
**THE CHARACTERISTICS OF PARENT-CHILD
INTERACTION DURING A PROBLEM-SOLVING TASK:
A COMPARISON OF CHILDREN WITH DOWN SYNDROME
AND TYPICALLY DEVELOPING CHILDREN**

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ABSTRACT

The characteristics of parent-child interaction and the impact it has on children's cognitive development has been an area of interest to developmental psychologists for many years. The seminal work of Vygotsky, which emphasised a distinction between the *actual level of development* and the *zone of proximal development (ZPD)*, and proposed that learning proceeds most effectively when tutoring occurs in the ZPD, has provided a foundation for much subsequent research on interactive problem-solving. As part of this tradition, Wood and his colleagues (e.g., Wood, 1980; Wood, Bruner & Ross, 1976; Wood & Middleton, 1975; Wood, Wood & Middleton, 1978) have described the process of *scaffolding* which is used by parents and tutors to target the child's ZPD during interaction. The present study uses a Vygotskian perspective and the past work of Wood and Middleton (1975) to compare the characteristics of parent-child interaction on a problem-solving task between children with Down syndrome (DS) and typically developing (TD) children. Each parent-child dyad completed a block model-copying task based on the one used by Wood and Middleton (1975) in their early research. Each session of interaction was then analysed and coded with regard to how general or specific the parent's interventions were, and how contingent they were upon the child's successes and failures, and level of ability. The frequencies of supportive and directive actions and vocalisations were also noted. In addition, each parent completed a measure of parenting style and the children were administered a test of expressive and receptive language development as a comparative measure of developmental level between the two groups.

The results revealed many differences between the two groups. The parents of the TD children followed the pattern predicted by Vygotskian theory to be most effective, focussing more on the children's *region of sensitivity to instruction (RSI)* and responding contingently to their successes and failures. By contrast, the parents of the children with DS focussed more on their child's *actual developmental level (ADL)* than their RSI, and followed the *contingent shift rule* less consistently than the parents of the TD children. They also intervened in the task more often, using higher, more specific levels of intervention, and were both more *supportive* and more *directive* than the parents of the TD children. The implications of these findings are discussed with reference to past research, and the proposition is put forward that the parents of the children with DS may be employing a different interactional strategy which is more adaptive to the different needs and abilities of their children.

CHAPTER ONE

INTRODUCTION

It is universally acknowledged that the relationship between parents and their children has a uniquely special and important role to play in children's development. From the initial formation of an attachment bond in infancy, right through the early years and beyond, children look to their parents for information and guidance about the world into which they have been born. It is through interacting with their parents and significant other adults that children learn how to speak, behave, solve problems and become independent members of society. Thus, the characteristics and quality of parent-child interaction have always been a subject of much interest for psychologists. Beginning with a description of Vygotskian theory, which centres around the process of development through interaction, the following chapter will present research looking at how learning occurs during parent-child interaction and the processes that are involved. It will then move on to a discussion of the characteristics of children with Down syndrome who have been found to have particular difficulty with both learning and interaction. Due to the difficulties that these children have, and the different expectations and perceptions of their parents, interaction between parents and their children with Down syndrome have been consistently found to differ in many ways to the interaction observed between parents and typically developing children. These differences will be discussed and then a description of the present study and its hypotheses will be presented.

Vygotskian theory and the Zone of Proximal Development (ZPD)

One of the most influential theorists in developmental psychology is Lev Semenovitch Vygotsky. The central thesis of Vygotsky's work is that cognitive development in childhood comes about principally as the result of social interaction. Or, in other words, the socialisation of the child's mind is at the core of mental development (Bornstein, 1989; Vygotsky, 1978). From this perspective, cognitive functioning in the individual can only be understood by studying the social and cultural processes from which it develops. To explain this theory Vygotsky proposed the "general genetic law of cultural development" which states that any function in the child's cultural development occurs twice, or on two planes (Wertsch, 1985a). The first is the social, or *interpsychological* plane, and the second is the individual, or *intrapsychological* plane. That is, mental processes first occur between people at the interpersonal level of social interaction, and then through the process of *internalisation* they become a part of individual (intrapersonal) cognitive functioning (Pratt, Kerig, Cowan &

Cowan, 1988; Vygotsky, 1978). In this view, things such as mind, cognition and memory are not considered to be attributes or properties of an individual, but rather are functions that can be carried out both intermentally and intramentally (Wertsch & Tulviste, 1996).

The process of internalisation by which social phenomena are transformed into psychological phenomena is thus an important one. Brown and Ferrara (1985) describe it as a gradual process which takes place in three stages. Firstly, the adult takes control and guides the child's activity. Secondly, the adult and child begin to share the problem-solving functions, with the child beginning to take the initiative and the adult correcting and guiding as needed. Finally, the child takes control and the adult moves into more of a supportive, observer role. It is important to understand that the process of internalisation is not simply taking an existing external reality and copying it to a pre-existing internal plane. Rather, it is a process whereby an internal plane of consciousness is *formed*. There is a dynamic relationship between the two planes, as progress and development on the interpsychological plane reflects additional development on the intrapsychological plane. Thus, changes in interpsychological functioning are understood to be inherently linked to changes in intrapsychological functioning (Wertsch, 1985a). If this is the case, the quality of interaction that children experience takes on great significance in terms of their cognitive development. A further important point is that due to its origins, the intrapsychological plane of consciousness takes on a 'quasi-social' nature, or in other words its form reflects the fact that it developed from social interaction.

Vygotsky proposed that this process of internalisation is mediated by tools and signs such as gesture and language. They both facilitate the construction of knowledge and are the means which are internalised to be used in future independent activity (Palincsar, 1998). For example, children initially learn language as a means of communication between themselves and those around them. However, subsequently language becomes converted to inner speech where it is used to organise the child's thoughts (Vygotsky, 1978). In Vygotsky's view "the greatest change in children's capacity to use language as a problem-solving tool takes place somewhat later in development, when socialized speech (which has previously been used to address an adult) is turned inward. Instead of appealing to the adult, children appeal to themselves; language thus takes on an intrapersonal function in addition to its interpersonal use" (1978; p. 27).

Based on this thesis that the process of development is essentially a social and interactive one, Vygotsky believed that to characterise a child's developmental level in terms of those functions that he or she has already mastered and is capable of carrying out independently, was somewhat irrelevant. To do so is to look only at the end products of development to the exclusion of those functions and skills which are in the process of developing, but are not yet fully mature. That is, those functions which the child can carry out only in an interactive context with the assistance of another more skilled member of his or her culture. Thus, he proposed a distinction between a child's "actual developmental level" and the "zone of proximal development". The *actual developmental level (ADL)* is defined as "the level of development of a child's mental functions that has been established as a result of certain already *completed* developmental cycles" (Vygotsky, 1978; p. 84). In contrast, the *zone of proximal development (ZPD)* is defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under guidance or in collaboration with more capable peers" (Vygotsky, 1978; p. 84). In other words, the ZPD refers to functions that are in the process of maturing, thus characterising mental development prospectively. Vygotsky proposed that the ZPD is a far more useful way of characterising cognitive development as it allows for prediction of future capabilities, and taps into functions and abilities which would be otherwise overlooked. For example, two children at the same actual level of development may in fact differ in important ways in terms of their ZPD. One may only be able to perform slightly higher than his or her actual level of development when given assistance, while the other may be able to perform at a significantly higher level. However, such differences would not be picked up on a standard, static assessment of the child's unassisted cognitive performance.

The concept of the ZPD is thus very useful for determining diagnostic information about individual differences. When a group of children are given a task, they may all be at the same level initially, but examining the ease with which they acquire information and use it enables researchers to make a distinction between individual children and identify those who are likely to go on to achieve highly, and those who are likely to encounter problems. The use of a static test of unassisted performance is a good measure of how much the child already knows (i.e., the actual level of development), whereas dynamic assessment within the child's ZPD gives a measure of how *efficiently the child can learn* and enables researchers to predict more accurately the child's future performance and development (Campione, Brown, Ferrara, & Bryant, 1984; Ferrara, Brown & Campione, 1986).

Looking at development in terms of the ZPD also has important implications for learning and intervention programmes. Vygotsky proposed that the only "good learning" is that which is in advance of development because "an essential feature of learning is that it creates the zone of proximal development; that is, learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his (her) environment and in cooperation with his/her peers" (Vygotsky, 1978: p. 90). In other words, the developmental process is thought to lag behind the learning process. Tutoring should, therefore, be aimed at the upper end of the child's ZPD in order for learning to proceed most effectively and to encourage development rather than being focussed on the child's existing level of competence (Brown & Ferrara, 1985; Pratt et al., 1988). It is also important to remember that the concept of the ZPD, because it corresponds to intermental functioning, has significant implications for how intramental functioning can be changed through interaction.

Parent - child interaction, scaffolding and problem-solving

Following on from this Vygotskian thesis of the crucial role that social interaction plays in children's cognitive development, many researchers have looked in depth at different types and aspects of parent/tutor-child interactions and the impact they have on different aspects of children's development (e.g., Bornstein, 1989; Bruner & Bornstein, 1989; Hartup & Laursen, 1999; King, Staffieri, & Adalgais, 1998; Levine, 1993; Maccoby, 1999; Maccoby & Martin, 1983; Meadows, 1996; Pratt et al., 1988; Rogoff, Ellis & Gardner, 1984; Wood, 1988; Wood & Middleton, 1975; Wood, Bruner & Ross, 1976). As the family is the primary environment in which social skills, problem-solving skills, and self-regulation skills are learned, the role that parent-child interaction plays in children's development is a crucial one (Maccoby & Martin, 1983). Wood and Bruner and their colleagues (e.g., Bruner & Bornstein, 1989; Wood, 1980; Wood, 1988; Wood, 1989; Wood et al., 1976; Wood & Middleton, 1975; Wood, Wood & Middleton, 1978) have been particularly influential in this area of research. They conducted a series of studies looking at the role that tutoring in interaction plays in the development of problem-solving skills. The first study in this series (Wood et al., 1976) was based on the important observation that tutorial interactions occur naturally in the world of all children as they develop skills such as attending, communicating and manipulating objects with the help of other people in their environment. Thus, the aim of this study was to examine the implications of this interactive relationship between the developing child and his or her elders for the study of skill acquisition and problem solving. They proposed that by breaking complex tasks down into problems that are smaller and more manageable, tutors can help children to detect

regularities and patterns in a problem-solving activity that they would be unlikely to discover alone. They developed the concept of *scaffolding* to describe these and other strategies that parents employ to support their children's learning during interaction. This process of scaffolding is defined as "the adult' controlling' those elements of the task that are initially beyond the learner's capacity, thus permitting him (her) to concentrate upon and complete only those elements that are within his (her) range of competence" (Wood et al., 1976; p. 90). They hypothesised that in order for the scaffolding process to be effective, the child must be able to *recognise* a solution to a particular class of problems before he or she is able to *produce* the steps leading to it without assistance. They then observed 30 children aged 3, 4 and 5 years completing a block model copying task in interaction with their mothers. The results showed that although the 3-year-olds were unable independently to *produce* a solution as effectively as the older children, they were just as adept at *recognising* one, suggesting that comprehension of a solution does indeed precede the ability to produce one.

From their observations in this study, the researchers composed a comprehensive outline of the scaffolding process, a metaphor which is now common in the interaction literature. They identified six stages of the scaffolding process as follows: the first stage, *recruitment*, involves the tutor enlisting the child's interest in and adherence to the requirements of the task; stage two is *reduction in degrees of freedom* during which the tutor simplifies the task by reducing the number of acts required to reach a solution; the third stage, *direction maintenance*, involves the tutor keeping the child motivated and in pursuit of a particular objective; stage four, *marking critical features*, is when the tutor uses various means to mark or accentuate various features of the task that are relevant, thus seeking to bridge the gap between the child's recognition of the correct solution, but inability to produce it; the fifth stage is labelled *frustration control* and involves the tutor aiming to make the task less frustrating for the child than it would be if he or she were trying to complete it independently; and finally, stage six is called *demonstration* and involves the tutor providing an idealised version of the appropriate act. At this stage, the tutor must often complete or explain steps that have already been partially executed by the child. The researchers concluded from this study that instruction in an interactive context through the process of scaffolding can be seen to be effective when it works to bridge the gap between the child's recognition of the solution and the ability to produce it. This occurs when the tutor continually challenges the child with goals or tasks which are beyond his or her current ability, but not so far beyond that the child is not able to understand the request.

Based on the findings of this first study, Wood and Middleton (1975)¹ conducted a second study looking at assisted problem solving, with a particular interest in how the mothers would modify their levels of intervention over time on the basis of their children's responses. Twelve children aged between 3.2 and 4.2 years, and their mothers completed the same block model-copying task used in the previous study. The task was too difficult for the children to complete alone, so the object was to observe the interactional process of each mother helping her child to construct the toy. Wood and Middleton defined five *levels of intervention* by which these mother-child interactions were assessed. The levels began with a very general, verbal instruction to the child, and slowly become more active and specific down to level 5 which involves the mother demonstrating the operation (refer to the method section for a full description of the levels). Bearing in mind the recognition-production gap as found in the previous study, and the Vygotskian concept of the ZPD on which it is thought tutoring should be focussed, they defined the *region of sensitivity to instruction* as being the level of intervention which asks the child to add one extra operation or decision to those which he or she is currently performing. They hypothesised that maternal instructions which were within this region would be the most effective. The results showed that the most effective instructors were indeed those mothers who concentrated their interventions within their child's region of sensitivity, and who responded most contingently to the effects of their instructions on their child. Contingent responding was defined as giving less support to the child after a success, and more support following a failure.

The final study in this series (Wood et al., 1978) was then conducted to evaluate the efficacy of the different teaching strategies observed in the above study. Four different teaching strategies were identified from the above study. The first, *demonstration*, involved the mothers relying solely on demonstration to teach their child, without ever attempting to discover their child's current level of ability, or challenge them to move past it. The second strategy, *verbal*, applied to mothers who only used the first two verbal levels of intervention, without ever intervening in a more active way. The third level, *swing*, describes those mothers who tended to swing between general verbal instructions, and demonstration, and finally, the fourth level, *contingent*, relates to those mothers who responded to their children's performance by providing more support after a failure and less support after a success. Thirty-two children aged between 3 and 4 years were divided into 4 groups and were asked to complete the block model-copying task with a tutor. Each group received tutoring in one of the four styles described above. The results showed that as expected, the children who were taught

¹ Note that even though the Wood, Bruner and Ross study was published after the Wood and Middleton study, it was conducted first.

contingently performed significantly better than the children in the other 3 groups. They were the most active and efficient at problem solving within the task and subsequently, were capable of performing the majority of the task independently. They suggested that a contingent style of interaction on the part of a parent or tutor is therefore most likely to lead to successful development of new skills in the child. If the parent is able to increase control as soon as the child begins to fail to the point where the child is successful again, and conversely, relinquish control to the child when he or she is performing successfully, the child will experience a learning environment in which he or she never succeeds too easily nor fails too often. Such an environment helps the child to develop a sense of self-competence and to internalise an understanding of the skills and relationships between events, which are required for successful independent problem solving.

The findings of these three studies can be put together to provide an overall picture of the characteristics of effective tutorial intervention. Firstly, the parent or tutor must understand that the child is able to recognise a correct solution before he or she is able to produce it, and thus seek to bridge this gap through intervention. Secondly, the parent or tutor must regulate his or her instructions and demonstrations to the child's current attentions and abilities, and respond contingently to the child's successes and failures. Wood (1980) proposes that it is this contingency, backed up with an effective analysis of the task that enables the tutor to both discover and operate within the child's ZPD. Finally, the parent or tutor must be able to provide sensitive scaffolding, which involves initially building a supportive structure around the child enabling him or her to connect his or her actions into the overall solution, and then progressively relaxing control which allows the child to begin to take the initiative and to internalise a sense of ownership of the task solution and self-competence. If the parent or tutor provides too much support and fails to relinquish control, or in other words works at the lower boundary of the ZPD and not in the region of sensitivity to instruction, the child does not have the opportunity to develop new skills or to gain a sense of self-competence (Wood, 1989).

Since these insightful studies, many other researchers have explored the concept of scaffolding and contingent interaction and the role it plays in children's development. Their findings support the proposition that effective scaffolding results in greater developmental gains for children (e.g., King et al., 1998; Meadows, 1996; Palincsar, 1998). Several researchers have also reviewed the concept of scaffolding from a Vygotskian perspective and found that it fits together well with the concept of the ZPD and the process of internalisation. Children who have been the recipient of effective scaffolding

in interaction are able to internalise the scaffolding process and thus learn how to 'self-scaffold', or in other words, to apply independently skills such as observation, analysis, and imitation to situations they encounter. The internalisation of such skills can be seen to be an important part of the development of self-regulation (Meadows, 1996). Also, the concept of scaffolding can be seen as a means by which the child's potential for new learning (or width of ZPD) can be assessed, and as a way of observing the process by which the child can be helped to make use of this potential (Stone, 1993).

Finally, another important point to remember is that the interaction between parents and children is bi-directional, with the children influencing the parents and the parents influencing the children. Thus, any examination of the effect that parental scaffolding and social interaction has on children's development must take into account mediational factors such as the capacity of the children to use the information provided, the children's motivation to complete the task, and the adults' perception of the children's abilities (Maccoby, 1999; Maccoby & Martin, 1983; Shatz, 1984).

Characteristics of children with Down syndrome

If parent-child interaction plays a crucial role in the cognitive development of typically developing (TD) children as the research suggests, then it follows that such interaction would be even more important for the cognitive development of children with developmental disabilities. Down syndrome² (DS) is the most common and the most easily recognised condition causing a learning disability (Carr, 1995). All individuals with DS have extra chromosome 21 material which is referred to as trisomy 21. There are, however, three different genetic mechanisms which can cause trisomy 21. The first and most common is non-disjunction trisomy 21, where there are three number 21 chromosomes in every cell instead of the normal two. Approximately 95% of individuals with DS have this type. The second type is translocation trisomy 21, which results from all or part of a chromosome 21 attaching to another chromosome, often chromosome 14. This form is less common, occurring in approximately 3 - 5% of individuals with DS. Finally, the third variant, which occurs in 2 - 4% of cases, is mosaic trisomy 21, where only some of the cells have the third 21 chromosome and the rest are normal (Benke, Carver, & Donahue, 1995; Rondall, 1993).

² Current research in this field has adopted the use of the term Down syndrome, rather than *Down's syndrome* because of a concern that children were being viewed as an extension of the syndrome they possessed, rather than as individuals. The use of the term Down syndrome has become accepted by both parents and researchers as a step towards acknowledging the individuality of these children (Cicchetti and Beeghly, 1990).

One of the central theoretical issues in the DS literature is the 'difference versus delay' debate. That is, is the development of children with DS simply a slowed down version of typical development, or is it qualitatively different in structure and process? The findings from research which has investigated this issue (e.g., Hodapp & Zigler, 1990; Morss, 1985; Motti, Cicchetti & Sroufe, 1983; Wishart, 1990; Wishart, 1999, Wishart & Duffy, 1990) suggest that although children with DS show organised patterns of development and they progress through the same sequence of developmental stages as TD children, they do not possess the same structure to their intelligence and demonstrate particular difficulties with many aspects of learning and development. One of the important implications of this difference in development is that it calls into question the validity of using assessment tools which are normed on TD children to assess the development of children with DS. It is common practice when doing research with children with DS to compare them to a control group of TD children who are matched on mental age (MA) on the basis of standard measures of intelligence or development. Wishart (1990; 1999; Wishart & Duffy, 1990) has pointed out that this practice of matching children on MA assumes firstly that the developmental processes are the same in both groups and that they have reached their current level of development by the same developmental pathways, and secondly, that their score on the intelligence test is an accurate measure of their ability. Both of these assumptions are not supported by the research into children with DS. Instead, the findings show that children with DS tend to lack motivation to perform, they do not respond well to testing situations, and they have been found to produce largely discrepant IQ scores in two different, closely spaced testing sessions. Thus, these findings indicate that assessing children with DS using standard assessment tools is not likely to produce an accurate or reliable measure of their abilities, and that matching children with DS to TD children for research purposes is not an optimal strategy.

These difficulties in the learning and development of children with DS are understood to stem both from the underlying biological dysfunction and from the psychological environment in which they learn. Factors such as making slow progress, experiencing frequent failure on tasks and being the recipient of low expectations from parents and teachers combine to make learning a difficult experience for many children with DS (Wishart, 1999). Studies looking specifically at aspects of learning and development in children with DS have revealed several areas that are particularly problematic for them.

Research looking specifically at the language development and communication skills of children with DS has revealed many areas of difficulty. In infancy, children with DS develop focussed gaze more slowly and are delayed in the development of flexibility and control of their gaze. Consequently, they have been found to be less likely than TD children to initiate eye-contact, particularly referential eye-contact, suggesting that they are not as effective at drawing out feedback from their mothers, or regulating their own behaviour, which has the effect of limiting their ability to learn through interaction. In addition, they find it difficult to take turns in verbal interaction, not leaving enough spaces in their speech patterns for their mother to respond. Their attention strategies tend to be inefficient, which means they find it difficult to benefit from incidental learning and they often need help directing their attention to the relevant cues. They show a particular difficulty with maintaining joint attention on both a toy, and their mother during interaction (Gunn, 1993; Jones, 1979; Landry & Chapieski, 1989; Sandall, 1988). In terms of responsivity and expressiveness, children with DS tend to be more passive and less spontaneous in initiating social interaction. The social signals they give out are often very difficult to read, and they show delayed responsiveness to their mother's signals (Fischer, 1987; Roach, Barrat, Miller & Leavitt, 1998). They show large delays in expressive language development, do not use language as often as TD children and show difficulties with encoding and decoding verbal stimuli (Beeghly, Weiss-Perry, & Cicchetti, 1990; Mervis, 1990; Rynders, Behlen, & Horrobin, 1979). In addition, they have difficulties with auditory processing, auditory memory and metacognition, and many have a hearing and/or visual impairment which serves to compound the difficulties they have with language development and communication skills (Chapman, 1995; Morss, 1985). Children with DS are typically slow to orient to and categorise auditory information, and to organise a motor response. Thus, they can benefit from being given extra time to process verbal instructions and from being given a limited amount of information to process at a time (Gunn, 1993). All of these difficulties with language development and communication skills lead to difficulties with social interaction, and therefore, from a Vygotskian perspective, to difficulties in cognitive development.

In terms of their temperament, children with DS have a decreased sensitivity to novelty and change in their environment, thus they often appear less reactive or interactive with their environment and are perceived as passive, or less interested than TD children. They also show a lag in the expression of intense affect such as laughter, and in the development of gestures (Cicchetti & Sroufe, 1976; Ganiban, Wagner, & Cicchetti, 1990). One of the major contributing factors to this deficit is that children with DS are typically hypotonic (or have low muscle tone) and have delayed

sensorimotor development. They are also delayed in their ability to process visual information, and are less inherently reactive to stimulation. In addition to hypotonia, about one third have serious congenital heart defects (Gunn, 1995).

Children with DS have also been found to have difficulties with mental organisation and problem-solving skills. Kopp (1990), in a study of the growth of self-monitoring in young children with DS found that they showed dysfunction in the areas of abstract reasoning and problem solving skills. Berry, Gunn and Andrews (1984) conducted a study using the 'lock box' to evaluate the mental organisation of children with DS. The 'lock box' is a rectangular container which has 10 doors, each of which has a different lock, and behind each door is a different toy. Firstly, the children were given a demonstration of how the box works, and then they were left to play with it. The findings showed that the children with DS showed far less consistent or purposeful behaviour than the TD children, and were more likely to persevere with the one task, than to continue exploring the rest of the locks.

Motivation is another area in which children with DS have been found to have serious deficits. Wishart (1990; 1991; 1993; 1999; Pitcairn & Wishart, 1994; Wishart & Duffy, 1990) conducted several studies of operant conditioning and object concept development with a group of young children with Down syndrome. Findings from the operant learning studies showed that as the children with DS got older they showed an increasing tendency to rely on reinforcement being generated by others, even when they were capable of generating it themselves, suggesting that children with DS have a tendency to respond to a learning task by allowing others to take the initiative (Wishart, 1991; 1993; 1999). This strategy of holding back and being avoidant can be seen as an understandable response for children who are likely to experience high levels of failure even when they try their hardest. A subsequent study (Wishart, 1991) using two different learning strategies, showed some interesting results for the children with DS. The first strategy was 'trial and error' which allowed the children to make mistakes as often as they usually would when learning a new task, and the second strategy was 'errorless' which involved the presenter making the right choice very obvious, and simply repeating the trial if the child made a mistake without commenting on the error. If given the trial and error strategy first, their subsequent performance on the errorless presentation was adversely affected. However, when given the errorless strategy first, their subsequent performance on the trial and error presentation was enhanced. These results suggest that the experience of erring has a depressing effect on the performance of children with DS in a learning context. Thus, being presented with an experience of errorless learning first may have increased their

motivation and confidence for learning in the trial and error task. The findings from the object concept studies also revealed serious deficits in motivation. The children with DS failed to maintain their success over time, suggesting that consolidation of new learning is a problem for them. They also tended to use low-level strategies for the easier tasks, such as choosing the same cup all the time and thus getting 50% correct by default, and avoidance strategies such as sweeping the cups to the floor, or engaging the experimenter in social interaction for the higher level tasks.

Overall, the results of Wishart's research revealed that the children with DS: tended to use avoidance strategies when faced with cognitive challenges more than one step above their current developmental status; showed an increasing reluctance to take the initiative in a learning task; made inefficient use of existing problem-solving skills; and failed to consolidate newly acquired skills into the repertoire. She proposes that the children adopt these strategies as a response to the adverse success/failure rates that they typically experience in learning situations, or in other words, it is more a case of 'won't do' rather than 'can't do'. It makes sense that the children may generalise an increasing awareness of low personal efficacy into comparative or untested abilities, thus developing a kind of learned helplessness.

All of these areas of difficulty, particularly passivity, dampened affect, social unresponsiveness, lack of motivation in learning situations, and impaired comprehension and language abilities, have a substantial impact upon the quality of social interactions and therefore, in Vygotskian terms, upon opportunities for cognitive development that children with DS experience.

The characteristics of interactions between parents and their children with DS

Thus, given the importance of social interaction for cognitive development, and the nature of the difficulties experienced by children with DS which impact negatively on their interactional experiences, the characteristics of interactions between parents and their children with DS have been the subject of much psychological investigation in recent years (e.g., Beeghly et al., 1990; Berger, 1990; Crawley & Spiker, 1983; Greaves & Poole, 1996; Hodapp, 1995; Miller, Leddy & Leavitt, 1999; Sandall, 1988). The most predominant and well-replicated finding in this literature is that parents of children with DS are more *directive* in their interactions with their children. This finding has raised two important questions which have been the subject of much debate. Firstly, are the parents of the children with DS more directive as a response to the difficulties their children have with social interaction, or are they more directive as a result of their own expectations and

perceptions of their children's abilities and their desire for their children to achieve as much as possible? And secondly, is this directive interactional style a negative feature of parent - child with DS interaction, thus having a detrimental effect on the children's development, or is it an adaptive response to the different needs and abilities of these children?

There is much research to suggest that parental directiveness is in fact child-driven, or in other words, a response to the child's difficulties and interactional characteristics. In studies of the interactional characteristics of young children with DS and their mothers (e.g., Beeghly et al., 1990; Berger, 1990; Dunst, 1985; Jones, 1979; Kelly & Barnard, 2000; Richard, 1986; Terdal, Jackson & Garner, 1976) one of the most consistently reported findings is that deficits or delays in the interactive social signalling of the children corresponds to the greater use of controlling or directive behaviour by the mothers. As described in the previous section, children with DS tend to generate fewer appropriate social signals, exhibit delayed responsiveness to their mothers' signals and demonstrate less predictable patterns of responses. Thus, it is suggested that in the absence of clear and frequent social signals from their children, the mothers may adopt a more controlling and directive style in order to sustain and structure the interaction. They tend to respond as if the responsibility for initiating the interactions and maintaining them lies with them rather than with the child. Tannock (1988) found that the children with DS tended to watch passively and not take advantage of turns to respond and communicate which were offered by their mothers. It is suggested that the mothers used control and directiveness primarily to support and encourage their children's participation in the interaction. The authors conclude that the data are consistent with the hypothesis that the mothers are more active because the children are less so, rather than the children being inactive because the mothers were overactive.

Further evidence that parental directiveness may be child-driven can be found in the results of research which shows that mothers of children with DS change their level of directiveness depending on the child's level of ability and current activity. Maurer and Sherrod (1987) found that compared to mothers of typically developing children, mothers of children with DS were less likely to issue a directive if their child was playing with an object in a functionally appropriate manner, and more likely to issue a directive when their children were playing in a functionally inappropriate manner. They observed that when the children were inactive, their mothers' requests and directives were aimed at engaging them in the interaction and encouraging them to perform challenging tasks. However, when the children were already actively involved in the interaction, their mothers' requests

were used primarily to challenge them to continue to perform to the best of their ability. Davis, Stroud and Green (1988), in a study of the maternal language environment of children with mental retardation, found that the mothers of the children with retardation were sensitive to their children's delays, matching their own verbal behaviour to their children's language ability, while at the same time adopting a more pervasive teaching role. Thus, research suggests that parental directiveness may be a response to the children's difficulties with interaction, and that it changes depending on the children's abilities and activities.

Conversely, the opposite perspective is that parental directive behaviour in interactions with children with DS results from the parents' own expectations, beliefs and perceptions, rather than as a response to the children's characteristics. One of the most common findings in research from this perspective is that parents are more likely to hold a perception of themselves as 'teachers'. They recognise their children's reduced capacity for interactive involvement, and have a desire to elicit their children's highest possible performance. Consequently, they adopt a directive style in all interactions, rather than just in specific, structured teaching situations. It seems they are anxious not to waste any opportunities to intervene and aid their children's development, whereas mothers of typically developing children, who have fewer concerns about their children's development, tend to show a greater desire to just play in a more spontaneous and less directive manner. (Hodapp, 1995; Roach et al., 1998). Jones (1980) also found that the mothers of the children with DS in his study tended to refer to 'teaching' their children more often than mothers of TD children.

It has also been found that parents of children with disabilities are more likely to believe that their children require more direction in order to develop (Schneider & Gearhart, 1988). Jones (1980) has suggested that this belief results in mothers of children with mental handicaps being more motivated than mothers of TD children to direct their children's behaviour. In line with this proposition, it has been found that mothers of children with handicaps are much less likely to follow their children's initiatives, but rather expect their children to follow their own initiatives (Mervis, 1990). In a study comparing the requesting strategies of mothers of children with DS across a free-play situation and a structured problem-solving situation, Landry, Garner, Pirie and Swank (1994) found that the mothers of the children with DS used the same amount of directives in a free play situation as they did in a structured problem-solving situation, suggesting that they have the perception that their children require a constant amount of structure in order to behave appropriately, regardless of the situation. It may be that for the parents of children with DS, the particular diagnosis

of the disability may come to define their views of their children's levels of ability, and what they can expect from them. These expectations may then in turn impact on the techniques and strategies they employ when scaffolding a problem-solving task. Expectations of low independent competence can be seen to lead to greater parental directiveness (Levine, 1993).

As support can be found in the literature for both the child-driven and parental perception explanations of parental directiveness, the most likely conclusion is that directiveness in interaction results from a combination of the two influences. Mahoney, Fors and Wood (1990) conducted a study to evaluate both hypotheses, and found that in general the findings supported the child-driven theory. However, there were also dimensions of the mothers' directiveness which were not related to the quality of the children's interactive behaviour, suggesting that the child-driven theory cannot explain the full picture. The mothers of the children with DS exhibited a tendency to direct their children's attention, with little regard for what the children were already focussed on, and they also requested more actions which were in the upper limits of their children's' developmental potential, when compared to the mothers of the TD children. These findings suggest that the mothers of the children with DS saw their role as one of helping their children to perform to the upper limits of their potential, rather than one of supporting and encouraging their children's current behaviour. Thus, overall it seems that both child characteristics and parental perceptions have an important role to play in the directiveness of parental interactions.

Given then that parents of children with DS exhibit higher levels of directiveness in interaction as a result of their own perceptions and beliefs, and their children's characteristics, the question of whether this directive interactional style is a negative or positive feature of interaction between parents and their children with DS must be addressed. In much of the early research in this area (e.g., Cunningham, Reuler, Blackwell, & Deck, 1981; Filler & Bricker, 1976; Rynders et al., 1979; Terdal et al., 1976), directiveness was equated with intrusiveness and insensitivity, and thus was assumed to be an inherently negative characteristic of parent-child interaction. This assumption was typically made because maternal directiveness has been found to be negatively associated with the development of competence in TD children. However, it fails to take into account the fact that parents and children are highly adaptive and responsive to each other's signals and characteristics (Marfo, 1991, Sorce & Emde, 1982). Given the many features of interactions between parents and their children with DS which are different to interactions between parents and TD children as

described earlier, it follows that being more directive may in fact be an adaptive response to the different needs and abilities of children with DS.

An insightful study by Crawley and Spiker (1983), which was one of the first to address this question, examined the issue of maternal directiveness in more detail. They proposed firstly, that directiveness is not necessarily synonymous with *intrusiveness*, nor incompatible with *sensitivity*. Secondly, the significance of directive maternal behaviour may vary as a function of how these behaviours are integrated within the mother's overall interactional style. And thirdly, the appropriateness of the use of maternal directives is contingent on how it relates to the child's characteristics (for example, a very passive child may require more direction for interactions to occur). The study looked at individual differences within a sample of mothers and their two-year-old children with DS. Based on Baumrind's (1967; 1973) parenting styles, in which control and warmth are seen as independent dimensions, they tested for relationships between measures of directiveness and sensitivity. The results showed no negative relationships between the measures of directiveness and sensitivity, suggesting that they may in fact be separate dimensions of interaction, and that directiveness is not necessarily a negative feature of mother-child interactions. On the contrary, they found that mothers may be both directive and highly sensitive, or conversely nondirective and insensitive. Interestingly, it was the mothers in the high directiveness and high sensitivity category who were also rated highly on elaborativeness and stimulation value, indicating that it is these mothers who provide the most stimulating environment for their children. Thus, these findings suggest that mothers who respond sensitively to their child's initiations without providing some level of direction may not be providing an optimally stimulating environment for a child with DS. Overall, the researchers concluded that directiveness and sensitivity are maternal qualities that are at least partially independent of each other, and that mothers who are sensitive and directive may provide the most stimulating environment, and thus may have the most competent children. These findings were then corroborated by Mahoney, Finger and Powell (1985) who found that a combination of high directiveness and low sensitivity was associated with lowered cognitive competence in children, suggesting that mothers who were highly directive and highly supportive did *not* have children with lowered cognitive competence.

Since these studies, many other researchers (e.g., Landry et al., 1994; Mahoney & Robenalt, 1986; Marfo, 1992; Marfo & Kysela, 1988; Tannock, 1988) have also found that directiveness in interaction does not presuppose intrusiveness, or preclude responsiveness and sensitivity. On the

contrary, there is now much evidence to suggest that directiveness, when combined with sensitivity, may be an adaptive response on the part of parents to the different needs and abilities of children with DS. For example, Roach et al., (1998) found that the mothers of the children with DS exhibited significantly higher frequencies of vocal directives, supportive object behaviour and vocal praise than the mothers of the typically developing children. These frequencies were found to be positively related to the children's frequencies of object play and vocalisation, suggesting that the mothers' behaviour was appropriate to their children's needs. Cielinski, Vaughn, Seifer and Contreras (1995) in a study of the play behaviours of mothers and their children with DS made a distinction between directiveness and intrusiveness. Their findings showed that maternal directiveness facilitated child play and engagement in interaction, whereas intrusiveness had a negative impact. McCathren, Yoder and Warren (1995) found that a maternal style of interaction which combines directiveness with nonresponsiveness is negatively correlated with the development of child communication skills in children with DS. However, directiveness paired with sensitivity and elaborativeness is associated with higher development. Cielinski (1993) found that the mothers of children with DS were both directive and responsive and that this strategy served to lengthen the attention duration of the children during play. In a study of maternal communication to children with DS, Miller et al. (1999) found that the mothers who showed higher levels of directiveness had children who were more developmentally advanced. Thus, taken together, research findings suggest that the increased directive and supportive behaviour typically exhibited by mothers of children with DS reflects an appropriate adaptation to the developmental capacities of their children and thus has a positive impact on their development.

From a Vygotskian perspective, the directive interactive style of mothers of children with DS appears to be adaptive because the directiveness is compensating for the children's unresponsiveness and lack of initiation, and it may enable the children to become engaged in the interaction. These mothers have to work harder to keep their children involved and in the ZPD when working on a task, and thus, are more directive to try and achieve this goal (Hodapp, 1995; Schneider & Gearhart, 1988). A common and interesting finding which supports this perspective (e.g., Mahoney, 1988; Maurer & Sherrod, 1987; Tannock, 1988) is that the directives used in interaction (e.g., "have a look at this picture here", "find a triangle block", "try pressing this button here to make it go") by mothers of typically developing children and mothers of children with DS serve different purposes. Most of the directives used by the mothers of the TD children are requests for attention, whereas most of the directives used by the mothers of the children with DS are action requests designed to engage the

children in interaction and encourage them to perform the challenging tasks. However, when the children are engaged, the mothers' requests are used to challenge them to perform to a higher level. These findings suggest that maternal directiveness serves as a supportive strategy to enable children with DS to participate more fully in interaction. Thus, increased directiveness and responsiveness in interaction with children with DS can be seen as an adaptive way for the parents to scaffold their children's learning and to target their ZPD.

Parenting styles

A natural extension of this finding that an interactive style that is both directive and sensitive seems to provide an optimal learning environment for children with DS, is to look at it in relation to the parenting styles devised by Baumrind (1967, 1971, 1973, 1989). These four parenting styles vary along two orthogonal dimensions of demandingness and responsiveness. *Authoritative* parents are both responsive and demanding, exerting consistent and firm control, but also providing clear explanations for their standards. They are loving and supportive, and encourage autonomy in their children. *Authoritarian* parents are demanding, but not responsive. They tend to expect unquestioning obedience, and respond punitively when their children's beliefs or behaviour conflict with their own standards of permissible conduct. They are discouraging of verbal give-and-take and are often not responsive to their children's needs. *Permissive* parents are responsive, but not demanding. They tend to allow their children to regulate their own activities, and make few maturity demands on them. They are warm in their responses, but do not insist that their children follow parentally defined standards. Finally, *rejecting-neglecting* parents are neither responsive nor demanding, exhibiting a tendency to be disengaged from their children. They are highly coercive and do not tend to monitor their children's behaviour (Smetana, 1994).

The results of Baumrind's research (1967, 1971, 1973, 1989) and that of many other researchers who have subsequently used her parenting styles as a framework (e.g., Collins, 1984; Cowan, Powell, & Cowan, 1998; Darling & Steinberg, 1993; Maccoby & Martin, 1983) consistently show that authoritative parenting is associated with the most positive outcomes for children. Children of authoritative parents have been found to be more socially responsible, achievement oriented, friendly towards their peers, co-operative towards adults, independent, socially dominant and purposeful than children of parents of other styles. Baumrind concluded that "the optimal parent-child relationship at any stage of development can be recognized by its balance between parents' acknowledgement of the child's immaturity - shown by providing structure, control and regimen

(demandingness) - and the parents' acknowledgement of the child's emergence as a confident, competent person - shown by providing stimulation, warmth and respect for individuality (responsiveness)" (1989; p. 371).

Pratt et al. (1988) conducted a study looking at adult scaffolding and how it relates to an authoritative parenting style. They worked from the Vygotskian perspective that learning proceeds most effectively when tutoring occurs in the ZPD, and therefore good tutors should seek out the ZPD and gradually reduce their support as the child becomes capable of greater independent task performance. They based this study on Wood and Middleton's (1975) work on scaffolding during a block-model problem-solving task as described earlier in this chapter, and coded several additional measures of levels of interaction, sensitivity and contingency of instruction, and rates of child success. They proposed that because authoritative parents have been found to be more sensitive to the child's needs for both direction and support, they would expect them to be more effective tutors than parents of the other three styles. Specifically, they predicted that authoritative parents would be more consistently contingent in their responses to their children's successes and failures during interaction (recall that contingent shifting was defined as giving more support after a failure and less support after a success) and that they would show greater use of the region of sensitivity to instruction (or ZPD) than the parents of other styles. Their results paralleled those of the Wood and Middleton study, with parents who followed the contingent shift rule (more support after failure and less support after success) and who successfully targeted their child's region of sensitivity to instruction, being the most effective. Also, as predicted, an authoritative parenting style was found to be positively related to the percentage of success measures for the dyad, the percentage of use of the region of sensitivity by the parent in tutoring, and the total percentage of contingent shifting by the parent. Thus overall the findings suggest that parents who adopt an authoritative parenting style are more effective at scaffolding their children's learning.

The present study

The aim of the present study is to expand upon and draw together the findings of previous research by examining and comparing the characteristics of interaction on a problem-solving task between parents and their children both with and without DS. Previous research (e.g., Bornstein, 1989; Maccoby, 1999; Vygotsky, 1978) has established the importance of parent-child interaction for cognitive development in children and Vygotskian theory proposes that such development occurs through the process of internalisation and proceeds most effectively when tutoring focuses on the

child's ZPD. Working from this perspective, Wood and his colleagues (e.g., Wood, 1988; Wood et al., 1976; Wood & Middleton, 1975) have put forward the concept of scaffolding to describe this process of assisting children during interaction to perform to a higher level than they are capable of independently. Scaffolding is thought to encompass several different *levels of intervention* which the parent uses depending on the child's level of development and abilities, and which are most effective when they are contingent upon the child's successes and failures at each step in the process. Children with DS have been found to have particular difficulties with learning and interaction, and interaction between children with DS and their parents has been consistently found to be characterised by high levels of both directiveness and support or responsiveness (e.g., Crawley & Spiker, 1983; Gunn, 1993; Wishart, 1999). These dimensions of directiveness and responsiveness are paralleled by the dimensions of demandingness and responsiveness in Baumrind's parenting styles. Research investigating this parallel found that authoritative parents who are high on both the dimensions of demandingness and responsiveness were found to be the most effective tutors when observed in interaction with their children (Pratt et al., 1988).

Thus the present study will compare the characteristics of parent-child interaction on a problem-solving task between a group of children with DS, and a group of TD children. The problem-solving task is based on the one designed by Wood and Middleton (1975) and involves each of the children observing a model block tower and constructing an exact replica in interaction with their primary caregiver. Each session of interaction will be videotaped and then coded by the experimenter. The coding process will use Wood and Middleton's (1975) *levels of intervention* to examine the nature of the scaffolding process that occurs in each dyad, and how contingent the changes in level are upon the children's responses. The frequencies of directive and supportive interventions and actions exhibited by the parents will also be noted. The children will be given a test of language development as a way of gauging the different levels of ability between the two groups and the parents will be asked to complete a measure of parenting style. It is expected that due to the different nature of interactions between parents and their children with DS which has been well documented in recent research as detailed earlier, there will be many observable differences between the two groups of dyads. Specifically, the following hypotheses and questions will be addressed.

Firstly, it is predicted that given the difficulties children with DS have in interaction, the parents of the children with DS will find it more difficult to stay within their child's ZPD when interacting, than parents of TD children. That is, the parents of the children with DS will spend less

time intervening within their child's region of sensitivity to instruction (RSI) and will follow the contingent shift rule less consistently than the parents of the TD children. Several other questions relating to this hypothesis will then be examined. Firstly, given the differences between TD children and children with DS in terms of the way that they learn, how motivated they are to learn, their past experiences of learning, and their ability to interact effectively and clearly, it follows that the percentage of time spent in the RSI may be associated with success for the TD children, while the percentage of time spent in the actual developmental level (ADL) may be more associated with success for the children with DS. Secondly, given the tendency children with DS have to avoid challenging tasks, to become more easily frustrated by failure, and the difficulties that they have with learning new skills, it may be that the parents of the children with DS show a propensity to use slightly more same than predicted shifts. Such a strategy would enable the parents to find a level of intervention that is successful for their child and focus on it, while still providing enough challenges to facilitate their development. Thus the question of whether the parents of the TD children will follow the typical patterns identified by Wood and his colleagues (Wood et al., 1976; Wood et al., 1978; Wood & Middleton, 1975), making more contingent than same shifts, while the parents of the children with DS make more of a balance of predicted and same shifts, will be examined. Finally, given that children with DS have been shown to lack motivation and are easily discouraged by failure, but have been shown to produce improved performance when they have experience of errorless learning (Wishart, 1991) it makes sense that the parents of the children with DS may choose to begin with higher, more specific directives which are easy for the child to follow, and then move to lower, more general levels of intervention once the child has become more confident with the task. Conversely, the parents of the TD children can be expected to be less concerned about being able to engage their children's participation and interest in the task, and thus may start with the more general levels of intervention in order to gauge their children's level of ability with the task, before moving to higher more specific directives if their children need it. Thus the question of whether the parents of the children with DS begin with higher levels of intervention and go down as the children become more confident with the task, and the parents of the TD children start low and go higher if the children need it, will be addressed.

The second hypothesis proposes that based on past research which shows that parents of children with DS are typically more *directive* and more *supportive* during interaction than parents of TD children (e.g., Beeghly et al., 1990; Berger, 1990; Kelly & Barnard, 2000), the parents of the

children with DS will intervene more, use higher levels of intervention, be more directive, and more supportive than the parents of the TD children.

The third hypothesis addresses the issue of whether parents who are both directive and supportive are more effective than parents who are just directive without being supportive, or parents who are just supportive without being directive. Past research has shown that parents who are both highly directive and supportive provide the most optimally stimulating environment for children with DS (e.g., Crawley & Spiker, 1983; Mahoney et al., 1985; Marfo, 1992). Hypothesis three therefore, predicts that parents of the children with DS who are both directive and supportive will be more contingent and their children more successful than those who are just directive, or just supportive. Recall that contingent responding is considered to be when the parent provides more support for the child after a failure by moving to a higher level of intervention for the next episode of interaction, and less support for the child after a success by moving to a lower level of intervention.

The final hypothesis deals with the effect of parenting style on interaction. Past research has shown that an authoritative parenting style is linked to the most desirable developmental outcomes for children and that parents with an authoritative parenting style make the most effective tutors (e.g., Baumrind, 1989; Cowan et al., 1998; Pratt et al., 1988). Thus it is predicted that parents who have an authoritative parenting style will stay more consistently within the child's RSI and be more contingent, directive and supportive than parents who adopt other styles.

In addition to these four main hypotheses, there are a few other incidental questions of interest that will be addressed. Firstly, there is research to suggest that parents of children with DS are more concerned about aiding their children's development and thus tend to view all interactional situations as opportunities to teach (e.g., Hodapp, 1995, Roach et al., 1998). Therefore, an interesting question is whether the parents of the TD children will report more pleasure in playing with their children than the parents of the children with DS, as they are less concerned about every interaction being used to teach.

Secondly, evidence shows that mothers of children with DS change their level of directives based on their child's abilities (e.g., Davis et al., 1988; Maurer & Sherrod, 1987). Using their score on the Test of Early Language Development - second edition (TELD-2) (Hresko, Reid & Hammill, 1991) as an indicator of the children's level of ability, the question will be asked whether children

with higher TELD-2 scores will receive less support and lower levels of intervention from their parents than the children who achieved lower TELD-2 scores.

Thirdly, the most specific levels of intervention, levels 5 and 6, involve the parent either demonstrating the task, or physically taking the child's hand and placing a block on the tower, and therefore, by definition guarantee success for the child. Parents of children with DS who consistently intervene at these levels are thus likely to show a relatively low frequency of directives as they are doing most of the work themselves, rather than asking their children to do it. The question of whether parents of children with DS who give the least directives will have a higher rate of level 5 and 6 interventions will therefore be examined.

Finally, research into the characteristics of children with DS has shown that they tend to avoid challenging tasks and become more easily frustrated with them than TD children (e.g., Pitcairn & Wishart, 1994; Wishart, 1999). Research also shows that parents of children with DS are likely to have lower expectations of their children's ability based on knowledge of their disability (e.g., Landry et al., 1994; Levine, 1993). Consequently, the final question to be addressed is whether the parents of the children with DS will report a lower expectation of their children's success and a higher likelihood of their children seeking to avoid a challenging task or becoming easily frustrated with a challenging task, than the parents of the TD children.

CHAPTER TWO

METHOD

PARTICIPANTS

The participants in this study consisted of a group of 15 children with Down Syndrome (DS), a group of 15 typically developing (TD) children, and their primary caregivers. The group of TD children served as the control group. The parents of the children with DS were contacted through the Champion Centre in Christchurch, New Zealand. The Champion Centre is an Early Intervention facility that provides a multi-disciplinary, clinic based service for children with developmental delay and their families. All of the children with DS who participated in the current study had a chromosomal diagnosis of the syndrome, thus no further confirmation of their disability was undertaken by the researchers. None of the children with DS who participated had any other serious difficulties, such as visual or auditory impairment. The parents of the TD children were contacted through advertisements in the local newspaper and in kindergartens around Christchurch.

In the DS group there were seven boys and eight girls and they ranged in age from 3.08 to 6.23 years, with a mean age of 4.69 years ($SD = 1.09$). Their primary caregivers were all mothers who ranged in age from 21 to 46 years, with a mean age of 37.53 years ($SD = 6.06$). Thirteen (86.7%) of the mother-child pairs were NZ European and two (13.4%) were of Pacific Island origin. There was also a small amount of variation in marital status with thirteen (86.7%) of the mothers being married and two (13.4%) being single or separated. There was a wide range of parental education levels within this group. Five (33.3%) of the mothers were school leavers, six (40%) had achieved bursary or University Entrance (UE), three (20%) had completed a tertiary diploma or certificate and one (6.67%) had a post-graduate degree.

As described in the introduction chapter, there are three different genetic etiologies for DS. The majority (73.3%) of the children in this group had DS caused by non-disjunction trisomy 21. However, three (20%) had DS caused by translocation trisomy 21, and one (6.7%) had DS caused by mosaic trisomy 21. In New Zealand in 1995 the incidence of liveborn cases of children with DS was 61 per 1000, in 1996 the rate was 55 per 1000, and in 1997 the rate was 60 per 1000¹. Given that the

¹ Statistics provided by Barry Borman, Manager of Public Health Intelligence at the Ministry of Health, NZ

population of Christchurch is less than 400,000, the sample of 15 children obtained for the present study represents the maximum number of eligible children, without also testing children in other cities.

The control group consisted of nine boys and six girls aged between 3.1 to 4.4 years, with a mean age of 3.6 years ($SD = 0.34$). Their primary caregivers consisted of fourteen mothers and one father, with an age range of 27 to 51 years and a mean age of 37 years ($SD = 5.61$). Thirteen (86.7%) of the parent-child pairs were NZ European, one (6.7%) was Maori, and one (6.7%) was Scottish. Most (80%) of the parents in this group were married, and the other three (20%) were in de facto relationships. There was also a range of parental education levels with two (13.33%) being school leavers, three (20%) having bursary or UE, seven (46.67%) having a tertiary diploma or certificate, and three (20%) having a tertiary degree.

There is much debate in the literature as to the best way to match a control group of TD children to a group of children with disabilities. One commonly used method is to gain an IQ score for the disabled group and then match the two groups on mental age (MA). However, there is a lot of evidence to suggest that this method is inherently problematic. Children with DS tend to show very inconsistent test performance and scores over time (Wishart, 1999) and, as previously mentioned, the intelligence structure of children with DS is different from that of TD children, making it difficult to know what exactly an IQ score for a child with DS means (Wagner, Ganiban & Cicchetti, 1990). Also, as Nilholm (1999) points out, a standard IQ score does not take into account the factor of potential for assisted development, or the child's ZPD. Based on these findings, instead of an IQ measure, the TELD-2 which is a measure of expressive and receptive language (refer to the measures section for further details) was administered to all of the participants. These scores were then used not to match the children, but simply as a comparative measure of developmental level between the two groups, enabling the researcher to get a sense of how they differ in this respect. Although this strategy has its own problems, it does not seem to be as inherently problematic as matching by IQ score.

MEASURES

Block model-copying task

The parent-child pairs were given a block model-copying task to complete based on the one used by Wood and Middleton (1975). The model was constructed of thirty-one brightly coloured wooden blocks which were glued together into a tower formation. Each section consisted of a different combination of colours and shapes, making it difficult for the child to make an exact copy without assistance. For constructing a replica model, each child was presented with a box containing the right blocks to copy the model, as well as a few extra blocks of various shapes, sizes and colours. These were included so that when the child was nearing the end of the task and there were only a few blocks remaining, it would not be obvious simply by deduction which blocks should be used.

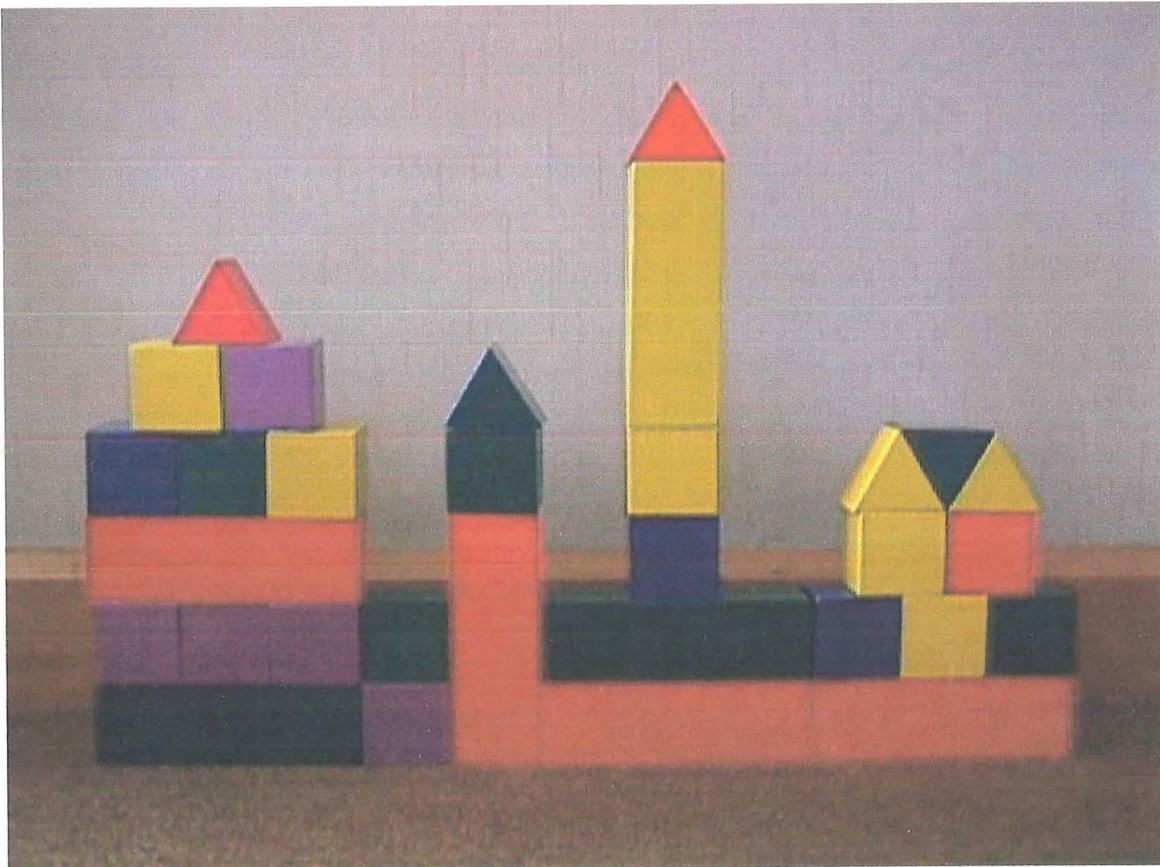


Figure 1: the block model

Test of Early language Development – 2

The Test of Early Language Development – Second Edition (TELD-2) is a standardised measure designed by Hresko, Reid and Hammill (1991) to assess the language skills of children aged

between 2-years and 7-years 11-months. It contains sixty-eight items that increase in difficulty and are designed to measure receptive and expressive language skills and syntactic and semantic ability. Items include naming body parts and family members, performing instructions, creating and/or completing sentences, pointing to pictures, and comprehension questions. The two major testing tools used for the TELD-2 are a 26-page picture book and accompanying question manual. Instructions for the examiner as well as instructions to be read out to the children and suggested prompts, are provided word for word. The TELD-2 has been reported to have good test-retest reliability and internal consistency, as well as content validity and construct validity (Hresko et al., 1991).

Scoring

Testing always begins at the item that is marked on the scoring sheet as corresponding with the child's age. Each of the child's responses is scored as either correct (1 point) or incorrect (0 points). A *basal* is established when the child correctly answers 5 items in a row, and a *ceiling* is established when the child misses 5 items in a row. All items below the basal are scored as correct and all items above the basal are scored as incorrect. Thus the examiner begins testing at the item appropriate for the child's age and finishes when the child misses 5 items. If the child reaches a ceiling without having established a basal, the examiner must then go back to the first item asked and work backwards from there until the child achieves 5 correct responses in a row. All the correct responses (including all items below the basal) are then added together to form the TELD-2 total raw score.

Parental Authority Questionnaire

Each parent in the study was asked to complete the Parental Authority Questionnaire (PAQ). The PAQ was designed by Buri (1991) to measure Baumrind's (1971) permissive, authoritarian, and authoritative parental authority prototypes. It consists of thirty-three items which are each answered on a five-point scale ranging from strongly disagree to strongly agree. Each parental prototype is measured by eleven of the thirty-three items, thus the PAQ yields a score for permissiveness, a score for authoritarianism and a score for authoritativeness. The PAQ has been shown to have good reliability and validity (Buri, 1991).

Scoring

Firstly, the thirty-three items are divided into the items for each prototype, making 3 groups of eleven items each. Within each of these groups the responses (ranging from 1-5) for each item are then added together giving an overall score out of fifty-five for each of the three prototypes.

Parental Questionnaire

Parents were also asked to complete a brief questionnaire which was designed by the experimenter to measure several different things. Firstly, it contained a number of demographic questions, and secondly, it asked the parents to provide ratings on 7-point Likert scales of various aspects of their interactions with their children. For the DS group a few additional items were added to the questionnaire. Firstly, there were a few items that asked what type of DS their child had, how much early intervention (EI) education their child had received, and what this EI typically involved. Then secondly, they were asked to indicate on 7 point Likert scales how severely they thought their child's development had been affected by his or her disability, and how much they felt they knew about DS and how it affected their child.

Revised Socio - Economic Index for New Zealand

The revised socio – economic index for New Zealand (Elley & Irving, 1976) gives a listing of occupations based on the International Standard Classification of Occupations which was introduced by the Department of Statistics in 1971. For each occupation it gives a rating between 1 and 6, with 1 being the highest and 6 being the lowest. For example, professions such as an Architect and an Accountant were given a rating of 1, and occupations such as a cafeteria assistant and a food packer received a rating of 6. For the present study, each parent and their partner (if applicable) was given a score between 1 and 6 based on their reported occupation as given in the parental questionnaire. For each couple the highest (i.e., closest to 1) score of the two was taken to represent the socio-economic status (SES) of that couple. In the case of a single parent with no paid occupation, they were given a default score of 6.

PROCEDURE

The parents came to the laboratory with their children and were greeted by the experimenter. They were then asked to read an information sheet and complete a consent form, which also contained a few questions regarding the child's age and date of birth. The child was then left to play in the waiting room while the experimenter took the parent through to the observation room and

showed them the block model-copying task. The parents were shown exactly how the task worked and it was explained to them that the point of the task was for them to *assist* their child to successfully complete it, without doing it for them. They were instructed to help their child in whichever way they deemed appropriate and to try to interact as naturally as possible. The experimenter then answered any questions the parents had and ensured that they completely understood what they were required to do.

The child was then brought into the observation room to rejoin his or her parent. Initially they were just left to play with the blocks for about five minutes to get familiar both with the blocks and with the surroundings. After this five-minute period the experimenter came back into the room and let the parent know they could begin the task. The experimenter then left the room and observed the interaction through a oneway mirror of which the child was unaware. Each session was also videotaped for later coding. Once the block task was successfully completed, or the child refused to comply any longer, the interactional session was considered to be complete.

The experimenter then came back into the observational room and praised the child for doing such a good job. The child was then allowed to crash over the tower of blocks if they wanted to, and the blocks were then packed away. The experimenter then got out crayons and a colouring-in book and gave the child a drink of juice and a biscuit. The experimenter played colouring-in with the child for about the next ten minutes until the child seemed comfortable interacting with her. She then gave the parent the PAQ and the parental questionnaire and asked him/her to complete them.

Whilst the parent was completing the questionnaires, the experimenter sat down with the child to administer the TELD-2, following the instructions in the manual. The TELD-2 was always administered in this way *after* the block task to ensure that the parent-child interaction during the block task was as fresh and natural as possible with no fatigue effects as a result of previous testing. The raw scores from the TELD-2 were then used in the analysis as a comparative measure of the differences in ability between the two groups of participants.

Finally, once the experimenter had finished administering the TELD-2 and the parent had completed both questionnaires, the parent was asked if he or she had any further questions or concerns. The child was then given the colouring-in book to take home as a thank-you gift and the parent was given a petrol voucher to cover the costs of travelling to the laboratory.

Coding Procedure

The videotapes of the interaction sessions were then coded both by the experimenter and by an independent rater, looking at measures of several different aspects of the parent-child interactional sessions as follows:

Firstly, the *behavioural episodes* for each session of interaction were defined and the start time and length of each was recorded. If the sessions of interaction were ten minutes or less, the whole session was recorded. However, if the session was more than ten minutes long, only the first five minutes and the last 5 minutes were coded. This ensured that the segments of interaction which were coded were all of a similar length.

The guidelines for defining the beginning and end of an episode were taken from Wood and Middleton (1975). The beginning of a behavioural episode was when the parent directed the child either by word or action toward some task activity. The end of an episode was either when the child chose a new set of blocks or in any other way changed the material he or she was working with, or when the child did not act on the parent's suggestion and the parent went on to suggest a new goal or operation. Only those episodes of interaction that were initiated by the parent were coded.

Each behavioural episode was then scored as one of five *levels of intervention*. The levels of intervention are as follows (adapted from Wood and Middleton, 1975):

1. *General verbal instruction*: the parent attempts to activate the child towards some generally specified goal (e.g., "that was good. Can you make another one like it?" or "what are you going to do next, another one?").
2. *Specific verbal instruction*: The parent lays down some clear parameter for search or operation (e.g., "can you find a large red one now?" or "No, you need a triangle one, don't you?").
3. *Parent indicates material*: here the parent intervenes directly in the process of construction and shows the child what material should be used by pointing to the block needed, or one like it on the model (e.g., "you need that one over there" or "you need one that looks like this one").
4. *Parent provides material and prepares it for assembly*: the parent not only indicates the material, but actually selects it and gives it to the child or places it in a suitable orientation for construction, leaving the child the task of simply pushing the material together.
5. *Parent demonstrates an operation*: the parent selects and assembles material while the child looks on.

6. *Parent holds child's hand and places material*: rather than just demonstrating an assembly, the parent physically places the block in the child's hand, places his/her hand over the child's hand with the block, and places the material correctly. (This level was added in order to more accurately code the interventions of the parents of the children with DS, as this was a common strategy used by the parents of the younger children.)

For each episode of intervention, the child's response was scored as either *successful* (i.e., he or she was able to follow the instruction and made a step towards task solution) or *failed* (i.e., He or she was unable to follow the parent's instruction).

Next, the frequencies of *directives* and *supportives* were recorded using definitions from Roach, Barrat, Miller, and Leavitt (1998). Directives were defined as either *vocal directives* – a vocalisation in which the mother requests an action or object from the child (e.g., “put it on top”, “find a red one”), or *vocal restriction* – a vocalisation in which the mother conveys rejection, restriction or disapproval of the child's behaviour or qualities (e.g., “don't eat it”, “you're not playing nicely”). Supportives were defined as either *supportive object* – facilitation of the child's interaction with an object by holding it, moving it closer, or otherwise supporting the child in play, or by giving, taking, or receiving a toy from the child, *vocal praise* – a vocalisation conveying praise or approval of the child's behaviour or qualities (e.g., “nice job”, “clever girl”). These definitions were thought to be most appropriate for the present study as the parents of the children with DS often provided ‘supportive object’ support, rather than just vocal praise. Thus, if the definition of supportives had been limited to vocal praise, the frequency count of supportives for the DS group would have been very misrepresentative of the actual behaviour of the parents.

The percentage of agreement between the experimenter and the independent rater for the levels of intervention was 98.66%, and the percentage of agreement for the outcomes was 99.71%. There was also a high correlation ($r = 0.99$) between the frequency counts of directives and supportives for the experimenter and the independent rater.

Based on the rates of success for each level of intervention, a measure of each child's *region of sensitivity to instruction* (RSI) was then calculated. The RSI was defined as that level just *below* the least structured one that showed clear indications of predominant success by the child. For example, a child that usually succeeded with instructions of level three or below, but usually failed

with instructions at level two or above, was coded as having his or her RSI at level two. Pratt et al. (1988) defined *predominant success* as over 66% of all episodes successful at any given level. Thus the level just below the least structured level at which the child achieved a success rate of 66% or more was coded as being that child's RSI. Based on each child's RSI, the *actual developmental level* (ADL) was also calculated. This was defined as the least structured level at which the child achieved 66% success or more (i.e., the level just above the RSI).

The *shift pattern* used by each parent was also calculated. When the parent followed the *contingent shift rule* (i.e., gave the child more support after failure, and less support after success) it was recorded as a *predicted shift*. An *opposite shift* was when a parent gave more support following a success and less support following a failure. And finally, a *same shift* was recorded when the parent continued to intervene at the same level, regardless of the outcome of the previous intervention. The percentages of each type of shift were then calculated. In addition, a *mean pattern score* was calculated for each parent-child dyad in order to measure their overall contingency. Each predicted shift was given a value of +1, each opposite shift was given a value of -1 and each same shift was given a value of 0. From these values a *mean pattern score* between +1 and -1 was calculated for each parent-child dyad. A figure closer to +1 indicates a highly contingent style of interaction, and a figure closer to -1 was considered indicative of a less responsive style of interaction.

CHAPTER THREE

RESULTS

Presented first in this chapter are a set of preliminary analyses of the secondary independent variables such as sex, ethnicity and socio-economic status, followed by an analysis of the TELD-2 scores and how they differed between the two groups. The main body of analyses is then divided up by hypothesis, with each hypothesis being addressed in turn.

An examination of the means and standard deviations for each of the variables revealed no ceiling or floor effects for either of the groups. Due to the fact that there is much variance between the two groups on a number of the important dependent variables, it was decided to run the correlational analyses for each group separately. It is believed that despite the small number of participants within each group, the results of such separate analyses are more informative and useful for examining the current hypotheses. Also, due to the large number of variables in this study, the full matrix of correlations is too large to be included. Thus, for each hypothesis separate matrices presenting only correlations between the variables relevant for that hypothesis have been included.

PRELIMINARY ANALYSES

Secondary independent variables

Before the main data analysis was conducted, a set of oneway analyses of variance (ANOVAs) was run using sex, parental age, socio-economic status, sibling rank, ethnicity, parents' marital status, parental education level and type of DS as the independent variables. There were no significant effects for any of these independent variables on any of the dependent measures.

Test of Early Language Development – second edition (TELD–2) scores

Recall that the TELD–2 was administered to all the participants in this study as a measure of the differences in language development between the two groups. The TD children scored a mean of 44.13 (SD 4.14) with a range of 35 – 51, and the children with DS scored a mean of 31.53 (SD 7.70) with a range of 19 – 44. An independent samples *t*- test confirmed that this difference was significant [$t(28) = 5.58, p < .001$]. The scores for the TD children fall within the normal range as specified in the TELD–2 manual, however, as expected, the scores for the children with DS fall below the population norms for their chronological age (Hresko et al., 1991). This result confirms that the two

groups of children do differ significantly in terms of their level of language development, therefore it is meaningful to compare them on other developmental variables.

In order to examine whether there were any interesting patterns of association between the TELD-2 scores, the percentage of each level of intervention used, the proportion of success at each level of intervention, the frequency of supportives and directives, and the mean level of intervention, a set of correlational analyses was calculated separately for each group. The results of these analyses are presented in Table 1.

For the DS group there were significant positive relationships between the TELD-2 scores and their proportion of success at level 2 ($r = .60, p < .05$) and level 3 ($r = .52, p < .05$), indicating that the children with better developed language skills were better able to follow level 2 and 3 interventions, as would be expected. It is also interesting to note that there is a significant negative relationship between the TELD-2 scores and the frequency of supportives given by the parents for the DS group ($r = -.53, p < .05$), indicating that the children with DS with better developed language skills received less support from their parents. For the TD group there were significant negative correlations between the TELD-2 scores and the proportion of level 5 interventions ($r = -.59, p < .05$) and the TELD-2 scores and the mean level of intervention ($r = -.59, p < .05$), indicating that the children with better developed language skills received fewer level 5 interventions and a lower mean level of intervention.

HYPOTHESIS ONE

Recall that hypothesis one predicted that the parents of the children with DS will find it more difficult to stay within their child's RSI when interacting than the parents of the TD children. That is, the parents of the children with DS will spend less time intervening within their child's RSI and will follow the *contingent shift rule* less consistently than the parents of the TD children.

For this section analysing hypothesis one, refer to Tables 2 and 3. The means and standard deviations for all of the variables associated with the shift pattern and RSI for both groups are presented in Table 2. Table 3 presents correlational analyses between the % of time spent in the RSI and the ADL, the mean pattern score, the % of predicted, same and opposite shifts, the % of success and failure, the number of adults interacted with daily, and the total number of episodes of interaction.

Table 1: Pearson Product Moment Correlations of TELD-2 scores, % of intervention and success at each level, mean level of intervention, % of success and failure, and the frequency of supportives and directives for both groups.

| | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. |
|-------------------------------|-----------|-------|--------|--------|--------|--------|-------|------|-------|---------|--------|-------|------|------|------|------|------|
| 1. TELD – 2 scores | <i>TD</i> | 1.00 | | | | | | | | | | | | | | | |
| | <i>DS</i> | 1.00 | | | | | | | | | | | | | | | |
| 2. % level 1 interventions | <i>TD</i> | .40 | 1.00 | | | | | | | | | | | | | | |
| | <i>DS</i> | .37 | 1.00 | | | | | | | | | | | | | | |
| 3. % level 2 interventions | <i>TD</i> | .04 | -.56* | 1.00 | | | | | | | | | | | | | |
| | <i>DS</i> | .22 | .25 | 1.00 | | | | | | | | | | | | | |
| 4. % level 3 interventions | <i>TD</i> | -.33 | -.66** | -.12 | 1.00 | | | | | | | | | | | | |
| | <i>DS</i> | .31 | -.16 | .24 | 1.00 | | | | | | | | | | | | |
| 5. % level 4 interventions | <i>TD</i> | -.15 | .06 | -.46 | -.07 | 1.00 | | | | | | | | | | | |
| | <i>DS</i> | -.44 | -.36 | -.84** | -.37 | 1.00 | | | | | | | | | | | |
| 6. % level 5 interventions | <i>TD</i> | -.59* | -.10 | -.26 | .02 | .28 | 1.00 | | | | | | | | | | |
| | <i>DS</i> | -.27 | -.29 | -.64* | -.50 | .57* | 1.00 | | | | | | | | | | |
| 7. % level 6 interventions | <i>TD</i> | - | - | - | - | - | - | 1.00 | | | | | | | | | |
| | <i>DS</i> | -.06 | -.20 | -.36 | -.31 | .08 | .03 | 1.00 | | | | | | | | | |
| 8. mean level of intervention | <i>TD</i> | -.59* | -.80** | -.01 | .73** | .38 | .48 | - | 1.00 | | | | | | | | |
| | <i>DS</i> | -.35 | -.54* | -.87** | -.40 | .75** | .69** | .60* | 1.00 | | | | | | | | |
| 9. % success | <i>TD</i> | .08 | .29 | -.36 | .00 | .24 | -.26 | - | -.15 | 1.00 | | | | | | | |
| | <i>DS</i> | .08 | -.42 | -.43 | -.36 | .32 | .61* | .37 | .63* | 1.00 | | | | | | | |
| 10. % failure | <i>TD</i> | -.08 | -.29 | .36 | -.00 | -.24 | .27 | - | .15 | -1.00** | 1.00 | | | | | | |
| | <i>DS</i> | -.08 | .42 | .43 | .36 | -.32 | -.61* | -.37 | -.63* | -1.00** | 1.00 | | | | | | |
| 11. % success at level 1 | <i>TD</i> | .25 | .51 | -.48 | -.12 | .18 | -.29 | - | -.35 | .91** | -.91** | 1.00 | | | | | |
| | <i>DS</i> | .50 | .12 | .29 | .56* | -.45 | -.30 | -.22 | -.39 | -.03 | .03 | 1.00 | | | | | |
| 12. % success at level 2 | <i>TD</i> | .28 | .29 | -.15 | -.11 | .09 | -.50 | - | -.32 | .93** | -.93** | .85** | 1.00 | | | | |
| | <i>DS</i> | .60* | .31 | .69** | .28 | -.80** | -.50 | -.07 | -.62* | .08 | -.08 | .47 | 1.00 | | | | |
| 13. % success at level 3 | <i>TD</i> | -.42 | -.34 | -.05 | .31 | .30 | .17 | - | .47 | .13 | -.11 | -.15 | .01 | 1.00 | | | |
| | <i>DS</i> | .52* | -.19 | .08 | -.06 | -.03 | -.20 | .31 | .09 | .50 | -.50 | .02 | .43 | 1.00 | | | |
| 14. % success at level 4 | <i>TD</i> | -.43 | -.10 | -.39 | .12 | .71** | .50 | - | .51 | -.18 | .18 | -.25 | -.43 | .29 | 1.00 | | |
| | <i>DS</i> | -.38 | .23 | -.21 | -.85** | .26 | .37 | .33 | .33 | .21 | -.21 | -.37 | -.20 | -.08 | 1.00 | | |
| 15. frequency of supportives | <i>TD</i> | -.21 | -.40 | -.05 | .46 | .10 | .22 | - | .50 | .31 | -.31 | .28 | .22 | .24 | -.16 | 1.00 | |
| | <i>DS</i> | -.53* | -.50 | .02 | -.18 | .22 | .03 | .15 | .22 | .29 | -.29 | -.40 | .05 | .20 | .28 | 1.00 | |
| 16. frequency of directives | <i>TD</i> | -.20 | -.60* | .67** | .21 | -.30 | -.19 | - | .23 | -.25 | .25 | -.42 | -.13 | .43 | -.34 | .16 | 1.00 |
| | <i>DS</i> | .20 | -.02 | .39 | .50 | -.28 | -.37 | -.44 | -.47 | -.17 | .17 | .63* | .21 | .10 | -.50 | -.28 | 1.00 |

Note: * $p < .05$ and ** $p < .01$

Table 2:

Means and Standard Deviations for % of predicted, opposite and same shifts, the *mean shift pattern*, the RSI, the % of time spent in the RSI, the ADL, and the % of time spent in the ADL for both groups.

| Variable | TD group (n = 15) | DS group (n = 15) |
|---|----------------------|----------------------|
| % of predicted shifts | 54.91 (16.38) | 37.44 (7.85) |
| % of opposite shifts | 16.79 (0.09) | 18.99 (7.15) |
| % of same shifts | 28.30 (16.66) | 43.57 (8.25) |
| Mean shift pattern | 0.38 (0.21) | 0.19 (0.13) |
| Region of sensitivity to instruction | 1.27 (0.46) | 2.13 (1.13) |
| % of time spent in RSI | 44.67 (16.79) | 17.01 (23.58) |
| Actual developmental level (ADL) | 2.07 (0.70) | 3.13 (1.13) |
| % of time spent in ADL | 39.71 (22.48) | 30.50 (23.81) |
| Mean level of intervention (1 st half) | 1.83 (0.37) | 3.19 (0.98) |
| Mean level of intervention (2 nd half) | 1.69 (0.47) | 2.80 (1.00) |

***Note:** Standard Deviations are given in parentheses

Table 3: Pearson Product Moment Correlations of the RSI, % of time spent in the RSI and ADL, the mean pattern score, the % of predicted, opposite and same shifts, the % of success and failure, the number of adults interacted with daily, and the total number of episodes of interaction for both groups.

| | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. |
|--|----|--------|--------|------|--------|--------|------|------|---------|------|------|------|
| 1. RSI | TD | 1.00 | | | | | | | | | | |
| | DS | 1.00 | | | | | | | | | | |
| 2. % of time spent in RSI | TD | -.23 | 1.00 | | | | | | | | | |
| | DS | -.19 | 1.00 | | | | | | | | | |
| 3. % of time spent in ADL | TD | -.72** | .31 | 1.00 | | | | | | | | |
| | DS | .51 | -.19 | 1.00 | | | | | | | | |
| 4. mean pattern score | TD | .09 | .68** | .28 | 1.00 | | | | | | | |
| | DS | .12 | .50 | .03 | 1.00 | | | | | | | |
| 5. % of predicted shifts | TD | .16 | .70** | .07 | .91** | 1.00 | | | | | | |
| | DS | .19 | .28 | .15 | .86** | 1.00 | | | | | | |
| 6. % of same shifts | TD | -.19 | -.55* | .20 | -.55* | -.85** | 1.00 | | | | | |
| | DS | -.19 | .24 | -.24 | -.11 | -.61* | 1.00 | | | | | |
| 7. % of opposite shifts | TD | .08 | -.27 | -.49 | -.63* | -.25 | -.30 | 1.00 | | | | |
| | DS | .01 | -.57* | .11 | -.81** | -.40 | -.49 | 1.00 | | | | |
| 8. % of success | TD | -.50 | .49 | .29 | .20 | .35 | -.44 | .19 | 1.00 | | | |
| | DS | -.35 | -.11 | .16 | -.26 | -.43 | .43 | -.02 | 1.00 | | | |
| 9. % of failure | TD | .50 | -.49 | -.29 | -.20 | -.35 | .44 | -.19 | -1.00** | 1.00 | | |
| | DS | .35 | .11 | -.16 | .26 | .43 | -.43 | .02 | -1.00** | 1.00 | | |
| 10. number of adults interacted with daily | TD | -.62* | .20 | .38 | -.29 | -.35 | .34 | .01 | .17 | -.17 | 1.00 | |
| | DS | -.69** | -.14 | .47 | -.12 | -.15 | .13 | .02 | .38 | -.38 | 1.00 | |
| 11. total number of episodes | TD | .43 | -.73** | -.43 | -.42 | -.49 | .46 | .04 | -.36 | .36 | -.29 | 1.00 |
| | DS | -.39 | .45 | .03 | .03 | -.16 | .36 | -.24 | -.16 | .16 | .08 | 1.00 |

Note: * $p < .05$ and ** $p < .01$

Shift pattern

As predicted, an interesting difference emerged when looking at the 'shift pattern'. Recall that a predicted shift occurs when the parent gives less support after a success, and more support following a failure (i.e., follows the *contingent shift rule*). An opposite shift occurs when a parent gives more support following a success and less support following a failure. And finally, a same shift occurs when the parent continues to intervene at the same level, regardless of the outcome of the previous intervention. The parents of the TD children made a higher proportion of predicted shifts than the parents of the children with DS (means are 54.91% and 37.44% respectively). An independent samples *t*-test between the groups and the proportion of predicted shifts revealed that this difference was significant [$t(28) = 3.73, p < .001$]. The proportion of opposite shifts was similar for both the parents of the TD children (16.79%) and the parents of the children with DS (18.99%). This difference was not significant, although the parents of the children with DS showed far larger variance than the parents of the TD children. Conversely, the parents of the children with DS made a higher proportion of same shifts (43.57%) than the parents of the TD children (28.30%). An independent samples *t*-test revealed that this difference was significant [$t(28) = -3.18, p < .005$] indicating that the parents of the children with DS showed a greater tendency to remain at the same level of intervention rather than challenging their children by moving to a lower level after a success. Thus, as predicted the parents of the children with DS followed the *contingent shift rule* less consistently than the parents of the TD children.

These differences in shift patterns are reflected in the difference in the *mean shift pattern* scores between the two groups. Each predicted shift was given a score of +1, each opposite shift was given a score of -1, and each same shift was given a score of 0. A mean pattern score between -1 and +1 was then calculated for each participant and used to calculate an overall mean pattern score for each group. This mean pattern score is a summary measure of the parents' behaviour, collapsed across the three different patterns. It can be seen therefore, to give a good indication of the parents' overall contingency and approach to interaction. The parents of the TD children showed an overall mean pattern of 0.38 compared to 0.19 for the parents of the children with DS. An independent samples *t*-test between the groups and the *mean shift pattern* revealed that the parents of the children with DS had a significantly lower *mean shift pattern* than the parents of the TD children [$t(28) = 3.15, p < .005$]. Thus, the parents of the TD children have a score closer to 1, indicating their greater proportion of predicted shifts, while the parents of the children with DS show a score closer to 0 which is indicative of their higher proportion of same shifts. The parents of the TD children can

therefore be said to have followed the *contingent shift rule* (giving more support after failure and less support after success) more consistently than the parents of the DS children.

Region of sensitivity to instruction (RSI)

As expected, the *region of sensitivity to instruction* (RSI) for the TD children was lower than the RSI for the children with DS (means are 1.27 and 2.13 respectively). Similarly, the *actual developmental level* (ADL) for the TD children was lower than the ADL for the children with DS (means are 2.07 and 3.13 respectively). Independent samples *t*-tests revealed that these differences were significant [$t(28) = -2.76, p < .01$ for the RSI and $t(28) = -3.11, p < .005$ for the ADL]. What is interesting however, is the differences in the proportion of time the parents of each group intervened at each of these levels. The pattern shows that the parents of the TD children spent more time intervening at their children's RSI (44.67%) than in their ADL (39.71%) as would be predicted by Vygotskian theory. However, the parents of the children with DS showed the opposite pattern, spending more time in their children's ADL (30.50%) than in the RSI (17.01%). It is also worth noting that the difference in time spent in the RSI and ADL is much larger for the parents of the children with DS than for the parents of the TD children. Two independent samples *t*-tests were performed between the two groups and the percentage of time spent in the RSI and in the ADL. As predicted, the parents of the children with DS spent significantly less time in their child's RSI than the parents of the TD children [$t(28) = 3.70, p < .001$]. However there was no significant difference in the time spent in the ADL between the two groups.

Also, as would be expected, the percentage of time spent in the RSI for the TD group correlates positively with the mean pattern score ($r = .68, p < .01$) and the percentage of predicted shifts ($r = .70, p < .01$), and correlates negatively with the percentage of same shifts ($r = -.55, p < .05$, refer to Table 3). This indicates that the parents of the TD children who make more predicted shifts and fewer same shifts, spend more time intervening within their child's RSI. For the DS group there was also a positive correlation between the percentage of time spent in the RSI and the mean pattern score, although this relationship did not quite reach significance. As would be expected, both groups showed a negative relationship between percentage of time spent in the RSI and percentage of opposite shifts, although this relationship was only significant for the DS group ($r = -.57, p < .05$). This relationship indicates that the parents of the children with DS who made more opposite shifts spent less time intervening in their child's RSI. For both groups there is a significant negative correlation between the RSI and the number of adults they interact with, which indicates that the children who have a lot of interaction with adults have a lower RSI as would be expected ($r = -.62, p$

< .05 for the TD group and $-.69, p < .01$ for the DS group). Finally, for the TD group there is a negative relationship between the total number of episodes and the proportion of time spent in the RSI ($r = -.73, p < .01$). This indicates that the parents who gave more interventions outside of their child's RSI need a longer interaction time and more episodes of interaction to help the child successfully complete the task than the parents who spent more time intervening within their child's RSI. Conversely, for the DS group there is a positive relationship between the total number of episodes and the percentage of time spent in the RSI, although this correlation did not quite reach significance. However, the trend suggests that the parents who initiated more episodes of intervention were also able to spend more time intervening within their child's RSI.

Other related questions

Thus the results indicate that the parents of the children with DS did spend less time intervening within their child's RSI and followed the *contingent shift rule* less consistently than the parents of the TD children, confirming the first hypothesis. These results suggest that the parents of the children with DS may be employing a different interactional strategy than the parents of the TD children. In order to further understand this difference, it is useful to examine several other related questions as follows. Firstly, is the percentage of time spent in the RSI associated with success for the TD children and the percentage of time spent in the ADL associated with success for the children with DS? Secondly, do the parents of the TD children make more predicted than same shifts, while the parents of the children with DS make slightly more same than predicted shifts? That is, do the parents of the children with DS tend to find a level of intervention that is successful for their child and focus on it, while still providing enough challenges to facilitate their development? And finally, do the parents of the children with DS begin with higher levels and go down as the child becomes more confident with the task, and do parents of TD children start low and go higher if the child needs it?

Question 1

To examine question 1, which asks whether the percentage of time spent in the RSI is associated with success for the TD children and the percentage of time spent in the ADL is associated with success for the children with DS, a set of correlational analyses were calculated between the percentage of time spent in the RSI, the percentage of time spent in the ADL and the percentage of success for each group (refer to Table 3). These analyses revealed no significant relationships. However, all trends were in the expected direction suggesting that the small sample was insufficient to provide appropriate power for the test. For the TD group, the relationships

between percentage of success, percentage of time spent in the ADL and percentage of time spent in the RSI were all positive, with the correlation between success and the percentage of time spent in the RSI being larger than the correlation between success and the percentage of time spent in the ADL. This indicates that interventions within the RSI were more associated with success than interventions in the ADL, consistent with Vygotskian theory. However, the results were quite different for the DS group with a negative relationship between success and percentage of time spent in the RSI and a positive relationship between success and the percentage of time spent in the ADL. These findings suggest that time spent in the RSI was associated with lack of success for the children with DS.

Question 2

To examine question 2, which was concerned with whether the parents of the TD children make more predicted than same shifts while the parents of the children with DS make slightly more same than predicted shifts, paired samples *t*-tests for the DS group and the TD group between the percentage of predicted shifts and the percentage of same shifts were performed. For the TD children the percentage of predicted shifts was found to be significantly higher than the percentage of same shifts [$t(14) = 3.24, p < .01$], with means of 54.91% and 28.30% respectively. This difference is as would be expected based on Vygotskian theory, and Wood and Middleton's (1975) research. The results for the DS group revealed a non significant difference. However, the means of 37.44% for the predicted shifts and 43.57% for the same shifts indicate that, as expected, the trend was in the opposite direction to that of the TD children, with a slightly higher proportion of same than predicted shifts. The fact that the percentages of the two types are shifts are much closer together for the DS group suggests that the parents in this group may be adopting a strategy which provides more of a balance of predicted and same shifts than the parents of the TD children.

Question 3

Finally, to examine question 3, “do the parents of the children with DS begin with higher levels and go down as the child becomes more confident with the task, and do parents of TD children start low and go higher if the child needs it?”, a paired samples *t*-test for the TD group between the mean level of intervention in the first half of the interaction and the mean level of intervention in the second half was calculated. This revealed no significant differences with means of 1.83 and 1.69 for the first and second halves respectively (refer to Table 2). However, although for the DS group the same analyses also revealed a nonsignificant difference, there is a slight difference in the means, with a mean level of 3.19 for the first half and a mean level of 2.80 for the second half. This indicates that

the parents of the children with DS did show a tendency to began with a high level and go lower as the children became more confident.

HYPOTHESIS TWO

Hypothesis two predicted that the parents of the children with DS would intervene more, use higher levels of intervention, be more directive, and more supportive than the parents of the TD children. For the analysis of this hypothesis, refer to tables 4, 5, and 6. Table 4 presents the means and standard deviations for all of the interaction variables for both groups. Presented in Tables 5 and 6 are correlations of the frequency of directives, the % of interventions and success at each level, the % of overall success and failure, enjoyment of interaction, % of predicted, same and opposite shifts, frequency of episodes of interaction, mean level of intervention, mean episode length, and the % of time spent in the RSI. These values are presented in two separate matrices for ease of comprehension.

Length and frequency of episodes of interaction

There was no significant difference in overall interaction time between the TD children and children with DS with means of 13.97 minutes and 13.48 minutes respectively. However, as expected, the children with DS had a shorter mean episode length (11.18 seconds, as compared with 16.09 seconds for the TD children) and a greater frequency of episodes of interaction (mean of 53.07 compared with 37.4) than the TD children. Independent samples *t*-tests revealed that both of these differences were significant [$t(28) = 3.13, p < .005$ for the mean episode length and $t(28) = -3.03, p < .01$ for the frequency of episodes of interaction] indicating that, as predicted, the parents of the children with DS intervened more frequently than the parents of the TD children.

Levels of intervention

The difference in mean level of intervention between the two groups was also as expected with the TD children receiving a lower mean level of intervention (1.78) than the children with DS (3.12). An independent samples *t*-test revealed that this difference was significant [$t(28) = -4.97, p < .001$].

Table 4:
Means and Standard Deviations for interaction time, mean episode length, frequency of episodes of interaction, mean level of intervention, % of success and failure, % of intervention and success at each level, frequency of directives, and frequency of supportives for both groups.

| Variable | TD group (n = 15) | DS group (n = 15) |
|--------------------------------------|----------------------|----------------------|
| Interaction time (mins) | 13.97 (3.90) | 13.48 (6.44) |
| Mean episode length (secs) | 16.09 (4.99) | 11.18 (3.44) |
| Frequency of episodes of interaction | 37.4 (10.31) | 53.07 (17.20) |
| Mean level of intervention | 1.78 (0.35) | 3.12 (0.99) |
| % of success | 65.31 (16.14) | 65.21 (20.74) |
| % of failure | 34.70 (16.14) | 34.79 (20.74) |
| % of level 1 interventions | 44.82 (18.04) | 5.26 (11.02) |
| % of success at level 1 | 58.24 (18.29) | 14.29 (27.35) |
| % of level 2 interventions | 40.89 (15.55) | 39.69 (27.50) |
| % of success at level 2 | 63.97 (22.10) | 41.29 (26.88) |
| % of level 3 interventions | 9.14 (14.17) | 17.49 (15.47) |
| % of success at level 3 | 53.59 (46.48) | 60.05 (28.90) |
| % of level 4 interventions | 2.08 (6.09) | 19.46 (22.88) |
| % of success at level 4 | 20.00 (41.40) | 64.54 (39.98) |
| % of level 5 interventions | 3.07 (3.73) | 11.06 (15.16) |
| % of level 6 interventions | 0.00 (0.00) | 7.03 (14.43) |
| Frequency of directives | 78.07 (31.71) | 140.73 (45.18) |
| Frequency of supportives | 34.60 (13.88) | 64.80 (31.19) |

*Note: Standard Deviations are given in parentheses

Table 5: Pearson Product Moment Correlations of frequency of directives, % of intervention and success at each level, enjoyment of interaction, and % of predicted, same and opposite shifts for both groups.

| | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. |
|------------------------------|-----------|-------|--------|--------|--------|--------|------|------|--------|------|------|------|------|--------|------|------|
| 1. frequency of directives | <i>TD</i> | 1.00 | | | | | | | | | | | | | | |
| | <i>DS</i> | 1.00 | | | | | | | | | | | | | | |
| 2. % level 1 interventions | <i>TD</i> | -.60* | 1.00 | | | | | | | | | | | | | |
| | <i>DS</i> | -.02 | 1.00 | | | | | | | | | | | | | |
| 3. % level 2 interventions | <i>TD</i> | .67** | -.56* | 1.00 | | | | | | | | | | | | |
| | <i>DS</i> | .39 | .25 | 1.00 | | | | | | | | | | | | |
| 4. % level 3 interventions | <i>TD</i> | .21 | -.66** | -.12 | 1.00 | | | | | | | | | | | |
| | <i>DS</i> | .50 | -.16 | .24 | 1.00 | | | | | | | | | | | |
| 5. % level 4 interventions | <i>TD</i> | -.30 | .06 | -.46 | -.07 | 1.00 | | | | | | | | | | |
| | <i>DS</i> | -.28 | -.36 | -.84** | -.37 | 1.00 | | | | | | | | | | |
| 6. % level 5 interventions | <i>TD</i> | -.19 | -.10 | -.26 | .02 | .28 | 1.00 | | | | | | | | | |
| | <i>DS</i> | -.37 | -.29 | -.64* | -.50 | .57* | 1.00 | | | | | | | | | |
| 7. % level 6 interventions | <i>TD</i> | - | - | - | - | - | - | 1.00 | | | | | | | | |
| | <i>DS</i> | -.44 | -.20 | -.36 | -.31 | .08 | .03 | 1.00 | | | | | | | | |
| 8. % success at level 1 | <i>TD</i> | -.42 | .51 | -.48 | -.12 | .18 | -.29 | - | 1.00 | | | | | | | |
| | <i>DS</i> | .63* | .12 | .29 | .56* | -.45 | -.30 | -.22 | 1.00 | | | | | | | |
| 9. % success at level 2 | <i>TD</i> | -.13 | .29 | -.15 | -.11 | .09 | -.50 | - | .85** | 1.00 | | | | | | |
| | <i>DS</i> | .21 | .31 | .69** | .28 | -.80** | -.49 | -.07 | .47 | 1.00 | | | | | | |
| 10. % success at level 3 | <i>TD</i> | .43 | -.34 | -.05 | .31 | .30 | .17 | - | -.15 | .01 | 1.00 | | | | | |
| | <i>DS</i> | .10 | -.19 | .08 | -.06 | -.03 | -.20 | .31 | .02 | .43 | 1.00 | | | | | |
| 11. % success at level 4 | <i>TD</i> | -.34 | -.10 | -.39 | .12 | .71** | .50 | - | -.25 | -.43 | .29 | 1.00 | | | | |
| | <i>DS</i> | -.50 | .23 | -.21 | -.85** | .26 | .37 | .33 | -.37 | -.20 | -.08 | 1.00 | | | | |
| 12. Enjoyment of interaction | <i>TD</i> | .07 | -.24 | .33 | -.06 | .18 | -.28 | - | .28 | .48 | .09 | -.15 | 1.00 | | | |
| | <i>DS</i> | -.55* | .09 | -.19 | -.38 | .12 | .32 | .17 | -.66** | -.01 | .20 | .10 | 1.00 | | | |
| 13. % predicted shifts | <i>TD</i> | -.59* | .59* | -.40 | -.36 | -.07 | .31 | - | .39 | .22 | -.11 | .06 | .08 | 1.00 | | |
| | <i>DS</i> | .03 | .71** | .20 | -.26 | -.25 | -.22 | -.02 | -.18 | -.04 | -.27 | .20 | .11 | 1.00 | | |
| 14. % same shifts | <i>TD</i> | .71** | -.50 | .67** | .16 | -.31 | -.48 | - | -.48 | -.20 | -.01 | -.37 | -.08 | -.85** | 1.00 | |
| | <i>DS</i> | .01 | -.55* | .14 | -.01 | .05 | .32 | -.25 | .01 | .17 | .31 | -.16 | .01 | -.61* | 1.00 | |
| 15. % opposite shifts | <i>TD</i> | -.25 | -.15 | -.51 | .36 | .69** | .34 | - | .18 | -.03 | .23 | .58* | .01 | -.25 | -.30 | 1.00 |
| | <i>DS</i> | -.04 | -.15 | -.37 | .29 | .22 | -.13 | .31 | .18 | -.16 | -.06 | -.04 | -.13 | -.40 | -.49 | 1.00 |

Note: * $p < .05$ and ** $p < .01$

Table 6: Pearson Product Moment Correlations of frequency of episodes of interaction, frequency of directives, % of intervention at each level, mean level of intervention, % of time spent in the RSI, % of success and failure, and mean episode length for both groups.

| | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. |
|---|-----------|--------|-------|--------|--------|-------|-------|-------|-------|-------|------|---------|------|------|
| 1. frequency of episodes of interaction | <i>TD</i> | 1.00 | | | | | | | | | | | | |
| | <i>DS</i> | 1.00 | | | | | | | | | | | | |
| 2. frequency of directives | <i>TD</i> | .86** | 1.00 | | | | | | | | | | | |
| | <i>DS</i> | .53* | 1.00 | | | | | | | | | | | |
| 3. % level 1 interventions | <i>TD</i> | -.48 | -.60* | 1.00 | | | | | | | | | | |
| | <i>DS</i> | -.10 | -.02 | 1.00 | | | | | | | | | | |
| 4. % level 2 interventions | <i>TD</i> | .34 | .67** | -.56* | 1.00 | | | | | | | | | |
| | <i>DS</i> | .54* | .39 | .25 | 1.00 | | | | | | | | | |
| 5. % level 3 interventions | <i>TD</i> | .23 | .21 | -.66** | -.12 | 1.00 | | | | | | | | |
| | <i>DS</i> | .56* | .50 | -.16 | .24 | 1.00 | | | | | | | | |
| 6. % level 4 interventions | <i>TD</i> | -.07 | -.30 | .06 | -.46 | -.07 | 1.00 | | | | | | | |
| | <i>DS</i> | -.31 | -.28 | -.36 | -.84** | -.37 | 1.00 | | | | | | | |
| 7. % level 5 interventions | <i>TD</i> | .15 | -.19 | -.10 | -.26 | .02 | .28 | 1.00 | | | | | | |
| | <i>DS</i> | -.52* | -.37 | -.29 | -.64* | -.50 | .57* | 1.00 | | | | | | |
| 8. % level 6 interventions | <i>TD</i> | - | - | - | - | - | - | - | 1.00 | | | | | |
| | <i>DS</i> | -.52* | -.44 | -.20 | -.36 | -.31 | .08 | .03 | 1.00 | | | | | |
| 9. mean level of intervention | <i>TD</i> | .36 | .23 | -.80** | -.01 | .73** | .38 | .48 | - | 1.00 | | | | |
| | <i>DS</i> | -.58* | -.47 | -.54* | -.87** | -.40 | .75** | .69** | .60* | 1.00 | | | | |
| 10. % time spent in the RSI | <i>TD</i> | -.73** | -.62* | .58* | -.19 | -.53* | .03 | -.02 | - | -.52* | 1.00 | | | |
| | <i>DS</i> | .45 | -.17 | .28 | .50 | -.20 | -.27 | -.28 | -.23 | -.45 | 1.00 | | | |
| 11. % of success | <i>TD</i> | -.36 | -.25 | .29 | -.36 | .00 | .24 | -.26 | - | -.15 | .49 | 1.00 | | |
| | <i>DS</i> | -.16 | -.17 | -.42 | -.43 | -.36 | .32 | .61* | .37 | .63* | -.11 | 1.00 | | |
| 12. % of failure | <i>TD</i> | .36 | .25 | -.29 | .36 | -.00 | -.24 | .27 | - | .15 | -.49 | -1.00** | 1.00 | |
| | <i>DS</i> | .16 | .17 | .42 | .43 | .36 | -.32 | -.61* | -.37 | -.63* | .11 | -1.00** | 1.00 | |
| 13. mean episode length | <i>TD</i> | -.84** | -.61* | .45 | -.18 | -.17 | -.36 | -.22 | - | -.50 | .62* | .32 | -.33 | 1.00 |
| | <i>DS</i> | -.71** | -.38 | .13 | -.33 | -.29 | -.01 | -.01 | .86** | .44 | -.37 | .09 | -.09 | 1.00 |

Note: * $p < .05$ and ** $p < .01$

Correlational analyses between the mean level of intervention and the percentage of failure and success revealed some interesting patterns of association (refer to Table 6). For the DS group there is a significant negative relationship between the percentage of failure and the mean level of intervention ($r = -.63, p < .05$) and conversely, a significant positive correlation between the mean level of intervention and the percentage of success ($r = .63, p < .05$). These findings indicate that the parents who used higher levels of intervention, which guaranteed a higher level of success, had more successful children than those who used lower levels of intervention which the children found more challenging.

An interesting pattern also emerges when looking at the proportions of each level used by the parents of the two groups, and success rates of the children at each level (refer to Table 4). Overall the parents of the children with DS showed much greater variance in the levels of intervention they used than did the parents of the TD children. The parents of the TD children used a level 1 intervention on average 44.82% of the time as compared with only 5.26% of the time for the parents of the children with DS. The percentage of success at this level is also very different for the two groups, with the TD children succeeding on average 58.24% of the time and the children with DS succeeding only 14.29% of the time. Independent samples *t*-tests revealed a significant difference for both of these variables [$t(28) = 7.25, p < .001$ for the percentage of level 1 interventions and $t(28) = 5.17, p < .001$ for the percentage of success at level 1].

The difference in the proportion of level 2 interventions used by the parents of the two groups is very small and thus not significant (40.89% for the parents of the TD children, and 39.69% for the parents of the children with DS), however, the difference in success at this level is quite large. The TD children succeeded on average 63.97% of the time, while the children with DS succeeded only 41.29% of the time at this level. An independent samples *t*-test revealed that this difference was significant [$t(28) = 2.53, p < .05$]. This indicates that although the parents of the children with DS did use level 2 interventions quite frequently, the children with DS were less able to respond successfully at this level than the TD children.

With levels 3 – 6, which are the higher, more specific levels of intervention, the pattern reverses. The parents of the children with DS used a mean of 17.49% level 3 interventions compared to 9.14% by the parents of the TD children, 19.46% level 4 compared to 2.08, 11.06% level 5 interventions compared to 3.07, and finally, the parents of the children with DS used 7.03% level 6 interventions and the parents of the TD children used none. Due to the children with DS receiving a

far higher proportion of levels 3 – 6 than the TD children, they also show higher rates of success at these levels as can be seen in Table 4 (note that the percentages of success for levels 5 and 6 are not reported here as these levels guarantee success for the child). Independent samples *t*-tests revealed significant differences between the groups for the percentage of level 4 interventions [$t(28) = -2.84, p < .01$] and the percentage of level 6 interventions [$t(14) = -1.89, p < .001$]. This finding is as expected because levels 4 and 6 are very specific, "hands-on" levels of intervention which were more appropriate for the children with DS than the TD children.

Frequency of directives and supportives

Finally, as expected, the parents of the TD children used fewer directives and supportives than the parents of the children with DS. The parents of the TD children used a mean of 34.60 supportives compared with 64.80 for the parents of the children with DS, and 78.07 directives compared with 140.73 for the parents of the children with DS. Two independent samples *t*-tests revealed significant differences for both the supportives [$t(28) = -3.43, p < .005$] and directives [$t(28) = -4.40, p < .001$], indicating that the parents of the children with DS were indeed more supportive and directive than the parents of the TD children.

Correlational analyses between the frequency of directives, the parents' enjoyment of interaction with their children, the children's success at the different levels of intervention, the percentages of the different levels of intervention used, and the percentage of predicted, same and opposite shifts revealed some interesting relationships (refer to Table 5). For the DS group, there is a negative correlation between the number of directives given and the parents' enjoyment of interaction with the child ($r = -.55, p < .05$) indicating that parents who are more directive reported that they enjoyed interacting with their children less. Also, the parents of the children with DS who were more directive were more likely to have children who responded successfully to level 1 interventions ($r = .63, p < .05$) suggesting that children with DS need more direction to be successful at the more general levels of intervention.

For the TD group, there is a negative relationship between the number of directives and the percentage of level 1 interventions used, and the percentage of predicted shifts made ($r = -.60, p < .05$ and $r = -.59, p < .05$, respectively) indicating that parents of TD children who are highly directive intervene at a higher level and make less predicted shifts. There is also quite a high, although not quite significant, negative relationship between the frequency of directives and the percentage of success at level one indicating that in contrast to the DS group, the TD children whose parents were

more directive were less successful with interventions at level one. Also, there is a positive correlation between the number of directives and the proportion of same shifts ($r = .71, p < .01$) indicating that parents of TD children who are more directive make more same shifts. Finally, there is a negative correlation between the percentage of time spent in the RSI and the number of directives given ($r = -.62, p < .05$, refer to Table 6) indicating that the more directive parents spent less time intervening in the child's RSI. Conversely, for the DS group there is no significant relationship between the frequency of directives and the percentage of time spent in the RSI, or the percentage of predicted, same, or opposite shifts, indicating that being highly directive is not necessarily associated with noncontingent interactive behaviour for the parents of the children with DS. These patterns of association suggest that being highly directive may be an effective strategy for the parents of the children with DS, but not for the parents of the TD children.

Additional correlational analyses for hypothesis two

Correlational analyses between the total number of episodes of interaction, the frequency of directives, the percentage of the different levels of intervention, the mean episode length, the mean level of intervention and the proportion of time spent in the RSI revealed some interesting patterns of association (refer to Table 6). As would be expected, there is a significant positive relationship for both groups between the total number of episodes of interaction and the number of directives ($r = .86, p < .01$ for the TD group and $r = .53, p < .05$ for the DS group). It is interesting to note though, that this relationship is far stronger for the TD group, suggesting that the parents of the children with DS were more directive regardless of the number of episodes of interaction. For the DS group the total number of episodes is positively related to the proportion of level 2 and 3 interventions ($r = .54, p < .05$ and $.56, p < .05$ respectively) and negatively related to the proportion of level 5 and 6 interventions and the mean level of intervention ($r = -.52, p < .05$, $-.52, p < .05$ and $-.58, p < .05$ respectively). These relationships indicate that if the children with DS received many level 2 and 3 interventions they needed more time and direction to successfully complete the task than if the parents used a higher proportion of level 5 and 6 interventions which guarantee success. In other words, the lower the mean level of intervention, the more time and hence episodes of interaction it took them to complete the task. For the TD group, there is a significant negative relationship between the mean episode length and the number of directives ($r = -.61, p < .05$), indicating that the longer the episodes were, the fewer directives the parents gave.

HYPOTHESIS THREE

Hypothesis three as stated in the introduction chapter predicts that the parents of the children with DS who are both directive and supportive will be more contingent, and their children will be more successful than those who are just directive or just supportive.

Firstly, each member of the DS group was given a supportive/directive category score. The median number of supportives and directives was found, and any parent whose supportive or directive score was placed above the median was categorised as high on that variable, and any parent whose supportive or directive score was placed below the median was categorised as low on that variable. Each parent was then placed into one of four categories: 1 = high directives and high supportives; 2 = low directives and low supportives; 3 = high supportives and low directives; 4 = low supportives and high directives. The means and standard deviations for the frequency of supportives and directives, the mean pattern score, the % of predicted, same and opposite shifts, the % of success and failure, and the mean level of intervention are presented by the supportive/directive category in Table 7. Due to the numbers within each category being so low, it was decided to examine only the pattern revealed by the means and not to do any more sophisticated analyses, as the results of such analyses would be impossible to interpret with any confidence.

Firstly, the parents in category 2 (low directives and low supportives) showed the highest mean pattern score (0.31), the highest percentage of predicted shifts (49.92%), and the lowest mean level of intervention (2.40), however, the children of these parents showed the lowest rate of success (30.75%). These findings suggest that intervening at a low level, and following the *contingent shift rule* without providing a high level of direction or support, is not an optimal strategy for children with DS.

Secondly, contrary to expectations, the parents in category four (low supportives and high directives) showed a higher mean pattern score (0.24 compared to 0.11 for category one), a higher proportion of predicted (38.57% compared to 34.31% for category one) and same shifts (46.91% compared to 42.22% for category one), and their children showed a higher percentage of success (71.86% compared to 58.21% for category one) than the parents in category one (high directives and high supportives). This was despite the fact that the parents in both categories used a very similar mean level of intervention (2.86 for category four and 2.85 for category one). These findings suggest that for the parents of the children with DS, being highly directive and making mainly same shifts

with some predicted shifts, while providing only a moderate level of support, is a more effective strategy than being highly directive and supportive, but making fewer predicted and same shifts.

Table 7:

Means and Standard Deviations for the frequency of supportives and directives, the mean pattern score, the % of predicted, same and opposite shifts, the % of success and failure, and the mean level of intervention by supportive/directive category score for the DS group.

| | Category 1 (high dir/high supp) n = 4 | Category 2 (low dir/low supp) n = 2 | Category 3 (high supp/low dir) n = 5 | Category 4 (low supp/high dir) n = 4 |
|----------------------------|---|---|--|--|
| frequency of supportives | 80.75 (34.33) | 27.00 (2.83) | 83.80 (25.08) | 44.00 (6.98) |
| frequency of directives | 171.25 (14.06) | 116.00 (5.66) | 94.40 (29.70) | 180.50 (28.41) |
| mean pattern score | 0.11 (0.11) | 0.31 (0.13) | 0.16 (0.08) | 0.24 (0.16) |
| % predicted shifts | 34.31 (6.08) | 49.92 (8.95) | 34.05 (6.11) | 38.57 (6.03) |
| % same shifts | 42.22 (2.76) | 30.21 (4.42) | 47.34 (8.56) | 46.91 (6.78) |
| % opposite shifts | 23.48 (4.55) | 19.87 (4.53) | 18.61 (5.85) | 14.53 (10.53) |
| % of success | 58.21 (11.45) | 30.75 (18.74) | 79.29 (17.50) | 71.86 (10.20) |
| % of failure | 41.80 (11.45) | 69.25 (18.74) | 20.71 (17.50) | 28.15 (10.20) |
| mean level of intervention | 2.85 (0.54) | 2.40 (0.99) | 3.86 (1.08) | 2.86 (1.00) |

***Note:** standard deviations are given in parentheses

Finally, the parents in category 3 (high supportives and low directives) showed the highest percentage of same shifts (47.34%), the highest percentage of success (79.29%) and the highest mean level of intervention (3.86). These findings suggest that the parents who were less directive and highly supportive tended to focus on the higher levels of intervention (recall that levels 4, 5, and 6 all involved high levels of parental support) at which the child was far more likely to be successful,

rather than challenging them by moving up to the lower levels which required more direction and were less likely to result in success.

Thus, the results do not confirm hypothesis 3. The children who achieved the highest levels of success had parents who were either highly directive and only moderately supportive (category 4) and intervened at a low level, or were highly supportive and less directive but intervened at a high level.

HYPOTHESIS FOUR

Recall that hypothesis four predicted that parents who have an authoritative parenting style will stay more consistently within the child's RSI and be more contingent, directive and supportive than parents who adopt other styles.

For the analysis of this hypothesis, correlational analyses were run between the permissive, authoritarian and authoritative scores on the PAQ, and the *mean shift pattern*, the mean level of intervention, the percentage of each level of intervention used, the percentage of time spent in the RSI, the number of directives and the number of supportives. The results of these analyses revealed no significant findings, and thus do not support this hypothesis.

ADDITIONAL QUESTIONS OF INTEREST

In addition to the hypotheses stated above, there were a number of incidental questions proposed in the introduction chapter which will be addressed below. Three tables will also be included in this section: Table 8 presents the means and standard deviations for time spent instructing, enjoyment of interaction, expectation of success, avoidance and frustration for both groups, and Table 9 presents a set of correlations between the TELD-2 scores, the % of intervention at each level, the frequency of directives and supportives, the expectations of success, frustration and avoidance for each group separately, and both groups together.

Question 1

Research suggests that parents of children with DS are more concerned about aiding their children's development, and thus tend to view all interactional situations as opportunities to teach (e.g., Hodapp, 1995, Roach et al., 1998). Thus, the first question to be examined is whether the

parents of the TD children will report more pleasure in playing with their children, as they are less concerned about every interaction being used to teach.

Table 8:

Means and Standard Deviations for time spent instructing, enjoyment of interaction, expectation of success, avoidance and frustration for both groups.

| Variable | TD group n = 15 | DS group n = 15 |
|---------------------------------|----------------------------|----------------------------|
| Time spent instructing | 4.93 (1.40) | 5.27 (1.33) |
| Enjoyment of interaction | 6.33 (0.96) | 6.27 (1.10) |
| Expectation of success | 4.63 (1.41) | 4.60 (1.11) |
| Avoidance | 2.50 (1.09) | 4.33 (1.59) |
| Frustration | 2.93 (1.39) | 4.40 (1.68) |

***Note:** standard deviations are given in parentheses

An independent samples *t*-test between the 2 groups for the ratings (on a scale of 1 – 7 with 1 being 'not at all' and 7 being 'very much') of how much the parents enjoyed interacting with their children, revealed a non-significant difference with means of 6.33 for the TD group and 6.27 for the DS group (refer to Table 8). This indicates that both sets of parents got equal enjoyment out of interacting with their children regardless of whether they had a disability or not. An independent samples *t*-test between the two groups for the parents' ratings (on a scale of 1 – 7) of how much time they spent deliberately teaching or instructing their children also revealed a non significant difference. However, an examination of the means revealed that the parents of the children with DS reported spending slightly more time teaching or instructing their children than the parents of the TD children with means of 5.27 and 4.93 respectively.

Table 9: Pearson Product Moment Correlations of TELD-2 scores, % of intervention at each level, frequency of directives and supportives, expectations of success, frustration and avoidance for each group separately and both groups together.

| | | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. |
|-----------------------------|-------------|--------|--------|--------|------|-------|------|------|------|------|-------|-------|------|
| 1. TELD – 2 scores | <i>TD</i> | 1.00 | | | | | | | | | | | |
| | <i>DS</i> | 1.00 | | | | | | | | | | | |
| | <i>both</i> | 1.00 | | | | | | | | | | | |
| 2. % level 1 interventions | <i>TD</i> | .40 | 1.00 | | | | | | | | | | |
| | <i>DS</i> | .37 | 1.00 | | | | | | | | | | |
| | <i>both</i> | .72** | 1.00 | | | | | | | | | | |
| 3. % level 2 interventions | <i>TD</i> | .04 | -.56* | 1.00 | | | | | | | | | |
| | <i>DS</i> | .22 | .25 | 1.00 | | | | | | | | | |
| | <i>both</i> | .14 | -.05 | 1.00 | | | | | | | | | |
| 4. % level 3 interventions | <i>TD</i> | -.33 | -.66** | -.12 | 1.00 | | | | | | | | |
| | <i>DS</i> | .31 | -.16 | .24 | 1.00 | | | | | | | | |
| | <i>both</i> | -.14 | -.48** | .10 | 1.00 | | | | | | | | |
| 5. % level 4 interventions | <i>TD</i> | -.15 | .06 | -.46 | -.07 | 1.00 | | | | | | | |
| | <i>DS</i> | -.44 | -.36 | -.84** | -.37 | 1.00 | | | | | | | |
| | <i>both</i> | -.58** | -.47** | -.68** | -.10 | 1.00 | | | | | | | |
| 6. % level 5 interventions | <i>TD</i> | -.59* | -.10 | -.26 | .02 | .28 | 1.00 | | | | | | |
| | <i>DS</i> | -.27 | -.29 | -.64* | -.50 | .57* | 1.00 | | | | | | |
| | <i>both</i> | -.45* | -.37* | -.55** | -.22 | .62** | 1.00 | | | | | | |
| 7. % level 6 interventions | <i>TD</i> | - | - | - | - | - | - | - | | | | | |
| | <i>DS</i> | -.06 | -.20 | -.36 | -.31 | .08 | .03 | 1.00 | | | | | |
| | <i>both</i> | - | -.33 | - | - | .23 | .14 | - | | | | | |
| 8. frequency of directives | <i>TD</i> | -.20 | -.60* | .67** | .21 | -.30 | -.19 | - | 1.00 | | | | |
| | <i>DS</i> | .20 | -.02 | .39 | .50 | -.28 | -.37 | -.44 | 1.00 | | | | |
| | <i>both</i> | -.42* | -.65** | .34 | .46* | .12 | -.01 | - | 1.00 | | | | |
| 9. frequency of supportives | <i>TD</i> | -.21 | -.40 | -.05 | .46 | .10 | .22 | - | .16 | 1.00 | | | |
| | <i>DS</i> | -.53* | -.49 | .02 | -.18 | .22 | .03 | .15 | -.28 | 1.00 | | | |
| | <i>both</i> | -.66** | -.62** | -.01 | .16 | .41* | .22 | - | .24 | 1.00 | | | |
| 10. expectations of success | <i>TD</i> | .05 | .24 | -.57* | .27 | -.14 | .42 | - | -.39 | .30 | 1.00 | | |
| | <i>DS</i> | .45 | .01 | .04 | .30 | -.17 | -.08 | -.05 | -.05 | -.13 | 1.00 | | |
| | <i>both</i> | .19 | .11 | -.20 | .27 | -.12 | .03 | - | -.16 | .01 | 1.00 | | |
| 11. frustration | <i>TD</i> | .01 | .17 | -.31 | -.08 | .55* | -.17 | - | -.15 | .12 | -.16 | 1.00 | |
| | <i>DS</i> | -.38 | .18 | .22 | -.48 | .08 | -.03 | -.14 | .08 | .09 | -.29 | 1.00 | |
| | <i>both</i> | -.48** | -.27 | .04 | -.14 | .33 | .11 | - | .28 | .31 | -.20 | 1.00 | |
| 12. avoidance | <i>TD</i> | -.31 | .14 | -.13 | .01 | -.17 | .10 | - | -.29 | .10 | .25 | .29 | 1.00 |
| | <i>DS</i> | -.23 | .37 | .26 | -.39 | -.05 | -.15 | -.12 | -.00 | .07 | -.53* | .83** | 1.00 |
| | <i>both</i> | -.56** | -.35 | .11 | -.03 | .23 | .12 | - | .31 | .36 | -.14 | .72** | 1.00 |

Note: * $p < .05$ and ** $p < .01$

Question 2

Evidence shows that mothers of children with DS adjust their level of directives and intervention based on their children's abilities (e.g., Davis et al., 1988; Maurer and Sherrod, 1987). Thus, question two looks at whether children with higher TELD-2 scores will receive less support and lower levels of intervention from their parents than the children who achieved lower TELD-2 scores.

Correlational analyses between the TELD-2 scores, the percentages of intervention at each level and the number of supportives and directives for each group separately and for both groups together, revealed some interesting associations (refer to Table 9). For both groups together there is a significant positive relationship between the TELD-2 scores and the percentage of level 1 interventions ($r = .72, p < .01$) indicating that overall, children with higher TELD-2 scores received more level 1 interventions (refer to Table 10). Conversely, for both groups together there is a significant negative relationship between the TELD-2 scores and the percentage of level 4 ($r = -.58, p < .01$) and 5 ($r = -.446, p < .05$) interventions, the number of supportives ($r = -.66, p < .01$), and the number of directives ($r = -.42, p < .05$), and the parents' ratings of the likelihood of their children becoming frustrated ($r = -.48, p < .01$) or avoidant ($r = -.56, p < .01$). These results indicate that overall, children with higher TELD-2 scores received fewer level 4 and 5 interventions, fewer directives, less support, and were less likely to become frustrated or seek to avoid the task than children with lower TELD-2 scores. For each group separately, the pattern of associations runs in the same direction as that just described for both groups together, with two exceptions; for the DS group, there is a small positive relationship between the frequency of directives and the TELD-2 scores, and for the TD group there is no relationship between the TELD-2 scores and the ratings of likelihood of becoming frustrated. These two exceptions to the general trend did not reach significance, but they suggest some interesting potential differences between the two groups regarding this question. They indicate firstly that there may be a tendency on the part of the parents of the children with DS to be more directive with the children who have a higher level of abilities, and secondly, that the parents' ratings of the likelihood of their TD children becoming frustrated when presented with a challenging task are not related to their children's level of ability as evidenced by their performance on the TELD-2.

Question 3

Recall that the most specific levels of intervention, levels 5 and 6, involve the parent either demonstrating the task, or physically taking the child's hand and placing a block on the tower, and thus by definition guarantee success for the child. Parents of children with DS who consistently intervene at these levels are thus likely to show a relatively low frequency of directives as they are doing most of the work themselves, rather than asking their children to do it. Thus question three addresses the issue of whether parents of children with DS who give the least directives will have a higher rate of level 5 and 6 interventions.

Correlational analyses between the frequency of directives and the percentage of level 5 and 6 interventions revealed no significant relationships (refer to table 10). However, the trend was in the expected direction with negative relationships between number of directives and percentage of level 5 and 6 interventions, indicating that a higher rate of level 5 and 6 interventions was associated with fewer directives.

Question 4

Question four examined whether the parents of the children with DS would report a lower expectation of their children's success, and a higher likelihood of their children seeking to avoid a challenging task or becoming easily frustrated with a challenging task, than the parents of the TD children.

Contrary to expectations, both sets of parents reported (on a scale of 1 – 7) that they would expect their children to be moderately successful when presented with a new problem-solving task, with a mean response of 4.63 for the TD children and 4.60 for the children with DS (refer to Table 8). However, as expected, the parents of the children with DS rated their children as more likely to try to avoid doing a challenging task (means are 4.33 for the DS group and 2.50 for the TD group) and more likely to give up or become frustrated (means are 4.40 for the DS group and 2.93 for the TD group) than the parents of the TD children. Independent samples *t*-tests revealed that these differences were significant [$t(28) = -3.69, p < .001$ for avoidance, and $t(28) = -2.61, p < .001$ for frustration].

CHAPTER FOUR

DISCUSSION

The present study set out to examine four main hypotheses and several other incidental questions regarding the nature of parent-child interaction on a problem-solving task between two groups of parents, one with TD children and the other with children with DS. The results provide support for hypotheses one and two, but support was not found for hypotheses three and four. The following chapter will address each hypothesis and the various additional questions in turn, discussing how the findings relate to past research and offering some explanations for the differences found between the two groups of parent-child dyads, before considering the findings as a whole and drawing some conclusions.

It should be noted here that due to the unavoidably small sample size, several of the analyses failed to reach significance even though the trends were in the expected direction, as in several cases the sample size was too small to provide sufficient power for the tests used. Therefore, in some cases the implications of nonsignificant findings will be considered, but always with the understanding that their value lies not in providing conclusive answers to the questions posed in the present study, but in highlighting issues and questions which could become the focus of future research.

Hypothesis one

This first hypothesis predicted that the parents of the children with DS would spend less time intervening within their child's RSI and would follow less consistently the *contingent shift rule* than the parents of the TD children. The findings supported this prediction, revealing that the parents of the children with DS did indeed spend less time in their children's RSI and made fewer predicted shifts than the parents of the TD children. A more detailed examination of these findings is needed in order to determine the origin of these differences, what purpose they serve and whether they represent an adaptive strategy on the part of the parents of the children with DS which is aimed at better aiding their children's development.

An examination of the differences in shift pattern between the two groups revealed some interesting findings. The proportion of predicted shifts made by the parents of the TD children was significantly higher than the proportion of predicted shifts made by the parents of the children with

DS, indicating that the parents of the TD children were more likely to follow the *contingent shift rule* than the parents of the children with DS. This finding suggests that the parents of the TD children were following an interactional strategy which is consistent with Vygotskian theory and the work of Wood and Middleton (1975). Conversely, the parents of the children with DS made a significantly higher proportion of same shifts than the parents of the TD children, indicating a greater tendency on the part of the parents of the children with DS to stay at the same level of intervention, rather than challenging their children by moving to a lower level of intervention after every success. Finally, there was no difference in the proportion of opposite shifts made by the two groups of parents, indicating that both groups were equally likely to occasionally respond non-contingently to their children's successes and failures. An examination of the *mean shift pattern*, which is a summary measure of the parents' behaviour across the three shift patterns, revealed that the parents of the children with DS had a significantly lower *mean shift pattern* than the parents of the TD children. This reflected their tendency to use a similar proportion of both predicted and same shifts, rather than focussing on making more predicted shifts like the parents of the TD children. An examination of the percentage of time spent intervening in the RSI also revealed some interesting differences between the two groups. As would be expected, the RSI and the ADL for the TD children were significantly lower than the RSI and the ADL for the children with DS, reflecting the underlying differences in ability between the two groups of children.

The strategy used by the parents of the TD children, that is, focussing their intervention more in the RSI than the ADL and making more predicted than same shifts, is precisely the strategy which is predicted by past research and theory to indicate the most effective tutoring style. Recall that Vygotskian theory predicts that learning will proceed most effectively when tutoring occurs in the child's ZPD, as it enables the child to go beyond what he or she already knows and develop new skills in a supported context (Vygotsky, 1978). In line with this, Wood and Middleton (1975) found that the most effective instructors in their study were those who focussed their activities within the RSI and who were systematically most responsive to the effects of their instructions on the child. In a subsequent study (Wood et al., 1978) they confirmed this with the finding that a contingent strategy of tutoring produced children who were the most active and efficient, and most capable of performing the task independently after the collaborative session. Further confirmation of this finding is provided by Pratt et al. (1988) who found that the parents who followed the *contingent shift rule* most consistently were more effective tutors.

Thus, with respect to the present study, given the fact that the parents of the children with DS tended to focus more on their child's ADL than the RSI, and followed the *contingent shift rule* less consistently, it would be easy to assume, based on past research and Vygotskian theory, that the parents of the children with DS were less effective tutors than the parents of the TD children. However, an alternative possibility is that the parents of the children with DS are in fact employing a different interactional strategy which is more adaptive to the different needs and abilities of their children.

In order to examine this possibility, some further analyses were conducted. Correlational analyses revealed a general trend in associations which suggested that for the TD group, interventions within the RSI were more associated with success than interventions within the ADL as would be expected based on Vygotskian theory. However, the trend for the children with DS showed the opposite pattern, with time spent in the RSI being associated with a lack of success. Due to the small sample size these analyses did not reach significance, and thus the findings are inconclusive. However, the fact that the correlations were in the right direction suggests that this is an issue which would be worth further exploration. Further examination of the means for each of the three shift patterns revealed that the parents of the TD children made significantly more predicted than same shifts, in accordance with Vygotskian theory. However, in line with the proposition that the parents of the children with DS may be employing a different interactional strategy, the analysis revealed no significant difference in the percentage of predicted and same shifts they made. The means revealed a slightly higher proportion of same shifts, but the percentages of the two were very close, indicating that the parents of the children with DS were using more of a balance of the two types of shifts, rather than simply following the *contingent shift rule* as predicted by Vygotskian theory. Finally, an analysis of the mean level of intervention used in the first and second halves of the interactional sessions revealed an interesting trend. It was reasoned that as the TD children do not have the same difficulties with learning and motivation, their parents would be likely to begin with a low level of intervention and then move higher if the children needed it. The results revealed no difference in the mean level of intervention between the two halves of the interactional session for the TD children, suggesting that their parents tended to use a similar level of intervention throughout the course of the interaction. However, conversely, it was reasoned that the parents of the children with DS would be likely to begin with a high level of intervention in order to engage the children in the task and give them an experience of being successful, before moving to lower levels as the children became more confident. Past research (Wishart, 1991) has found that the performance of children with DS was enhanced after

an experience of errorless learning. The analysis of the means for the DS group revealed a non significant difference between the first and second halves, however the difference in means is in the expected direction, suggesting that again, the small sample size did not provide enough power for the test. It would be interesting to address this question with a larger sample of children, as a significant finding would add further support to the proposition that the parents of the children with DS are employing a different interactional strategy which is adaptive to the needs of their children.

Much research, particularly the work of Wishart and her colleagues (Pitcairn & Wishart, 1994; Wishart, 1990; 1991; 1993; 1999; Wishart & Duffy, 1990), has found that children with DS have particular deficits in the areas of motivation and learning new information. Overall, the results of this research shows that children with DS tend to use avoidance strategies when faced with cognitive challenges more than one step above their current developmental status. They also show an increasing reluctance to take the initiative in learning tasks, make inefficient use of existing problem-solving skills, and have difficulty consolidating newly acquired skills into their repertoire. Thus it can be argued that in the present study, parents of children with DS adopted the strategy of focusing on their children's ADL, and making a similar proportion of same and predicted shifts as an adaptive response to the different needs and abilities of their children. Using a balance of predicted and same shifts, and focussing more on the children's ADL than their RSI, can be seen to be a strategy which maintains the children's interest and engagement in the task by providing enough challenge for new learning to occur, but not pushing the limits of their abilities so far that they become frustrated and seek to avoid the task. It is important to note that the parents of the children with DS did still make predicted shifts and intervene within their child's RSI as predicted by Vygotskian theory, but they differed from the parents of the TD children in that these were not the focus of their interactional strategy. Overall then, the findings of hypothesis one can be seen to provide support for the proposition that the parents of the children with DS are employing a different interactional strategy which is more adaptive to the different needs and abilities of their children than the strategy predicted by Vygotskian theory and past research to be most effective.

A possible alternative explanation for these observed differences between the two groups is not that the parents of the children with DS deliberately employ a different strategy which is more adapted to their children's needs, but that the children with DS were harder to read than the TD children, resulting in their parents not being able to respond as contingently to their successes and failures, and finding it more difficult to determine their RSI. Many researchers (e.g., Gunn, 1993;

Landry & Chapieski, 1989; Roach et al., 1998) have reported that children with DS have difficulty giving out clear social signals, are less responsive, less likely to initiate social interaction, have inefficient attention strategies, and are delayed in expressive language development. It could, therefore, be argued that the parents of the children with DS may simply have ended up intervening more in their child's ADL and making more same shifts because the characteristics of their children during interaction made it too difficult for them to adopt a more challenging strategy.

The most likely conclusion is that the differences in interactional style observed between the two groups of dyads result from a combination of the two alternatives proposed. However, the results do suggest that the parents making a deliberate adaptive response to the needs of their children has a much stronger influence on their interactive behaviour, than simply not being able to read their children's cues. The fact that the parents of the children with DS made 37.44% predicted shifts indicates that they were able to read their children's cues and respond appropriately to them. Likewise, spending 17.01% of the time intervening within their child's RSI suggests that they were able to accurately gauge their children's current level of ability and challenge them by working at a level just above it. Therefore, it seems that although their children are undoubtedly hard to read at times, and this can affect their ability to respond contingently to them, the results support the proposition that the parents of the children with DS may deliberately be adopting a different interactional strategy which is more adaptive to the different needs and abilities of their children.

It is also worth considering some more practical factors which may have been contributing to the fact that the parents of the children with DS spent less time intervening within their child's RSI than the parents of the TD children. Firstly, it should also be taken into account that all of the parent-child interactional sessions were videotaped and observed by the experimenter. It may be that the parents of the children with DS were so concerned with presenting the best picture of their children's abilities, and maintaining their children's best possible behaviour, that they chose to stay more within their child's ADL as they did not want to challenge them too much and risk an outburst of frustrated behaviour or a refusal to continue with the task. If this is the case it is likely that the parents would have challenged their children more, focussing more on the ZPD, if they were interacting in an everyday situation without being observed. Secondly, it is of interest to consider whether the parents of the children with DS would have used the same strategy had the task been one that was familiar to the children. If the children had been asked to complete a task that was more familiar to them, it is likely that the parents may have expected more from them and interacted in a more challenging way.

Future research could assess this idea by comparing the strategies that parents use in interaction between a novel and familiar problem-solving task, to see if any differences do exist.

In summary, although according to Vygotskian theory the strategy employed by the mothers of the children with DS is not an optimal one as it did not focus on the children's ZPD, or on following the *contingent shift rule*, a picture of a different strategy which may be more adaptive for the different needs of these children seems to be coming to light. Focussing more on the child's ADL than the RSI serves to help keep the child motivated and engaged in the task, and enables the child to experience a level of success which is rewarding and builds self-confidence. Moving occasionally to the RSI can then be seen to provide sufficient challenge for new learning to occur, but not so much that the child becomes frustrated and seeks to avoid the task. Similarly, making more of a balance of same and predicted shifts serves to facilitate the child's difficulty with learning and consolidating new skills, giving the child sufficient time to take on board the new information while still being provided with the same level of scaffolding. However, at the same time such a strategy gently provides enough challenge for new learning to take place.

Hypothesis two

The results very clearly support hypothesis two which predicted that the parents of the children with DS would intervene more, use higher levels of intervention, be more directive, and more supportive than the parents of the TD children. Although there was no difference in the overall length of the interactional sessions between the two groups, the children with DS and their parents produced a significantly shorter mean episode length and a greater frequency of episodes of interaction, indicating that these parents were indeed intervening at a significantly higher rate than the parents of the TD children. The children with DS also received a significantly higher mean level of intervention than the TD children, indicating that the parents of the children with DS tended to use more of the higher, more specific levels of intervention when interacting, whereas the parents of the TD children tended to use the lower, more general levels. A closer look reveals that the parents of the TD children used almost exclusively level 1 and 2 interventions. In contrast, the parents of the children with DS showed much greater variance in the level of intervention they used. It is interesting to note that both groups used approximately the same proportion of level 2 interventions, however, the TD children were far more successful at this level than the children with DS. For the DS group there was also a positive relationship between the total number of episodes of interaction and the proportion of level 2

and 3 interventions, indicating that if their parents chose to use a high level of level 2 and 3 interventions, the children with DS needed more time and direction to successfully complete the task.

In terms of the frequency of *directives* and *supportives* given by the parents of the two groups, the parents of the children with DS produced a significantly higher frequency of both than the parents of the TD children, as expected. This finding is in line with much of the past research in this area (e.g., Crawley & Spiker, 1983; Landry et al., 1994; Mahoney & Robenalt, 1986; Marfo, 1991; 1992) which has found that directiveness and supportiveness are not mutually exclusive facets of interaction with children with DS, but rather, that a high level of both is needed for optimal learning and development to occur. Furthermore, correlational analyses revealed that the parents of the children with DS who were more directive were more likely to have children who responded successfully to level 1 interventions, suggesting that a high level of direction was indeed associated with the development of greater competence in children with DS. Also, for the DS group there were no significant relationships between the frequency of directives and the time spent in the RSI, or the percentage of predicted, same, or opposite shifts, indicating that being highly directive is not necessarily associated with noncontingent interactive behaviour for the parents of the children with DS. This finding supports the more recent literature in this area (e.g., Landry et al., 1994; Marfo, 1991; 1992) which has set out to disprove the widely held assumption that parental directiveness must be associated with intrusiveness and insensitivity. The present findings can thus be seen to add to the literature which holds that directiveness and sensitivity are independent dimensions of interactional style. Conversely, the pattern of correlations for the TD children suggests that a high level of directiveness is not an optimal strategy for these parents to adopt in interaction. A high level of directiveness for the TD children was associated with a higher mean level of intervention and fewer predicted shifts, indicating that the parents of the TD children who adopted a more directive style tended to use more specific, less challenging levels of intervention and respond less contingently to their children's successes and failures. This finding is supported by past research which has shown that directiveness in interactions with TD children is associated with negative outcomes (Marfo, 1991; Sorce & Emde, 1982).

An interesting question to address at this stage is whether the high levels of directiveness and support used by the parents of the children with DS occur as an adaptive and deliberate response to the needs of the children, or whether the parents are simply more directive and supportive because of their perceptions of their children and an expectation that they will require more direction. One of the

main difficulties experienced by children with DS is delayed development of their fine motor skills (Carr, 1995; Gunn, 1993), and the block model-copying task required quite a high level of fine motor development in terms of being able to pick up the blocks and balance them on top of one another in some quite complex configurations. Consequently, the parents of the children with DS were often observed to be supporting their children by facilitating their ability to hold, place and balance the blocks. This was particularly common with the younger children, whose fine motor skills were obviously less developed than those of the older children. These supportive actions can be seen to be an adaptive response to the needs of the children, allowing them to be successful, despite their delayed fine motor skills. The other form of supportives which were recorded was incidents of vocal praise. As described previously, children with DS often have serious deficits in the area of motivation, and therefore, need more encouragement to remain engaged with a task. A high level of verbal praise and encouragement could, therefore, also be interpreted as an adaptive response to the children's needs. In terms of the directives, the parents of the children with DS were often observed to be repeating the same instruction several times. Given that these children have difficulties with auditory processing and attention strategies (Chapman, 1995; Gunn, 1993; Morss, 1985), it could be that repeating the same instruction several times is an adaptive strategy allowing the children sufficient time and opportunity to attend to, process and understand what is required of them. Thus, there is reasonable evidence to suggest that the parents of the children with DS were being highly supportive and directive as a deliberate, adaptive response to the needs of their children.

However, informal observations also revealed that there were also some characteristics of the interaction between the parents and their children with DS which suggested they may have been acting out of an expectation that their children require more direction and support, regardless of their current abilities. It was often observed by the researcher that parents would continue to give directions at the same rate even when the children demonstrated an understanding of a stage in the task solution which would enable them to complete an action independently. For example, sometimes while the parent was occupied by a task such as picking a block up off the floor, or straightening the tower, the child would correctly select the next block and attempt to place it on the tower independently, however, when the parent redirected her attention to the task, she would still direct the child to perform the action he or she had just been attempting anyway. Such behaviour can be seen to indicate a perception on the part of the parents that their children require more direction and support as a function of their disability, and thus they provide these regardless of the child's actions or demonstrated ability.

The most likely conclusion is that the high levels of directiveness and supportiveness used by the parents of the children with DS are due to a combination of these two factors just described. Interaction between two people is always a complex combination of adaptive responses to the other, and personal perceptions and expectations, and it would be impossible to definitively separate the two influences on behaviour. At the very best, more research on the parents' perceptions and beliefs about what they were doing during the problem-solving task in the present study, and also in other situations, is needed to further examine this issue. Thus, overall, the results provide strong support for hypothesis two, and the pattern of associations suggests that being highly directive may be an effective strategy for the parents of the children with DS, but not for the parents of the TD children. This provides support both for the literature which has proposed that a high level of directiveness and support are necessary for an optimal learning environment for children with DS, and for the proposition of the present study that the parents of the children with DS may be employing a different interactional strategy which is more suited to the different needs and abilities of their children.

Hypothesis Three

Hypothesis three sought to further examine whether parents who are both highly supportive and highly directive provide an optimal learning environment for children with DS. It was predicted that parents of the children with DS who are both directive and supportive will be more contingent during the task, and their children will be more successful than those who are just directive or just supportive.

Firstly, based on past research and the findings from hypotheses one and two of the present study, the pattern of results for the parents in categories two (low directives and low supportives) and three (high supportives and low directives) makes logical sense. The parents in category one produced the highest mean pattern score and the highest percentage of predicted shifts, which from a Vygotskian perspective would be interpreted as being an optimal interaction strategy which effectively targeted the child's ZPD. However, for the children with DS this pattern was associated with the lowest level of success, suggesting that parents who follow the contingent shift rule without providing a high level of direction and support do not provide an optimal learning environment for children with DS. Conversely, the parents in category three showed the highest percentage of same shifts, the highest mean level of intervention, and the highest percentage of success. This finding reflects the fact that the higher levels of intervention, particularly levels 4, 5, and 6 required a high level of support from the parents in the form of demonstration, providing the appropriate blocks, and

physically helping the child to place blocks correctly. Consequently, intervention at these levels allows little room for failure, with levels 5 and 6 in particular guaranteeing success for the child. Parents who chose to focus on these levels had no need to be highly directive, and showed a tendency to remain at these high levels of intervention, rather than challenging their children by moving down to the lower levels which required more direction and were less likely to result in success for the child.

Secondly, contrary to expectations, the parents in category four (low supportives and high directives) showed a higher mean pattern score, a higher proportion of predicted and same shifts, and their children showed a higher percentage of success than the parents in category one (high directives and high supportives). Thus, the results do not provide support for this hypothesis. However, it is interesting to note that the mean supportive score in category 4 is substantially higher than the mean supportive score in category 2 (low directives and low supportives). This indicates that the level of supportives given by the parents in category 4 would be better thought of as a *medium* level of support by comparison. Thus, it may be that providing a high level of direction and a medium level of support is a better strategy for the children with DS than providing a high level of both as originally hypothesised. Given that children with DS have been found to be more passive and less spontaneous in initiating social interaction (e.g., Fischer, 1987; Roach et al., 1998), and have a tendency to rely on reinforcement being generated by others, even when they are capable of generating it themselves (Wishart, 1990; 1991; 1993; 1999), it could be argued that providing a very high level of support may lead to increased dependency on the part of the children with DS. However, providing a medium level of support may be more adaptive in that it allows the children to feel secure and experience success, but still requires them to work hard at achieving a solution to the task.

There are several possible factors to be considered which are likely to have had an effect on this outcome. The most obvious is the very small number of dyads within each category. A replication study would need to be conducted with a far larger sample of parents and children before any conclusions could be drawn in regard to this hypothesis. It may also be that the proportion of success in response to each intervention is not the best indicator of the efficacy of any given interactional strategy. As mentioned previously, level 5 which involves the parents demonstrating a step in the problem-solving process, and level 6 which involves the parent taking the child's hand and physically placing a block in the correct place on the tower, both guarantee success for the child. Thus, as demonstrated by the parents in category three, a parent could adopt a completely non-

contingent, unchallenging strategy which does not seek at all to work within the child's ZPD, and still have his or her child achieve a high level of success. Perhaps a better way of evaluating the effects of the levels of directiveness and supportiveness in each parental strategy would be to get each child to attempt to complete the problem-solving task independently, subsequent to the collaborative session. Observing how successful the children were, what strategies they employed, and what degree of task solution they were able to accomplish would give a more clear indication of how effective the parents' interactional strategies were in terms of facilitating the development of independent skills, or in Vygotskian terms, the internalisation of interpsychological processes.

Despite not providing support for the hypothesis, these findings do provide some support for the growing body of literature (e.g., Landry et al., 1994; Mahoney & Robenalt, 1986; Marfo, 1992; Marfo & Kysela, 1988; Tannock, 1988), stemming from Crawley and Spiker's (1983) research which proposes that directiveness and supportiveness are separate dimensions of parental interaction. Or in other words, directiveness does not presuppose intrusiveness and insensitivity. The fact that there were parents in the present study who fitted into all four categories indicates that being high on the dimension of directiveness did not automatically mean being low on the dimension of sensitivity or supportiveness.

Hypothesis Four

Based on a study by Pratt et al. (1988) who found that an authoritative parenting style was positively related to the percentage of success, the percentage of use of the RSI, and the percentage of contingent shifting by the parents, hypothesis four predicted that the parents who have an authoritative parenting style will more consistently stay within the child's RSI, and be more contingent, directive and supportive than parents who adopt other styles. Correlational analyses for this hypothesis failed to produce any significant relationships between parenting style and the various interactional variables, with the majority of the r values in the matrix being less than .10. Thus, the results do not provide any support for this hypothesis.

The most likely reason for this negative outcome is that the Parental Authority Questionnaire (PAQ) which was used to measure parenting styles in this study did not provide an accurate measure of the different styles. Even if parents do not practise an authoritative style of parenting, the majority of them know what the ideal is, and the nature of the questions on the PAQ is such that it is not difficult for the parent to infer which style each question is referring to. For example, a question such

as "I feel that parents should use more force than they often do in order to get their children to behave the way they are supposed to" (question 9, PAQ) is quite obviously measuring authoritarian tendencies. The rather 'see-through' nature of many of the questions allows the parents to provide a set of model answers which do not necessarily fit with their actual behaviour. In the present study, this resulted in the vast majority of the parents producing a score on the PAQ which was very high on authoritativeness, despite informal observations by the researchers revealing a lot of variation in parenting style amongst the sample. Also, the nature of the scoring system, which gave a score out of 55 for each of the dimensions, meant that it was possible for parents to achieve a high score on more than one of the dimensions. Thus, some parents scored highly on both the authoritative *and* authoritarian dimensions, or on authoritativeness *and* permissiveness. Such a result is obviously nonsensical, and cannot be considered to give an accurate description of the parenting styles favoured by the parents in the present study.

A more accurate way of measuring parenting style would have been to conduct a formal observation in the way that Pratt et al. (1988) did. They had two experimenters make independent ratings of parenting style on a series of 14 scales across several different tasks. The average ratings on these scales were then composited to construct two-factor scores for each parent, which represented the four different styles in Baumrind's typology: authoritative, authoritarian, permissive and rejecting-neglecting (Baumrind, 1989; Maccoby & Martin, 1983). This observational measure of parenting style enabled the researchers to gain a more accurate picture of the parents' behavioural styles and thus analyse their relationships to the other dimensions of interaction being examined. Thus, although the present study has not been able to examine this hypothesis, future research using observational, rather than self-report, measures of parenting style may be able to shed some more light on the relationship between parenting style and effectiveness in tutorial interactions.

Additional questions of interest

Enjoyment of interaction

Based on research (e.g., Hodapp, 1995; Roach et al., 1998) which has shown that the parents of children with DS have an increased tendency to view all interactions with their children as opportunities to teach, and are more concerned about aiding their children's development than parents of TD children, question one examined whether the parents of the TD children would report more pleasure in interaction with their children than the parents of the children with DS. The results of the analysis revealed no significant difference between the two groups of parents in their ratings of how

much they enjoyed interacting with their children, indicating that both sets of parents got equal enjoyment out of playing with their children.

There are a few possible reasons for this finding. Firstly, it may simply be that there exists an innate enjoyment for parents in interacting with their children, regardless of their level of ability. Alternatively, it may be that given the amount of time and effort that parents of children with DS typically put into intervening in their children's development, they find interactions rewarding and enjoyable as they are able to see their children learn and succeed. It must be personally very rewarding and satisfying for these parents to be able to have such a direct and tangible impact on their children's learning and development. Regardless of the reasons why, this finding of no difference between the two groups in terms of their enjoyment of interaction with their children has important implications for the main findings of the present study, because it indicates that the results of the block model-copying task were not confounded by differences in enjoyment between the two groups of parents. If a difference had been found, it would have likely had an impact on how the parents interacted with their children during the task, making the findings more difficult to interpret.

Relationship between TELD-2 scores and level of intervention

Past research (e.g., Davis et al., 1988; Maurer & Sherrod, 1987) has shown that rather than being indiscriminately directive as was once thought, parents of children with DS are sensitive to the different levels of ability shown by their children and are able to adjust their level of directiveness and intervention accordingly. In the present study, it was reasoned that if the parents of the children with DS were adjusting their pattern of intervention during interaction to fit with their children's differing levels of ability, there would be a relationship between the children's TELD-2 scores, the level of directives and supportives, and the level of intervention they received. Thus, question three examined whether children with higher TELD-2 scores would receive less support and lower levels of intervention from their parents than the children who achieved lower TELD-2 scores. The results showed firstly that for both groups of children those with higher TELD-2 scores received more level one interventions, indicating that their parents were recognising their higher level of ability, and adjusting their own level of intervention accordingly. The analysis of each group separately on these factors revealed the same positive pattern of association. These results suggest that the parents of *both* groups were able to adjust their level of interaction in response to their children's level of development, which for the parents of the children with DS fits in with past findings. Secondly, the correlational analyses for both groups together also revealed significant negative relationships

between the TELD-2 scores and the percentage of level 4 and 5 interventions, the number of supportives and directives, and the ratings of frustration and avoidance. These results indicate that the children with higher TELD-2 scores did indeed receive less support and lower levels of intervention as predicted.

This finding shows that the parents in both groups were able to adjust their level of intervention and support depending on the child's level of ability. Thus, rather than being indiscriminately directive as was once thought, the parents of the children with DS were sensitive to the different levels of ability shown by their children and adjusted their level of intervention and support accordingly. This finding can be seen to add support to the proposition that the parents of the children with DS may be employing a different interactional strategy which is adapted to the different needs of their children. Adjusting the style of interaction based on the children's level of ability, as indicated by these findings, suggests that the different interactional strategies observed in these parents may be a deliberate response to the children's needs, rather than just an inability to read their cues.

Relationship between directiveness and the higher levels of intervention

Due to the fact that the most specific levels of intervention, levels 5 and 6, involve the parents either demonstrating the task, or taking the child's hand and placing the block correctly, it is impossible for a child to fail at these levels, and they do not require much direction from the parent. Thus, it was reasoned that the parents of children with DS who consistently intervene at these levels are likely to show a relatively low frequency of directives as they are doing most of the work themselves, rather than trying to get their children to do it. This question, therefore, examined whether the parents of the children with DS who gave the lowest frequency of directives would use a higher rate of level 5 and 6 interventions. The analyses failed to produce any significant results, however, there were quite substantial negative relationships between the frequency of directives and the number of level 5 and 6 interventions, suggesting that the group was too small to provide sufficient power for the test. This pattern of association indicates that the parents who used a high rate of level 5 and 6 interventions did indeed show some tendency to be less directive.

It should be considered here, that rather than being less directive, these parents may simply be exchanging one form of directiveness for another. In other words, rather than giving a lot of verbal directives, they are being highly physically directive. There are two possible reasons for this tendency

in parents who use a high level of level 5 and 6 interventions to use fewer *directives*. Firstly, it may be that the children have a lower level of ability to understand verbal directives, thus using a high level of physical support is an appropriate strategy for their level of development. Or conversely, it may be that the parents were overly anxious to see their children succeed, and thus focussed on the highest and most specific levels of intervention in order to get the job done. Further research is required to address this question.

Parental expectations, frustration, and avoidance

Based on past research which has found that children with DS have difficulties with learning and motivation (e.g., Chapman, 1995; Gunn, 1993; Wishart, 1999) it was reasoned that the parents of the children with DS would report having a lower expectation of their children's success, based on their experience of their children's learning difficulties. It was also proposed that they would report that their children were more likely to seek to avoid a challenging task, and would become more easily frustrated with a challenging task than the TD children.

Firstly, contrary to expectations, there was no significant difference between the two groups of parents in their ratings of how successful they expected their children to be when presented with a new problem-solving task. Both groups of parents had a mean rating which was just above the middle of the scale, indicating that they both had moderate expectations of their children's success. There are a couple of possible explanations for this lack of difference in expectations of success between the two groups. Firstly, it may simply be that the parents of the children with DS have the same expectations of their children, regardless of their disability. Alternatively, this finding may be an artifact of using a self-report measure to ascertain the parents' expectations of their children's success. They may have been anxious to say the 'right' thing, and thus, given an overexaggerated picture of their actual expectations.

Secondly, the finding that the children with DS were rated by their parents as significantly more likely to become frustrated with a challenging task and significantly more likely to avoid a challenging task than the TD children, is as expected. Recall that the difficulties that children with DS experience with learning and development are understood to stem both from the underlying biological dysfunction and from the psychological environment in which they learn. It makes sense that if these children have often encountered failure when presented with a challenging task in the past, they will be more likely to seek to avoid any new challenging task that is presented to them. Likewise, if in the

past they have had experience of struggling to achieve a task solution and have not been able to produce a successful outcome, it follows that they will show a tendency to become frustrated more easily when faced with a new challenge. Much research which has looked at the characteristics of learning in children with DS, particularly the work of Wishart and her colleagues (e.g., Pitcairn & Wishart; Wishart, 1993;1999; Wishart & Duffy, 1990) confirms these two features of the approach that children with DS have towards challenging tasks, showing that they have difficulties with motivation and often develop a sense of learned helplessness as a result of the adverse success/failure rates that they typically experience. From this perspective, interactive problem-solving in which the parts of the task that are beyond the child's current abilities are managed by the parent, and the parent scaffolds each step in the process, allowing the child to experience an increased rate of success and a sense of personal efficacy, can be seen to be more effective than independent problem-solving during which the child is likely to experience a high rate of failure, leading to avoidance and frustration.

Summary and conclusions

This study compared a group of children with DS and group of TD children in terms of the characteristics of parent-child interaction during a problem-solving task. The hypotheses were based largely on Vygotskian theory which proposes that effective tutoring should focus on the child's ZPD, and the work of Wood and Bruner and their colleagues (e.g., Bruner & Bornstein, 1989; Wood, 1989; Wood et al., 1976; Wood & Middleton, 1975) which has provided details of the process of scaffolding, and has shown that effective tutoring must be contingent upon the child's responses. Much research with TD children has shown that contingent tutoring which focuses on the child's ZPD is associated with the most positive developmental outcomes for the children. However, to the author's knowledge, no past research has employed the present methodology to examine the characteristics of parent-child interactive problem-solving with children with DS. The findings of the present study revealed many differences between the two groups. On examination, it was found that the interactional strategy used by the parents of the TD children was as would be predicted based on Vygotskian theory and Wood and Middleton's (1975) research. However, the characteristics of the interaction between the parents and their children with DS did not fit this profile. This observation led to the suggestion that rather than being ineffective tutors, which would be the logical assumption based purely on Vygotskian theory, the parents of the children with DS may be employing a different interactional strategy which is more adapted to the special needs and abilities of their children. It was found that the parents of the children with DS tended to focus more on their children's RSI than the ADL, they made a similar number of predicted and same shifts, they intervened more, used higher

levels of intervention, were more directive and more supportive, and were sensitive to the different levels of ability in their children.

These findings can be seen to both confirm and add to the findings of previous research, as well as opening up several new questions for future research. Given all the evidence which shows that children with DS have difficulties with learning and processing new information, and tend to lack motivation in learning situations, displaying avoidant and frustrated behaviours, the strategy used by the parents of the children with DS in the present study can be seen to be an adaptive one. Focussing on the ADL rather than the RSI, and making a balance of predicted and same shifts serves to keep the children engaged in the task, providing an environment which gives enough support to ensure a good measure of success, and enough challenge to ensure new learning occurs. If these parents had followed the same strategy as the parents of the TD children, focussing on the RSI and making more predicted than same shifts, it is likely that the children with DS would have felt too challenged, and responded with avoidant and/or frustrated behaviours. Thus, the results suggest that the strategy proposed by Vygotskian theory and found in past research to be associated with success for TD children, may not be entirely appropriate for the needs and characteristics of children with DS.

The finding that the parents of the children with DS used a significantly higher frequency of *directives* and *supportives* than the parents of the TD children both fits in with and adds to past research which has found that directiveness is a characteristic feature of interactions between parents and their children with DS (e.g., Beeghly et al., 1990, Berger, 1990; Greaves & Poole, 1996; Miller et al., 1999), and that a high level of directiveness does not necessarily presuppose intrusiveness and insensitivity (e.g., Crawley & Spiker, 1983; Landry et al., 1994; Marfo, 1992). The fact that it was possible for parents to be high in both directiveness and sensitivity suggests that the two are in fact at least partially separable dimensions of interaction. One of the main questions surrounding this issue is whether a high level of both directiveness and sensitivity is an adaptive feature of parental interactions with their children with DS. The analysis of this question in the present study suggested that a high level of direction and a medium level of support was associated with the best outcomes for the child. It is important to remember though that for this analysis the number of parent-child dyads in each category was very small, and thus the present findings can do no more than highlight this issue as an important potential area for future research.

Taken together, the findings from the first three hypotheses indicate that the parents of the children with DS were employing a different interactional strategy than the parents of the TD children, and that this strategy was more adapted to their children's needs than the strategy Vygotsky used to characterise interactions between parents and TD children. The counter argument, that the interactional characteristics do not occur as a deliberate adaptation to the needs and abilities of the children, but rather are due to the parents' perceptions and expectations of their children and their disability, and an inability to read their children's cues, does not fit as well with the current findings. Evidence for this claim can be found in the fact that the parents of the children with DS spent time intervening in both the RSI and the ADL, and made a similar level of predicted and same shifts, indicating they were aware of their children's level of ability and were able to respond contingently to it. The findings also show that they were not rigidly providing directives, but rather altered their interactional strategy depending on the different needs of the children. This is shown by the fact that the children with higher TELD-2 scores received more level 1 and fewer level 4 and 5 interventions, and fewer *supportives* and *directives* than the children with lower TELD-2 scores. In addition, the parents of the children with DS used a far greater range of levels of intervention across the group, indicating an ability to adjust their level of intervention to suit the varying levels of development amongst the children. Having said that though, one must always remember that human interactions by nature always include some element of personal perceptions and expectations. Thus, it is not being argued here that parental perceptions and expectations do not have any influence on the parents' behaviour, but rather that the *main* factor seems to be an adaptive response to the needs of the children.

In conclusion, the findings of the current research can be seen to bring together, add to and confirm past research on parent-child interactive problem-solving, and the characteristics of children with DS, within a Vygotskian framework. The unavoidably small sample size and the range of ages within the DS group prohibits the drawing of strong conclusions. However, the suggestion that an interactional strategy which focuses on the ADL more strongly than the ZPD, uses a balance of predicted and same shifts, and provides high levels of direction and support may be an adaptive response to the needs and abilities of children with DS is an interesting one which certainly opens up many questions for future research.

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APPENDIX

Information Sheet for Parents

Thank you very much for volunteering to participate in this research project! We are looking at how different parent-child interactional styles relate to the development of problem-solving ability in children both with and without Down syndrome.

In order to observe these aspects of interaction and development you and your child will be asked to complete a block model-copying task. The task involves building a replica of an already completed model. The model is a tower of coloured wooden blocks glued together. Each section is made up of a different combination of colours, shapes and sizes making it too difficult for your child to build an exact replica without assistance. Firstly, the task will be explained to you while your child plays nearby. Your role will be to *assist* your child to successfully complete the task, without actually *doing* the task for him or her. Once you feel you have a good understanding of what your role is, your child will be brought in to join you. The model will be set up on a table with a box full of wooden blocks with which to construct the replica model. Your child will then be encouraged to play with the blocks for about 5 minutes in order to become familiar with the new surroundings. After this time, you will be asked to begin to assist your child to build a replica of the model using the blocks he or she has been playing with. You will be free to assist your child in any way you feel is appropriate and natural. Please note that this session will be videotaped so that we can score it in detail afterwards.

After the block model-copying task is completed, we will take a break and the experimenter will sit down and do some colouring-in with your child in order for him or her to become comfortable working with her. After 5-10 minutes you will be asked to complete a couple of questionnaires with questions about your child's development and your personal approach to parenting. While you are doing that the experimenter will sit down with your child and administer the Test of Early Language Development. This will involve your child doing such tasks as looking at pictures, naming body parts and family members, performing instructions, and creating and/or completing sentences. The scores from this test will be used simply as a point of comparison between the children with Down syndrome and the children with no disabilities in this study. Please note that most children find both the block model-copying task and the language test to be pleasurable and are keen to be involved. If however, at any time your child indicates that he or she no longer wishes to participate the task will be stopped immediately. We can then either make another time for you to come in, or you can choose to withdraw your child from the study. Your child's welfare will be the most important consideration at all times.

The project has been reviewed by the University of Canterbury's Human Ethics Committee and has been approved. In order to include you and your child, we need your written consent, which can be given by signing and dating the consent form. Please keep this page for future reference.

Of course, all information which we gather will be kept confidential. Videotapes will be used only by the principal investigator and the graduate students who will view the tapes for scoring purposes (if you like a copy of the tape, we can arrange to make one for you). No names or individual identifications will be used in publications that may arise as a result of this research. Our experience in testing hundreds of children in this fashion is that they very much enjoy these games and benefit from interacting with a stranger in a positive way which leaves them feeling happy and confident.

We also require the birth date of your child so we can determine their exact age in months and days. This information can be provided in the appropriate spaces on the consent form. Finally, if you are interested, we can provide you with a written summary of the findings that we will mail out to you on completion of the study. If you are interested in receiving this information, please tick the box on the consent form and provide your postal address.

Thank you very much for your help with this study. If you have any questions about the study, please do not hesitate to contact us.

Sincerely,

Clare Kennedy and Dr Thomas Keenan
Department of Psychology
University of Canterbury
Christchurch

phone 364-2987, ext. 7097 or 366-7001, ext. 6169

Consent Form

I have read and understood the description of this project. On this basis, I agree to allow my child to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved. I understand also that at any time I may withdraw my child from the project, including the withdrawal of any information provided.

I agree to allow my child _____ to participate in the study described above.

Signed: _____ **Date:**

:

Phone Number: _____:

Please Print.

Child's Full Name: _____.

Child's Birth Date: _____.

I would be interested in receiving a copy of the written report when completed. (Please provide your postal address in the space below).

Address: _____

_____.

Parental Questionnaire

Please answer the following questions about yourself and your child to the best of your knowledge.

I am this child's: Mother / Father / Other (please specify)

What ethnicity group or race do you identify yourself and your child with?

Yourself: _____ Your child: _____

Your date of birth: _____

Are you: Single Married De Facto Separated Divorced

How many adults are there in your household? (e.g. Mother, Father, Grandparents etc.)

How many hours a week do you work away from your children?

1. 0 - 5 hours
2. 5 - 10 hours
3. 10 – 20 hours
4. 20 – 40 hours
5. more than 40 hours

How many hours a week does your partner work away from your children? (If applicable)

1. 0 - 5 hours
2. 5 - 10 hours
3. 10 – 20 hours
4. 20 – 40 hours
5. more than 40 hours

How many children regularly live in your home? What are their ages?.....

On a typical day how many people does your child play and talk with for a half hour or more?

Adults..... Older children Same age children Younger children

What is your occupation?

What is your partner's occupation? (If applicable)

What level of education do you have?

1. School Leaver
2. Bursary/University Entrance
3. Tertiary Diploma/Certificate
4. Tertiary Degree
5. Postgraduate Degree

What level of education does your partner have? (If applicable)

1. School Leaver
2. Bursary/University Entrance
3. Tertiary Diploma/Certificate
4. Tertiary Degree
5. Postgraduate Degree

What type of Down syndrome does your child have? (non disjunction, translocation, or mosaicism) (**question used for DS group only**)

On a scale of 1-7, with 1 being very mildly and 7 being very severely, how severely do you think your child's development has been affected by his/her disability? (**question used for DS group only**)

1.....2.....3.....4.....5.....6.....7
 very mildly very severely

How much Early Intervention Education has your child received? (**question used for DS group only**)

1. less than 1 year
2. 1-2 years
3. 2 years or more
4. none

What did/does this typically involve?

On a scale of 1-7, how much time do you spend deliberately teaching or instructing your child?

1.....2.....3.....4.....5.....6.....7
 none a lot

On scale of 1-7, how much do you enjoy interacting with your child?

1.....2.....3.....4.....5.....6.....7
not at all very much

How much do you feel you know about Down Syndrome and how it affects your child?
(question used for DS group only)

1.....2.....3.....4.....5.....6.....7
nothing a lot

When you present your child with a new problem-solving task such as a jig-saw puzzle, or an educational toy, how successful do you expect him/her to be in solving it?

1.....2.....3.....4.....5.....6.....7
not at all successful very successful

When your child is presented with a challenging task, how likely is he/she to try to avoid doing it?

1.....2.....3.....4.....5.....6.....7
not at all likely very likely

When your child is engaged in a challenging task, how easily does he/she give up and/or become frustrated?

1.....2.....3.....4.....5.....6.....7
not at all easily very easily

Thanks for taking the time to complete this!

PARENTAL AUTHORITY QUESTIONNAIRE

For each of the following statements, circle the number on the 5-point scale that best describes how that statement applies to you.

- 1 = Strongly disagree**
2 = Disagree
3 = Undecided
4 = Agree
5 = Strongly agree

- | | |
|--|-------------------|
| 1. I feel that in a well-run home a child should have his or her own way as often as the parents do. | 1 2 3 4 5 |
| 2. Although my child does not always agree with me, I often insist that he or she conform to what I think is right. | 1 2 3 4 5 |
| 3. When I ask my child to do something, I expect him or her to do it immediately without asking questions. | 1 2 3 4 5 |
| 4. Once family policy has been established, I discuss the reasoning behind the policy with my child. | 1 2 3 4 5 |
| 5. I encourage verbal give-and-take whenever my child feels that family rules and restrictions are unreasonable. | 1 2 3 4 5 |
| 6. I feel my child needs to be free to make up his or her own mind and to do what he or she wants to do, even if I do not agree. | 1 2 3 4 5 |
| 7. I do not allow my child to question any decision I make. | 1 2 3 4 5 |
| 8. I tend to direct the activities and decisions of my child through reasoning and discipline. | 1 2 3 4 5 |
| 9. I feel that parents should use more force than they often do in order to get their children to behave the way they are supposed to. | 1 2 3 4 5 |
| 10. I do not feel that my child needs to obey rules and regulations simply because someone in authority has established them. | 1 2 3 4 5 |

11. I let my child know what I expect in the family, but am open to discuss these expectations when he or she feels they are unreasonable. 1 2 3 4 5
12. I feel that a wise parent teaches his or her child early just who is boss in the family. 1 2 3 4 5
13. I think it is best to avoid giving children specific expectations and guidelines for their behaviour. 1 2 3 4 5
14. I tend to do what my child wants when making family decisions. 1 2 3 4 5
15. I believe that the direction and guidance I give my child is consistent, rational and objective. 1 2 3 4 5
16. I tend to get upset if my child tries to disagree with me. 1 2 3 4 5
17. I feel that most problems in society would be solved if parents would **not** restrict their child's activities, decisions and desires as they are growing up. 1 2 3 4 5
18. I let my child know what behaviour is expected, and if my child does not meet those expectations, I punish him or her. 1 2 3 4 5
19. I allow my child to decide most things for himself/herself without a lot of direction from me. 1 2 3 4 5
20. I take into consideration my child's opinions when making family decisions, but I do not decide something simply because he or she wants it. 1 2 3 4 5
21. I do not feel it is my responsibility to direct and guide my child's behaviour as he or she is growing up. 1 2 3 4 5
22. I have clear standards of behaviour for my child, but I am also willing to adjust those standards to the needs of my child. 1 2 3 4 5

23. I expect my child to follow my directions regarding his or her behaviour and activities, but I am also willing to listen to his or her concerns and discuss those directions. 1 2 3 4 5
24. I allow my child to form his or her own opinions regarding family matters and, generally, allow my child to decide what he or she is going to do. 1 2 3 4 5
25. I have always felt that most problems in society would be solved if we could get parents to strictly and forcibly deal with their children when they fail to do what they are supposed to do. 1 2 3 4 5
26. I often tell my child exactly what I want him or her to do and how I expect my child to do it. 1 2 3 4 5
27. I often give my child clear direction for his or her behaviours and activities, but I am also understanding when my child disagrees with me. 1 2 3 4 5
28. I do not attempt to direct the behaviours, activities and desires of my child. 1 2 3 4 5
29. My child should know what I expect of him or her and to conform to those expectations simply out of respect for my authority. 1 2 3 4 5
30. If I make a decision that hurts my child, I am willing to discuss that decision and to admit any mistakes. 1 2 3 4 5
31. I avoid interfering when my child has conflicts with other children. 1 2 3 4 5
32. I try to help my child resolve conflicts with other children by helping him or her to see other people's point of view. 1 2 3 4 5
33. I tell my child how to interact with other children, and I expect him or her to follow those rules. 1 2 3 4 5



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9 June 2000

Clare Kennedy
C/o Dr Thomas Keenan
Department of Psychology
UNIVERSITY OF CANTERBURY

Dear Clare

The Human Ethics Committee advises that your research proposal "**The impact of different parental interactional styles and parenting styles on the development of problem-solving skills in children with and without Down syndrome**" has been considered and approved.

Yours sincerely

A handwritten signature in cursive script, appearing to read "Isobel S Phillips".

Isobel S Phillips
Secretary