	2	0	66	0
1	4	0	66	0
1	6	0	66	0
1	8	0	66	0
1	10	0	66	0
1	12	0	66	0
1	14	0	66	0
1	16	0	66	0
1	18	0	66	0
1	20	0	66	0
1	22	0	66	0
1	24	0	66	0
1	26	0	66	0
1	28	0	66	0
2	30	0	26	0
2	32	0	26	0
2	34	0	26	0
2	36	0	26	0
2	38	0	26	0
2	40	0	26	0
2	42	0	26	0
2	44	0	26	0
2	46	0	26	0
2	48	0	26	0
2	50	0	26	0
2	52	0	26	0
2	54	0	26	0
3	56	0	4	0
3	58	0	4	0
3	60	0	4	0
3	62	0	4	0
3	64	0	4	0
3	66	0	4	0
3	68	0	4	0
3	70	0	4	0
3	72	0	4	0
3	74	0	4	0
3	76	0	4	0
3	78	0	4	0
3	80	0	4	0
3	82	0	4	0
4	84	0	7	0
4	86	0	7	0

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4	88	0	7	0
4	90	0	7	0
4	92	0	7	0
4	94	0	7	0
4	96	0	7	0
5	98	0	0	0
5	100	0	0	0
5	102	0	0	0
5	104	0	0	0
5	106	0	0	0
5	108	0	0	0
5	110	0	0	0
5	112	0	0	0
5	114	0	0	0
5	116	0	0	0
5	118	0	0	0
6	120	21	25	25
6	122	21	25	25
6	124	21	25	25
6	126	21	25	25
6	128	21	25	25
6	130	21	25	25
6	132	21	25	25
6	134	21	25	25
6	136	21	25	25
6	138	21	25	25
6	140	21	25	25
6	142	21	25	25
7	144	33	19	8
7	146	33	19	8
7	148	33	19	8
7	150	33	19	8
7	152	33	19	8
7	154	33	19	8
7	156	33	19	8
7	158	33	19	8
7	160	33	19	8
7	162	33	19	8
7	164	33	19	8
7	166	33	19	8
7	168	33	19	8
7	170	33	19	8
7	172	33	19	8
7	174	33	19	8
7	176	33	19	8
7	178	33	19	8
8	180	2	0	0
8	182	2	0	0
8	184	2	0	0
8	186	2	0	0
8	188	2	0	0
8	190	2	0	0
8	192	2	0	0
8	194	2	0	0
8	196	2	0	0
8	198	2	0	0

Table of Values for % Flicking in Red, Blue and Green for Brian

Appendix 2

% Flicking (% of each colour section during which he was flicking)			
Date	**Red**	**Blue**	**Green**
30 September 1999	10	10	0
		0	
		0	
		0	
4 November 1999	21	0	
	15	2	
	30	6	
		18	
		0	
		23	
11 November 1999	56	22	8
	41	40	3
		38	
		18	
		23	

Totals	173	200	11
Number	6	15	3
Mean	**28.83%**	**13.33%**	**3.67%**

Red = Red light only, Reds and Pinks on only.
Blue = Blues on only.
Green = Greens on only.

Appendix 2

ANALYSIS OF VARIANCE: TO DETERMINE WHETHER THE DIFFERENCE IN THE MEAN %FLICKING RATES IN RED, BLUE AND GREEN FOR BRIAN IS STATICALLY SIGNIFICANT

The Analysis of Variance* (ANOVA) test is to find out whether the apparent differences between the values of flicking in the 3 colours can be accepted as significantly different or whether such differences could have occurred due to chance. The larger the difference between the means of the groups, and the smaller the variation in scores within groups, the more likely the result is to be valid.

The Null Hypothesis would in this case be that the colour of the light makes no different to the flicking rate for Brian i.e. flicking rate is the same in red, blue and green light.

This test will give an answer as to whether the Null Hypothesis can be rejected or not.

***Variance** is essentially a measure of how much the different scores or values in the groups vary from their arithmetic mean. It is calculated from the Sum of Squares of the deviations from the mean divided by the total number of scores or values. The Standard Deviation is the square root of the Variance.

Analysis of Variance for % Flicking in Red, Blue and Green for Brian

Appendix 2

	Red	Blue	Green					
				Analysis of Variance (cf mean scores) & F test (cf standard deviation).				
1	10	10	0	**Uncorrelated and repeated measure tests**				
2	21	0	8	**One Way Analysis of Variance**			**equiv. to t test.**	
3	15	0	3	Source	**deg.fr.**	Sum Sq	Var.Est	**F ratio**
4	30	0		Between Groups	**2**	1551.2	775.6	**3.846**
5	56	0		Within Groups	**21**	4234.8	201.7	
6	41	2		**One Way Analysis Variance with repeated measures**				**Data from same individuals**
7		6		Source	**deg.fr.**	Sum Sq	Var.Est	**F ratio**
8		18		Rows				
9		0		Columns				
10		23		Interaction				
11		22		Total				
12		40		**F test compares the variance (standard deviation squared) of groups**				
13		38				**Red**	**Blue**	**Green**
14		18		Check Zero's** = OK				
15		23		Number =		6	15	3
16				Mean of Grp =		28.83	13.33	3.67
17				Variance * N =		1494.83	2707.33	32.67
18				Variance Est. =		298.97	193.38	16.33
19				St.Deviation =		15.784	13.435	3.300
20				Pop.Est. S.Dev=		17.291	13.906	4.041
21				CombinedVariance=		175	349	262
22				**F Test: F=**		**1.709**	**1.806**	**16.016**
23				Column df		5	8	20
24				Row df		17	14	2
25				If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other groups combined.				

Calculated value for **F = 3.846**

Value of **F** in statistical tables for 2 and 21 degrees of freedom **= 3.47** at 5%

Since **3.846 > 3.47 the Null Hypothesis can be rejected.**

Therefore the observed differences in %flicking rate in Red, Blue and Green can be considered significant (PTO for Variance ratio or F test).

To Check Whether the Analysis of Variance is Applicable

Appendix 2

The Variance Ratio or F test

The ANOVA rests on the assumption that the Standard Deviations of the background populations of the 3 samples are equal i.e. the SPREAD of the values in the 3 groups can be considered to be sufficiently similar to be able to assume that they were drawn from the same populations or those with the same Standard Deviation.

The Variance Ratio or F test compares the variance of each group with the other 2 combined to find out if it is significantly different. If it is NOT, i.e. if the variance ratio or calculated value of F is less than the critical value in the F table, then the difference between the (best) estimates of the population variances and therefore Standard Deviations based on the 3 samples is not so great as to be incompatible with the assumption that the Standard Deviations of the 3 populations are equal. If the calculated value for F is greater than the critical value then the assumption of a common population Standard Deviation cannot be made and the ANOVA cannot be used.

	Red	Blue	Green
Values above are:	1.709	1.806	16.016
Values in statistical table:	2.81	2.7	19.44
df	5 and 17	8 and 14	20 and 2

In each case the calculated value of F is LESS than the value given in the tables and therefore it can be assumed that there is no significant difference between the Standard Deviations of the background populations of the 3 groups so the use of the ANOVA test above is valid.

Appendix 2

Further ANOVA Tests to Determine which Colours Have a Significantly Different Effect on Flicking from the Others

The ANOVA test above confirms that at least **one** of the colours has a significantly different effect on flicking than the others. Further ANOVA tests can be carried out to find out which colours are significantly different from which others. If one colour column is deleted, and the test repeated, then the difference between the remaining two can be tested for significance.

ANOVA Test Between Red and Green

Appendix 2

	Red	Green	
			Analysis of Variance (cf mean scores) & F test (cf standard deviation).
1	10	0	**Uncorrelated and repeated measure tests**
2	21	8	**One Way Analysis of Variance** **equiv. to t test.**
3	15	3	Source **deg.fr.** Sum Sq Var.Est **F ratio**
4	30		Between Groups **1** 1266.7 1266.7 **5.805**
5	56		Within Groups **7** 1527.5 218.2 **t=** **2.41**
6	41		**One Way Analysis Variance with repeated measures**
7			Source **deg.fr.** Sum Sq Var.Est **F ratio**
8			Rows
9			Columns
10			Interaction
11			Total 3734.7
12			**F test compares the variance (standard deviation squared) of groups**
13			**Red** **Green**
14			Check Zero's** = OK
15			Number = 6 3
16			Mean of Grp = 28.83 3.67
17			Variance * N = 1494.83 32.67
18			Variance Est. = 298.97 16.33
19			St.Deviation = 15.784 3.300
20			Pop.Est. S.Dev= 17.291 4.041
21			CombinedVariance= 16 299
22			**F Test: F=** **18.304** **18.304**
23			Column df 5 5
24			Row df 2 2
25			If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other groups combined.

Calculated value for **F = 5.805**

Value of **F** in tables for 1 and 7 degrees of freedom **= 4.74** at 5%

Since **5.805 > 4.74 the Null Hypothesis can be rejected.**

Therefore the observed differences in %flicking rate in Red and Green can be considered significant.

Similarly, the values of F for the Variance Ratio F test are less than those in the tables indicating that the use of the ANOVA test is valid.

ANOVA Test Between Red and Blue

Appendix 2

	Red	Blue	Analysis of Variance (cf mean scores) & F test (cf standard deviation).
1	10	10	**Uncorrelated and repeated measure tests**
2	21	0	**One Way Analysis of Variance** **equiv. to t test.**
3	15	0	Source **deg.fr.** Sum Sq Var.Est **F ratio**
4	30	0	Between Groups **1** 1029.6 1029.6 **4.656**
5	56	0	Within Groups **19** 4202.2 221.2 **t=** **2.16**
6	41	2	**One Way Analysis Variance with repeated measures** **Data from same individuals**
7		6	Source **deg.fr.** Sum Sq Var.Est **F ratio**
8		18	Rows
9		0	Columns
10		23	Interaction
11		22	Total 262.9
12		40	**F test compares the variance (standard deviation squared) of groups**
13		38	**Red** **Blue**
14		18	Check Zero's** = OK
15		23	Number = 6 15
16			Mean of Grp = 28.83 13.33
17			Variance * N = 1494.83 2707.33
18			Variance Est. = 298.97 193.38
19			St.Deviation = 15.784 13.435
20			Pop.Est. S.Dev= 17.291 13.906
21			CombinedVariance= 193 299
22			**F Test: F=** **1.546** **1.546**
23			Column df 5 5
24			Row df 14 14
25			If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other groups combined.

Calculated value for **F = 4.656**

Value of **F** in tables for 1 and 19 degrees of freedom **= 4.38** at 5%

Since **4.656 > 4.38 the Null Hypothesis can be rejected.**

Therefore the observed differences in %flicking rate in Red and Blue can be considered significant.

Similarly, the values of F for the Variance Ratio F test are less than those in the tables indicating that the ANOVA test is valid.

Appendix 2

ANOVA Test Between Blue and Green

	Blue	Green						
1	10	0	**Uncorrelated and repeated measure tests**					
2	0	8	**One Way Analysis of Variance**				**equiv. to t test.**	
3	0	3	Source	**deg.fr.**	Sum Sq	Var.Est	**F ratio**	
4	0		Between Groups	**1**	233.6	233.6	**1.364**	
5	0		Within Groups	**16**	2740.0	171.3	**t=**	**1.17**
6	2		**One Way Analysis Variance with repeated measures**				**Data from same individuals**	
7	6		Source	**deg.fr.**	Sum Sq	Var.Est		**F ratio**
8	18		Rows					
9	0		Columns					
10	23		Interaction					
11	22		Total		#DIV/0!			
12	40		**F test compares the variance (standard deviation squared) of groups**					
13	38					**Blue**	**Green**	
14	18		Check Zero's** = OK					
15	23		Number =			15	3	
16			Mean of Grp =			13.33	3.67	
17			Variance * N =			2707.33	32.67	
18			Variance Est. =			193.38	16.33	
19			St.Deviation =			13.435	3.300	
20			Pop.Est. S.Dev=			13.906	4.041	
21			CombinedVariance=			16	193	
22			**F Test: F=**			**11.840**	**11.840**	
23			Column df			14	14	
24			Row df			2	2	
25			If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other groups combined.					

Calculated value for **F = 1.364**

Value of **F** in tables for 1 and 16 degrees of freedom **= 4.49** at 5%

Since **1.364 < 4.49 the Null Hypothesis must be accepted.**

Therefore the observed differences in % flicking rate in Blue and Green must be considered insignificant.

Similarly, the values of F for the Variance Ratio F test are less than those in the tables indicating that the ANOVA test is valid.

Spreadsheet for Attentiveness Levels for Brian in CMD and non-CMD

Appendix 2

Attentiveness for Brian in CMD and non CMD over 4 Sessions

Mean for non- CMD = 14.5
Mean for CMD = 46.84848

Date		**Non CMD**		**CMD**
	Sect no.	**Attent %**		Attent %
30-Sep	1	47	16-Dec-99	54
	2	15		77
	3	28		55
	4	4		73
	5	38		41
	6	38		21
	7	52		14
	8	25		55
	9	15		40
	10	23		60
	11	1		27
	12	14		61
	13	0		19
	14	0		
	15	6		
	16	14		
	17	39		
	18	4		
	19	20		
	20	32		
	21	5		
	22	41		
	23	6		
	24	10		
	25	4		
04-Nov-99	1	66	07-Feb-00	56
	2	26		54
	3	4		0
	4	7		30
	5	0		0
	6	25		29
	7	19		17
	8	0		24
	9	26		18
	10	15		39
	11	20		69
	12	20		40
	13	2		96
	14	0		48
	15	9		72
	16	0		76
	17	4		100
	18	8		58
	19	11		44
	20	26		79
	21	0		
	22	**0**	**Total**	**1546**
	23	**0**	**Mean=**	**46.85**
	24	**0**		

25	**0**
26	**3**
27	**7**
28	**5**
29	**0**
30	**26**
31	**2**
Total	**812**
Mean	**14.5**

Appendix 2

Analysis of Variance for Significance of Difference in Attentiveness Levels in CMD and Non-CMD for Brian

The Analysis of Variance below is to verify that the observed difference between the means for attentiveness levels in CMD and non-CMD is statistically significant:

Analysis of Variance for Mean Attentiveness Values in CMD & non-CMD for Brian

nonCMD	*CMD*						
47	54	**Analysis of Variance (cf mean scores) & F test (cf standard deviation).**					
15	77	**Uncorrelated and repeated measure tests**					
28	55	**One Way Analysis of Variance**				**equiv. to t test.**	
4	73	Source	**deg.fr.**	Sum Sq	Var.Est	**F ratio**	
38	41	Between Groups	**1**	19686.0	19686.0	**47.767**	
38	41	Within Groups	**81**	33382.0	412.1	**t=**	**6.91**
38	21	**One Way Analysis Variance with repeated measures**					
52	14	Source					
25	55	Rows					
15	40	Columns					
23	60	Interaction					
1	27	Total					
14	61	**F test compares the variance (standard deviation squared) of groups**					
0	19				**nonCMD**	**CMD**	
0	56	Check Zero's** OK			**Zeros**	**Zeros**	
6	54		Number	=	50	33	
14	0		Mean of Grp	=	15.38	46.85	
39	30		Variance * N	=	12371.78	21010.24	
4	0		Variance Est.	=	252.49	656.57	
20	29		St.Deviation	=	15.730	25.232	
32	17	Pop.Est. S.Dev=			15.890	25.624	
5	24	CombinedVariance=			657	252	
41	18	**F Test: F=**			**2.600**	**2.600**	
6	39	Column df			32	32	
10	69	Row df			49	49	
4	40						
66	96						

Appendix 2

Analysis of Variance for Mean Attentiveness Values in CMD & non-CMD for Brian

26	48	|
4	72	|
7	76	|
0	100	|
25	58	|
19	44	|
0	79	|
26		|
15		|
20		|
20		|
2		|
0		|
9	Non-CMD	|
0	0	|
4	0	|
8	0	|
11	0	|
26	0	|

Calculated value for **F = 47.767**

Value of **F** in tables for 1 and 81 degrees of freedom **= 3.96** at 5% and **6.96** at 1%

Since **47.767 > 6.96 the Null Hypothesis can be rejected.**

Therefore the observed differences in attentiveness in CMD and non-CMD are indicated as **significant**, but it is then necessary to carry out the Variance Ratio test to verify that this test is applicable.

The calculated values of F for the Variance Ratio F test are **2.600**

Value of F from tables, column df = 32, row df = 42 is **2.11**

This would indicate that there is a significant difference in the spread, i.e. in the Standard Deviations of the two samples. Although this does not mean that the difference between the means of the two samples is insignificant it does indicate that the ANOVA test is **not suitable** for comparison of these two samples. Therefore the Wilcoxon-Mann-Whitney test will be carried out.

Wilcoxon-Mann-Whitney U Test for Mean Attentiveness Values in CMD & non-CMD for Brian

This test does not rest for its validity on the assumptions of equal Standard Deviations made

in the ANOVA test, instead it compares ranks for the sets of data.

(Note: The software used for this test does not recognise zero values and discards them so values of 0.0001 are put in to replace them. This will make a negligible difference to the end result.)

Gps		
1	47	**Mann-Whitney** (Wilcoxon Mann-Whitney) **U test**
1	15	**The Mann-Whitney test is equivalent to the t test**
1	28	**Insert Groups and scores in columns A and B.**
1	4	
1	38	
1	38	
1	52	
1	25	
1	15	
1	23	
1	1	
1	14	
1	0	
1	0	
1	6	
1	14	
1	39	
1	4	
1	20	
1	32	
1	5	
1	41	
1	6	
1	10	
1	4	
1	66	
1	26	
1	4	
1	7	
1	0	

CHANGE ZERO MARKS TO 0.0001

Group 1 = NonCMD

Group 2= CMD

		Group 1	Group 2	
	N_1 & N_2 =	**50**	**33**	{**W_1** uses Rank & Freq. for Group **1**
	W_1 & W_2 =	**1528.5**	**1957.5**	**W_2** uses Rank & Freq. for Group **2**}
	C_u or Wx =	**1957.5**		
Check1=	*W_1+W_2=*	*3486*	Combined Maximum	
Check2=	*(N(N+1))/2*	*3486*	Formula Comb.Max.	

Full tables to assess significance of Mann-Whitney test can be found in:

Siegel, S. (1956) Nonparametric Statistics. McGraw-Hill:London

Siegel, S. & Castellan, N.J. (1988) Nonparametric Statistics.

To use tables:		
m =	**33**	*Number of individuals in smallest group*
n =	**50**	*Number of individuals in largest group*
C_u (U) =	**1957.5**	*Sum of Ranks in smallest group*
Ignore column 1 (CL).		*Cu is to the right of the probability column in each table.*

Siegel argues that if, the number in either group is greater than 10, the distribution found approaches that found in the Normal Distribution, hence:

"*When m>10 or n>10, we may determine the significance of an observed value Wx*" as follows:

Siegel & Castellan, 1988, (p132)

		Total Rank for Small Group (C_u or Wx) =	**1957.5**
		NoH Expected Total for Small Group (U) =	**1386.0**
		Population Stdev=	**107.471**
Siegel & Castellan (1988) pp.133-134		**z=**	**5.322**
	2-tailed test	**Level of Sig. =**	**0.1% sig**
	1 tailed test	**Level of Sig. =**	**0.1% sig**

Note: if identical scores in each group are found then a z of 0 results IF the +.5 or -.5 are removed from formulae above.

Appendix 2

Wilcoxon-Mann-Whitney U Test Ctd.

Groups	Ctd.
1	25
1	19
1	0
1	26
1	15
1	20
1	20
1	2
1	0
1	9
1	0
1	4
1	8
1	11
1	26
1	0
1	0
1	0
1	0
1	0
2	54
2	77
2	55
2	73
2	41
2	21
2	14
2	55
2	40
2	60
2	27
2	61
2	19
2	56
2	54
2	0
2	30
2	0
2	29
2	17
2	24
2	18
2	39
2	69
2	40
2	96
2	48
2	72
2	76
2	100
2	58
2	44
2	79

Wilcoxon-Mann-Whitney U Test Ctd.

W_1	W_2	Rank	Freq.	RankDiff	||
64		64	64	64	||
33		32	34	33	||
51		51	51	51	||
18		16	20	18	||
55.5		55	56	55.5	||
55.5		55	56	55.5	||
66		66	66	66	||
45.5		45	46	45.5	||
33		32	34	33	||
43		43	43	43	||
14		14	14	14	||
30		29	31	30	||
7		1	13	7	||
7		1	13	7	||
22.5		22	23	22.5	||
30		29	31	30	||
57.5		57	58	57.5	||
18		16	20	18	||
40		39	41	40	||
54		54	54	54	||
21		21	21	21	||
61.5		61	62	61.5	||
22.5		22	23	22.5	||
27		27	27	27	||
18		16	20	18	||
75		75	75	75	||
48		47	49	48	||
18		16	20	18	||
24		24	24	24	||
7		1	13	7	||
45.5		45	46	45.5	||
37.5		37	38	37.5	||
7		1	13	7	||
48		47	49	48	||
33		32	34	33	||
40		39	41	40	||
40		39	41	40	||
15		15	15	15	||
7		1	13	7	||
26		26	26	26	||
7		1	13	7	||
18		16	20	18	||
25		25	25	25	||
28		28	28	28	||
48		47	49	48	||
7		1	13	7	||
7		1	13	7	||
7		1	13	7	||

Wilcoxon-Mann-Whitney U Test Ctd.

Appendix 2

7		1	13	7	||
7		1	13	7	||
	67.5	67	68	67.5	||
	80	80	80	80	||
	69.5	69	70	69.5	||
	78	78	78	78	||
	61.5	61	62	61.5	||
	42	42	42	42	||
	30	29	31	30	||
	69.5	69	70	69.5	||
	59.5	59	60	59.5	||
	73	73	73	73	||
	50	50	50	50	||
	74	74	74	74	||
	37.5	37	38	37.5	||
	71	71	71	71	||
	67.5	67	68	67.5	||
	7	1	13	7	||
	53	53	53	53	||
	7	1	13	7	||
	52	52	52	52	||
	35	35	35	35	||
	44	44	44	44	||
	36	36	36	36	||
	57.5	57	58	57.5	||
	76	76	76	76	||
	59.5	59	60	59.5	||
	82	82	82	82	||
	65	65	65	65	||
	77	77	77	77	||
	79	79	79	79	||
	83	83	83	83	||
	72	72	72	72	||
	63	63	63	63	||
	81	81	81	81	||

Inferences from the Wilcoxon-Mann-Whitney U Test for Mean Attentiveness Values in CMD & non-CMD for Brian

It can be seen from the table above that the difference in mean values for attentiveness in CMD and non-CMD is significant at the 0.1% level. This is a high level of significance, indicating that the increased level of attentiveness in CMD compared to non-CMD can be accepted as a valid result.

Discussion and Conclusions from the Statistical Tests

Meaning of Statistical Significance

If a statistical test indicates that the result was significant at 5%, this means that there is only a 1 in 20 probability that this result was obtained due to chance. Conventionally it is accepted that this is sufficiently unlikely that it can be assumed not to have happened due to chance. Therefore when the difference between groups is significant at 5% (or more significantly at 0.1%) it means that this difference can be taken as real.

Significance of the ANOVA Tests for Flicking in Red, Blue and Green

- **Colour of light has a significant effect on % flicking rate.**
- **There is a significant difference between % flicking rates in Red and Green**
- **There is a significant difference between % flicking rates in Red and Blue**
- **There no significant difference between % flicking rates in Blue and Green**

Significance of the Wilcoxon-Mann-Whitney U Test for Attentiveness in CMD and non-CMD

- **There is a very significant difference in attentiveness level in Colour Mood Dialogue and non-colour Mood Dialogue.**

Appendix 2

Spreadsheet for Attentiveness Levels for George in CMD and non-CMD

Attentiveness for George in CMD and non-CMD over 3 Sessions				Mean for Non CMD	9.32
				Mean for CMD	69.55
Non CMD	Non CMD	Non CMD	Non CMD	CMD	CMD
Sect. No.	Attent %	Sect. No	Attent %	Sect. No.	Attent %
1	11	1	0	8	69
2	8	2	3	9	55
3	25	3	0	10	50
4	0	4	20	11	54
5	5	5	0	12	78
6	43	6	0	13	87
7	37	7	0	14	90
8	4	8	0	15	91
9	0	9	0	16	67
10	10	10	0	17	50
11	25	11	0	18	34
12	30	12	0	19	53
13	22	13	0	20	74
14	21	14	0	21	63
15	24	15	0	22	71
16	0	16	0	23	89
17	0	17	0	24	66
18	0	18	0	25	71
19	0	19	0	26	78
20	0	20	7	27	84
		21	2	28	54
		22	0	29	62
		23	0	30	40
		24	22	**Total**	1530
		25	18	**Mean**	69.54
		26	15		
		27	4		
		28	25		
		29	64		
		30	25		
		31	7		
		32	20		
		33	0		
		34	3		
		35	20		
		36	2		
	Total over both sessions		**522**		
		Mean	**9.32**		

Appendix 2

Spreadsheet for Detailed Analysis of Small Section in Colour Mood Dialogue for Brian

Spreadsheet Data for Detailed Analysis of Small Section in CMD for Brian 31 January 2000

Time	Reds/Pinks	Greens	Blues	Flicking	Vocalisation
0	0	30	100	33.3	66.6
1	5	30	100	33.3	66.6
2	10	30	100	33.3	0
3	20	20	100	33.3	0
4	30	20	100	33.3	66.6
5	30	20	100	33.3	66.6
6	30	20	100	33.3	0
7	30	20	100	0	0
8	20	20	100	0	0
9	20	20	100	33.3	33.3
10	60	20	100	66.6	99.9
11	70	20	100	0	0
12	20	20	100	0	0
13	20	10	100	0	0
14	90	10	100	66.6	66.6
15	100	10	100	99.9	99.9
16	100	10	100	0	0
17	20	10	100	0	0
18	30	20	100	0	0
19	30	20	100	0	0
20	30	20	100	0	0
21	10	20	100	0	0
22	10	20	100	33.3	33.3
23	20	10	100	33.3	33.3
24	30	10	100	66.6	33.3
25	90	10	100	99.9	66.6
26	100	10	100	99.9	99.9
27	100	10	100	99.9	99.9
28	100	10	100	0	0
29	20	10	100	0	0
30	10	10	100	0	0
31	10	5	100	0	0
32	10	5	100	66.6	33.3
33	80	5	100	99.9	99.9
34	90	5	100	99.9	0
35	100	5	100	66.6	99.9
36	100	5	100	99.9	99.9
37	100	5	100	99.9	99.9
38	90	5	100	66.6	66.6
39	100	5	100	99.9	99.9
40	70	5	100	99.9	99.9
41	100	5	100	66.6	99.9
42	100	5	100	66.6	99.9
43	100	5	100	99.9	99.9
44	80	5	100	0	0

45	0	5	100	0	0
46	10	10	100	0	0
47	10	10	100	0	0
48	10	10	100	0	0
49	30	30	100	0	0
50	10	40	100	0	0
51	0	30	100	0	0
52	0	20	100	33.3	0
53	0	20	100	66.6	0
54	10	10	100	66.6	0
55	100	10	100	99.9	33.3
56	100	10	100	99.9	66.6
57	100	10	100	66.6	99.9
58	100	10	100	99.9	99.9
59	100	10	100	99.9	99.9
60	90	5	100	0	0
61	20	5	100	66.6	66.6
62	60	5	100	66.6	99.9
63	80	5	100	66.6	99.9
64	100	5	100	0	0
65	40	5	100	66.6	99.9
66	90	5	100	99.9	0
67	40	5	100	0	0
68	60	5	100	33.3	66.6
69	100	5	100	66.6	99.9
70	100	5	100	99.9	99.9
71	100	5	100	99.9	0
72	100	5	100	99.9	0
73	100	5	100	99.9	0
74	100	5	100	99.9	99.9
75	100	5	100	99.9	99.9
76	100	5	100	99.9	99.9
77	100	5	100	99.9	99.9
78	100	10	100	99.9	99.9
79	70	10	100	0	0
80	40	10	100	0	0
81	20	20	100	0	0
82	0	20	100	0	0
83	0	30	100	0	0
84	0	40	100	0	0
85	0	50	100	66.6	66.6
86	0	60	100	66.6	33.3
87	0	70	100	66.6	0
88	0	80	100	33.3	0
89	0	80	100	0	0
90	0	80	100	0	0

Appendix 3. *Tables and Statistical Tests for Second Cohort*

Appendix 3

Video Analysis Recording Sheet Computer Sequence

Type of Session Normal/Comp. Seq *Date of session* 9 March 2000

Name of child Simon *Date of analysis* 15 June 2001

Support person J.E.

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
1	**W↓B↑**	**20↓15↑**	**0**	10	**50**	0	**0**	0	**0**	*Lying.*
2	**B**	**50**	**20**	23	**46**	0	**0**	0	**0**	*Legs stretched out in blue.*
3	**BP↑**	**20**	**70**	7	**35**	0	**0**	0	**0**	
4	**BP**	**50**	**90**	6	**12**	0	**0**	2	**4**	*'singing'*
5	**B↓PR↑**	**20↓15↑**	**140**	2	**10**	0	**0**	0	**0**	
6	**PR**	**50**	**160**	10	**20**	0	**0**	0	**0**	*Sits more upright, back stretched up.*
7	**B↑P↓R↓**	**4↑5,5↓**	**210**	5	**100**	0	**0**	0	**0**	
8	**B***	**50**	**215**	15	**30**	0	**0**	1	**2**	*Singing. Moving legs. Sits up.*
9	**BG↑**	**20**	**265**	9	**45**	0	**0**	0	**0**	
10	**BG**	**50**	**285**	6	**12**	0	**0**	0	**0**	*Folds arms.*
11	**B↓G**	**20**	**335**	13	**65**	0	**0**	0	**0**	
12	**G**	**50**	**355**	0	**0**	8	**16**	2	**4**	*High sound, Louder.*
13	**B↑G↓**	**4↑5↓**	**405**	1	**20**	0	**0**	0	**0**	
14	**B***	**50**	**410**	16	**32**	0	**0**	1	**2**	

Name of child ___Simon_____ *Date of session* ___9 March 2000_

Appendix 3

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
15	**BP↑**	**20**	**460**	2	**10**	0	**0**	0	**0**	*Tapping hands on legs.*
16	**BP**	**50**	**480**	11	**22**	0	**0**	0	**0**	*Back stretched up*
17	**B↓PR↑**	**20↓15↑**	**530**	7	**35**	0	**0**	0	**0**	*Back stretched up. Hand movements.*
18	**PR**	**50**	**550**	16	**32**	0	**0**	2	**4**	*Back stretched up.*
19	**B↑P↓R↓**	**4↑5,5↓**	**600**	4	**80**	0	**0**	3	**60**	*Gentle singing with vibrato.*
20	**B***	**50**	**605**	9	**18**	2	**4**	0	**0**	*Looking up was at start of section*
21	**BG↑**	**20**	**655**	4	**20**	0	**0**	0	**0**	
22	**BG**	**50**	**675**	2	**4**	1	**2**	2	**4**	*1-2 notes singing.*
23	**B↓G**	**20**	**725**	0	**0**	0	**0**	0	**0**	
24	**G**	**50**	**745**	0	**0**	4	**8**	0	**0**	*Legs moving.*
25	**B↑G↓**	**4↑5↓**	**795**	0	**0**	0	**0**	0	**0**	
26	**B***	**50**	**800**	2	**4**	0	**0**	0	**0**	*Looks up immediately after change.*
27	**B↓W↑**	**20**	**850**	6	**30**	0	**0**	0	**0**	
	W	**….end**	**870**							

Notes:

* after-image point

Video Analysis Recording Sheet Computer Sequence

Appendix 3

Type of Session Normal/Comp. Seq *Date of session* 16 March 2000

Name of child Simon *Date of analysis* 15/16 June 2001

Support person J.E.

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
1	**W↓B↑**	**20↓15↑**	**0**	2	**10**	0	**0**	1	**5**	*Lying down*
2	**B**	**50**	**20**	0	**0**	3	**6**	3	**6**	*Lying, knees up. Hands to face. Stretches legs.*
3	**BP↑**	**20**	**70**	15	**75**	0	**0**	0	**0**	*Sits up*
4	**BP**	**50**	**90**	10	**20**	5	**10**	0	**0**	
5	**B↓PR↑**	**20↓15↑**	**140**	10	**50**	8	**40**	0	**0**	*Fiddling with something*
6	**PR**	**50**	**160**	31	**62**	0	**0**	0	**0**	*Stretches up back against wall*
7	**B↑P↓R↓**	**4↑5,5↓**	**210**	0	**0**	0	**0**	0	**0**	
8	**B***	**50**	**215**	0	**0**	45	**90**	0	**0**	*Lying on back so difficult to know how to assess*
9	**BG↑**	**20**	**265**	3	**15**	0	**0**	0	**0**	
10	**BG**	**50**	**285**	4	**8**	45	**90**	1	**2**	*Fiddling with fingers on chest*
11	**B↓G**	**20**	**335**	0	**0**	0	**0**	1	**5**	
12	**G**	**50**	**355**	0	**0**	2	**4**	0	**0**	
13	**B↑G↓**	**4↑5↓**	**405**	2	**40**	0	**0**	0	**0**	
14	**B***	**50**	**410**	14	**28**	31	**62**	2	**4**	*Lying face down singing Then looks up*

Name of child ___Simon_____ *Date of session* ___16 March 2000_

Appendix 3

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
15	**BP↑**	**20**	**460**	7	**35**	2	**10**	0	**0**	*Looks up as pinks get brighter*
16	**BP**	**50**	**480**	24	**48**	6	**12**	0	**0**	
17	**B↓PR↑**	**20↓15↑**	**530**	19	**95**	6	**30**	0	**0**	
18	**PR**	**50**	**550**	43	**86**	0	**0**	3 *singing*	**6**	*Hands to head*
19	**B↑P↓R↓**	**4↑5,5↓**	**600**	5	**100**	0	**0**	0	**0**	
20	**B***	**50**	**605**	12	**24**	3	**6**	8	**16**	*Hands to face*
21	**BG↑**	**20**	**655**	3	**15**	0	**0**	4	**20**	
22	**BG**	**50**	**675**	2	**4**	1	**2**	9 *singing*	**18**	*Hands to face*
23	**B↓G**	**20**	**725**	0	**0**	0	**0**	0	**0**	*Hands to face*
24	**G**	**50**	**745**	0	**0**	2	**4**	16 *Excited 'chatting'*	**32**	*Hands to face*
25	**B↑G↓**	**4↑5↓**	**795**	1	**20**	0	**0**	1 *High squeal*	**20**	*Hands over knees*
26	**B***	**50**	**800**	1	**2**	2	**4**	25 *High 'chatty'*	**50**	
27	**B↓W↑**	**20**	**850**	0	**0**	0	**0**	14 *High squeal*	**70**	*'Bye bye'*
	W	**….end**	**870**							*Excited 'chat' No real words v. animated*

Notes:

* after-image point

Video Analysis Recording Sheet Computer Sequence

Appendix 3

Type of Session Normal/Comp. Seq *Date of session* 23 March 2000

Name of child Simon *Date of analysis* 18 June 2001

Support person J.E.

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
1	**W↓B↑**	**20↓15↑**	**0**	10	**50**	0	**0**	0	**0**	
2	**B**	**50**	**20**	7	**14**	26	**52**	9	**18**	*Singing Taps hands to floor*
3	**BP↑**	**20**	**70**	10	**50**	0	**0**	3	**15**	*High sound, calling 'Jo' ?*
4	**BP**	**50**	**90**	13	**26**	12	**24**	0	**0**	
5	**B↓PR↑**	**20↓15↑**	**140**	20	**100**	0	**0**	0	**0**	
6	**PR**	**50**	**160**	32	**64**	1	**2**	0	**0**	*Hands to head. Straightens up back, sits up*
7	**B↑P↓R↓**	**4↑5,5↓**	**210**	5	**100**	0	**0**	0	**0**	
8	**B***	**50**	**215**	9	**18**	25	**50**	0	**0**	*Taps hands to floor*
9	**BG↑**	**20**	**265**	16	**80**	0	**0**	3	**15**	*Lower, chatty sound, not singing*
10	**BG**	**50**	**285**	4	**8**	0	**0**	0	**0**	*Legs apart. Then together*
11	**B↓G**	**20**	**335**	5	**25**	0	**0**	0	**0**	*Hands to face (as usual)*
12	**G**	**50**	**355**	3	**6**	27	**54**	0	**0**	*Hands tapping on knees. Then stretches legs*
13	**B↑G↓**	**4↑5↓**	**405**	4	**80**	0	**0**	0	**0**	*Claps as changes to blue*
14	**B***	**50**	**410**	3	**6**	4	**8**	0	**0**	

Name of child ___Simon_____ *Date of session* ___23 March 2000_

Appendix 3

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
15	**BP↑**	**20**	**460**	9	**45**	0	**0**	0	**0**	*Sits up. Stretches*
16	**BP**	**50**	**480**	15	**30**	8	**16**	0	**0**	*Hands over eyes*
17	**B↓PR↑**	**20↓15↑**	**530**	12	**60**	4	**20**	0	**0**	*Tapping chin as blues fade*
18	**PR**	**50**	**550**	29	**58**	5	**10**	0	**0**	*Hands over mouth*
19	**B↑P↓R↓**	**4↑5,5↓**	**600**	1	**20**	1	**20**	0	**0**	
20	**B***	**50**	**605**	6	**12**	2	**4**	0	**0**	*Knock at door J.E. explains to S and leaves*
21	**BG↑**	**20**	**655**	4	**20**	4	**20**	2	**10**	*Flapping hands, laughing*
22	**BG**	**50**	**675**	14	**28**	8	**16**	1	**2**	
23	**B↓G**	**20**	**725**	8	**40**	3	**15**	2	**10**	*High squeaks, some hand flapping*
24	**G**	**50**	**745**	10	**20**	21	**42**	5	**10**	*High pitched happy sound*
25	**B↑G↓**	**4↑5↓**	**795**	5	**100**	0	**0**	0	**0**	*Hand flapping at change*
26	**B***	**50**	**800**	27	**54**	5	**10**	0	**0**	
27	**B↓W↑**	**20**	**850**	9	**45**	2	**10**	1	**5**	*Happy sound flaps*
	W	**….end**	**870**							

Notes:

* after-image point

Video Analysis Recording Sheet Computer Sequence

Appendix 3

Type of Session Normal/Comp. Seq *Date of session* 30 March 2000

Name of child Simon *Date of analysis* 20 June 2001

Support person J.E.

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
1	**W↓B↑**	**20↓15↑**	**0**	16	**80**	0	**0**	1	**5**	
2	**B**	**50**	**20**	9	**18**	15	**30**	14	**28**	*Staccato sounds like words, then 'comb your hair'*
3	**BP↑**	**20**	**70**	18	**90**	0	**0**	9	**45**	*'Thank you very much' 'OK'*
4	**BP**	**50**	**90**	9	**18**	1	**2**	4	**8**	*Sounds like words but couldn't identify*
5	**B↓PR↑**	**20↓15↑**	**140**	9	**45**	0	**0**	8	**40**	*Excited sounds like words*
6	**PR**	**50**	**160**	20	**40**	0	**0**	12	**24**	*Hands over face*
7	**B↑P↓R↓**	**4↑5,5↓**	**210**	0	**0**	0	**0**	0	**0**	
8	**B***	**50**	**215**	4	**8**	10	**20**	11	**22**	*Lying lower on back, singing softly 'E' 'M' ?*
9	**BG↑**	**20**	**265**	0	**0**	0	**0**	0	**0**	
10	**BG**	**50**	**285**	2	**4**	3	**6**	1	**2**	
11	**B↓G**	**20**	**335**	16	**80**	0	**0**	0	**0**	
12	**G**	**50**	**355**	6	**12**	25	**50**	0	**0**	*Bends right down, head to floor. Taps floor*
13	**B↑G↓**	**4↑5↓**	**405**	1	**20**	0	**0**	0	**0**	*Taps floor*
14	**B***	**50**	**410**	3	**6**	5	**10**	4	**8**	*Laughs, Legs stretch out & apart*

Name of child ___Simon_____ *Date of session* ____30 March 2000 *Appendix 3*

Colours				***Observations***						
Colour section number	*Lighting descript*	*Time of section*	*Time at start of section*	*Look up time s* ↑	*Look up as % of section* ↑	*Look down time s* ↓	*Look down as % of section* ↓	*Vocal. time s*	*Vocal. time as % of section*	*Comments*
15	**BP↑**	**20**	**460**	6	**30**	0	**0**	0	**0**	*Stretches up back*
16	**BP**	**50**	**480**	5	**10**	0	**0**	0	**0**	
17	**B↓PR↑**	**20↓15↑**	**530**	20	**100**	0	**0**	0	**0**	
18	**PR**	**50**	**550**	25	**50**	0	**0**	0	**0**	*Smiling*
19	**B↑P↓R↓**	**4↑5,5↓**	**600**	0	**0**	0	**0**	0	**0**	
20	**B***	**50**	**605**	6	**12**	12	**24**	2	**4**	*3 gentle whimpers. Taps floor*
21	**BG↑**	**20**	**655**	10	**50**	0	**0**	2	**10**	*Low sound*
22	**BG**	**50**	**675**	10	**20**	18	**36**	0	**0**	
23	**B↓G**	**20**	**725**	4	**20**	7	**35**	0	**0**	
24	**G**	**50**	**745**	9	**18**	8	**16**	1	**2**	*Hands to face towards end of section*
25	**B↑G↓**	**4↑5↓**	**795**	2	**40**	0	**0**	0	**0**	
26	**B***	**50**	**800**	8	**16**	8	**16**	1	**2**	*Strong sound like 'word'*
27	**B↓W↑**	**20**	**850**	4	**20**	0	**0**	1	**5**	*1-2 notes singing*
	W	**….end**	**870**							

Notes: When facing towards camera, it was difficult to tell whether he was looking up or not. This was counted as looking level unless there was a clear upward movement of the head.

* after-image point

Table of Average (Mean) Values for %Looking Up for Simon over 4 Sessions

Appendix 3

Colours			***Observations***				
Colour Section No.	*Lighting Description*	*Time at Start of Section*	*% Looking Up 9 March 00*	*% Looking Up 16 March 00*	*% Looking Up 23 March 00*	*% Looking Up 30 March 00*	***Mean***
1		**0**	50	10	50	80	**47.5**
2		**20**	46	0	14	18	**31**
3		**70**	35	75	50	90	**62.5**
4		**90**	12	20	26	18	**19**
5		**140**	10	50	100	45	**51.25**
6		**160**	20	62	64	40	**46.5**
7		**210**	100	0	100	0	**50**
8		**215**	30	0	18	8	**14**
9		**265**	45	15	80	0	**35**
10		**285**	12	8	8	4	**8**
11		**335**	65	0	25	80	**42.5**
12		**355**	0	0	6	12	**4.5**
13		**405**	20	40	80	20	**40**
14		**410**	32	28	6	6	**18**
15		**460**	10	35	45	30	**30**
16		**480**	22	48	30	10	**27.5**
17		**530**	35	95	60	100	**72.5**
18		**550**	32	86	58	50	**56.5**
19		**600**	80	100	20	0	**50**
20		**605**	18	24	12	12	**16.5**
21		**655**	20	15	20	50	**26.25**
22		**675**	4	4	28	20	**14**
23		**725**	0	0	40	20	**15**
24		**745**	0	0	20	18	**9.5**
25		**795**	0	20	100	40	**40**
26		**800**	4	2	54	16	**19**
27		**850**	30	0	45	20	**23.75**

Appendix 3

Table of Average (Mean) Values for %Looking Down for Simon over 4 Sessions

Colours			***Observations***				
Colour Section No.	*Lighting Description*	*Time at Start of Section*	*% Looking Down 9 March 00*	*% Looking Down 16 March 00*	*% Looking Down 23 March 00*	*% Looking Down 30 March 00*	***Mean***
1		**0**	0	0	0	0	**0**
2		**20**	0	6	52	30	**22**
3		**70**	0	0	0	0	**0**
4		**90**	0	10	24	2	**9**
5		**140**	0	40	0	0	**10**
6		**160**	0	0	2	0	**0.5**
7		**210**	0	0	0	0	**0**
8		**215**	0	90	50	20	**40**
9		**265**	0	0	0	0	**0**
10		**285**	0	90	0	6	**24**
11		**335**	0	0	0	0	**0**
12		**355**	16	4	54	50	**31**
13		**405**	0	0	0	0	**0**
14		**410**	0	62	8	10	**20**
15		**460**	0	10	0	0	**2.5**
16		**480**	0	12	16	0	**7**
17		**530**	0	30	20	0	**12.5**
18		**550**	0	0	10	0	**2.5**
19		**600**	0	0	20	0	**5**
20		**605**	4	6	4	24	**9.5**
21		**655**	0	0	20	0	**5**
22		**675**	2	2	16	36	**11.5**
23		**725**	0	0	15	35	**12.5**
24		**745**	8	4	42	16	**17.25**
25		**795**	0	0	0	0	**0**
26		**800**	0	4	10	16	**7.5**
27		**850**	0	0	10	0	**2.5**

Table of %Looking Up for Simon in Red, Blue and Green over 4 Sessions

Appendix 3

	% Looking Up		
Date of Session	***Red***	***Blue***	***Green***
9 March 2000	**20**	**46**	**0**
	32	**30**	**0**
		32	
		18	
		4	
16 March 2000	**62**	**0**	**0**
	86	**0**	**0**
		28	
		24	
		2	
23 March 2000	**64**	**14**	**6**
	58	**18**	**20**
		6	
		12	
		54	
30 March 2000	**40**	**18**	**12**
	50	**8**	**18**
		6	
		12	
		16	
Mean	**51.5**	**17.4**	**7**

Table of %Looking Down for Simon in Red, Blue and Green over 4 Sessions *Appendix 3*

	% Looking Down		
Date of Session	***Red***	***Blue***	***Green***
9 March 2000	**0**	**0**	**16**
	0	**0**	**8**
		0	
		4	
		0	
16 March 2000	**0**	**6**	**4**
	0	**90**	**4**
		62	
		6	
		4	
23 March 2000	**2**	**52**	**54**
	10	**50**	**42**
		8	
		4	
		10	
30 March 2000	**0**	**30**	**50**
	0	**20**	**16**
		10	
		24	
		16	
Mean	**1.5**	**19.8**	**24.25**

Table of %Looking Up (+)/Down (-) for Simon in Red, Blue and Green over 4 Sessions

Appendix 3

	% Looking Up/Down (Values for Down are subtracted from values for Up)		
Date of Session	***Red***	***Blue***	***Green***
9 March 2000	**20**	**46**	**-16**
	32	**30**	**-8**
		32	
		14	
		4	
16 March 2000	**62**	**-6**	**-4**
	86	**-90**	**-4**
		-34	
		18	
		-2	
23 March 2000	**62**	**-38**	**-48**
	48	**-32**	**-22**
		-2	
		8	
		44	
30 March 2000	**40**	**-12**	**-38**
	50	**-12**	**2**
		-4	
		-12	
		0	
Mean	**51.5**	**17.4**	**7**

Appendix 3

Table of Average (Mean)Values for %Vocalisation for Simon over 4 Sessions

Colours			***Observations***				
Colour Section No.	*Lighting Description*	*Time at Start of Section*	*% Vocalisation 9 March 00*	*% Vocalisation 16 March 00*	*% Vocalisation 23 March 00*	*% Vocalisation 30 March 00*	***Mean***
1		**0**	0	5	0	5	**2.5**
2		**20**	0	6	18	28	**13**
3		**70**	0	0	15	45	**15**
4		**90**	4	0	0	8	**3**
5		**140**	0	0	0	40	**10**
6		**160**	0	0	0	24	**6**
7		**210**	0	0	0	0	**0**
8		**215**	2	0	0	22	**6**
9		**265**	0	0	15	0	**3.75**
10		**285**	0	2	0	2	**1**
11		**335**	0	5	0	0	**1.25**
12		**355**	4	0	0	0	**1**
13		**405**	0	0	0	0	**0**
14		**410**	2	4	0	8	**3.5**
15		**460**	0	0	0	0	**0**
16		**480**	0	0	0	0	**0**
17		**530**	0	0	0	0	**0**
18		**550**	4	6	0	0	**2.5**
19		**600**	60	0	0	0	**15**
20		**605**	0	16	0	4	**5**
21		**655**	0	20	10	10	**10**
22		**675**	4	18	2	0	**6**
23		**725**	0	0	10	0	**22.5**
24		**745**	0	32	10	2	**11**
25		**795**	0	20	0	0	**5**
26		**800**	0	50	0	2	**13**
27		**850**	0	70	5	5	**20**

Table of %Vocalisation for Simon in Red, Blue and Green over 4 Sessions

Appendix 3

	% Vocalisation		
Date of Session	***Red***	***Blue***	***Green***
9 March 2000	**0**	**0**	**4**
	4	**2**	**0**
		2	
		0	
		0	
16 March 2000	**0**	**6**	**0**
	6	**0**	**32**
		4	
		16	
		50	
23 March 2000	**0**	**18**	**0**
	0	**0**	**10**
		0	
		0	
		0	
30 March 2000	**24**	**28**	**0**
	0	**22**	**2**
		8	
		4	
		2	
Mean	**4.25**	**8.1**	**6**

Appendix 3

Analysis of Variance and F Test for Significance of Levels of Looking Up and Down in Red, Blue and Green for Simon

(Figures for looking up are given + values, for down – values. Where Simon looks up and down in the same section the smaller figure is subtracted from the larger, the sign remaining that of the larger. Therefore a + value signifies a net looking up in that section and a – value signifies a net looking down.)

RED	BLUE	GREEN
20	46	-16
32	30	-8
62	32	-4
86	14	-4
62	4	-48
48	-6	-22
40	-90	-38
50	-34	2
	18	
	-2	
	-38	
	-32	
	-2	
	8	
	44	
	-12	
	-12	
	-4	
	-12	
	0	

Analysis of Variance (cf mean scores) & F test (cf standard deviation). **Number of rows= 231**

Uncorrelated and repeated measure tests **Groups = 3**

One Way Analysis of Variance **equiv. to t test.** **Data from diff groups**

Source	deg.fr.	Sum Sq	Var.Est	F ratio
Between Groups	2	21223.6	10611.8	**14.716**
Within Groups	33	23796.3	721.1	

Note: Max 6 groups groups can differ in size

One Way Analysis Variance with repeated measures **Data from same individuals**

Source	deg.fr.	Sum Sq	Var.Est	F ratio
Rows				
Columns				
Interaction				
Total				

See Ferguson(1989) P348

Note:Needs every score for each individual.

Note: Max 6 scores for each individual

F test compares the variance (standard deviation squared) of groups

	RED	BLUE	GREEN
Check Zero's** = OK			
Number =	8	20	8
Mean of Grp =	50.00	-2.40	-17.25
Variance * N =	2912.00	18676.80	2207.50
Variance Est. =	416.00	982.99	315.36
St.Deviation =	19.079	30.559	16.611
Pop.Est. S.Dev=	20.396	31.353	17.758
CombinedVariance=	820	1547	1381
F Test: F=	**1.972**	**1.574**	**4.378**
Column df	27	15	27
Row df	7	19	7

If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other groups combined. If this happens, compare mean of that group using Mann Whitney U test (Ordinal.xls)

** Zero's: IF the zeros are actual marks then test is valid. Zero's are actual marks

Calculated value for **F = 14.716**

Value of **F** in statistical tables for 2 and 33 degrees of freedom = **3.30 at 5% and 5.34 at 1%**

Since 14.716 > 3.30 or 5.34 the Null Hypothesis can be rejected.

Therefore the observed differences in % looking up and down in Red, Blue and Green can be considered significant.

The Variance Ratio or F Test gives values of **1.972** (d.f. 27,7), **1.574** (d.f. 15,19) and **4.378** (d.f. 27,7). When these values are compared with those in the tables of F, the first and second are less indicating a common population Standard Deviation. The third is greater indicating that its Standard Deviation is different. Strictly, the ANOVA test is therefore not suitable though this does not mean that the differences are not significant. A Wilcoxon Mann-Whitney test has therefore been carried out for Red and Green. This demonstrates that the results are significant.

Appendix 3

Analysis of Variance and F Test for Significance of Levels of Looking Up and Down in Red and Blue for Simon

Figures for looking up are given + values, for down – values. Where Simon looks up and down in the same section the smaller figure is subtracted from the larger, the sign remaining that of the larger. Therefore a + value signifies a net looking up in that section and a – value signifies a net looking down.

RED	BLUE	
		Analysis of Variance (cf mean scores) & F test (cf standard deviation). **Number of rows= 231**
20	46	**Uncorrelated and repeated measure tests** **Groups = 2**
32	30	**One Way Analysis of Variance** **equiv. to t test.** **Data from diff groups**
62	32	Source **deg.fr.** Sum Sq Var.Est **F ratio** Note: Max 6 groups
86	14	Between Groups **1** 15690.1 15690.1 **18.896** groups can differ in size
62	4	Within Groups **26** 21588.8 830.3 **t=** **4.35**
48	-6	**One Way Analysis Variance with repeated measures** **Data from same individuals**
40	-90	Source **deg.fr.** Sum Sq Var.Est **F ratio** See Ferguson(1989) P348
50	-34	Rows Note:Needs every score
	18	Columns for each individual.
	-2	Interaction Note: Max 6 scores for
	-38	Total 33960.0 each individual
	-32	**F test compares the variance (standard deviation squared) of groups**
	-2	**RED** **BLUE**
	8	Check Zero's** = OK **Zeros**
	44	Number = 8 20
	-12	Mean of Grp = 50.00 -2.40
	-12	Variance * N = 2912.00 18676.80
	-4	Variance Est. = 416.00 982.99
	-12	St.Deviation = 19.079 30.559
	0	Pop.Est. S.Dev= 20.396 31.353
		CombinedVariance= 983 416
		F Test: F= **2.363** **2.363**
		Column df 19 19
		Row df 7 7
		If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other
		groups combined. If this happens, compare mean of that group using Mann Whitney U test (Ordinal.xls)
		** Zero's: IF the zeros are actual marks then test is valid. Zero's are actual marks.

Calculated value for **F = 18.896**

Value of **F** in statistical tables for 1 and 26 degrees of freedom = **4.22 at 5% and 7.72 at 1%**

Since 18.896 > 4.22 or 7.72 the Null Hypothesis can be rejected.

Therefore the observed differences in % looking up and down in Red and Blue can be considered significant.

Appendix 3

Analysis of Variance and F Test for Significance of Levels of Looking Up and Down in Red and Green for Simon

Figures for looking up are given + values, for down – values. Where Simon looks up and down in the same section the smaller figure is subtracted from the larger, the sign remaining that of the larger. Therefore a + value signifies a net looking up in that section and a – value signifies a net looking down.

RED	GREEN
20	-16
32	-8
62	-4
86	-4
62	-48
48	-22
40	-38
50	2

Analysis of Variance (cf mean scores) & F test (cf standard deviation). Number of rows= 2
Uncorrelated and repeated measure tests **Groups = 2**

One Way Analysis of Variance **equiv. to t test.** **Data from diff groups**

Source	deg.fr.	Sum Sq	Var.Est	F ratio	Note: Max 6 groups
Between Groups	**1**	18090.3	18090.3	**49.470**	groups can differ in size
Within Groups	**14**	5119.5	365.7	**t=**	**7.03**

One Way Analysis Variance with repeated measures **Data from same individuals**

Source	deg.fr.	Sum Sq	Var.Est	F ratio	See Ferguson(1989) P348
Rows	**7**	2839.8	405.7	1.246	Note:Needs every score
Columns	**1**	18090.3	18090.3	**55.546**	for each individual.
Interaction	7	2279.8	325.7		Note: Max 6 scores for
Total	15	23209.8	**t=**	**7.45**	each individual

F test compares the variance (standard deviation squared) of groups

	RED	*GREEN*
Check Zero's** =		
Number =	8	8
Mean of Grp =	50.00	-17.25
Variance * N =	2912.00	2207.50
Variance Est. =	416.00	315.36
St.Deviation =	19.079	16.611
Pop.Est. S.Dev=	20.396	17.758
CombinedVariance=	315	416
F Test: F=	**1.319**	**1.319**
Column df	7	7
Row df	7	7

If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other groups combined. If this happens, compare mean of that group using Mann Whitney U test (Ordinal.xls)

Calculated value for **F = 49.470**

Value of **F** in statistical tables for 1 and 14 degrees of freedom = **4.60 at 5% and 8.86 at 1%**

Since 49.470 > 4.60 or 8.86 the Null Hypothesis can be rejected.

Therefore the observed differences in % looking up and down in Red and Green can be considered significant.

Appendix 3

Analysis of Variance and F Test for Significance of Levels of Looking Up and Down in Blue and Green for Simon

Figures for looking up are given + values, for down – values. Where Simon looks up and down in the same section the smaller figure is subtracted from the larger, the sign remaining that of the larger. Therefore a + value signifies a net looking up in that section and a – value signifies a net looking down.

BLUE	GREEN	
		Analysis of Variance (cf mean scores) & F test (cf standard deviation). **Number of rows= 231**
46	-16	**Uncorrelated and repeated measure tests** **Groups = 2**
30	-8	**One Way Analysis of Variance equiv. to t test.**
32	-4	Source **deg.fr.** Sum Sq Var.Est **F ratio** Note: Max 6 groups
14	-4	Between Groups **1** 1260.1 1260.1 **1.569** groups can differ in size
4	-48	Within Groups **26** 20884.3 803.2 **t= 1.25**
-6	-22	**One Way Analysis Variance with repeated measures** **Data from same individuals**
-90	-38	Source **deg.fr.** Sum Sq Var.Est **F ratio** See Ferguson(1989) P348
-34	2	Rows Note:Needs every score
18		Columns for each individual.
-2		Interaction Note: Max 6 scores for
-38		Total each individual
-32		**F test compares the variance (standard deviation squared) of groups**
-2		***BLUE*** ***GREEN***
8		Check Zero's** = OK
44		Number = 20 8
-12		Mean of Grp = -2.40 -17.25
-12		Variance * N = 18676.80 2207.50
-4		Variance Est. = 982.99 315.36
-12		St.Deviation = 30.559 16.611
0		Pop.Est. S.Dev= 31.353 17.758
		CombinedVariance= 315 983
		F Test: F= **3.117** **3.117**
		Column df 19 19
		Row df 7 7
		If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the ot
		groups combined. If this happens, compare mean of that group using Mann Whitney U test (Ordinal.xls)
		** Zero's: IF the zeros are actual marks then test is valid. Zero's are actual marks.

Calculated value for **F = 1.569**

Value of **F** in statistical tables for 1 and 26 degrees of freedom = **4.22 at 5% and 7.72 at 1%**

Since 1.569 < 4.22 the Null Hypothesis must be accepted.

Therefore the observed differences in % looking up and down in Blue and Green cannot be considered significant.

Appendix 3

Wilcoxon Mann-Whitney Test for Significance of Differences in %Looking Up and Down in Red and Green for Simon

Gps *COLS.* ||

Mann-Whitney (Wilcoxon Mann-Whitney) **U test**

The Mann-Whitney test is equivalent to the t test

CHANGE ZERO MARKS TO 0.0001

Insert Groups and scores in columns A and B.

Group 1 = NonCMD

Group 2= CMD

	Group 1	Group 2	
N_1 & N_2 =	**8**	**8**	{**W_1** uses Rank & Freq. for Group **1**
W_1 & W_2 =	**100**	**36**	**W_2** uses Rank & Freq. for Group **2**}
C_u or Wx =	**100**		
Check1= $W_1+W_2=$	*136*	Combined Maximum Formula Comb.Max.	*formulae satisfactory*
Check2= (N(N+1))/2	*136*		*Check from in Siegel&Castellan,1988,p132*

Full tables to assess significance of Mann-Whitney test can be found in:

Siegel, S. (1956) Nonparametric Statistics. McGraw-Hill:London

Siegel, S. & Castellan, N.J. (1988) Nonparametric Statistics.

To use tables:

m =	**8**	*Number of individuals in smallest group*
n =	**8**	*Number of individuals in largest group*
C_u (U) =	**100**	*Sum of Ranks in smallest group*

Ignore column 1 (CL). *Cu is to the right of the probability column in each table.*

Siegel argues that if, the number in either group is greater than 10, the distribution found approaches that found in the Normal Distribution, hence:

"*When m>10 or n>10, we may determine the significance of an observed value Wx*" as follows:

(Siegel & Castellan, 1988, p132)

		Total Rank for Small Group (C_u or Wx) =	**100**
		NoH Expected Total for Small Group (U) =	**68.0**
		Population Stdev=	**9.522**
Siegel & Castellan (1988) pp.133-134		**z=**	**3.413**
	2-tailed test	**Level of Sig. =**	**1.0% sig.**
	1 tailed test	**Level of Sig. =**	**0.1% sig**

Note: if identical scores in each group are found then a z of 0 results IF the +.5 or -.5 are removed from formulae above.

The above test gives a significance of 0.1% indicating that although the value of F in the F test of the previous ANOVA test was significant, there is nevertheless a **significant difference in the levels of looking up and down between red and green.**

Appendix 3

Analysis of Variance and F Test for Significance of Levels of Vocalisation in Red, Blue and Green (Computer Controlled Sequence) for Simon

RED	BLUE	GREEN
0	0	4
4	2	0
0	2	0
6	0	32
0	0	0
0	6	10
24	0	0
0	4	2
	16	
	50	
	18	
	0	
	0	
	0	
	0	
	28	
	22	
	8	
	4	
	2	

Analysis of Variance (cf mean scores) & F test (cf standard deviation). Number of rows= 231

Uncorrelated and repeated measure tests Groups = 3

One Way Analysis of Variance **equiv. to t test.** **Data from diff groups**

Source	deg.fr.	Sum Sq	Var.Est	F ratio
Between Groups	**2**	90.9	45.5	**0.332**
Within Groups	**33**	4519.3	136.9	

Note: Max 6 groups can differ in size

One Way Analysis Variance with repeated measures **Data from same individuals**

Source	deg.fr.	Sum Sq	Var.Est	F ratio
Rows				
Columns				
Interaction				
Total				

See Ferguson(1989)

Note:Needs every score for each individual.

Note: Max 6 scores for each individual

F test compares the variance (standard deviation squared) of groups

	RED	BLUE	GREEN
Check Zero's** =OK			
Number =	8	20	8
Mean of Grp =	4.25	8.10	6.00
Variance * N =	483.50	3179.80	856.00
Variance Est. =	69.07	167.36	122.29
St.Deviation =	7.774	12.609	10.344
Pop.Est. S.Dev=	8.311	12.937	11.058
CombinedVariance=	150	90	139
F Test: F=	**2.178**	**1.857**	**1.135**
Column df	27	19	27
Row df	7	15	7

If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other groups combined. If this happens, compare mean of that group using Mann Whitney U test (Ordinal.xls)

** Zero's: IF the zeros are actual marks then test is valid. Zero's are actual marks.

Calculated value for **F = 0.332**

Value of **F** in statistical tables for 2 and 33 degrees of freedom = **3.28 at 5%**

Since 0.332 < 3.28 the Null Hypothesis must be accepted.

Therefore the observed differences in % Vocalisation in Red, Blue and Green cannot be considered significant.

Appendix 3

Video Analysis Recording Sheet

Type of Session CMD *Date of session* 9th November 2000

Name of child Anna *Date of analysis* 12 June 2001

Light desk operator DP *Support person* JE

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
1	**W↓ B↑P↑** *(pinks low)*	11-04-00	**0**	**1**	**2**	*Gentle lilting sounds*
2	**B P** *(pinks low)* *purple ↔ blue*	04-30	**30**	**1**	**2**	*More rhythm.* *'Hallo'*
3	**B R↑P↑** *(pinker)* *magenta ↔ blue*	05-02	**62**	**2**	**1**	*'Ba Ba' louder*
4	**B↓ R P** *(low blue)* *red ↔ crimson*	05-38	**98**	**3**	**1**	*'Br Br, Ge Ge, Go Go'*
5	**B** *low* **R P** *red ↔ crimson*	06-02	**122**	**2**	**1**	*More like singing*
6	**B↑R P** *(bluer)* *purple ↔ blue*	06-18	**138**	**1**	**1**	
7	**BR↓P↓** *(bluer)* *violet ↔ blue*	06-35	**155**	**2**	**1**	
8	**BR↑P↑** *Purple ↔ blue*	06-50	**170**	**1**	**1**	*'Ba Ba' light and gentle, almost singing*
9	**BR P** *Purple ↔ blue*	07-22	**202**	**2**	**1**	
10	**B↓R P** *Red ↔ crimson*	07-30	**210**	**3**	**0**	*Loud rhythm between 7-30 and 7-33*

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous.
Sections are chosen according to both colour changes and differences in intensity.
Some chin-tapping on and off all the way through.

BG (blue/green rocking) The blues and greens move gently up and down sequentially B G

Appendix 3

Video Analysis Recording Sheet

Name of child *Anna* *Date of session* 9th November 2000

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
11	**B↑R↓P↓** *(reds down)* *purple ↔ blue*	07-34	**214**	**0**	**0**	
12	**B R↓P↓** *(reds lower)* *violet ↔ blue*	07-40	**220**	**0**	**0**	
13	**B R↓P↓** *almost blue*	08-20	**260**	**0**	**0**	
14	**B** *blue*	09-00	**300**	**0**	**0**	
15	**BG↑** *(greens low)* *blue/ green rocking*	09-07	**307**	**0**	**0**	
16	**BP↑** *(pinks low)* *purple ↔ blue*	09-38	**338**	**0**	**0**	
17	**B R↓P↓** *(almost blue)* *purple down to blue*	10-24	**384**	**0**	**0**	
18	**BR↑P↑** *Magenta ↔ blue*	10-32	**392**	**1**	**0**	
19	**B R↓P↓** *(reds lower)* *violet ↔ blue*	10-38	**398**	**0**	**0**	
20	**BR↑P↑** *magenta ↔ blue*	11-12	**432**	**1**	**0**	

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.
Some chin-tapping on and off all the way through.

BG (blue/green rocking) The blues and greens move gently up and down sequentially

Appendix 3

Video Analysis Recording Sheet

Name of child Anna *Date of session* 9th November 2000

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
21	**B R↓P↓** *(reds lower)* *purple ↔ blue*	11-14	**434**	**0**	**0**	
22	**BR↑P↑** *Magenta ↔ blue*	11-27	**447**	**1**	**0**	
23	**B R↓P↓** *almost blue* *purple down to blue*	12-16	**496**	**0**	**0**	
24	**BG↑** *rocking*	13-02	**542**	**0**	**0**	
25	**B**	15-46	**706**	**0**	**0**	
26	**BR↑P↑** *Purple ↔ blue*	16-27	**747**	**0**	**0**	
27	**BR↑P↑** *crimson ↔ blue*	17-00	**780**	**0**	**0**	
28	**B R↓P↓** *(reds lower)* *magenta ↔ blue*	17-58	**838**	**0**	**0**	
29	**B** *blue*	18-30	**870**	**0**	**0**	
30	**BG↑** *Blue/green rocking*	18-44	**884**	**0**	**0**	

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.
Some chin-tapping on and off all the way through.

BG (blue/green rocking) The blues and greens move gently up and down sequentially

Appendix 3

Video Analysis Recording Sheet

Name of child Anna *Date of session* 9th November 2000

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
31	**B**	19-43	**943**	**0**	**0**	
32	**B↓w↑**	20-02	**962**	**1**	**0**	*Laughing* *Jumps on mat and lies face down*
33	**W** *Room lights*	20-50	**1010**	**0**	**0**	
34	**End**	21-00	**1020**			
35						
36						
37						
38						
39						
40						

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.
Some chin-tapping on and off all the way through.

BG (blue/green rocking**)** The blues and greens move gently up and down sequentially 

Appendix 3

Video Analysis Recording Sheet

Type of Session CMD *Date of session* 16th November 2000

Name of child Anna *Date of analysis* 14th June 2001

Light desk operator DP *Support person* JE

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
1	**W↓ B↑P↑** *(pinks low) violet*	10-48-50	**0**	**1**	**0**	
2	**BP R** *(Redder) Magenta ↔ blue*	49-32	**42**	**1**	**0**	
3	**BR↓ P** *(pinks low) purple ↔ blue*	49-58	**68**	**1**	**1**	*Rocking from side to side*
4	**B↓P R↑** *(Redder) crimson ↔ red*	50-28	**98**	**2**	**2**	
5	**BP R** *(Redder) crimson ↔ red*	50-59	**129**	**3**	**2**	
6	**BP R** *(Redder) crimson ↔ red*	51-30	**160**	**2**	**2**	
7	**B↑ P↓** *(pinks low) violet ↔ blue*	52-22	**212**	**2**	**1**	*Rocking forwards and backwards*
8	**B** *(blues only)*	52-33	**223**	**2**	**1**	
9	**BG↑**	52-41	**231**	**3**	**0**	*Stops rocking towards end of section*
10	**B G** *(blue/green rocking)*	53-13	**263**	**2**	**0**	

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.

B G (blue/green rocking) The blues and greens move gently up and down sequentially

B G

Video Analysis Recording Sheet

Appendix 3

Name of child *Anna* *Date of session* 16th November 2000

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
11	**B G** *(blue/green rocking)*	53-30	**280**	**1**	**0**	
12	**B G** *(blue/green rocking)*	53-37	**287**	**0**	**0**	*Chin-tapping Quiet Hands to head*
13	**B** *(Blues only)*	55-38	**408**	**0**	**0**	*Looking at colours*
14	**BP↑R↑** *(pinks and reds low-)* ***purple***	55-45	**415**	**0**	**0**	*Hands to head and eyes Looks up*
15	**BP↑R↑** *(Reds and pinks stronger) Blue ↔* ***magenta***	56-57	**487**	**0.5**	**0**	*Sounds not continuous*
16	**B↓P↑R↑** *(Reds and pinks stronger-**redder**) crimson ↔ red*	57-37	**527**	**0**	**0**	*Hands to top of head*
17	**BP R** *(Reds and pinks strong-**redder**) crimson ↔ red*	58-45	**595**	**2**	**0**	*Lying down*
18	**B↑R↓P↓** *(reds down, pinks low)* ***Blue ↔ violet***	58-50	**600**	**0**	**0**	
19	**BY↑** *(yellows up, responding over blue) Yellow ↔ blue*	59-03	**613**	**0**	**0**	
20	**BY** *(yellows responding over blue) Yellow ↔ blue*	59-16	**626**	**1**	**0**	*Gets up , goes towards J.E. who responds as she comes towards her*

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.

B G (blue/green rocking) The blues and greens move gently up and down sequentially

Video Analysis Recording Sheet

Appendix 3

Name of child *Anna* *Date of session* 16th November 2000

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
21	**BY** *(yellows responding over blue)* *Yellow ↔ blue*	59-25	**635**	**0**	**0**	*Pulls at J.E. clearly wanting her to play*
22	**BW↑**	11-00-32	**702**	**0**	**0**	*Needs toilet*
23	**End**	00-49	**719**			*Session ends as goes out to toilet*

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.

BG (blue/green rocking) The blues and greens move gently up and down sequentially

Appendix 3

Video Analysis Recording Sheet

Type of Session CMD

Name of child Anna

Light desk operator DP

Date of session 14th December 2000

Date of analysis 14th June 2001

Support person JE

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
1	**W**	10-58-50	**0**	**1**	**2**	*Rocking almost but not quite continuous. Take speed & amplitude while is rocking.*
2	**W↓ B↑P↑** *(pinks low)* *violet*	58-56	**6**	**1**	**2**	
3	**B ↓P** *(reds low)* *purple*	59-16	**26**	**1**	**2**	
4	**B P↑R↑** *(reds & pinks higher)* *magenta ↔ red*	59-35	**45**	**2**	**3**	
5	**B↓ P↑R↑** *(Redder. Blues negligible)* *red ↔ crimson*	11-00-20	**90**	**2**	**3**	
6	**B P R** *(Redder-red. Blues negligible)* *red ↔ crimson*	00-50	**120**	**2**	**2**	
7	**B P R** *(Redder-red. Blues negligible)* *red ↔ crimson*	01-07	**137**	**3**	**2**	
8	**B P R** *(Redder-red. Blues negligible)* *red ↔ crimson*	01-20	**150**	**2**	**3**	
9	**B P R** *(Redder-red. Blues negligible)* *red ↔ crimson*	02-00	**190**	**3**	**3**	
10	**B↑P↓R↓** *Crimson to blue*	02-19	**209**	**3**	**2**	

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.

B G (blue/green rocking) The blues and greens move gently up and down sequentially

Video Analysis Recording Sheet

Appendix 3

Name of child *Anna* *Date of session* 14th December 2000

Colours				***Observations***		
Colour section number	*Colour section description*	*Time at start of section From clock m.-s.*	*Time at start of section* s.	*Vocalisation* *1 – 3*	*Rocking* *1 – 3*	*Comments*
11	**B** *(Blues only)*	02-37	**227**	**0**	**0**	*Coughs*
12	**BG↑** *(Greens up minute amount)*	02-46	**236**	**0**	**0**	*Coughs, J.E. goes to wipe nose*
13	**BG↑** *(Blue/green rocking)*	03-04	**254**	**0**	**0**	*Coughing. Lies on front. Stands at 08-43 then lies again at 04-30. Coughing*
14	**BG↓** *(Greens down to blue only)*	04-42	**352**	**0**	**0**	*Gets up at 04-43, goes to J.E. out of camera view.*
15	**BP↑** *(Pinks low, no red) -violet*	05-25	**395**	**0**	**0**	*J.E starts to interact*
16	**BP↑ R↑** *(Reds/pinks slightly higher) magenta ↔ crimson*	05-53	**423**	**–**	**–**	*J.E. interacting, holds hands pushing*
17	**BP↓R↓** *(Pinks low, no red) -purple↔blue*	07-30	**520**	**–**	**–**	*Interacting*
18	**BG↑** *(Greens up small amount)*	09-12	**622**	**–**	**–**	*Anna initiated sitting down and pushed J.E. down.*
19	**B**	10-14	**684**	**–**	**–**	*Sitting together*
20	**BW↑**	10-20	**690**	**–**	**–**	
21	**End**	11-49	**779**	**–**	**–**	

Notes:

Vocalisation is estimated 1,2 or 3 by intensity**. Rocking** similarly by speed and amplitude of movement. Not necessarily continuous. Sections are chosen according to both colour changes and differences in intensity.

BG (blue/green rocking) The blues and greens move gently up and down sequentially

B G

Appendix 3

Table of Vocalisation and Rocking Intensities for Anna (in Responding Reds and Blue/Greens) in CMD over 3 Sessions

	Vocalisation Intensity 1 - 3		***Rocking Intensity 1 - 3***	
Date of Session	***Reds*** ***(Responding)***	***Blues/Greens*** ***(Rocking)***	***Reds*** ***(Responding)***	***Blues/Greens*** ***(Rocking)***
9 November 2000	3	0	1	0
	2	0	1	0
	3	0	0	0
16 November 2000	2	3	2	0
	3	2	2	0
	2	1	2	0
	0	0	0	0
	2		0	
14 December 2000	2	0	2	0
	3	0	2	0
	2		2	
	2		1	
	2		1	
	3		0	

Appendix 3

Table of Mean (Weighted Values) for Vocalisation and Rocking Intensities for Anna in Responding Reds and Rocking Blue/Greens in CMD over 3 Sessions

	Vocalisation						***Rocking***					
	Reds ***(Responding)***			***Blues/Greens*** ***(Rocking)***			***Reds*** ***(Responding)***			***Blues/Greens*** ***(Rocking)***		
Date of session	*Intens. 1-3*	*Time units*	*Amount int.x no. of units*	*Intens. 1-3*	*Time*	*Amount int.x t*	*Intens. 1-3*	*Time*	*Amount int.x t*	*Intens. 1-3*	*Time*	*Amount int.x t*
9 November *2000*	3	2	**6**	0	1	**0**	1	2	**2**	0	1	**0**
	2	1	**2**	0	7	**0**	1	1	**1**	0	7	**0**
	3	1	**3**	0	3	**0**	0	1	**0**	0	3	**0**
16 November 2000	2	2	**4**	3	3	**9**	2	2	**4**	0	3	**0**
	3	3	**9**	2	1	**2**	2	3	**6**	0	1	**0**
	2	4	**8**	1	1	**1**	2	4	**8**	0	1	**0**
	0	6	**0**	0	10	**0**	0	6	**0**	0	10	**0**
	2	1	**2**				0	1	**0**			
14 December 2000	2	7	**14**	0	2	**0**	2	7	**14**	0	2	**0**
	3	3	**9**	0	16	**0**	2	3	**6**	0	16	**0**
	2	3	**6**				2	3	**6**			
	2	2	**4**				1	2	**2**			
	2	6	**13**				1	6	**6**			
	3	3	**9**				0	3	**0**			
Totals		44	89		44	12		44	55		44	0
Weighted ***Means***	**2.02**			**0.27**			**1.25**			**0**		

Because the time of each section is not constant, it is necessary to make an adjustment. Longer or shorter duration times for a score must be accounted for. The time for each section is measured in the x-axis units as shown on the charts. If for example the duration of a score was 3 units then it is counted as 3 scored 3 times. This figure of units of time is used in calculating the means in order to give correct weighting to the values.

Appendix 3

Analysis of Variance for Vocalisation Intensity in Reds and Blue-Greens in CMD over 3 Sessions for Anna

REDS	BLUE GREENS	
		Analysis of Variance (cf mean scores) & F test (cf standard deviation). — **Number of rows=231**
3	0	**Uncorrelated and repeated measure tests** — **Groups = 2**
3	0	**One Way Analysis of Variance** **equiv. to t test.** — **Data from diff groups**
2	0	Source **deg.fr.** Sum Sq Var.Est **F ratio** — Note: Max 6 groups
3	0	Between Groups **1** 65.6 65.6 **87.208** — groups can differ in size
2	0	Within Groups **86** 64.7 0.8 **t= 9.34**
2	0	**One Way Analysis Variance with repeated measures** **Data from same individuals**
3	0	Source **deg.fr.** Sum Sq Var.Est **F ratio** — See Ferguson(1989)
3	0	Rows **37** 2.4 0.1 0.039 — Note:Needs every score
3	0	Columns **1** 47.7 47.7 **28.323** — for each individual.
2	0	Interaction 37 62.3 1.7 — Note: Max 6 scores for
2	0	Total 75 112.4 **t=** **5.32** — each individual
2	3	**F test compares the variance (standard deviation squared) of groups**
2	3	***REDS*** ***BLUE GREENS***
0	3	Check Zero's** = OK
0	2	Number = 44 44
0	1	Mean of Grp = 2.00 0.27
0	0	Variance * N = 36.00 28.73
0	0	Variance Est. = 0.84 0.67
0	0	St.Deviation = 0.905 0.808
2	0	Pop.Est. S.Dev= 0.915 0.817
2	0	CombinedVariance= 1 1
2	0	**F Test: F=** **1.253** **1.253**
2	0	Column df 43 43
2	0	Row df 43 43
2	0	If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other
2	0	groups combined. If this happens, compare mean of that group using Mann Whitney U test (Ordinal.xls)
2	0	** Zero's: IF the zeros are actual marks then test is valid. If zeros simply mean missing or absent
3	0	from the test, then delete each zero because test comparisons would be unfair.
3	0	If any group has more than 231 entries, insert extra rows after row 50 and fill down
3	0	formulae in columns R to AI.
2	0	***Test below: difference between means for 2 correlated samples (Grp1 & Grp2)***
2	0	*Diff Gr1 & Gr2* *76.00* ***t =*** ***7.976*** *(equiv. to first two columns of ANOVA*
2	0	*Diff(X1-X2)^2* *220.00* ***df =*** ***43*** *repeated measures)* ***63.619***
		F=
2	0	***Calculations:*** ***One Way Analysis of Variance (equivalent to t test)***
2	0	*Grand Total=* *100* *Corr.Total =* *113.6364*
2	0	*Total Sum Sq.=* *130.3636* *N.groups* *2*
2	0	*Between Group Sum of Sq.=* *65.64*
2	0	*Within Sum Squares=* *64.7*

2	0		***F test compares the variance (standard deviation squared) of groups***					
2	0		*Sums of:*	*REDS*	*BLUE GREENS*	*0*	*0*	*0*	*0*
2	0		*numbers*	*88.00*	*12.00*	*0.00*	*0.00*	*0.00*	*0.00*
3	0		*squared numbers*	*212.00*	*32.00*	*0.00*	*0.00*	*0.00*	*0.00*
3	0		***One Way Analysis Variance with repeated measures. Calculations below***					
3	0		*T=*	*100*	*268*	*=T.r^2*		
			MT=	*1.136364*	*7888*	*=T.c^2*		
			col =	*2*	*244*	*=Xrc^2*		
			rows=	*38*				

(Zero's are actual marks)

Calculated value for **F = 87.208**

Value of **F** in statistical tables for 1 and 86 degrees of freedom = **3.96 at 5% and 6.96 at 1%**

Since 87.208 > 3.96 6.96 the Null Hypothesis can be rejected.

Therefore the observed differences in Vocalisation Intensity in Red and Blue-Green can be considered significant.

The Variance Ratio or F Test gives values of **1.253** (d.f. 43,43) for both Red and Blue-Green. The value of F in the tables is **1.74**. Since the calculated value is less than that in the tables it can be accepted that there is no significant difference between the Standard Deviations of the two samples so they can be considered to come from the same population. Therefore the ANOVA test is valid.

Appendix 3

Analysis of Variance for Rocking Intensity in Reds and Blue-Greens in CMD over 3 Sessions for Anna

(Values of 0.0001 have been substituted for the zero's in column 2 because the program did not function when all the figures were zero. This would make a negligible difference to the result.)

REDS	BLUE-GREEN						
		Analysis of Variance (cf mean scores) & F test (cf standard deviation).					**Number of rows=231**
3	0.0001	**Uncorrelated and repeated measure tests**					**Groups =2**
3	0.0001	**One Way Analysis of Variance**				**equiv. to t test.**	
2	0.0001	Source	**deg.fr.**	Sum Sq	Var.Est	**F ratio**	Note: Max 6 groups
3	0.0001	Between Groups	**1**	88.0	88.0	**210.201**	groups can differ in size
2	0.0001	Within Groups	**86**	36.0	0.4		**14.50**
						t=	
2	0.0001	**One Way Analysis Variance with repeated measures**				**Data from same individuals**	
3	0.0001	Source	**deg.fr.**	Sum Sq	Var.Est	**F ratio**	See Ferguson(1989) P348
3	0.0001	Rows	**37**	4.1	0.1	0.129	Note:Needs every score
3	0.0001	Columns	**1**	74.1	74.1	**85.951**	for each individual.
2	0.0001	Interaction	37	31.9	0.9		Note: Max 6 scores for
2	0.0001	Total	75	110.1	**t=**	**9.27**	each individual
2	0.0001	**F test compares the variance (standard deviation squared) of groups**					
2	0.0001			***REDS***	***BLUE-GREENS***		
0	0.0001	Check Zero's** = OK					
0	0.0001	Number =		44	44		
0	0.0001	Mean of Grp =		2.00	0.00		
0	0.0001	Variance * N =		36.00	0.00		
0	0.0001	Variance Est. =		0.84	0.00		
0	0.0001	St.Deviation =		0.905	0.000		
2	0.0001	Pop.Est. S.Dev=		0.915	0.000		
2	0.0001	CombinedVariance=		0	1		
2	0.0001	**F Test: F=**		4.5×10^{15}	6.2×10^{22}		
2	0.0001	Column df		43	43		
2	0.0001	Row df		43	43		
2	0.0001	If the F score for the F test is statistically significant, then the St.Dev.for that group differs from that of the other					
2	0.0001	groups combined. If this happens, compare mean of that group using Mann Whitney U test (Ordinal.xls)					
2	0.0001	** Zero's: IF the zeros are actual marks then test is valid. If zeros simply mean missing or absent					
3	0.0001	from the test, then delete each zero because test comparisons would be unfair.					
3	0.0001	If any group has more than 231 entries, insert extra rows after row 50 and fill down formulae in columns R to AI.					
2	0.0001	***Test below: difference between means for 2 correlated samples (Grp1 & Grp2)***					
2	0.0001	*Diff Gr1 & Gr2*		*88.00*	***t =***	***14.498***	*(equiv. to first two columns of ANOVA*
2	0.0001	*Diff(X1-X2)^2*		*211.98*	***df =***	***43***	*repeated* ***210.201***

											measures) F=
2	0.0001	|	***Calculations:***	***One Way Analysis of Variance (equivalent to t test)***							
2	0.0001	|	*Grand Total=*			*88.0044*	*Corr.Total =*		*88.0088*		
2	0.0001	|	*Total Sum Sq.=*			*123.9912*	*N.groups*		*2*		
2	0.0001	|	*Between Group Sum of Sq.=*			*87.99*					
2	0.0001	|	*Within Sum Squares=*			*36.0*					
2	0.0001	|	***F test compares the variance (standard deviation squared) of groups***								
2	0.0001	|	*Sums of:*	*REDS*	*BLUE-GREEN*		*0*	*0*	*0*	*0*	
2	0.0001	|	*numbers*	*88.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*		
3	0.0001	|	*squared numbers*	*212.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*		
3	0.0001	|	***One Way Analysis Variance with repeated measures. Calculations below***								
3	0.0001	|	*T=*	*88.0044*	*212*	*=T.r^2*					

(Zero's are actual marks)

Calculated value for **F = 210.201**

Value of **F** in statistical tables for 1 and 86 degrees of freedom = **3.96 at 5% and 6.96 at 1%**

Since 210.201 > 3.96 6.96 the Null Hypothesis can be rejected!

Therefore the observed differences in Rocking Intensity in Red and Blue-Green can be considered significant.

The values for F in The Variance Ratio or F Test are so large that a proper comparison with values in statistical tables cannot be made. Therefore this test is not really suitable.

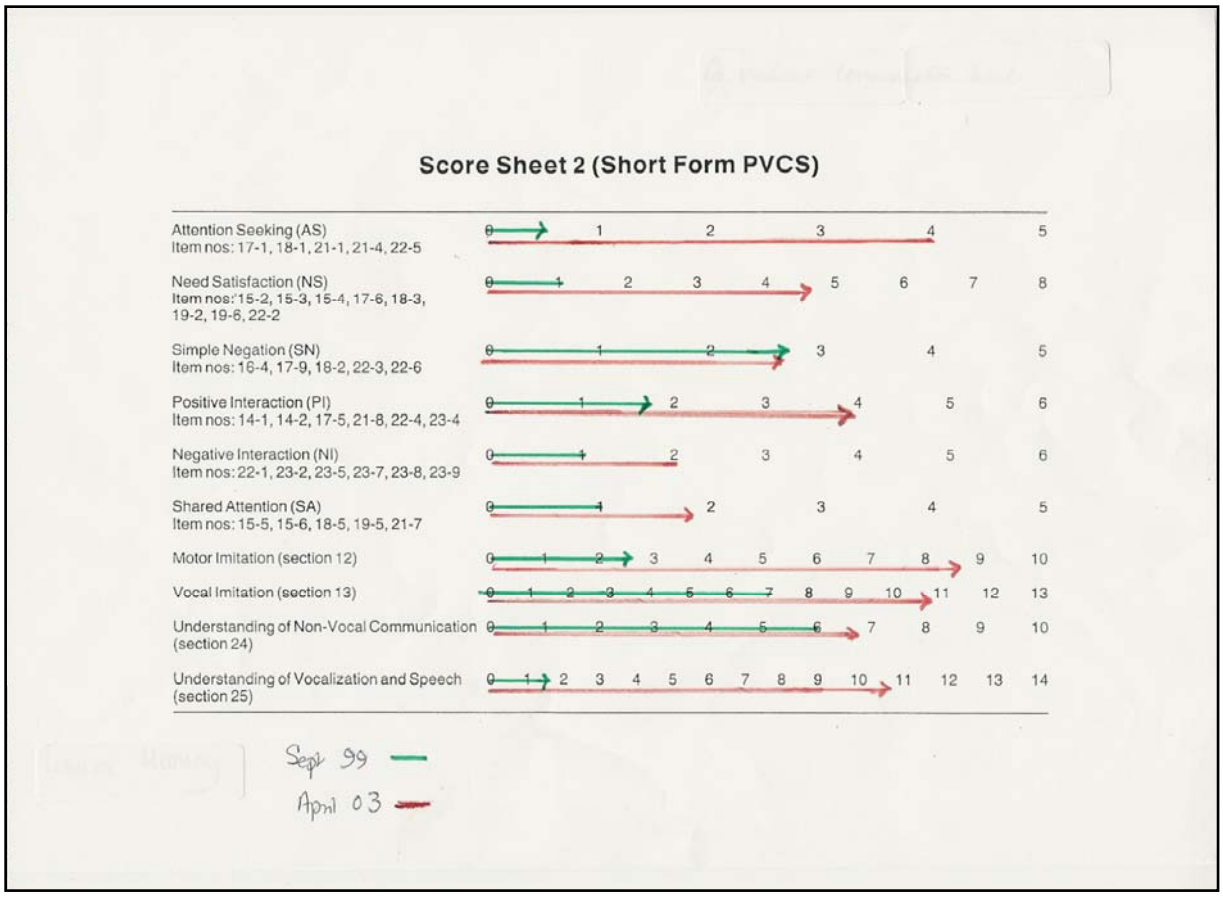
Note: The differences in the values are so great that it would be better simply to make the assumption that the results are significant. This test is not really necessary, and in any case there are problems with counting time units as separate scores. Figures of this magnitude of difference are not really suitable for this ANOVA computer programme.

Appendix 4. Results of PVCS Test for Anna, Coloured Filters and Temperature

Third Stage

Results of the Pre-Verbal Communication Scale Test for Anna- Score Sheet (2)

These tests were carried out by the speech and language therapist at the school where the research took place.
Original (baseline) test carried out in Sept 1999, final test in April 2003



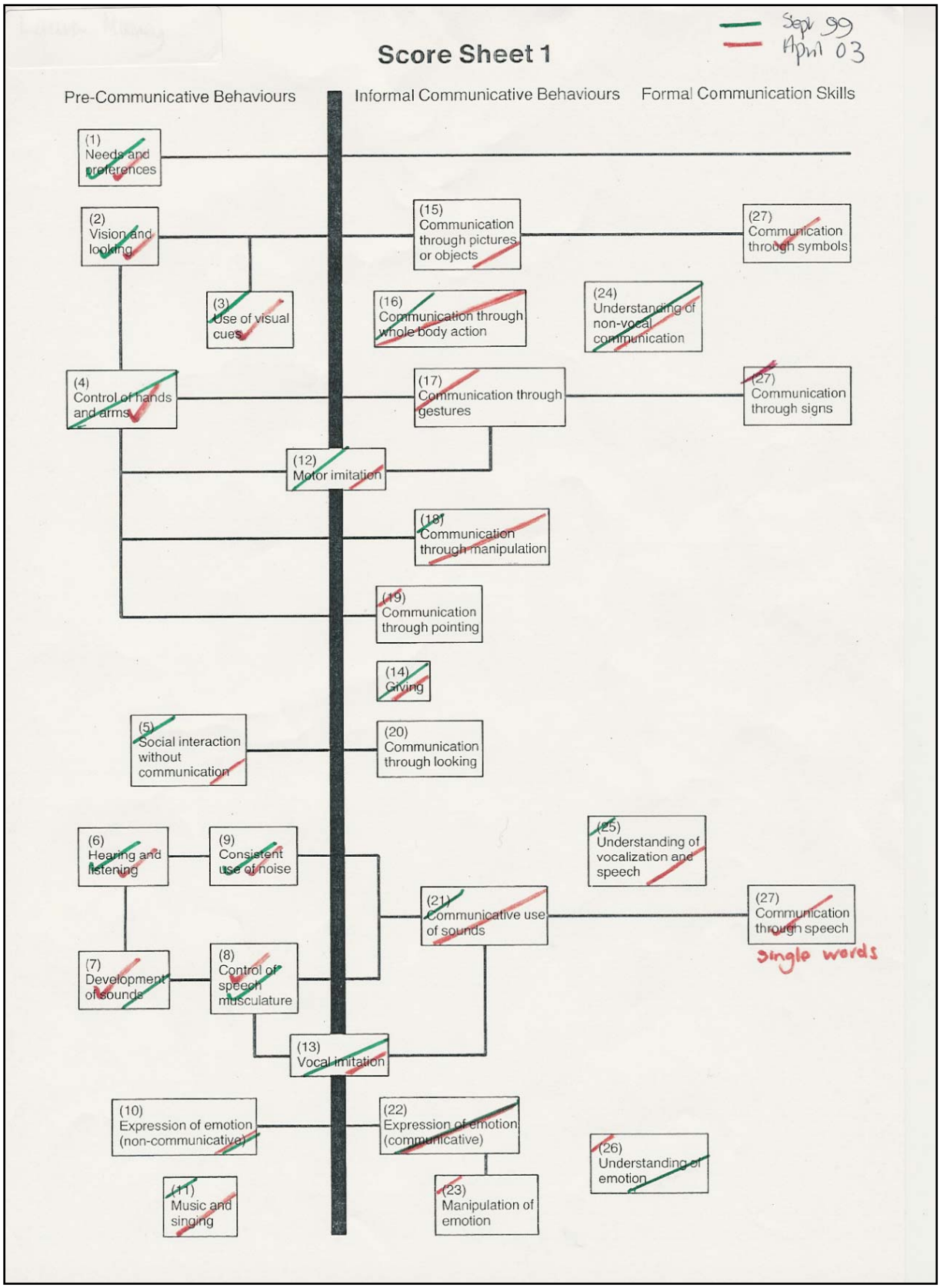
For Score Sheet 1 overleaf, the further the lines are to the right of the box, the greater the score in that category. Red ticks indicate that a particular category has been satisfactorily completed.

(Note: Item 26 appears to show a regression in understanding of emotion. When questioned about this the speech and language therapist who carried out the test said that this was probably because the test relied on things like the child going to sit on someone's lap, which in 1999 Anna would have done, whereas in 2003 being somewhat older she would not. Due to the nature of the test this was not thought to be on great significance.)

Score Sheet (1) for the Pre-Verbal Communication Schedule for Anna

Appendix 4

Original (baseline) test carried out in Sept 1999, final test in April 2003



Notes on Anna Reported by her Key Worker

Appendix 4

This report was given by Anna's key worker at the end of the three years she was with the project. The key worker had known Anna since well before the project commenced.

'Over the three years Anna has become more sociable. She communicates more, both verbally and using symbols and pictures. She also initiates play more now, and also physical contact and interaction. Three years ago she preferred her own space whereas now she prefers to be with others, though she still often likes to interact on her own terms. She also plays more with her peers than she did.'

ADDITIONAL INFORMATION

Appendix 4

Coloured Filters:

Stage lighting filters were used over the lights in the colour room to produce the colours as follows:

Red- Rosco Supergel No. # 26 'Light Red' Transmission 12%

Blue- Rosco Supergel No. # 79 'Bright Blue' Transmission 8%

Green - Lee Filters No. 124 'Dark Green' Transmission 30%

Yellow- Rosco Supergel No. # 10 'Medium Yellow' Transmission 92%

Rose Pink- Rosco Supergel No. #339 'Broadway Pink' Transmission 15%

(3 pieces, estimated transmission 12%)

Numbers of Lights and Coloured Filters

Blues: 9 Fresnels and 4 Floods are under the control of submaster **1.**

Rose Pinks: 4 Fresnels are under the control of submaster **2**

Reds: 5 Fresnels are under the control of submaster **3.**

Greens: 9 Fresnels are under the control of submaster **4.**

Yellows: 4 Fresnels are under the control of submaster **5.**

Red, Blue, Green 3 Fresnels (1 of each) aimed at screen, under the control of submaster **6.**

Appendix 4

Note: The blue filters used transmit a proportion of white light (red and green as well as blue) to lighten the colour. This is because ‘pure’ blue filters would transmit only about 3% (e.g. Rosco # 85 ‘Deep Blue’) of the light from the bulb and this would simply be too dark. Ideally such ‘pure’ filters would be used but this would necessitate many more high wattage lights that was not possible on grounds of cost. For individuals with autism the purity of a colour of light may be more significant than for others since there is some evidence that they can actually distinguish the spectral make-up of light. (Donna Williams described in a lecture in 1996 in Camphill, Gloucester how she could see the two spectral colours of red and yellow which make up the ‘pink’ colour of high pressure sodium street lights.)

THE EFFECTS OF TEMPERATURE

Appendix 4

The Question as to whether the Observed Effects are really Due to Colour

It has been assumed that when an effect (in terms of child behaviour) is observed in a particular colour it is actually the hue of the colour that is having the effect. It seems reasonably clear that it is the up fading or down fading of lights which cause the effects; but the question arises as to whether it is possible that some other factor (other than colour) connected with the lights is responsible. Could it be some other form of emission from the lights? The possibilities will briefly be discussed. The only other reasonable possibilities are ultra violet or infrared.

Ultra violet (u.v.) can be discarded because the specification of the lights is for low u.v. emission and in any case the filters in general do not transmit u.v. Also, u.v. is not usually considered detectible through the skin, only its after effects can be observed. Furthermore the levels from these lights are so low that they would not have any discernable effect on the skin. It would therefore seem reasonable to discount u.v. as a cause of the effects.

A more feasible candidate would be infrared. When the light room was being designed it was assumed that considerable heat would be generated by the lights as is common experience in stage lighting rigs. However this was found not to be the case and no extra fans or ventilation were found to be necessary during the operation of the room.

The question is whether the different colours give off minutely different amounts of heat and this could be the actual cause of the behavioural effect. It might be expected that the blue lights would give off the least energy, reds slightly more, greens more still and yellows the most due to the transmission figures of the filters (shown above). This has already been taken into account in the design of the room since there are considerably more blue lights and

slightly more reds to compensate for this (than green, pink and yellows). Nevertheless a simple test was carried out to find out whether there was any detectible difference in heat transmission between the various coloured filters.

The different colours were switched on for 3 minutes and the temperature of the room checked with a greenhouse thermometer. This was carried out on a fairly cold day in April immediately after the door had been left open for some minutes, allowing it to cool down. Each colour was tested over a period of 3 minutes (longer than average use) and the temperature change recorded. The results were as follows:

Blues (13 lights)	19.6 °C – 20 °C
Reds (9lights)	20 °C – 20.2°C
Greens (7lights)	20.2°C – 20.5°C
Yellows (4lights)	20.5°C – 20.7°C
Blues again	20.7°C – 21.2°C

These results show that only minute differences (0.2°C to 0.5°C) could be detected. In fact the blues showed a slightly greater increase in temperature than the others and this is almost certainly due to the considerably greater number of lights in this colour. Because these differences are so small it can safely be assumed that they would be most unlikely to have a detectable effect on the human body in terms of causing behavioural changes. It can therefore be considered most unlikely that differences in temperature in the different colours were responsible for the behavioural changes.

It can also be seen from the results above that there was a small but significant general rise in temperature over the course of the test and this can be attributed to the general heating effect of the lights. This could be expected to take place during a normal colour session, so if temperature were a contributory factor in behaviour then its effect could be expected to show a general trend corresponding to a steady change in one direction during the course of a session. Analysis of sessions shows that this was clearly not the case and therefore it will be assumed that changes in behaviour were not due to lighting-associated temperature changes.

Notes to Accompany Videos (DVD's)

Introduction

Two videos (on DVD discs) are presented with this thesis. They consist of edited clips taken from the video recordings which were made continuously during the course of the research as the main system of data collection. The thesis is written so that it can stand on its own without these, but they are given as an addition to give the reader a clearer picture of the nature of the study.

The separate clips are put together in a continuous sequence with no gaps or captions. The notes provided here are to assist the viewer with identifying each clip and to give a brief description of the content. For a fuller discussion, the main text in Chapter 14 should be referred to. For the earliest clips there was no date or clock on the video so a general description will be given for identification. For later clips (after November 2000) the dates (in black) and times (in red) are given.

There are two videos. The first gives a general overview of the whole project and shows examples of the three main stages, using clips from several of the children. The second is more of a biographical account of the progress of one child, Anna [not her real name] over the three years she was with the project. This was felt to be worthwhile as it illustrates the change in the child over the course of time and shows the steps along the way as her sociability increases and character emerges.

Appendix 5

The two videos are independent, and because of the nature of what they are attempting to illustrate, there is some degree of overlap, with some of the same clips of Anna being used in both films.

Most of the project was recorded on a small security camera permanently mounted in the corner above the booth. The picture quality is poor, not only because of the quality of the camera but also because of its fixed position. Later in the research a hand held camera was used and this provided a much-improved record. However, the sound is unfortunately quieter on the fixed camera, so it will be necessary for the viewer to adjust the sound volume on the monitor to compensate for this.

The Lighting

A row of spotlights can be seen at the top of the far end of the room. The blues are to the outside, then the pinks and greens, with the yellows in the middle. An identical row of lights is also mounted at the near end, under the control of the same dimmers, so when a child appears to be looking towards the camera it can see exactly the same lighting changes that the viewer can see at the far end.

Video 1 (DVD 1) *(Time 28 minutes)*

Appendix 5

'Engaging the Feeling and Will of Children with Autism Through the Medium of Colour – Edited Video Clips Illustrating the Main Stages'

First Stage – Examples of Colour Response Profiles

30 September 1999

Brian is sitting peacefully in blue. As the pinks gradually fade up he becomes slightly more restless. He begins to rock and vocalise and as the stronger reds come up the flicking begins.

23 March 2000

Simon is sitting on the right hand side of the room in strong reds. As the lights change to blue he looks down and seems to relax.

14 December 2000

Anna is sitting on the mat in the far left hand corner in strong responding reds. She is rocking and vocalising and sometimes sounding quite aggressive. The lights suddenly change to blue and she almost immediately stops the sound and movement and sits peacefully, apart from coughing and having her nose wiped. She remains quiet during the blue/ green rocking and actually continued to be peaceful for many minutes after the end of this clip.

2000 – 12 – 14

11 : 01 : 40 to 11 : 03 : 15 (Change is at 11 : 02 : 22)

Second Stage – Examples of Colour Mood Dialogue

Appendix 5

31 January 2000

Brian is standing to the left of the room. The reds and pinks are responding to his flicking and vocalisations. He can be seen to flick and vocalise while watching the lights, then to go quiet as the reds go down, then to look up at the lights again and wait, and then to start again to bring up the reds again. He appears to realise that the lights are responding to him and seems to enjoy the interaction with them.

13 December 1999

George is sitting to the right of the room. The reds are responding to his vocalisations and gestures. He is looking up at the lights for much of the time and appears to be happy, as indicated by his wrist banging (this is known to signify pleasure) and vocalisations. At one stage he seems to be 'conducting' the lights with his hand. This was the first and only session in Colour Mood Dialogue for George.

The Shadow Screen

21 March 2002

Jane is standing in front of the screen with the three spotlights to the right of the room. She is making multiple and overlapping coloured shadows with arm movements. Jane and DP take it in turns to lead a kind of hand 'dance'.

Colour Mood Dialogue Leading to Interaction

Appendix 5

19 July to 26 November 2001

This sequence involves **Alan.** It shows the gradual development from his side-to-side head movements and vocalisations with the yellows through mirroring by DP to an interactive and spontaneous 'dance'. It should be noted that matching the two yellow lights which can be seen in the middle at the back are two identical ones under the control of the same dimmer on the opposite side near the camera. These are what he is responding to and therefore the viewer can see the interaction.

19 July 2001

'Dialogue' with the yellows. Alan moves his head, the lights correspondingly flash, Alan stops and the lights stop, then he starts again and the lights start again. He can be seen to 'cotton on' to the fact that he is affecting the lights.

2001 – 07 – 19

11 : 22 : 58 to 11 : 23 : 40

12 November 2001

Beginning of interaction through Alan's game. DP is in the background and starts to 'join in'. At first it seems that Alan is taking no notice, but gradually the involvement of DP becomes more obvious. By the end of this sequence she is clearly part of the game.

2001 – 10 – 15

10 : 13 : 20 to 10 : 16 : 54

12 November 2001

Appendix 5

The game now develops into a ‘round and round dance’.

2001 – 11 – 12

11 : 36 : 00 to 11 : 36 : 31

26 November 2001

The game now develops into a spontaneous dance around the room including bouncing up and down, and jumping. At the end of this sequence the adult begins to lead, ‘asking’ Alan to raise his arms in the yellows.

2001 – 11 – 26

11 : 35 : 40 to 11 : 37 : 09

Interaction Developing from Child’s Natural Rocking Behaviour Leading to Speech (Anna)

28 June 2001

This is the first session for **Anna** where DP is the interactive partner. DP sits with Anna who then gets up and starts rocking. DP joins in. Swaying reds over blue accompany the movement.

2001 – 06 – 28

10 : 40 : 55 to 10 : 41 : 07

13 September 2001

Rocking together in red over blue. Anna starts to push against DP and then hugs.

2001 – 09 – 13

10 : 22 : 38 to 10 : 22 : 57

22 November 2001

Appendix 5

Anna is sitting with her back to the wall. DP sits facing her. Anna spontaneously and completely unexpectedly starts her head shaking game, and DP copies. There is good eye contact for the first time and real engagement. She also looks at the yellow lights with real interest for the first time. This is the beginning of having fun with DP.

2001 – 11 – 22

12 : 20 : 51 to 12 : 21 : 02

12 : 21 : 17 to 12 : 21 : 34

31 January 2002

Again sitting face-to-face. Anna shakes head and makes 'Bww…Bww…' sounds. There is good eye contact and laughter.

2002 – 01 – 31

12 : 28 : 43 to 12 : 29 : 04

12 : 29 : 18 to 12 : 29 : 30

21 March 2002 (Hand held camera)

This shows the development of the speech sound 'S' from Anna's head shaking game. The eurythmy hand gestures are similar to those she has previously made herself during this game. Anna can be seen to copy the gestures first and then to succeed in making the 'S' sound.

No date on video

'S' 11 : 13 : 22 to 11 : 13 : 48

There follow similar sequences for the sound 'B' and 'H'

'B' 11 : 14 : 17 to 11 : 14 : 49

'H' 11 : 15 : 47 to 11 : 16 : 57

7 October 2002 (Small security camera)

Appendix 5

This is a short sequence which demonstrates the effect of using gesture as well as sound to encourage speech sounds. Anna is again sitting face-to-face with DP who is trying to get her to make the sound 'K'. To begin with DP is making the sound only, and Anna seems unengaged. After a few moments DP makes the eurythmy gesture and Anna immediately becomes interested, makes better eye contact and begins to laugh. She then makes the gesture, followed eventually by the sound.

2001 – 10 – 07

12 : 09 : 02 to 12 : 09 : 36

21 October 2002 (hand –held camera)

Anna is sitting on the floor between DP's legs rocking from side to side. SP sings a 'rocking' song. Anna can be seen to try to form the word 'rock' with her mouth and then quietly says 'rock'.

21 – 10 – 2002

10 : 51 : 53 to 10 : 52 : 26

10 : 52 : 48 to 10 : 52 : 59

Anna now sits by the wall and of her own accord says the word 'rock'. She then pushes her head from side to side which appears to indicate the rocking action. This would appear to be good evidence that she understands the meaning of the word 'rock'.

Connecting Words to Movement (Anna)

Appendix 5

21 October 2002 (continued) (hand –held camera)

Anna commences a rocking sequence holding hands with DP. She then suddenly changes her mind, flaps her hand, and starts to push against DP. This is then turned into a 'pushing' game (something she has not done before) and the word 'push' is used. Anna very soon repeats the word.

21 – 10 – 2002

11 : 02 : 19 to 11 : 02 : 51

18 November 2002

Anna is sitting on the mat holding hands with DP and pulling backwards and forwards. A 'pulling' song is made up which emphasises the word 'pull'. The lighting goes to red when Anna makes an effort to pull.

18 – 11 – 2002

12 : 10 : 49 to 12 : 11 : 12

12 : 11 : 21 to 12 : 11 : 33

25 November 2002

Anna is again sitting down, pulling backwards and forwards with DP.

25 – 11 – 2002

11 : 53 : 22 to 11 : 53 : 29

Anna is making a real effort to pull with the camera focussing on her hands. At the end of the sequence she clearly says the word 'pull'.

25 – 11 – 2002

12 : 00 : 57 to 12 : 01 : 13

3 Feb 2003

Appendix 5

DP points to her nose and asks Anna what it is. She immediately says ‘nose’ indicating that she not only understands the question but also can give the appropriate answer. This is progress because she is now not just repeating words.

3 – 2 – 2003

12 : 05: 24 to 12 : 05 : 34

Use of a Story to Provide the Child with Emotional Involvement in Pretence

(Simon)

Simon is told a simple story about a boy who goes for a walk, comes to a river where he sees water and fish. He then swims in the river.

2001 – 05 – 24

Walk, water, fish: **10 : 21: 12 to 10 : 22 : 15**

Swims: **10 : 22: 40 to 10 : 22 : 57**

10 : 23: 04 to 10 : 23 : 15

Simon is making gestures for flames with the reds and yellows. DP then says the word ‘hot’ and acts as though putting her hands out towards the fire. Simon copies and then draws a sudden in-breath, withdraws his hands and clasps them round his middle as though burnt. He then puts his hand out and starts to make a sort of crying sound. DP does not spot this gesture so the sequence is not continued but it appears from the video that Simon is acting being burnt and appropriately upset.

2001 – 05 – 24

Fire: **10 : 23: 30 to 10 : 24 : 24**

Connecting Words to Movements

Appendix 5

12 July 2001

Here Simon is being introduced to the 'In/Out' exercise. After a little while he gets the idea of what is wanted and manages to use the words 'in' and 'out' appropriately.

2001 – 07 – 12

11 : 50: 04 to 11 : 51 : 07

11 March 2002

The 'In/Out' exercise again.

2002 – 03 – 11

12 : 22: 12 to 12 : 22 : 21

The 'Up/Down' exercise with yellow for 'up'

2002 – 03 – 11

12 : 22: 38 to 12 : 22 : 50

11 March 2002 (continued)

The next sequence shows an identity exercise. Again words are connected to movements but this time Simon has to use names appropriately as the actions are carried out.

2002 – 03 – 11

'Simon jump, Di jump' **12 : 29: 16 to 12 : 29 : 30**

'Simon pull, Di pull' **12 : 39: 39 to 12 : 40 : 00**

A Game Requiring Choice with Build Up and Release of Tension

Appendix 5

25 April 2002

This is the 'Choosing Sweets' game where Simon has to pretend to make a choice of imaginary sweets and offer the appropriate name (see p 275). When the game is first introduced (first clip) Simon requires some help, in the form of DP starting to mouth the word. The next two choices are entirely his own, when he offers 'bag' and 'biscuit'. It is clear from the video that these are original choices as DP can be seen not at first to recognise the word he is using.

2002 – 04 – 25

'Mars', 'bag' & 'biscuit' **10 : 37: 04** **to** **10 : 38 : 51**

Drink 'Orange juice' **10 : 39: 06** **to** **10 : 39 : 45**

16 January 2003 (hand held camera)

This shows Simon taking part in an imaginary meal with DP. He clearly understands what is involved and is willing and able to take part in the pretence.

16 – 1 – 2003

09 : 40: 50 **to** **09 : 41 : 33**

This is the final clip

Video 2 (DVD2) *(Time 25 minutes)*

Appendix 5

Engaging the Feeling and Will of Children with Autism Through the Medium of Colour – '[The subject]'s Story'

For this film [the subject's] real name has been used since it is unavoidably obvious and since the film is specifically about her. It starts with a baseline clip of [the subject] in the playground at the start of the project. It then goes on to show her progress from the first introduction to the room, to the development of social skills, play and speech through her three years with the project.

Baseline Video

Spring 2000

[The subject] is sitting in the playground 'chatting' to herself. She can be seen to be very much 'in her own world'. She is then taken by an assistant towards school.

20 January 2000

[The subject] is brought into the colour room with white room lights only. She sits down with two assistants.

Colour Response Profile

5 April 2000

[The subject] is sitting at the right hand side of the room in red light. She is vocalising and fidgeting. When the lights change to blue the vocalisation can be seen to stop and the fidgeting becomes slightly less.

(NB the video camera was broken from April – September 2000)

14 December 2000

Appendix 5

This sequence shows [the subject]'s reaction to a change from red to blue light. To begin with she is sitting on the mat in responding strong reds. She is rocking from side to side is and vocalising to herself loudly and sometimes quite aggressively. The red lights are responding to her movement and vocalisations and this appears to encourage them. While in 'full flight' the lights are deliberately changed to blue and then to rocking blue/green. Almost immediately she goes quiet and the rocking stops. She remains peaceful and quiet (apart from coughing and having her nose wiped) and actually remains like this for many minutes.

2000 – 12 – 14

11 : 01: 56 to 11 : 03 : 15

Start of Interaction with Support Person

18 January 2001 (no sound on video)

[The subject] is seen playing with the support person. Reds are used for the more active sequences with blue and blue/green for the more passive. She is often boisterous and sometimes quite aggressive. On a number of occasions she hits the support person

10 : 24: 35 to 10 : 24 : 57

10 : 25: 35 to 10 : 25 : 55

10 : 26: 03 to 10 : 26 : 20

A calmer moment: **10 : 27: 46 to 10 : 27 : 54**

8 February 2001

Appendix 5

[The subject] and the support person are playing with a piece of chiffon. Again reds are used for the more lively moments, blue/greens for the calmer.

2001 – 02 – 08

10 : 28: 24	**to**	**10 : 28 : 36**
10 : 35: 06	**to**	**10 : 35 : 22**
10 : 35: 40	**to**	**10 : 35 : 55**

Start of Interaction with DP

'Joining In' with [the subject]**'s Natural Behaviours**

28 June 2001

This is the first occasion when DP goes in with [the subject]. They sit together for some time and then [the subject] gets up and starts rocking. DP takes her hands and 'joins in'.

2001 – 06 – 28

Introduction and sit together	**10 : 36: 45**	**to**	**10 : 37 : 00**
	10 : 37: 17	**to**	**10 : 37 : 31**
	10 : 37: 49	**to**	**10 : 37 : 56**
	10 : 38: 19	**to**	**10 : 38 : 32**

Sitting in blue, Get up together and start to rock	**10 : 40: 00**	**to**	**10 : 40 : 06**
	10 : 40: 14	**to**	**10 : 40 : 29**
	10 : 40: 32	**to**	**10 : 40 : 36**
	10 : 40: 39	**to**	**10 : 40 : 49**
	10 : 40: 55	**to**	**10 : 41 : 07**

13 September 2001

Appendix 5

[The subject] and DP are again rocking together. [The subject] embraces DP.

2001 – 09 – 13

10 : 22: 38 to 10 : 22 : 58

Beginning of Adult –Led Interaction

25 October 2001

[The subject] and DP are playing. [The subject] pulls DP up and goes round and round. The game is on [The subject]'s terms to begin with. DP then encourages [The subject] to lift her arms up for the 'Up/Down' exercise.

2001 – 10 – 25

Arms up	**11 : 26: 12**	**to**	**11 : 26 : 23**
Round and round	**11 : 28: 31**	**to**	**11 : 28 : 45**
Arms up	**11 : 28: 54**	**to**	**11 : 29 : 03**

Beginning of Connecting Words to Movements

8 November 2001

In this session [The subject] shows achieves speaking her first clear word but also shows aggression by hitting when she cannot have her own way. The session starts with rocking and is followed by the 'Up/ Down' exercise where she says 'up' for the first time. When asked to repeat the exercise she shows her disinclination by hitting. In the second sequence she is playing the 'round and round' game and does not want to stop. When DP tries to stop she hits again. The sequence ends with successfully achieving the 'arms up' exercise after some 'persuasion'.

Appendix 5

2001 – 11 – 08

Rocking, 'Up/Down', hits **12 : 03: 48** **to** **12 : 04 : 35**

Round & round, hits again **12 : 05: 11** **to** **12 : 05 : 33**

Start of Real Social Engagement

22 November 2001

This is an important moment in the relationship. [The subject] is sitting against the wall, face to face with DP where previously she has been requested to make the arms up gesture. Unexpectedly and spontaneously she suddenly starts to **shake her head and make a 'Brrr…Brrr' sound**. DP copies the head shaking and sound and [The subject] laughs. This is the first real 'fun' interaction which leads later to the forming of speech sounds. It is not repeated for some time despite the fact that DP tries to encourage it.

2001 – 11 – 22

12 : 20: 35 **to** **12 : 21 : 02**

12 : 21: 17 **to** **12 : 21 : 35**

13 December 2001

[The subject] has enjoyed jumping previously and on this occasion the attempt is made to connect the word to the action. As she jumps DP jumps as well and uses the word 'jump'. [The subject] avoids the demand at first but then says **'**jump**'** several times. From her smiles she clearly appears pleased with her achievement.

Appendix 5

2001 – 12 – 13

Galloping round		**12 : 54: 14**	**to**	**12 : 54 : 17**
Galloping & jumping	Fails	**12 : 54: 18**	**to**	**12 : 54 : 33**
		12 : 54: 45	**to**	**12 : 54 : 57**
Word ‘jump’	Succeeds	**12 : 56: 23**	**to**	**12 : 57 : 25**

31 January 2002

This is the first time that [The subject] is asked to perform the ‘In/Out’ exercise. She does not at first understand what is required of her, but as soon as she begins to get the idea she shows joy and starts to laugh. Clearly she finds this exercise fun, once she knows that she can do it. The words ‘ In’ and ‘Out’ are introduced and [The subject] manages to say the word ‘Out’.

2002 – 01 – 31

12 : 20: 25	**to**	**12 : 20 : 57**
12 : 21: 11	**to**	**12 : 21 : 42**
12 : 21: 46	**to**	**12 : 22 : 09**

31 January 2002 (continued)

[The subject] is sitting face-to-face with DP. There is good eye contact. Suddenly she starts to shake her head and make funny sounds such as ‘Bww…Bww…’ or ‘Brr…Brr…’ There is lots of laughter and real social engagement. For the first time [The subject] is having proper fun with DP.

2002 – 01 – 31

12 : 28: 42 to 12 : 29 : 38

28 February 2002

Appendix 5

[The subject] performs the 'In/Out' exercise again. DP requests, [The subject] recognises the exercise and willingly takes part. She uses the word 'out' several times.

2002 – 02 – 28

12 : 28: 33 to 12 : 29 : 52

14 March 2002

[The subject] is sitting face-to-face with DP again. [The subject]'s head shaking game is now transformed into the sound 'S' which in eurythmy has a movement with the hands and shaking of the

head. [The subject] is very amused and follows the head shaking and soon makes the sound 'Ssss…'

This seems to be a favourite and she regularly makes this gesture and sound for the next few sessions.

2002 – 03 – 14

12 : 16: 32 to 12 : 16 : 58

12 : 17: 08 to 12 : 17 : 18

21 March 2002 (hand held camera, no date on video)

This sequence shows the further development of speech sounds using the gestures of eurythmy. The gesture for 'S' plus the sound is first made. [The subject] can be seen to be engaged with the movement as she begins to copy. She then succeeds in making the sound 'S'. Similar sequences show the sounds for 'B' and for 'H'.

2002 – 03 – 21

‘S’	**11 : 13: 22**	**to**	**11 : 13 : 48**
‘B’	**11 : 14: 17**	**to**	**11 : 14 : 49**
‘H’	**11 : 15: 77**	**to**	**11 : 16 : 57**

21 March 2002 (continued)

Appendix 5

[The subject] now plays the ‘Horse riding game’. In this game the emphasis, besides being on fun, is on anticipation and excitement with a slight element of fear. She copies the word ‘horse’ and also uses the word ‘off’ spontaneously as she anticipates ‘falling off’. Her expression before the second fall should be noted; this is a good example of affect. The lights are very blue and this was not intended, unfortunately the operator was just watching and forgot to change the colours!

2002 – 03 – 21

Riding & word ‘horse’	**11 : 21: 26**	**to**	**11 : 21 : 47**
	11 : 22: 06	**to**	**11 : 22 : 16**
Two ‘falls’	**11 : 22: 26**	**to**	**11 : 23 : 40**

7 October 2002 (Small security camera)

This is a short sequence which demonstrates the effect of using gesture as well as sound to encourage speech sounds. Anna is again sitting face-to-face with DP who is trying to get her to make the sound ‘K’. To begin with DP is making the sound only, and [The subject] seems unengaged. After a few moments DP makes the eurythmy gesture and [The subject] immediately becomes interested, makes better eye contact and begins to laugh. She then makes the gesture, followed eventually by the sound.

2001 – 10 – 07

12 : 09 : 02 **to** **12 : 09 : 36**

21 October 2002 (hand –held camera)

Appendix 5

[The subject] is sitting on the floor between DP's legs rocking from side to side. DP sings a 'rocking' song. [The subject] can be seen to try to form the word 'rock' with her mouth and then quietly says 'rock'.

21 – 10 – 2002

10 : 51 : 53 to 10 : 52 : 26

10 : 52 : 48 to 10 : 52 : 59

[The subject] now sits by the wall and of her own accord says the word 'rock'. She then pushes her head from side to side which appears to indicate the rocking action. This would appear to be good evidence that she understands the meaning of the word 'rock'.

21 – 10 – 2002

10 : 53 : 17 to 10 : 53 : 26

21 October 2002 (continued)

[The subject] has learnt the sound 'P' and during the last few sessions has enjoyed making it into a game and song. In this sequence it is played again and has become known as her 'Per…Per…' song.

21 – 10 – 2002

10 : 54 : 02 to 10 : 54 : 50

Connecting Words to Movement

Appendix 5

21 October 2002 (continued)

[The subject] commences a rocking sequence holding hands with DP. She then suddenly changes her mind, flaps her hand, and starts to push against DP. This is then turned into a 'pushing' game (something she has not done before) and the word 'push' is used. Anna very soon repeats the word.

21 – 10 – 2002

11 : 02 : 19 to 11 : 02 : 51

A 'Fun' Game Making Animal sounds

21 October 2002 (continued)

This sequence shows a game where [The subject] and DP make the sounds of various animals. She not only can repeat the names of some of the animals but also makes the appropriate sounds unprompted.

21 – 10 – 2002

Dog	**11 : 04 : 46**	**to**	**11 : 05 : 01**
Dog & cat	**11 : 05 : 29**	**to**	**11 : 05 : 49**
Lion	**11 : 06 : 20**	**to**	**11 : 06 : 30**

Connecting Words to Movement

Appendix 5

18 November 2002

Anna is sitting on the mat holding hands with DP and pulling backwards and forwards. A 'pulling' song is made up which emphasises the word 'pull'. The lighting goes to red when Anna makes an effort to pull.

18 – 11 – 2002

12 : 10 : 49 to 12 : 11 : 12

12 : 11 : 21 to 12 : 11 : 33

25 November 2002

Anna is again sitting down, pulling backwards and forwards with DP.

25 – 11 – 2002

11 : 53 : 22 to 11 : 53 : 29

Anna is making a real effort to pull with the camera focussing on her hands. At the end of the sequence she clearly says the word 'pull'.

25 – 11 – 2002

12 : 00 : 57 to 12 : 01 : 13

'Row the Boat' Game

20 January 2003

[The subject] can now join in children's games like this and knows when to 'scream' at the end of the song.

20 –1 – 2003

11 : 44 : 49 to 11 : 45 : 26

3 Feb 2003

Appendix 5

DP points to her nose and asks Anna what it is. She immediately says 'nose' indicating that she not only understands the question but also can give the appropriate answer. This is progress because she is now not just repeating words.

3 – 2 – 2003

12 : 05: 24 to 12 : 05 : 34

[The subject] finished on the project soon after this, but because she was now engaging and communicating with all staff, progress in general social skills continued to be made.

November 2003

This final clip shows a short sequence of a play session held after [The subject] had left the colour project. She can be seen to be engaged with the play therapist, there is good eye contact, smiling, and use of appropriate words. Her increased level of social engagement can be seen from a comparison with the baseline clips at the start of the video.