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A multimoal and systemic intervention for children with attention deficit hyperactivity disorder

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DECLARATION

I, Evelyn M. Goodison-Farnsworth declare that this body of work has not been submitted for a degree to any other university or institution, and that the work contained within is my own.

Signed: *E M Goodison - Farnsworth*

Dated: *12th December 2001*

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ABSTRACT

The primary aim of this thesis was to design, deliver and evaluate a long term cognitive behavioural multimodal and multisystemic (MMS) intervention for children with Attention Deficit Hyperactivity Disorder. The need to design an intervention was based on research identifying a notable proportion of children with ADHD who for a variety of reasons cannot use stimulant medication.

This research identified the need to have an intervention that was classroom based and whose specific focus was to address the academic functioning problems so many children with ADHD experience. The aim was to improve self control, attention to tasks and general classroom behaviours, factors that have been identified as essential for academic achievement. This research used the Academic Performance Rating Scale to measure intervention outcome. This scale was designed to monitor academic performance, impulse control and on task behaviour in order to evaluate changes associated with intervention outcomes for children with ADHD.

From the literature, this research identified essential intervention components with sound empirical outcomes to be combined into one intervention. The cognitive component involved self management, and the inclusion of this component addresses the disinhibition problems that children with ADHD exhibit. Despite the controversy surrounding cognitive self instructional interventions, it is suggested that as many children with ADHD fail to use internal language to plan and guide their behaviour, the inclusion of this component is important. Emphasis was placed on teaching the use of planned self guiding internal language in response to an external cue. The children had to monitor, evaluate and verify task behaviour with a checklist to help guide behaviour towards successful completion of the task. The behaviour modification component included role play, rehearsal, monitoring, evaluating and feedback of desired behaviours

and addressed the need to reinforce the learning taking place. If generalisation problems are to be overcome the environments in which these children spend most of their time must be included in an intervention. Accordingly, the school system and the home system were actively involved.

The research evaluated intervention outcomes of a MMS group and a stimulant medication group of children with a confirmed diagnosis of ADHD. The MMS group was evaluated not only as a whole but was also divided to examine whether environment, age differences and comorbid conduct disorder would influence intervention outcome. Intervention outcomes were compared between the stimulant medication group and the MMS group to evaluate if similar gains could be achieved. The stimulant medication group took part in an MMS intervention to evaluate additive effects.

The MMS intervention produced clinically significant intervention gains of between .65 and .77 and is therefore a valuable addition to interventions for ADHD. Whilst these gains were not as great as the stimulant medication gains of between .84 and .94, there is now an intervention option for those children who cannot use stimulant medication.

Outcomes from combining the MMS intervention with stimulant medication revealed that effect sizes of between .27 and .39 were obtained. Whilst these effect sizes are not clinically significant it is recognised that the addition of the MMS intervention gives these children the opportunity to learn and use strategies to improve their self regulation and management skills, something that stimulant medication is unable to do.

Result outcomes from examining the durability of the MMS intervention indicate why interventions for ADHD need to be long term. Measures taken after 9 monthly booster sessions revealed intervention gains remained significant. The children who did not

have booster sessions exhibited a return to almost base line scores, providing strong evidence that successful interventions were related to maintenance of the intervention

The outcomes from evaluating the MMS intervention in a classroom or clinic environment indicated no differences in intervention gains. Outcomes also revealed no intervention differences between age groups and nor were there intervention differences between children who did or did not have a conduct disorder.

The results obtained from this research do indicate that the MMS intervention has a significant role to play when attempting to intervene with children with ADHD. The principle role of the MMS intervention was identified as an intervention for children unable to use stimulant medication. However, the additive effect of the MMS intervention experienced by the stimulant medication group justifies further evaluation of this combined intervention, particularly for long term management.

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INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most researched, most controversial and commonly diagnosed psychiatric disorder (Hale, Hoepfner, DeWitt, Coury, Ritacco & Trommer, 1998; Wolraich, 2000). ADHD is a heterogeneous disorder. The symptoms of ADHD are pervasive, persistent, maladaptive and substantially impairing (Barkley, Fischer, Edelbrock & Smallish, 1990; Biederman, Faraone, Milberger, Curtis, Chen, Marris, Ouellette, Moore, & Spencer, 1996; Gittelman, Mannuzza, Shenker & Bonagura, 1985; Mannuzza, Gittelman-Klein, Bonagura, Malloy, Giampino & Addalli, 1991; Weiss & Hechtman, 1986). The multifaceted symptoms detrimentally impact upon family, academic, interpersonal, social and vocational functioning of those with the diagnosis (Barkley, 1989; 1990; Cantwell, 1996; Spencer, Biederman, Wilens, Harding, O'Donnell & Griffin, 1996). It is proposed that the symptomatology displayed by the child with ADHD reflects impairments in the behavioural inhibition system (Barkley, 1998).

Within the literature there is an awareness of the need for a multimodal intervention approach in the treatment of ADHD to address the persistence, pervasiveness and multifaceted symptomatology associated with ADHD (Abikoff, 1991; Hechtman, 1993; Weiss & Hechtman, 1993). However what precisely constitutes the components of a multimodal approach is often unclear and, in some cases, the interventions are not necessarily based on any fundamental conceptual framework. This thesis will seek to develop a clearly articulated and conceptually framed model of multimodal intervention for ADHD by researching:

- The intervention needs of children for whom stimulant medication is not an option.

- The nature of ADHD and the recent developments in conceptualising ADHD in relation to the executive functions of disinhibition, self regulation and internalisation of language.
- A multimodal intervention option that can at least offer the same level of intervention efficacy as stimulant medication, and that can
 - (a) Assist children with ADHD to spend more time academically engaged and on task and so increase academic functioning in order to overcome academic problems these children often exhibit.
 - (b) Intervene in the long term for intervention gains to be maintained and built upon.

The need to explore intervention options other than stimulant medication.

The most widely used form of intervention for ADHD is stimulant medication (Cantwell, 1996; Safer & Krager, 1988; Safer, Zito & Fine, 1996; Spencer, Biederman, Wilens, Harding, O'Donnell & Griffin, 1996; Swanson, Sergeant, Taylor, Sonuga-Barke, Jensen & Cantwell, 1998; Wolraich, 2000). Whilst this form of intervention at present is the most valid, stimulant medication is a unimodal intervention, and as such encounters limitations in managing the heterogeneity of ADHD. No unimodal intervention for ADHD can possibly succeed in successfully addressing such multifaceted symptomatology, especially the academic problems, experienced by these children (Barkley, 1990; DuPaul & Stoner, 1992; Hechtman, 1993).

A specific concern that this thesis addresses in developing a framework for intervention is tied to the nature of problems experienced by many children with ADHD in the area of academic functioning. Although stimulant medication is the most widely used

intervention option for ADHD, it is in the area of academic functioning that stimulant medication has tended to have the least impact (Arnold, Abikoff, Cantwell, et al., 1996; Hechtman, Weiss, Perlman & Amsel, 1984; Swanson, McBurnett & Wigal, 1993; Swanson, et al., 1998). Unless the child with ADHD is able to productively learn and use what is being taught the problem of academic underachievement or failure will be a significant handicap throughout life. This thesis will examine the nature of a multimodal intervention with relevance to level of academic functioning in children with ADHD.

Another compelling reason for using a multimodal intervention for ADHD is that some concerns have been raised regarding the use of stimulant medication with all children who experience ADHD. There are a notable proportion of children for whom stimulant medication is contra-indicated or is opposed by parents. Estimates on the proportion of these children vary from 2% to 30%, with the consensus being around 20% (Cantwell, 1994; Elia, 1993; Spencer, et al., 1996; Swanson, et al., 1998; Wilens & Biederman, 1992).

The factors contributing to the inability to use stimulant medication as an intervention option are due to unwanted side effects, parental objection, and a worsening of behaviours at school or at home (Barkley, 1990; Cantwell, 1994; 1996). Further, responses to stimulant medication differ between children, impacting with variable success on some domains and not others (Tannock, Schachar, Carr & Logan, 1989; Tannock, Schachar & Logan, 1995). Some children with ADHD do not exhibit any response to stimulant medication (Barkley, 1990; Cantwell, 1996). While children with a comorbid anxiety disorder are less likely to exhibit optimal responses (Cantwell, 1996; Denney & Rapport, 1999; DuPaul, Barkley & McMurray, 1994; Elia, 1993; Pelham,

Bender, Caddell, Booth & Moorer, 1985; Pelham & Milich, 1991; Swanson, et al., 1998; Wilens & Biederman, 1992).

It is important that research examines the concept of a multimodal intervention that excludes stimulant medication in order for interventions to be available to all children with ADHD. Clearly, where stimulant medication is an intervention option, a multimodal approach combined with stimulant medication may also be delivered.

This research aims to develop and evaluate a multimodal intervention that attempts to offer children with ADHD a viable option to stimulant medication, with a level of intervention effects similar to that which stimulant medication alone has been able to produce. In doing this, it may be possible to offer parents and children an alternative intervention when stimulant medication is contraindicated or not appropriate. However multimodal interventions need to be theoretically sound and firmly based on adequate empirical evidence. Therefore, current conceptualisations of ADHD need to be accounted for and included within any intervention for all children with ADHD.

Recent conceptualisations of ADHD that can assist in the development of intervention components

The inability to focus on and inhibit unwanted behaviours supports the emerging awareness in the literature that children with ADHD have a disorder of disinhibition (Barkley, 1996; 1997; 1998; Oosterlaan & Sergeant, 1998; Quay, 1997; Schachar, Tannock, Marriott & Logan, 1995). Disinhibition refers to the inability to delay a response, and is a component of executive functions. The processes thought to be involved in disinhibition are primarily those of self regulation and self management, working memory and the internalising of language (Barkley, 1998).

One of the most difficult functions for a developing child to learn is the use of skills that are required to inhibit inappropriate responses, or to self regulate behaviour. These skills are needed in all aspects of daily life (Kopp, 1982; Reed, Pien & Rothbart, 1984). Stimulant medication is incapable of teaching children with ADHD to acquire and use the skills of self regulation in order for them to be able to manage and evaluate their own behaviour (Grainger, 1997).

This thesis proposes that there is a need to use interventions other than, or in conjunction with stimulant medication in order to assist children with ADHD to acquire and use the skills of self regulation. Only a multimodal intervention with empirically sound components will have the sufficient integration of diverse program elements to encourage the use of knowledge and skills, and impact upon the delays in developing or deficits in functioning children with ADHD exhibit

Rationale for cognitive behavioural components in a multimodal intervention

It has been suggested by Kendall, (1991) that the optimal intervention for ADHD should combine both cognitive and behavioural elements. Researchers Barkley, (1990), Shapiro, DuPaul and Dudley-Klug, (1998) encourage further research into cognitive behaviour therapy (CBT) for ADHD, especially when combined with other components, such as parent training. Further research is encouraged, despite the fact that CBT interventions at times produce inconsistent results. However current clinical conceptualisations of the nature of the core deficit of ADHD, the inability children with ADHD have in inhibiting inappropriate behaviours, prompt the need to re-examine cognitive behavioural intervention approaches that teach self management and self evaluation.

There is evidence which indicates that cognitive behavioural self management interventions produce considerable success with children across age groups, who also have a variety of developmental disabilities and externalising disorders (Fantuzzo & Polite, 1990; Hughes, Korinek & Gorman, 1991; Rhode, Morgan & Young, 1983; Shapiro & Cole, 1994; Smith, Young, Nelson & West, 1992; Smith, Young, West, Morgan & Rhode, 1988). Self management interventions have also been used in general classroom settings and appear to improve academic productivity (McDougall & Brady, 1998). With these findings taken into account, this thesis recommends that self management interventions be used for ADHD, especially in the classroom, in order to attempt to address the difficulties these children have with academic functioning.

Rationale for self instructional components of a multimodal intervention

This thesis argues that it is important to examine how children self regulate and guide their behaviour, especially in an academic situation. There is evidence that the acquisition of self regulation is in part tied to the development of appropriate and adaptive internal self guiding language (Berk, 1986a, 1986b; 1990; 1994; Luria, 1973; Vygotsky, 1962). Internal language helps to facilitate introspection and allows for the generation of rule-governed behaviour relevant to the task at hand (Barkley, 1997; 1998; Bronowski, 1977; Damasio, 1994; Eslinger, 1996; Luria, 1973; Vygotsky, 1962). Whilst children with ADHD have as much internal language as normal children, they often do not have situationally appropriate internal language to help plan and guide responses (Berk & Potts, 1991). The inability to guide behaviour by internal language often results in marked problems related to the regulation of behaviours (Berk & Potts, 1991).

Whilst there is doubt in the literature (DuPaul & Stoner, 1994) about the efficacy of teaching children with ADHD task relevant internal language (in order to help them plan

and guide their behaviour), it is a very important function lacking in children with ADHD (Berk, 1986a; 1986b; 1994). Accordingly, there is a need for an intervention that teaches children with ADHD the use of strategies required to use internal language to plan and guide behaviours that are relevant to the task at hand. Therefore, despite the poor outcomes of cognitive interventions alone (Abikoff, 1991), this thesis argues that combining a self instructional intervention with a self management intervention may allow children with ADHD to perform more efficiently in the classroom.

Research has clearly identified that children with ADHD exhibit a marked inability to plan and organise their behaviour in a situationally appropriate goal directed way (Barkley, 1990), Edwards and Barkley, (1997), and this in turn is related to the fact that children with ADHD cannot use internal language that is self regulatory, and this inability also contributes to poor planning abilities (Berk, 1986a; 1986b; 1994; Berk & Potts, 1991).

With the above research evidence in mind, the intervention designed for this research involved children being taught to use a self management strategy that facilitated the engagement and completion of tasks that were situationally appropriate. A strategy that involved learning to internalise of a set of pre planned self statements that were related to guiding their behaviour in the classroom in order to complete tasks. The children were taught to act upon an auditory cue and use the planned internal language to monitor and evaluate their task behaviour and then to verify their behaviour with a check list. The use of planned statements to facilitate task completion is taken from the early literature examining cognitive self instruction interventions (Meichenbaum & Goodman, 1971). By teaching children to internalise planned self statements that help guide behaviours, the development of self management and regulation will be enhanced

and may reduce the need for children with ADHD to be externally monitored and supervised so often.

Within the education literature the use of planned statements related to behaviours needed to problem solve and complete tasks has found to be successful (Ashman & Conway, 1993). The plans are used as a means of helping children achieve outcomes they are developmentally capable of doing. It is noted that teacher based plans which involve cuing, acting, monitoring and verifying can help children stay on task in the classroom. These researchers propose that when children are actively involved in and methodically taught to use teacher designed planning strategies, they can achieve an increase of independence when attempting problem solving and learning. Therefore, if children are to master independent learning and problem solving, one of the important means of achieving this is the use of plans (Ashman & Conway, 1993).

Rationale for a systems approach with a multimodal intervention

In considering the nature of a multimodal intervention in which components are clearly identified, it is also important to determine who is to be involved in the delivery and maintenance of the intervention. The classroom and the home environments can be viewed as systems where behaviours can be reinforced or extinguished, but which also have the potential to be adaptive or maladaptive (Doyle, 1986). As the problem behaviours to be extinguished are exhibited in both of these environments (Conway, 2001) it is therefore necessary to examine a method of intervening which integrates these systems. Attempting to intervene within only one system must impact upon the effectiveness of an intervention.

It has been suggested (Cantwell, 1996) that training parents in management strategies is an essential component of any intervention for ADHD. Poor parenting styles can result

in poor child management and exacerbate the problems being experienced, as research indicates maternal behaviour or parenting style impacts either positively or negatively on the development of self regulation and control (Berk, 1994; Silverman & Ragusa, 1992).

Research outcomes examining parental education and involvement in interventions for their children's ADHD, indicated that the parents felt more competent in dealing with their children. The parents exhibited a significant decrease in parenting and family stress and increases in confidence when dealing with their children. Parents also noticed that their children exhibited more self control (Anastopoulos, et al., 1992; Barkley, 1990; Cantwell, 1996; Guevremont, Tisheiman & Hall, 1985; Pisterman, Firstone, McGrath, Goodman, Webster, Mallory & Goffin, 1992). It is also suggested that poor parental compliance to their children's interventions may also be overcome with parental education (Kendall, 1991)

Chronic and persistent disruption of class room activities by students with ADHD often leads to teaching practices that frequently fail to meet the needs of children with ADHD. These persistent and disruptive behaviours can significantly impact upon the teacher, and will at times cause the teacher to be unable to fulfil his/her role in the classroom, thereby causing a failure within the classroom system (Cooper & Ideus, 1995; Pelligrini & Horvat, 1995). It has been suggested by Shapiro, et al., (1998) that teachers need to be fully involved when trying to intervene with children with ADHD. Within the classroom system there is the potential to maximize the learning taking place for the student with ADHD, or to allow the learning and behavioural problems to manifest themselves in a way so as to negatively impact upon the functioning of the classroom system. Therefore, it is suggested that a well organised and manageable intervention

could help the busy teacher to decrease the behavioural problems and increase the learning of students with ADHD.

The need to address academic problems experienced by children with ADHD

Children with ADHD often exhibit problems with academic functioning. Established links have been found between behavioural problems and learning in children with ADHD (August & Garfinkel, 1993; Cantwell & Baker, 1991; Evans, Ferre, Ford & Green, 1995; Shaywitz, Fletcher & Shaywitz, 1995). Poor academic achievement or academic failure is a risk factor for the development of antisocial behaviours and drug and alcohol problems (Barkley, 1990; Cantwell & Baker, 1991).

It remains unclear if academic problems produce symptoms of ADHD, or if ADHD produces problems with academic achievement. What is clear is that academic difficulties and failure are associated with ADHD (Barkley, 1990; Cantwell, 1996; DuPaul & Stoner, 1994; Hinshaw, 1992; McGee & Share, 1988; Swanson, et al., 1998). ADHD symptomatology therefore poses a considerable threat to academic functioning. Rapport Scanlan and Denney, (1999) suggest that self control, functional classroom behaviours and the control of attention are essential factors that facilitate improvements in academic achievement for children with ADHD. However, it is the combination of these three factors that facilitate improvements, not one factor in isolation. Therefore, within any intervention for ADHD, ways of improving these three essential components needed for achieving academically must be addressed.

Researchers Barkley, (1990), Barkley, Fischer, Edelbrock & Smallish, (1990), Cantwell and Baker, (1991), DuPaul and Stoner, (1994), have identified reservations about the effect stimulant medication has in addressing what appears to be significant academic

problems experienced by children with ADHD. For some children, stimulant medication appears to have very little impact upon academic functioning, as children with ADHD can continue to function below the level of their normal counterparts (Cantwell & Baker, 1991; Cunningham & Barkley, 1978; McGee & Share, 1988; Swanson, et al., 1991). Furthermore, research outcomes for a significant subset of children with ADHD indicate a failure to exhibit any improvement in academic functioning while on stimulant medication (Rapport, Denney, DuPaul & Gardner, 1994).

Stimulant medication has been successful in dampening maladaptive behaviours in the classroom, thereby improving the environment for learning to take place (Grainger, 1997; Weingartner, Ebert, Mikhelsen, Rapport, Buchsbaum, Bunney & Cain 1990). Stimulant medication produces improvement in behaviour that is up to seven times greater than the improvement produced in the academic arena (Swanson, 1993). When stimulant medication ceases, the gains made in positive functioning in the classroom can disappear, as long term outcomes reveal no real improvement for classroom behaviour, learning and academic outcome (Cantwell, 1996; Charatan, 1998; Jacobvitz, Stroufe, Stewart & Leffert, 1990; O'Toole, Abramowitz, Morris & Dulcan, 1997; Rapport, et al., 1994; Swanson, 1993; Swanson, et al., 1991; Swanson, McBurnett & Wigal, 1993; Swanson et al., 1998).

From these important finding, it is imperative that interventions for ADHD be multimodal and target academic functioning, as it is essential that academic functioning is managed in order for these children to achieve as well as their normal counterparts.

Rationale for the inclusion of booster sessions within a multimodal intervention

Another issue this thesis addresses is the fact that long term outcomes of interventions for ADHD often indicate very little retention of intervention gains, especially after intervention ceases (Abikoff, 1985; Hechtman, et al., 1984; Wiess & Hechtman, 1993). As ADHD is persistent, the durability of intervention gains has to be addressed, and interventions for ADHD need to be done at intervals throughout childhood development (Hechtman, 1993; Whalen & Henker, 1991). Therefore, it is very important a multimodal intervention should include booster sessions of the intervention at regular intervals in order to attempt to maintain intervention gains.

Organisation of this thesis

The focus, arguments and rationales of this thesis have been presented in the Introduction.

Chapter 1 orients the reader to research relating to diagnostic features, prevalence, nomenclature and taxonomy, comorbidity, aetiology, environmental factors, genetic factors and neurological factors of ADHD. The literature related to these issues with ADHD has been researched in order to examine how these issues are accounted for within the evolution of interventions for ADHD.

Chapter 2 examines the current conceptualisations of the nature of the core deficit of ADHD, and how these conceptualisations may assist clinicians and educators to improve treatment interventions or to augment stimulant medication treatment. Executive functions (those involved in disinhibition) are thought to be at the centre of the core deficit in ADHD. For any treatment modality to be successful there is a need to incorporate these findings when delivering interventions to children with ADHD.

Chapter 3 examines the literature in relation to interventions for ADHD. Long term outcomes related to poorly treated or untreated ADHD are issues that need to be examined and ways of overcoming these problems addressed, in order to try to reduce the downward spiral in functioning that these children often end up experiencing. The chapter examines the problems interventions for ADHD have in managing the heterogeneity of ADHD. This chapter also attempts to identify intervention components that are most beneficial and can be incorporated into a multimodal intervention.

Chapter 4 looks at future directions related to research outcomes in intervening with ADHD. The chapter produces evidence for the inclusion of each intervention component this research has used in designing a MMS intervention for ADHD. Research hypotheses are outlined at the end of this chapter.

Chapter 5 explains the materials, subjects and procedures related to this research.

Chapter 6 reports all the results pertaining to this thesis.

Chapter 7 discusses the results of the evaluation of the MMS intervention and outcomes of each hypothesis. This chapter discusses the implications arising from this research and draws conclusions and highlights areas for future research. The final chapter also examines the limitations, ethical and professional issues stemming from this research.

CHAPTER ONE

THE NATURE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER

This chapter reviews the literature that describes the disorder in terms of prevalence, diagnostic features, nomenclature and taxonomy, aetiology and comorbidity. This review of aspects of ADHD has been undertaken in order to understand the characteristics, complexity and nature of ADHD, particularly from an historical and descriptive perspective. These perspectives highlight the difficulty of developing one framework from which to treat ADHD.

ADHD is the most studied and the most frequently made diagnosis in child psychology (Barkley, 1990; 1998; Edwards & Barkley, 1997). There have been many attempts to define the exact nature of ADHD, and as a consequence the disorder occupies a controversial position (Cooper & Ideus, 1995; Edwards Schulz & Long, 1995; Goodman & Pillion, 1992; Reid, Maag & Vasa, 1993). Nomenclature and taxonomy are constantly being redefined, renamed and reconceptualised, but often outcomes are not reflected in updated interventions for ADHD (Gumpel & Reid, 1998; Lahey, Pelham, Schaughency, Atkins, Murphy, Hynd, Russo, Hardagen & Lorys-Vernon, 1988).

The mosaic of problems that children with ADHD exhibit suggest that knowledge of aetiology and different diagnostic features must lend themselves to the development of a clear and conceptually derived intervention. Differing conceptualisations of the disorder present considerable difficulties in terms of delivering successful interventions for ADHD. A significant problem faced in designing an intervention is how to teach these children to manage the core symptoms of impulsivity, hyperactivity and inattention in the classroom in order to achieve academically.

One of the most crucial developmental tasks of early to mid childhood in our society is the mastery of literacy and numerical skills (Grainger, 1997). ADHD symptomatology threatens the child's ability to learn (August & Garfinkel, 1993; Cantwell & Baker,

1991, Fergusson, Horwood & Lynskey, 1993; Gittelman, 1983). It is important for an intervention to help overcome the inability that children with ADHD have in managing their core symptoms, in order that academic success can be achieved. Interventions for ADHD have to be based on sound theoretical frameworks and empirical outcomes, and it becomes necessary in many instances to develop several types of intervention to deal with the disorder.

Validity in the way ADHD is diagnosed is an important issue. Indeed, research suggests that ADHD can be viewed as a continuum rather than a discrete and specific disorder (Levy, Hay, McStephen, Wood & Waldman, 1997). Issues with the problems of differing prevalence rates within communities and countries make ADHD difficult to assess and treat consistently (August & Garfinkel, 1993; Barkley, 1990; Pelligrini & Horvatt, 1995).

Differing diagnostic features do not necessarily take into account the research outcomes in genetic and neurological fields, as there are also conflicts defining aetiology with evidence that supports neurochemical, neuroanatomical, genetic and environmental influences (Barkley, 1997; Goldstein, 1995; Grainger, 1997; Hynd, Hern, Voeller & Marshall, 1991; Levy et al., 1997; Zametkin & Rapport, 1986).

- The current rationales for stimulant medication interventions are based upon the neurochemical imbalance argument (Ballard, Bolan, Burton, Snyder, Pasterczyk-Seabolt & Martin, 1997; Swanson, et al., 1998; Tannock, 1998).
- It has also been suggested that children with ADHD have different neuroanatomical features from normal children (Ballard, et al., 1997).
- There is also compelling evidence that ADHD is a genetic disorder that is highly heritable (Goodman & Stevenson, 1989; Levy, et al., 1996; Levy, et al., 1997).

- Finally, there is evidence that the environment does influence the progression and outcomes of the disorder (Barkley, 1990; Carroll, 1993; Grainger, 1997).

These different strains of research produce significant evidence for their validity and lead to differences and confusion as to how best to intervene. However none of these influences are causative, but are interwoven in the complex nature of contributing different factors to the ADHD symptomatology. Currently, the cause of ADHD is not known, and to date there is no cure (Barkley, 1990; Cantwell, 1996; Weiss & Hechtman, 1993).

1.1 Prevalence estimates for ADHD

Prevalence estimates range from 1% to 20%, with a general consensus of between 3 and 5%. These rates are dependent on whether it is a general or clinical population that is being studied (American Psychiatric Association, 1987; 1994; Barkley, 1990; Schachar 1991; Shaywitz & Shaywitz, 1991; Szatmari, Offord, & Boyle, 1989). Sergeant, (1996) proposed that prevalence in the male population is 1%. Over time however rates decrease approximately 20% with each year of age. This suggests some children are successfully treated in the long term, or grow out of the disorder (Cohen, Cohen, Kasen, Velez, Hartmark, Johnson, Ronjas, Brook & Steuning, 1993).

The main area of agreement with prevalence rates is in the ratio of male to female. Rates range from 4:1 for epidemiologic populations to 9:1 for clinical populations (Breen & Barkley, 1988; American Psychological Association, Diagnostic and Statistical Manual – IV, 1994), (DSM –IV, 1994). No one appears to be able to explain these marked differences between genders, although there is the suggestion that females tend to be overlooked, as their presenting symptoms often differ from males (Arnold, 1996).

Higher socioeconomic status children have lower prevalence rates than lower socioeconomic children, indicating that there may be an environmental influence affecting these different groups. There are also marked differences in rates between city and rural areas. Rural rates are around 4 - 6%, and urban rates are approximately 7%. Within urban areas, the inner city rates are higher than the suburban rates (Schachar, 1991; Schachar, Rutter & Smith, 1981; Szatmari, et al., 1989; Taylor, 1986).

These differences between prevalence rates add to the conflict over the diagnosis. Not only do rates differ within a country, they also vary between countries. The DSM-IV criteria are used in the USA and Australia. Children in the United Kingdom and Europe are classified by the ICD-10 (World Health Organisation, 1992) with a diagnosis of Hyperkinetic Syndrome. There is a consensus between these two diagnostic systems in the area of academic, cognitive and neurodevelopmental functioning (Tripp, Luk, Schaughency & Singh, 1999). However the major cardinal feature in ICD-10 criteria is excessive hyperactivity which is cross-situational. The non-involvement of the other two cardinal features of impulsivity and inattention used in the DSM-IV produces much lower prevalence rates in the U.K. than in the U.S.A. and Australia. Therefore controversy surrounding the criteria employed in the diagnosis of children with ADHD contributes to an absence of cross-validation (August & Garfinkel, 1989; 1991). This controversy may influence treatment intervention. Some children will possibly be overlooked with ICD-10 criteria and some over diagnosed with DSM-IV criteria. Therefore these inconsistencies may determine whether a child has access to intervention for ADHD.

1.2 Diagnostic features used for ADHD

ADHD is a diagnostic label defined by the American Psychiatric Association, DSM-IV (1994). Care must be taken when using DSM-IV criteria for diagnosis, as one could

argue that it is subjective. It is possible that it can be viewed as somewhat flawed and circular. The criterion of observable symptoms allows inferences to be made about those symptoms. The diagnosis is validated by observation of those same symptoms (Goodman & Poillion, 1992). Observations of ADHD symptomatology and diagnosis are often made by primary clinicians who rarely communicate with educators especially when coordinating treatment (Wolraich, 2000). A National Institute of Health panel found no evidence of a consistent simple diagnostic test for ADHD, and this casts doubt on the validity of other tests for the disorder (Charatan, 1998).

A diagnosis of ADHD can also be confounded due to overlapping comorbid symptomatology. A literature review of symptom overlap by Hinshaw, (1987) indicated that one third of the studies found evidence for a single as opposed to separate syndromes. It is proposed that using objective measures to distinguish pure ADHD from other presenting comorbid overlaps will enhance the validity of the disorder by distinguishing the divergent and equally valid comorbid symptoms (Halperin, et al., 1993). However to date there is no valid objective measure available to accurately make a diagnosis of ADHD.

When clinicians are assessing the three cardinal features of ADHD (impulsivity, hyperactivity and inattention) on behavioural rating scales, children diagnosed with ADHD can be distinguished from normal controls. Combined with the persistence of the core symptoms there is also a certain degree of risk taking behaviour, oppositional defiant behaviour and quite often some form of sleep disorder (Halperin, Newcorn, Matier, Bedi, Sharma, McKay & Schwarts, 1993; McGee, Williams & Silva, 1987).

However the development of the psychopathology of ADHD changes over time, and indeed, children with ADHD can have periods with no obvious symptoms. This can

lead to problems with a diagnosis, especially with boys, who are normally exuberant (DuPaul, Barkley & Guevremont, 1991).

Throughout the long history of ADHD it has been difficult for clinicians to define, due to the ongoing research which constantly refines and modifies the diagnostic criteria. The problems in defining attention, impulsivity and hyperactivity, which are considered by most clinicians to be the cardinal features of ADHD are enormous, especially when one considers that there are over 70 definitions of attention (Sergeant, 1997).

The DSM-IV criteria when met, indicate a pattern of symptoms that are pervasive, enduring and have led to impairments in functioning which can result in academic failure, antisocial behaviours and poor peer relations (American Psychiatric Association, 1994; Barkley, 1990; Cantwell, 1996).

The DSM-IV lists fourteen criteria, grouped around the three cardinal features. For a diagnosis of ADHD to be made, at least six of these criteria must be met. The cardinal features in children with ADHD must be persistent and pervasive and are inappropriate for biological and mental ages.

The symptoms must take place in two or more settings, school, peer interactions, social interactions or home. The symptoms must be present before the child is seven. Often these symptoms are evident between the ages of two to four, but in some children may only emerge when they commence school (Hartsough & Lambert, 1985; Ross & Ross 1982).

However, the validity of the DSM-IV definition of age onset has come into question. To qualify for a diagnosis, symptoms must occur before 7 years of age. A study found that 43% of youths who were predominantly inattentive type and 18% of youths who were combined type did not manifest impairment before 7 years of age. However it was

concluded that age differences in onset of impairment and symptoms of ADHD may support the distinguishing between subtypes (Applegate, Lahey, Hart Biederman, et al., 1997).

1.3 Subtypes of ADHD

The DSM-IV proposes three subtypes, which are listed as predominantly inattentive type, predominantly hyperactive-impulsive type and a combined type. Attempting to establish a pure group of either ADHD or Attention Deficit Disorder (ADD) children can be quite difficult (Sergeant, 1997). However, the differentiation between subtypes has been supported by numerous studies (Cantwell, 1996). Research from factor analysis indicates that the clinical symptoms can be grouped into two clusters, firstly, that of inattention and secondly, hyperactivity/impulsivity (American Psychiatric Association, 1994).

There are important issues that need to be taken into account with subtypes. Children with ADHD symptoms that are predominantly inattentive with no hyperactivity, differ cognitively from other subtypes. These children are much slower and more likely to have a learning disorder. They are shy and more socially withdrawn, and often have anxiety symptomatology. In comparison, children who present with high levels of hyperactivity are more likely to exhibit conduct problems, be less anxious, more impulsive, and more unpopular with peers and have more social problems (Barkley, DuPaul & McMurray, 1990; Cantwell & Baker, 1991; Hynd, et al., 1991).

1.4 Cardinal features of ADHD

Impulsivity is characterised by inappropriate responding to situations, such as, "blurting out" answers before the questions are finished. Children with ADHD also have an inability to wait for their turn in game playing and the need of instant gratification

(Barkley, 1998). The inability of these children to delay responses and use internal language to reflect and plan, results in the fact that they are either unaware of, or unable to evaluate, the relationship between a behaviour and the consequences of that behaviour. The inability to reflect upon a response, delay a response or decide to respond, results in deficits in the ability to plan, organise, set goals or consider outcomes in relation to situational demands (Barkley, 1990; Edwards & Barkley, 1997). Overall, these symptoms of impulsivity point to an inability of children with ADHD to either regulate, manage or evaluate behaviours, especially in the classroom or at home. These factors can contribute quite significantly to the poor teacher, parent, and peer and social problems experienced by children with ADHD (Barkley, 1990; Sergeant, 1997).

Hyperactivity is most commonly defined in relation to inappropriate levels of motor activity. This particular difficulty exhibited by some children with ADHD causes problems in the classroom, at home and with their peers (Edwards & Barkley, 1997). Children with ADHD with hyperactivity show a marked inability to sit still, or stop body parts from constant motion. They are often unable to complete tasks quietly. Their behaviour is as if "motor driven". Within a classroom setting, children with ADHD are often unable to stay seated, and will therefore be disruptive to other students. This behaviour does not auger well for student/teacher relationships or academic achievement, and in the playground seriously affects peer relationships (Cantwell, 1996; Ferguson, Horwood & Lynskey, 1993; Frick, Lahey, Loeber, Stouthamer-Loeber, Chirst & Hanson, 1992). Children with ADHD appear to have an inability to manage or regulate their motor activity (Abikoff & Gittleman, 1985; American Psychiatric Association, DSM-IV, 1994; Barkley, 1990; Carlson, Lahey & Neeper, 1986).

Attention levels are also affected as children with ADHD can appear to be "spaced out". They are often unable to ignore irrelevant stimuli, leading to an inability to complete

tasks, organise themselves, or follow through instructions. Inattentive children with ADHD often appear to be not listening. They also have a marked ability to forget instructions (Douglas & Benezra, 1990).

It would appear logical to conclude that the effects of the symptoms of ADHD would manifest themselves in an inability to do well in the academic arena. Research indicates that effortful cognitive work and comprehension of tasks are difficult for inattentive children with ADHD (Cantwell, 1996; Green & Chee, 1994).

Within the classroom, the three cardinal features of ADHD often have a negative impact on learning and behaviour. Children with ADHD who cannot regulate or manage their behaviour are going to have difficulty in academic progress. Academic failure itself is associated with increasing negative behaviours and can precipitate children gravitating towards a deviant peer group (Barkley, 1990; Cantwell & Baker, 1991; Gittleman, et al., 1985; Grainger, 1997; Lahey, et al., 1980; Loney, Kramer & Milich, 1981). The seriousness of academic failure has far reaching implications, detrimentally affecting children with ADHD and their families as well as society at large (August, Steward & Holmes, 1983; Cantwell, 1985; 1996; Ferguson, et al., 1991; Gittleman, et al., 1985)

1.5 Gender differences

The majority of research into the disorder of ADHD has been conducted upon males. The reason for the dominance of male based research could be due to the higher prevalence of the disorder in males than females (Breen & Barkley, 1998).

It has been suggested that the life course of ADHD differs between the sexes. These differences cast doubt on whether the ADHD diagnostic construct is valid for females (Gaub & Carlson, 1997). However, there appears to be phenotypic similarities between genders. Females with ADHD when compared with normal females were found to have

more impairment in functioning within the family, social and school environment. Females with ADHD also exhibit a higher incidence of anxiety, conduct and mood disorders, and their IQ and academic achievement were lower than their normal female counterparts. These findings highlight the severity of dysfunction and psychopathology in multiple domains in females (Biederman, Faraone, Mick, Williamson, Wilens, Spencer, Weber, Jetton, Kraus, Pert & Zallen, 1999).

Same age males with ADHD exhibit more externalising problems such as aggression and conduct disorder and consequently are more likely to be noticed. Females, in comparison, show more intellectual impairment, inattention and lower rates of externalising behaviours. This can result in females with ADHD being more easily overlooked or perceived to have less need for treatment (Arnold, 1996; Gaub & Carlson, 1997). Male over inclusion and female under inclusion could constitute referral bias, and may contribute to the large differences in prevalence between genders. Biederman, et al., (1999) conclude that females exhibit prototypical core symptoms, multiple domain dysfunction and comorbid symptoms that indicate that ADHD has as severe an impact on functioning for females as it has for males.

1.6 Aetiology of ADHD

Within the literature there is a distinct lack of agreement in adequately identifying the aetiology of the disorder. This lack of unity and understanding of the causes and development of the symptomatology of ADHD can have serious implications for the treatment and management of the disorder. Interventions for ADHD need to evolve simultaneously with research outcomes. There needs to be better communication between all those involved in ADHD parents, teachers, researchers, therapists and medical practitioners (Gumpel & Reid, 1998). Using feedback and empirical

information, additional or adjunctive modalities can be added to the armoury to address the many presenting issues children with ADHD have.

Numerous theories and causative factors have been postulated in the aetiology of ADHD (Barkley, 1990; 1997; Goldstein, 1995; Grainger, 1997; Hynd, et al., 1991; Levy, et al., 1997; Zametkin & Rapport, 1986). It was suggested by DuPaul, et al., (1991) that ADHD does not have a single aetiological background, rather, it has many aetiological backgrounds which lead down to one common pathway. The confusing aetiology in ADHD is an interplay of paths between biological and psychosocial factors that merge into this common pathway (Cantwell, 1996).

1.7 Environmental factors thought to be involved with ADHD

Controversy arises when examining the role diet and allergic conditions play in ADHD. There is no statistically significant evidence that links ADHD with allergies sugar intake or dietary additives, despite the assertions of Feingold, (1975). It has however generated a large amount of public support and is reported in great detail by the media. Children are put on elimination diets to reduce the symptoms of ADHD despite the reports that only 5% of children with ADHD are affected by additives (Connors, 1980).

Lead has also been linked to the development of ADHD, but once again evidence is very weak (Ross & Ross, 1982). In an analysis of research into diet, metabolic abnormalities, asthma and allergies, Scahill and deGraft-Johnson, (1997) concluded that the above variables could play a limited role in the aetiology in a small subgroup of children with ADHD.

Psychosocial factors such as dysfunctional families, maternal depression, marital discord, poor parenting skills or poor parenting styles are not viewed as being causative

of ADHD. However they do contribute to the maintenance of the disorder (Barkley, 1990; Barkley, Karlsson & Pollard, 1985; Biederman, et al., 1996; Grainger, 1997).

Grainger (1997) suggests that psychosocial factors exacerbate the ADHD symptoms, but ADHD symptoms may cause parental and familial stress. Marital discord has been shown to be predictive of disruptive behaviours, but not causative of them. Associations have been identified between the family environment and ADHD as Biederman, et al., (1995) suggest that families with children with ADHD exhibit more maternal psychopathology, more conflict and decreased family cohesion when compared to control families.

Several researchers suggest that aversive childhood experiences within the family environment can lead to behaviours that are maladaptive (Rutter, 1988; Rutter, Cox, Tupling, Berger & Yule, 1975; Rutter & Quinton, 1977). These researchers identified six factors that put a child at risk: low socioeconomic class, marital discord, depression or other mental disorders, (usually maternal), large family, paternal criminality and child fostering. However, one factor on its own does not produce the risk.

Lack of maternal sensitivity and warmth and high levels of criticism are also thought to be predictive of, though not causative of, ADHD (Barkley, et al., 1985; Barkley, Fischer, Edelbrock & Smallish, 1990). However, children exposed to all the above variables do not end up with a diagnosis of ADHD. It may be that the variables act upon a genetic susceptibility or vulnerability to the disorder (Rutter, 1994). As ADHD appears to have a strong hereditary link, parents who have ADHD themselves could also have poor skills in self regulation and self management, which could contribute to poor parenting styles and management (Frick, et al., 1992).

1.8 Genetic factors thought to impact upon ADHD

Current research into the genetic influences prevailing in ADHD indicates that genetic factors are part of the aetiology of ADHD. However, no specific gene is causal of ADHD (Ballard, et al., 1997). Outcomes from several studies give strong empirical evidence that ADHD is in part genetic and inheritable (Goodman & Stevenson, 1989; Levy, et al., 1996; Levy, et al., 1997; Sherman, Iacono & McGue, 1997; Stevenson, 1992). Comings, (1994) suggested that one type of dopamine action on the D2 gene coding could be the moderator. Recent research also indicates the involvement of three genes in the dopaminergic system, and it is proposed that some forms of these genes can be transmitted preferentially in families (Birchard, 1999).

A recent study (Levy & Swanson, 2000 in press) concluded that the dopamine theory is supported by research. However the nor-adrenergic system also appears to be involved in ADHD and would therefore indicate another genetic factor influencing the aetiology of ADHD.

A study examining genetic and environmental influences on ADHD symptomatology examined 576 twin boys 11-12 years old. Factor analysis indicated that inattention and impulsivity-hyperactivity were substantially contributed to by genetic factors, with environmental factors at a minimum. However it was noted that reports of behaviours, especially maternal reports had rater bias (Sherman, Iacono & McGue, 1997).

In a study tracing adopted children's biological parents, Cantwell (1972) established the inheritability of hyperactivity. Safer, (1973) found full siblings have a hyperactivity concordance rate of 50%, however half siblings had concordance rates of 29%. Results from a study involving 91 pairs of monozygotic same sex twins and 105 pairs of dizygotic same sex twins produced results that indicated the high heritability of ADHD

(Stevenson, 1992). Goodman and Stevenson, (1989) studied identical and fraternal twins. Their results showed concordance rates for hyperactivity in 51% of monozygotic twins and 33% in dizygotic twins.

An increased incidence of ADHD has been found in biological parents and siblings who have a diagnosis of ADHD when compared to adopted parents or siblings. Additive heritability of 0.75-0.91 across twin, twin sibling and sibling and across ADHD definitions was found when examining 1,939 families of twins and siblings with an age range of 4-12 years. These results suggest that ADHD is part of a continuum, not a discrete disorder and therefore ADHD has very high heritability (Levy, et al., 1997).

One of the diverse aetiological pathways of ADHD is thought to be linked to genetic/biological origins. It may be inferred that some of the presenting problems in ADHD stem from malfunctioning neurobiological systems (Hynd, et al., 1991). With this information in mind, it is important to examine more fully the neurological influences on aetiology in ADHD.

1.9 Neurological factors thought to contribute to ADHD

Neurological factors dominated the early research into the causes of ADHD. Most of the emphasis for the cause was on some form of neurological damage. However research indicates that ADHD can be directly attributed to neurological damage in less than 5% of cases (Rutter, 1977).

Research into adults and children with frontal lobe damage noted that the pattern of symptoms was similar to the pattern of symptoms of children diagnosed with ADHD (Boucugnani & Jones, 1989; Douglas & Benezra, 1990; Lezak, 1995). In a review of 22 neuropsychological studies involving the frontal lobe functions of children with ADHD

Barkley, et al., (1992) found that frontal lobe deficits were involved in inhibitory control in children with ADHD when compared to normal children.

Some studies have indicated that underactivity of the pre frontal regions the thalamic and limbic systems are highly correlated with ADHD symptoms (Chelune, Ferguson & Richard, 1986; Lou, Hendrickson & Brun, 1984). Some children with ADHD also exhibit lower levels of cerebral blood flow in the frontal midbrain (Lou, et al., 1984).

When examining the neurological evidence from functional imaging and magnetic resonance imaging, results indicate that the frontal basal-ganglia is smaller and less active in children with ADHD (Swanson & Castellanos, 1998). However these researchers suggest that as nearly all individuals with ADHD have at some time been prescribed stimulant medication the changes in neuroanatomy, such as brain atrophy, could be due to stimulant medication and not ADHD.

Shelly-Tremblay and Rosen, (1996) posit that there is considerable difficulty in establishing the pathogenesis of ADHD within one specific neurological system. Benson, (1991) suggests that in ADHD, the dysfunction in the brain is widespread, not just related to frontal lobe dysfunction.

Neurological dysfunction has also been associated with imbalances in neurotransmitters. Neurophysiological studies indicate that anatomical differences interact with the neurochemical functions in the individual with ADHD (Ballard, et al., 1997). Neurotransmitter abnormalities are thought to be those of dopamine and norepinephrine (Hynd, et al., 1991; Zametkin & Rapport, 1986). The monoaminergic systems which involve either dopamine or norepinephrine are considered involved, because imbalances of these neurotransmitters result in normal brain functioning being adversely affected (Zametkin & Rapport, 1986).

The debate that surrounds the neurotransmitters is whether neurotransmitter problems are causative or related to other aetiological factors. Evidence suggests that stimulant medication does not act exclusively on any one neurotransmitter (Brown, Voigt & Elksnin, 1996). However, the rationale for stimulant medication treatment is based on neurotransmitter imbalances Ballard, et al., (1997), Volkow, Wang, Fowler, Gatley, Logan, Ding, Hitzemann & Pappas, (1998), especially dopamine and serotonin (Swanson et al., 1998). Methylphenidate (MPH) is known to be a noradrenergic agonist. However, how MPH works is as yet not clearly understood, as normal children also show improvements when given the drug (Douglas, Varr, Amin, O'Neill & Britton, 1988; Tannock, et al., 1989).

These suggestions of aetiology, or what is thought make up the core manifestations of the disorder, have led to a variety of diagnostic labels that are often short lived (Barker, 1988; Weiss & Hechtman, 1986). However, recent research is producing a clearer picture, although this picture is still of a multifaceted aetiology.

1.10 Nomenclature and Taxonomy involved with ADHD

The constant changing of nomenclature and taxonomy produces problems for clinicians when trying to intervene successfully in this disorder. A brief review of the literature shows a variety of theories about the nature of the disorder, which has led to a continual change in how best to manage and/or remediate. ADHD has had a variety of labels over the past 98 years, including defects in moral character, consciousness organically driven syndrome, minimal brain syndrome and hyperkinetic impulse disorder (Barkley, 1998; Cantwell & Baker, 1991).

Considerable confusion due to changing conceptualisations, diagnostic criteria and ambiguities of the nature of ADHD has resulted in three different diagnostic

nomenclatures since 1980. Examining the DSM-IV criteria of ADHD in relation to the DSM-III criteria, there is a close association between the two with both supporting the multi-dimensional conceptualisation of the diagnostic features of ADHD (Morgan, Hynd, Riccio & Hall, 1996).

ADHD was initially identified and classified by Still, (1902), who described children he saw as having a developmental disorder that was not related to mental retardation or poor upbringing. These children exhibited clinically significant levels of hostility, defiance, aggression and were antisocial in some behaviour. Still, (1902) concluded that the problem lay in an inability to behave in a morally acceptable way. These children had no control in inhibiting unwanted behaviour, which Still, (1902) suggested stemmed from some form of disordered neurological development. This organic disorder also involved an inability to sustain attention, destructiveness, fidgetiness, violent unpredictable outbursts and extreme restlessness. The disorder was consequently labelled “defects of moral control”. What is interesting to note here is that current conceptualisations of the core nature of the deficit of children with ADHD are reflecting Still's, (1902) writings and his hypotheses about the deficit. Levin, (1938) suggested that the central issue was motor restlessness. Strauss and Lehtinen, (1948) suggested the main symptom was high distractibility and in the 60's, hyperactivity became the central symptom (Barkley, 1990).

Douglas, (1972; 1983; 1988) proposed that both hyperactivity and impulsivity indicated problems with attention. Not only were these children unable to inhibit impulsive behaviours, they were also unable to sustain attention in relation to tasks. However there are problems, as attention is a very diffuse construct, with definitions being used interchangeably (Prior & Sanson 1986). The deficits of attention resulted in children with ADHD functioning poorly when required to self direct their attention in a way that

was both focused and organised (Douglas, 1988). Douglas and Peter, (1979) suggested that the underlying problem was poor self regulation, which directly impacted on inhibition and reward and which resulted in poor attention and an inability to inhibit impulsive responding. Therefore in response to these findings, the DSM-III (American Psychiatric Association, 1980) labelled the disorder as Attention Deficit Disorder. Two sub-types were added, ADD with hyperactivity or ADD without hyperactivity.

However subsequent research indicated that certain deficits in cognitive processing occurred with ADHD that were as detrimental as the hyperactivity and disruptive behaviour (Rutter, 1988). The DSM-III-R produced another shift in nomenclature, and the disorder was relabelled Attention Deficit Hyperactivity Disorder and Undifferentiated Attention Deficit Disorder. However, it was proposed by Prior and Sanson, (1986) that a deficit in attention lacked empirical support. It is important to recognise that as outcomes from the research into the nature of ADHD has evolved it presents real problems that need to be taken into account, if successful outcomes with interventions are to be achieved.

1.11 The impact of comorbidity in ADHD

Difficulty arises when trying to define boundaries between the overlapping symptoms, or comorbidity, in children presenting with ADHD, as they are not a homogeneous group. Comorbid presentation with ADHD contributes to the ambivalence and uncertainty of the core nature of the deficits. However, due to the heterogeneous nature of ADHD, there are various patterns of comorbidity now being recognised. There is an acceptance that symptoms are hard to define singularly and are consequently shared (Biederman, Newcorn & Sprich, 1991).

The comorbid presenting symptoms are Conduct Disorder (CD), Learning Disorder (LD) and Reading Disorder (RD) which often present with depression and anxiety. As a result doubt is cast as to whether or not these comorbid factors are a separate disorder or manifestations of the same disorder (August & Garfinkel, 1993; Gittleman, et al., 1985; Halperin, et al., 1993; McGee, Williams, Moffit & Anderson, 1987). These problems not only occur during childhood they can persist throughout the lifespan (Barkley, 1990; Cantwell & Baker, 1991; Prior & Sanson, 1986).

When comparing control of impulsivity and attention, children with ADHD with a comorbid diagnosis of conduct disorder, anxiety or learning difficulties were found to be both significantly more impulsive and inattentive than children with ADHD with no comorbid diagnosis (Halperin, et al., 1993).

1.12 Conduct disorder and the impact it has on ADHD

Conduct disorder (CD) is the most common comorbid disorder that children with ADHD present with (Jensen, Martin & Cantwell, 1997). The seriousness of a comorbid CD is highlighted when studies indicate at least 50%-60% of children diagnosed with ADHD will present with conduct disorder (Anastopoulos & Barkley 1992; Shaywitz & Shaywitz, 1994). Confirmatory factor analysis produces correlations ranging from 0.54 to 0.88, indicating a high degree of association between ADHD and CD. These high correlations could indicate a common aetiology, i.e. biological and/or social factors being implicated (Ferguson, et al., 1991).

Conduct disorder (CD), when it is comorbid with ADHD has a detrimental effect on most areas of functioning, across all levels of interactions. Studies indicate that conduct problems show long term stability (Babinski, Hartsough, & Lambert, 1999; Hinshaw, 1987; Klein & Abikoff, 1997; Loeber, 1990). Research has also found that children

with hyperactive/impulsive type ADHD and conduct disorder were at a significantly higher risk for arrests for all crimes when compared to a normal group (Babinski et al., 1999)

When defining risk liability due to cognitive, behavioural and psychosocial determinants within an ADHD/CD population, research outcomes indicate that on parent rating scales assessing aggression and delinquent behaviour, children with ADHD/CD received more deviant ratings than those children without the conduct disorder. Mothers of these children rated themselves less confident and more deficient in controlling their children's behaviours (August, Realmuto, MacDonald, Nugent & Crosby, 1996). Patterson, (1986) found that some parental management styles within families of children with ADHD/CD were dysfunctional, as punishing these children often resulted in an escalation of the disruptive behaviours.

The early emergence of oppositional defiant disorder (ODD), is highly predictive of conduct disorder at ages 7-10 (Campbell & Cueva, 1995; Hechtman, et al., 1984). Biederman, et al., (1996) found evidence for two subtypes of ODD and predict that one subtype is prodromal to CD. Children who have a combination of ADHD/CD that emerges early, are a subgroup at risk for future development of antisocial behaviour such as delinquency and criminal behaviours (August, et al., 1996; Gresham, Lane & Lambros, 2000; Klein & Abikoff, 1992). New Zealand research concluded that a combination of both early attention and conduct problems are predictors of antisocial behaviour (Moffit, 1993).

Taylor, Chadwick, Heptinstall and Danchnerts, (1996) compared two groups of children with ADHD aged 6-7 over a three year period. One group had pervasive hyperactivity and/or conduct problems; the other group had neither problem. The children were

assessed ten years later, and findings indicated that hyperactivity was a risk factor of academic, peer and social problems and antisocial behaviours. Three years of studying children with ADHD/CD indicated that academic problems, school behaviour problems and delinquent behaviour were stable and that these children were at serious risk of failure in all areas of functioning (McConaughy & Achenbach, 1994).

The addition of a conduct disorder has serious implications for long term outcome in ADHD. Not only is the individual unable to concentrate in class, aggressive and disruptive behaviours contribute to lack of completion of work. When work is not completed, it produces poor academic outcome or academic failure. Academic failure as has been mentioned is a risk factor for antisocial behaviours, poor inter-personal relationships and substance abuse (Biederman, et al., 1996; Carrol, 1993; Hechtman, et al., 1984; Mannuzza, Gittelman-Klein, Bonagura, Malloy, Giampino, & Addalli, 1991).

ADHD/CD groups show significantly more arithmetic and psychosocial problems indicating that a comorbid conduct disorder can be diagnosed separately from ADHD (Schachar, et al., 1995). Comparisons between ADHD/CD and ADHD indicate both groups show similar impairments in inhibitory control, alteration of responses, and have developmental delays and problems with reading. This finding has been replicated, and it is suggested the core deficit in children with ADHD may be problems with executive processes, namely that of self regulation or an inhibitory control deficit (Schachar & Logan, 1990b; Schue & Douglas, 1992; Quay, 1997).

As at least 60% of children presenting with ADHD also present with a comorbid conduct disorder (Anastopoulos & Barkley, 1992), there is a need to address this issue in any intervention for ADHD, as it has a significant impact on the severity of the presenting symptomatology. Clearly, the possibility of a multiplicity of intervention

strategies must be recognised, as this comorbid presentation has serious implications for the treatment of the disorder. Children who are diagnosed with a severe comorbid conduct disorder may have to have this treated first, if full advantages are to be achieved from an intervention that addresses the lack of self regulation and inhibitory control.

1.13 Learning and reading disorder in ADHD

ADHD and learning disorder (LD), or reading disorder (RD), present with symptoms that include poor concentration, short attention span, anxiety, shyness, social isolation, academic under achievement and memory deficits. However, there is no obvious pattern of cognitive or memory tasks deficits. Once again, deficits impact differently across domains of functioning (Barkley, 1990; Cantwell & Baker, 1991; Halperin, Gittleman, Klein & Rudel; 1984; McGee & Share, 1988; Prior & Sanson, 1986).

Jorm, Share, Mathews and Maclean, (1986) suggest that children with learning disabilities had problems before they started schooling. However results from longitudinal data indicate learning difficulties could lead to ADHD (Cunningham & Barkley, 1978; McGee & Share, 1988). Whether or not learning disabilities manifest themselves before the commencement of schooling, problems with learning often precipitate emotional and social problems. Low peer popularity is one of the significant social problems suffered by children with ADHD/LD (Frick, et al., 1992). Smart, Sanson and Prior, (1996) found no support for behaviour problems exacerbating reading problems. More recent research indicates that the development of reading difficulties in some children is related to problems with attention (Rabiner & Coie, 2000). However, academic difficulties and failure are associated with ADHD, and seem to have a multifaceted aetiology (Cantwell & Baker, 1991).

Research has failed to disentangle the overlapping symptoms of learning problems, hyperactivity and inattention, however research suggests that LD lies along a continuum and is not a discrete entity (Shaywitz, Fletcher & Shaywitz, 1996). Between 15-30% of children diagnosed with ADHD have a LD (August & Garfinkel, 1991; Pliszka, 1998). It is unclear whether LD is due to hyperactivity, impulsivity and an inability to attend, or that children with ADHD have learning problems (Cunningham & Barkley, 1978). Regardless of this inability to disentangle what came first, these children are all at serious risk of academic problems, especially if they have reading and speech difficulties, as the ability to read impacts upon all areas of academic achievement (Cantwell & Baker, 1991; Love & Thompson, 1988).

Research indicates significant gender difference in relation to reading and speech difficulties in twins and siblings, aged 4-12. Males, when compared to females, exhibited the higher speech difficulties, reading and ADHD problems. Strong associations were found between ADHD symptoms and speech and reading problems. It was concluded that the findings were specific to ADHD and not other behaviour problems (Levy, et al., 1996). Smart, et al., (1996) also found evidence for sex differences with the reading disabled. Up to two thirds of reading disabled boys exhibit behaviour problems, whereas they found that girls had no behaviour problems combined with their reading problems.

Language tasks were studied using PET scans and cerebral blood flow and results found differences between LD and non LD subjects in the left temporal lobe and left inferior parietal lobe, thought to be associated with word meaning and fine auditory discrimination (Flowers, 1993). Using language processing tests, children with ADHD were found to have deficits in receptive and expressive semantic language abilities (Purvis & Tannock, 1997). The deficits were related to the difficulty in organising and

monitoring the retelling of a story. Purvis and Tannock, (1997) suggest that children with ADHD/RD who are unable to logically sequence reading information may have problems in executive functions, as well as problems with semantic, orthographic or phonological awareness.

Children with ADHD with a comorbid learning or reading disability are at serious risk of academic failure. Therefore, the types of intervention have to not only address the learning and reading problems, but should also address the problems experienced with executive functioning.

1.14 Summary of research review on ADHD

The aim of this chapter was to examine important issues in the literature surrounding ADHD. An understanding of prevalence, diagnosis, aetiology, comorbidity, nomenclature and taxonomy was warranted, as the ever evolving research outcomes in these areas should be taken into account when trying to intervene and manage children with ADHD.

Children with ADHD invariably present with poor social skills, poor parent-child interactions, non-compliance at home and at school and poor academic standards that may have lead to failure in, interpersonal, social and vocational lives (Cantwell, 1985; Ferguson, et al., 1991). In view of the persistence and perverseness of ADHD symptomatology, it is imperative that the implications of research are taken into account at the intervention level. There have been a number of advances in research that need to be identified. The implications arising from these advances can perhaps add to the battery of interventions that have been used for the past few years.

Current research on the aetiology of ADHD suggests that there is more than one aetiological pathway to this disorder, which adds to the confusion surrounding how to

intervene effectively (Barkley, 1990). There is some evidence regarding biological, genetic, neurochemical, neuroanatomical and environmental factors contributing to causation (Barkley, 1997; 1998; Goldstein, 1995; Grainger, 1997; Hynd, et al., 1991; Levy, et al., 1997; Zametkin & Rapport, 1986). Neurological evidence points to neurotransmitter and anatomical abnormalities interacting, indicating the possibility of organic causation (Bowden, et al., 1988; Hynd, et al., 1991, Zametkin & Rapport, 1986). Neurotransmitter abnormalities are the rationale for stimulant medication intervention (Swanson, et al., 1998). However, to date, there is no clear research that can identify causation.

Research outcomes indicate that genetic factors contribute to the aetiology of ADHD, indicating that ADHD is highly heritable (Levy, et al., 1997). Environmental factors appear to contribute to the vulnerability or susceptibility of ADHD. Environmental factors, such as diet or lead play a very small role in a sub-group of children with ADHD (Scahill & deGraft-Johnson, 1997). A variety of experiences in the family environment, such as poor parenting skills and styles and marital discord can lead to or exacerbate maladaptive behaviours (Grainger, 1997).

Interventions for children with ADHD with a comorbid diagnosis have to incorporate remediation of the learning disorder, and compliance training for the children with conduct disorder. If these co-morbid disorders are not controlled before the intervention for ADHD, then the effectiveness of an intervention may not be as successful. From the evidence of the impact of comorbidity on functioning, it is possible to conclude with certainty that no one intervention is going to be sufficient to effectively manage the disorder. There is a need for a diversity of intervention approaches and in particular a need to examine how the changing nature of understanding ADHD's core deficits can influence the development of an intervention program.

Chapter 2 will therefore examine the changing conceptualisations regarding the nature of ADHD. There is a need to understand and reflect upon the executive function of disinhibition and the need to control attention. Therefore, the third chapter will also review the literature regarding executive functions and the role these functions play in the development of internal language and self regulation. It is thought that the core deficit results in an inability to effectively organise self regulatory skills, which are subsumed under executive functions.

CHAPTER TWO

EXECUTIVE FUNCTIONS AND ATTENTION DEFICIT HYPERACTIVITY DISORDER

This chapter reviews current conceptualisations about ADHD in relation to executive functioning. The reason this examination is warranted is due to the fact that many of the problems experienced by children with ADHD appear to be related to executive functioning. Problems such as the inability to use internal language to guide behaviour, poor attentional processes and poor inhibition of behaviour all detrimentally impact upon children with ADHD's ability to effectively self regulate. It is also necessary when reviewing executive functions, to note how self regulation is developed and the role that internal language may play in helping to develop the use of self regulation skills.

2.1 An explanation of executive functions

Executive functions are believed to be responsible for anticipating, assessing and acting appropriately in a controlled way to any given situation. Executive functions also need to be flexible to enable the handling of new or unexpected situations. When tasks are performed, executive functions allow for the choosing, the constructing and the executing of the optimal strategy in a situationally appropriate manner. This is due to the ability to analyse, deconstruct and reconstruct behaviour and recognise consequences of any given behaviour. Executive functions are involved in planning, organising and implementing goal directed strategies and behaviour, using the processes of inhibition, self regulation, managing and monitoring motivation, arousal and the internalisation of language (Barkley, 1997; Damasio, 1994; Eslinger, 1996; Klorman, Hazel-Fernandez, Shaywitz, Fletcher, Marchione, Holahan, Stuebing & Shaywitz, 1999; Moffat, 1993; Wiers, Boudewijn, Gunning & Sergeant, 1998). As executive functions are involved in the inhibition of inappropriate behaviour, a failure to inhibit or self regulate behaviours would be directly related to a failure within the executive functions (Schachar & Logan, 1990).

Barkley, (1997; 1998) has proposed a theory of impaired delayed responding (or impaired response inhibition) in ADHD. Barkley, (1998) draws on Bronowski's, (1977) model which was based upon the ability humans have to receive an incoming signal and delay the response to that signal. The ability to delay allows four processes to respond. The first process involves the separation of emotion from the signal. The second and third processes involve the ability to use prior knowledge to compare but also to evaluate consequences. The fourth process involves the internalisation of language, which is a self regulation process. Internalised language allows the generation of diverse plans of actions which can be constructed and reconstructed producing hypotheses about intended action. Barkley, (1997) suggests that the evidence for response inhibition being the core deficit in ADHD is compelling however he recognises the fact that more research is needed in this area.

Gray, (1987) proposed a two brain system, whereby the first system was responsible for behavioural inhibition (BIS) and the other system was responsible for behavioural activation. (BAS) Quay, (1988, 1997) used Gray's, (1987) systems to demonstrate that children with ADHD have an under active BIS. Quay, (1997) suggested that failure of inhibition is the core deficit of ADHD. Using Quay's, (1997) paradigm, Oosterlaan and Sergeant, (1998) found evidence that children with ADHD with and without aggression were slower in activating their inhibitory processes and concluded that these children exhibited a failure of inhibition. Sergeant, (1997) proposed that the clinical symptoms of ADHD were aligned with cognitive processes and neural networks, and that the deficit in ADHD was in information processing. Information processing is a component of working memory, which in turn is controlled at executive levels.

The precise form of the clinical syndrome of ADHD has been surrounded by dissent in identifying the exact nature of the core deficits. However, there appears to be a general

consensus that one of the underlying core deficits is that of disinhibition, which is regarded as a process considered to be part of executive functioning (Barkley, 1998).

Disinhibition is the inability to delay responding, which results in situationally inappropriate impulsive behaviours. Such behaviours are going to impact significantly on the way the individual with ADHD learns in the classroom. If, due to disinhibition, the task commences before instructions are fully understood, then the task will not be completed correctly. The individual may be distracted by another child and may not hear the instructions at all. The end result of not being able to delay responding or other impulsive behaviours could well result in academic problems or academic failure. Academic failure, as research has indicated, is a risk factor that may contribute to the individual joining a deviant peer group, to conduct disorder, to peer rejection and to poor parent relations (Biederman, et al, 1996; Shaywitz, et al., 1994; 1995).

2.2 A review of research involving executive functions and ADHD

As noted in the previous chapter, frontal lobe damage interferes with the ability to execute various cognitive and behavioural functions. The frontal lobes are involved in the mental processes of self-awareness, planning, abstract reasoning and self regulation (Benson, 1991; Dennis, 1988). The frontal lobes are also involved in the modulation of affective behaviour, the organisation and monitoring of goal directed actions, managing simultaneous incoming sources of information and allowing smooth shifting from low to high priority tasks dependent on situational cues (Stuss & Benton, 1986; Matter & Williams, 1991; Welsh, Pennington & Groisser, 1991). Children with frontal lobe damage show impairments on these functions (Lezak, 1995).

The frontal lobes are directly involved in the integration of information from other major neural systems. They are responsible for the interaction between the internal systems and external environment (Dennis, 1988). Executive functions are thought to be associated with the frontal or orbital frontal areas of the brain. It is suggested that failures of these executive functions are related to the deficits in ADHD (Barkley, 1997, 1998; Crowe, 1992; Schaughency & Hynd, 1989). Children with ADHD exhibit many of the symptoms of children with frontal lobe damage or lesions, and they also exhibit developmental lags or deficits in executive functions (Levin, et al., 1991). Schue and Douglas, (1992) assessed frontal lobe functions in children with ADHD and their results indicated that some ADHD impairments can be related to specific frontal lobe processes.

Baddeley, (1986) proposed that other brain systems are incorporated into a complex relationship with the frontal lobes, so to imply that it is purely a frontal lobe problem was an inadequate explanation. Psychological functions are controlled by the prefrontal brain Stuss and Benson, (1986) and it is these functions that are pertinent when examining ADHD. Executive functions should not be described anatomically, but rather as psychological constructs, because some of the neuronal circuits of the subcortical areas of the limbic system are involved as well as the frontal cortex (Damasio, 1994; Esliger & Stuss, 1992).

In order to evaluate the relationship between executive functions and ADHD, (Reader, Harris, Schuerholz & Denckla, 1994) administered a battery of tests that specifically relate to executive process functioning. Results indicated that children with ADHD performed below average on two of the four tests. These results support other studies which have found that children with ADHD perform significantly below normal

controls on tests assessing executive functions (Boucugnani & Jones, 1989; Gorenstein, Mammato & Sandy, 1989; Chelune, Ferguson, Koon & Dickey, 1986).

In examining neuropsychological and academic functioning in pre-school boys, (Mariani & Barkley, 1997) suggest that the deficits found in working memory and motor control appear to be inherent within the makeup of ADHD. Children with ADHD have later and poorer inhibitory control than normal children (Barkley, 1994; Quay, 1997; Schachar & Logan, 1990b; Schachar, et al., 1995). Regulatory processes involve the ability to commence, inhibit, modulate or cease attending, and they allow individuals to communicate in a socially acceptable, rule abiding and productive way (Duncan, 1986). Children with ADHD appear to be unaware of and/or are unable to be self critical of their behavioural and verbal responses (Barkley, 1998). Therefore, it could be concluded that within a neuropsychological framework, the deficits in executive functions directly impact upon self regulation.

Sub-types of ADHD and comorbidity are a continuing confounding issue when researching and examining means of intervening with children with ADHD. An examination of a group of ADHD hyperactive-impulsive type, combined with LD, found that these children exhibited both encoding and central processing deficits in functioning. The ADHD inattentive type combined with a CD group demonstrated deficits in encoding information and poor cognitive functioning. The ADHD hyperactive type, combined with a CD group, indicated that the deficits were in arousal and activation, but they had no deficit in effort. The ADHD hyperactive-impulsive group did not have an encoding deficit, but appeared to have rule governed deficits, which exhibited themselves at the output stage (Oosterlaan & Sergeant, 1998).

Further research has noted that when examining executive functioning deficits in ADHD/combined type and ADHD/inattentive type that the combined type of ADHD exhibited executive functioning deficits however the ADHD/inattentive type, exhibited no executive functioning deficits (Klorman, et al., 1999). It was concluded that ADHD/inattentive type was a "qualitatively different cognitive disorder" due to the absence of executive functioning deficits. They state that their results support Barkley's, (1997; 1998) proposition that cognitive profiles between subtypes are different and deficits in executive functioning are more likely to be exhibited in ADHD/combined type. Clinical implications stemming from this research need to be considered when trying to intervene as children with ADHD/inattentive type may result in lack of referral due to being overlooked (Klorman, et al., 1999). Hence in view of the impact of differing subtypes and comorbidity on different domains of functioning, the specific nature of intervening successfully may become very complicated. Interventions for ADHD need to be sensitive and adaptable to the differing symptomatology each and every child presents with.

The findings from the research on executive functioning in children with ADHD indicate that some of the problems these children have will impact on how they function in the classroom. The lack of self regulation and self management skills in the classroom may result in children with ADHD often not being able to complete academic tasks. Rapport, et al., (1999) have noted that in order for children with ADHD to successfully achieve academically, they have to have good self control, reduce maladaptive classroom behaviours and be able to pay attention, all processes related to executive functions. Previously, it was thought that the main deficit in children with ADHD was one of attention. Whilst current research suggests the core deficit is that of disinhibition, attention problems are linked to disinhibition and therefore an

understanding of attentional processes is needed in an explanation of executive functions in ADHD (Barkley, 1998).

2.3 The development and involvement of attentional processes in executive functioning

The nature of attention is quite diffuse. Because attention is multifaceted, deficits in attention can manifest and present in a variety of ways and can possibly stem from underlying neuropsychological processes. Attending involves concentration, selective attention, vigilance and sustained attention (Proir & Sanson, 1986). The acquisition of attentional control can be seen as a two part system, having a lower level control and a higher level control (Jeannerod, 1994). The lower level control is the orienting/investigative level, where objects are seen as goals. The higher level control involves frontal pathways and structure, and is in part governed by language, either by others or by self. The higher level also involves the planning of action in the long term, goal related attention and the ability to sequence. The systems are connected, and the lower level is controlled internally by the higher level, rather than being controlled externally by the environment (Jeannerod, 1994; Posner & Rothbart, 1991).

Many children by the time they are two have learnt to focus their attention. They have also learnt to shift attention from one object to another in a stressful situation. These functions demonstrate the ability to self regulate or modulate their behaviour in relation to social, cognitive and emotional demands. However there is variability in the development of these functions (Johnson, Posner & Rothbart, 1991; Posner & Rothbart, 1991).

The variability in the development of attention can be related to different factors;

1. Differences in how quickly children learn information they have acquired about a given situation.
2. Variability in temperament.
3. Differences between children in inhibitory control.
4. Attentional systems are reliant on neural networks and the possible delay in their development may also affect how well a child acquires control of attention (Rothbart, 1989; Rothbart, Ziaie, & O'Boyle, 1992).

The concepts of divided, sustained and focused attention have been widely researched in ADHD. Children with ADHD do not appear to differ from normal children in divided attentional tasks (Van der Meere & Sergeant, 1988a). When sustained attention was examined in relation to performance and task efficiency, children with ADHD had declines in only one of these areas (Van der Meere & Sergeant, 1988a). Selective attention problems produce results that have a lower latency and higher error rate. However this difference was not due to poor selective attention, but due to problems with poor organisation of responses (Sergeant & Van der Meere, 1988b). Tasks examining focused attention also showed no differences between children with ADHD and normal children (Sergeant & Scholten, 1983; Van der Meere & Sergeant, 1988c). Nor is there evidence that overall attentional capacity is faulty as children with ADHD appear to have the same capacity as normal children. However it has been suggested that maybe the underlying problem is the way the capacity is managed (Sergeant & Scholten, 1988).

The allocation and reallocation of attention can be examined by using a variety of tasks, such as stop tasks and change tasks. Schachar and Tannock, (1995) found that children with ADHD when compared to normal children had significant differences in their

ability to inhibit ongoing behaviour and to re-engage. It was concluded that children with ADHD appear to be very susceptible to both external and internal interference resulting in poor attention and persistence to tasks. Barkley, (1997) suggests in his model of impaired delayed responding that the deficit in ADHD is a deficit in the ability to inhibit behaviours, therefore it is important to examine the role of inhibition and ADHD.

2.4 Inhibitory control in ADHD

Children with ADHD exhibit poor inhibition across a variety of tasks. When a task requires the cessation of one response and the commencement of another, or when feedback from a task suggests it is the wrong response, children with ADHD show response perseveration and appear unable to move smoothly to the other task (Oosterlaan & Sergeant, 1998; Schachar & Logan, 1990; Sergeant & Van der Meere, 1988).

There is some evidence to suggest that children with ADHD can manage to control their impulsivity and distractibility and plan when response contingencies are linked to task performance, as inhibitory control can be dependent upon rewards (Douglas, 1985; Pelham, et al., 1993).

Sonuga-Barke, Taylor, Sembi and Smith, (1992) manipulated the size and delay of reinforcement to examine this hypothesis. Children with ADHD chose to reduce the delay for obtaining a reward rather than extend the time to maximise the reward. Hyperactive-impulsive children with ADHD are far more reward driven as the inability to inhibit behaviour on a stop task with this group can be improved with rewards or response costs (Oosterlaan & Sergeant, 1998; Quay, 1996). However, Oosterlaan and Sergeant, (1998) found that despite response contingencies, children with ADHD still

exhibit impairments in response inhibition. But they conclude that response inhibition is enhanced with response contingencies in comparison to no response cost.

Implications arising from this research information need to be used in order to develop interventions for ADHD. Children with ADHD have problems inhibiting unwanted and inappropriate responses, especially in the classroom while engaged on academic tasks. An external monitoring system that utilises an evaluation linked to response cost appears to be able to motivate these children sufficiently to enable them to complete tasks more successfully (Pelham, et al., 1993). There are problems with compliance to response cost. Research indicates that parents are often unreliable both in giving information about and complying to response cost components of interventions. It is suggested that a way of overcoming compliance problems is to educate and involve parents in all aspects of interventions for ADHD (Kendall, 1991).

However it would seem necessary to eventually try to teach children with ADHD to internally monitor, not to be reliant on external monitors and response cost programs in order for them to acquire and use self regulation and self management skills independently. This is clearly a complex and difficult problem to overcome, as acquiring self regulation is a developmental and social task (Schunk & Zimmerman, 1994). Therefore the development of self regulation needs to be examined in light of the evidence that it is directly implicated in ADHD (Barkley, 1997).

2.5 The nature and development of self regulation in relation to ADHD

Self regulation is viewed as a complex construct which involves initiating, directing or inhibiting responses in order to comply with socially acceptable norms without an external monitor (Kopp, 1982; Silverman & Ragusa, 1992). Children with ADHD

exhibit difficulty in planning and organising behaviours, difficulty in inhibiting responses to stimuli and difficulty in modulating arousal, attention and activity in situationally appropriate ways, all evidence that these children have problems that are related to an inability to plan, guide, monitor and control behaviours in order to attain goals. These problems are in turn related to the processes of self regulation (Barkley, 1997; 1998).

This inability of children with ADHD to self regulate could be viewed as lack of knowledge and skills. Barkley, (1997) suggests that the processes of separation of emotion, and the ability to delay behaviour by internally talking through strategies are underutilised, and not practised. Barkley says that there is not a lack of knowledge or skills, but rather, these processes may become less efficient and impaired.

Whether the deficit in ADHD is viewed as less efficient and impaired, or as the lack of knowledge and skills, it is important that ways be found to make the system more efficient. Perhaps one way of attempting to remediate the deficit is to try to teach children with ADHD to use self regulation skills, in order to help them inhibit unwanted responses.

How children acquire the skills to control their behaviour is a central issue of developmental psychology. It has been noted that the acquisition of the skills required to inhibit an inappropriate response, that is to self regulate behaviour, is perhaps one of the most difficult tasks that face the developing child. Yet self regulation is a skill that is needed in all aspects of daily life (Kopp, 1982; Reed, et al., 1984). It has been proposed by Ruff and Rothbart, (1996) that poor self regulation may in part be linked to a neurodevelopmental lag. Control processes appear not to develop along general

developmental lines for children with behavioural and attentional problems. These children behave like children much younger than their chronological age would indicate.

Cognitive skills such as self regulation are also acquired by modelling and repetition of situation specific strategies. These skills facilitate the development of strategies needed for different situations (Kopp, 1982; Silverman & Ragusa, 1992). The strategies allow for flexible and appropriate associations to be made that result in a correct response that is adapted when situations differ (Borkowski, Estrada, Milstead & Hale, 1989; Hinshaw & Melnick, 1992; Newman & Wallace, 1993; Silverman & Ragusa, 1992).

Other research indicates that social factors are also involved in the development of self or independent control. Wertsch, Minick and Arns (1981) examined three age groups of children, (2.5 years, 3.5 years and 4.5 years) and their mothers. In the 2.5 years age group, the children's behaviour was dependent on what the mother did 76% of the time, at 3.5 years it had dropped to 56% and at 4.5 years it was down to 33%. The researchers interpreted these results to indicate that with cognitive development, children took more responsibility for their attention to and performance of a task.

The gradual acquisition of self regulation skills is explained by Kopp, (1982), in a three phase model. The "Control Phase" occurs when children acquire the ability to initiate, maintain and stop behaviours when requested indicating an awareness of social and task relevant behaviours that are appropriate to the situation. The second phase, "Self Control", occurs when children understand how to self monitor without external monitoring or cues from others. The third phase "Self Regulation" develops when children can use metacognition, integration of strategies and introspection. This allows children to respond to different situational demands and to adapt quickly to changing situations.

Research outcomes indicate that self regulation is dependent on the emergence of cognitive maturation and positive social factors. Vygotsky, (1962) suggested that higher psychological functions are primarily developed through sociocultural origins. The developing child first experiences events on an external interpsychological social level between others. Gradually experiences of events become internal and intrapsychological. This transition from external to internal suggests that mental functioning is voluntary in nature rather than reflexive and passive. Initially, simple sensory processes form the building blocks for higher mental processes. These higher mental processes end up as controlling systems, and are conscious and voluntary.

The quality of child/adult interactions are highly influential in determining the level of self regulatory skills a child can develop. Children are limited in learning to regulate their own behaviours if adult/child communications are negative and controlling. Adults who do not allow children to be responsible, and are always issuing explicit instructions and supplying immediate solutions to problems, do not encourage the development of functional self regulation (Diaz, Neal & Amaya-Williams, 1990).

It has been noted that children with ADHD have greater difficulty in inhibiting unwanted behaviour to stay on task if the experimenter is absent. If assistance is not provided to children with ADHD they often appear to be unable to master activities or successfully complete tasks without adults or more skilled peers continually supervising their behaviour, something that normal children progress to being able achieve (Dreager, et al., 1986).

However, evidence suggests that children with ADHD can be controlled by external monitoring. When children with ADHD are asked to go slower to maximise accuracy, they can inhibit impulsive responding (Sergeant, 1997). Children with ADHD can stay

on task and sustain their attention almost as well as normal children when the experimenter is present. It is also interesting to note that when children with ADHD have to pace themselves as compared to being paced by the experimenter, memory deficits only appeared in the self paced condition (Sonuga Barke, Taylor & Hepinstall, 1992).

Therefore, for children to learn to effectively self regulate, certain strategies need to be put in place by adult while children learn the required skills to problem solve and complete tasks independently. From a Vygotsky, (1987) perspective, to help develop self regulation, child/adult strategies that focus on tasks within the child's zone of proximal development will facilitate the development of self regulation.

Vygotsky's, (1987) zone of proximal or potential development provides valuable focus for children with ADHD. The zone of proximal or potential development Vygotsky suggests is a higher cognitive process that develops from interpersonal and social interactions and activities that provide guidance and assistance from more mature people in the environment. This theory defines cognitive or behavioural functions that are in the process of maturing or in their embryonic state today, but will be more mature tomorrow. The zone of proximal development can be regarded as situated between the level of a child's independent task completion and task completion made possible by adult assistance. Therefore, children need to be given tasks that are sensitive to the developmental stage they are at, yet at the same time, providing access to a higher stage through the assistance of an adult.

Vygotsky suggests that the zone of proximal development can be wide or narrow. When the zone of proximal development is narrow, children perform better with assistance when tasks are not far from those tasks which they are able to do

independently. A wide zone of proximal development indicates that these children can perform far more independently at a higher level when working alone.

It appears that children with ADHD have more difficulties in successfully moving from a narrow zone of proximal development to a wider one in the way normal children can. Children with ADHD have difficulties in inhibiting responding, planning actions, monitoring and evaluating actions, as well as assessing the consequences of actions and strategies when they are not closely supervised by an adult (Dreager et al., 1986). It is very important then that children with ADHD be helped by strategies involving the adjustment of tasks to the appropriate level of their social and cognitive abilities and will allow the development of more independent learning.

One of these strategies parents or teachers can use is “scaffolding”. Scaffolding is a support system put in place by adults to facilitate learning and self regulation. Scaffolding promotes children’s mastery of independent task completion by breaking the task into subgoals, so that it is sensitive to the developmental level of each child. The use of “plans of action” when tasks need to be broken down into subgoals is an important form of deliberate guidance that is needed to facilitate the gaining of self regulation. Scaffolding offers necessary planned assistance to enable children to master a task while encouraging and promoting them to become more responsible for independent task completion (Berk, 1993).

The aim of scaffolding is to work with the child within their zone of proximal development with constant task adjustment related to child’s current abilities by structuring the environment and the tasks at challenging and meaningful levels (Pratt, Kerig, Cowan, & Cowan, 1988; Wood, 1989). Scaffolding helps develop children’s autonomy by giving planned, sensitive, adaptive and contingent assistance from adults

to facilitate children's strategic and representation thinking, thus encouraging children to be more responsible and independent in problem solving and achieving goals. As children's skills increase, adult supervision decreases, allowing the children to discover solutions to problems independently, therefore promoting the development and use of self regulation skills (Diaz, et al., 1991; Diaz, et al., 1990).

The findings mentioned may point towards a way of helping children with ADHD. Being aware that an experimenter, supervisor or teacher can assist children with ADHD to better self regulate, then learning to self supervise by a conscious act of self monitoring in the form of guiding internal language might facilitate these children to eventually work productively in an academic situation without being closely supervised.

Vygotsky, (1987) has suggested that the language used by adult figures to help a child reach the autonomous stage has to be internalised by the child in the form of self guiding private speech or internal language. In this way, children learn to use thought to control their behaviour. However, research indicates that children with ADHD have significant problems in acquiring and using internal language that is self guiding, in order for them to organise and plan their own behaviour and thinking without supervision (Berk, 1986).

Self regulation appears in part to be governed by language emanating from self or others (Vygotsky, 1962). Vygotsky, (1986) suggested that instructions from adults are internalised by children when tasks are challenging and children learn to reflect on these internal speech strategies and consciously use them. When language is used by the self it allows for internal control, rather than being externally controlled by the environment (Jeannerod, 1994). The internalisation of language is a process that can facilitate the choosing of the right response to the situation (Barkley, 1998).

2.6 The role internal language plays in the development of self regulation

It is thought that internal language facilitates the self regulation of behaviour (Bronowski, 1977; Berk, 1994; Luria, 1959; Vygotsky, 1962). Internal language is covert, and can be addressed to self or no one else in particular (Berk & Landau, 1993). Luria, (1959) suggested that language plays a crucial part in the development of self regulation. His stage theory proposed that self regulation is intra-individual. Early impulsive language, with development, eventually becomes analytical. These analytical skills are necessary as the content of language facilitates children in regulating their behaviour. Language has both an excitatory and inhibitory function. Initially, children speak overtly, and this acts as an external guide to plan behaviour. However with maturity, language becomes internalised, but still acts as a self guiding system. With cognitive maturity, children learn to precede any action with internal language, thus developing the ability to control and regulate their actions (Berk, 1986).

The role language plays is decisive in early childhood development. If there are problems with neural processes, the directive function of language can be substantially limited (Curtiss, 1989). Initially, there are three stages of the child's ability to use language. The first stage, speaking, does not organise the child's behaviour. Verbal instructions can initiate a behaviour, but they have no role in inhibiting a behaviour. The second stage is where the impulsive aspect of language dominates the semantic aspect. In the third stage, the semantic aspect becomes dominant and language becomes internal in its regulatory form (Berk, 1986; Bivens & Berk, 1990; Berk & Potts, 1991; Berk & Garvin, 1984, Frauenglass & Diaz, 1985; Frawley & Lantolf, 1986).

Vygotsky, (1962) viewed internal language being used not only for social communication, but also for self guidance. When the child produces a behaviour

language often follows the behaviour as an afterthought. With time, the child learns to precede the behaviour with self guiding language that eventually ceases to be overt and becomes covert. Vygotsky (1962) claimed that the role of internal language was global and multi-functional. Internal language could be used to interact with others, to control attention, to plan, guide and monitor the solving of problems, that is, to communicate and to self-regulate. Vygotsky, (1962) also hypothesised that internal language that is task relevant is conducive to success at that task. Berk, (1994) supports Vygotsky's suggestion that internal language is an essential aspect of development. Frauenglass and Diaz, (1985) suggest that not only does internal language guide behaviour, it also assists in facilitating the child's ability to solve tasks, to follow instructions and to sustain attention, despite the fact that the child may not reach the desired or correct outcome.

Both Luria, (1959) and Vygotsky, (1962) believed the regulatory actions of language commence when children mimic commands and actions of significant others around them in their daily lives. With cognitive development, these vocalisations become hidden or private and self directory. Berk, (1994) found results that were consistent with Vygotsky's assumption that as language becomes more internalised, cognitive competence increases.

Vygotsky's hypotheses were examined in two separate studies. Results indicated that tasks that involved task relevant internal language were more likely to be successful, whereas the use of task irrelevant internal language resulted in task failure. Children who used task relevant internal language were more autonomous and more advanced academically. The authors suggest that this link is very important to self regulated learning (Daugherty & Logan, 1996; Winsler, Diaz & Montero, 1997).

The acquisition of task relevant internal language by thirty, 4 and 5 year olds indicated more effective performance in the execution of solving challenging tasks. It was found that children who rehearsed what task was to be done, performed better on rote memory tasks than did children who did not rehearse (Berk & Spuhl, 1996). Berk, (1986) concluded that internal language impacts on how a child learns to control thought and use it to bring action under control. She found that children can guide their behaviour and facilitate thinking by means of internal language. Initially children use the language that instructions are given in and incorporate it into their own internal language. Children then use the internal language to organise and plan their own behaviour, thus developing skills in internal language.

The results from all the research suggest that for internal language to be able to control thought and bring action under control, the environment children are brought up in is highly relevant (Berk & Spuhl, 1996). Internal language is a good predictor of task performance, and Berk, (1994) proposes that authoritative parenting styles influence the mastery of internal language and subsequent task performance.

Another influence on the development of internal language is teacher involvement within the school environment. Vygotsky, (1983) suggested that self regulation was also facilitated by active teacher involvement in childrens' verbalisations in relation to planning, monitoring and evaluating activities. This active involvement allowed children to progress from regulation by others to regulation by self as higher mental processes related to reflective thought developed. Clinicians, parents and teachers who are aware of a child's zone of proximal development and who use scaffolding effectively should foster enhanced self regulation by giving planned supervision and assistance that is gradually reduced as the child can complete the tasks in an independent way. The encouragement and collaboration of all those involved with

children with ADHD to use relevant self directing verbalisations in relation to successful task completion needs to be addressed in order to promote the development of self regulation skills.

The importance of children developing task relevant internal language in order to gain skills in self regulation cannot be understated or ignored. If language is not functionally internalised, children may not be able to be effective in the planning and control of behaviour in relation to instructions and rules that govern every day living.

Children with ADHD do use internal language. However, as it is often dysfunctional or immature and often fails to be used as a self guiding and self regulating process (Berk & Potts, 1991). When attempting to successfully intervene, internal language is an important issue to take note of, especially when trying to understand how best to address the lack of self regulation and poor impulse control children with ADHD exhibit. If internal language guides behaviour Berk and Potts, (1991) one way of targeting wanted behaviours would be by teaching children with ADHD to use internal language that was self guiding.

With the above research findings in mind, it can be concluded that one component that needs to be included in any intervention for ADHD is the teaching of task relevant internal language.

2.7 Summary

The purpose of this chapter has been to review the evidence for executive function deficits as critical to the understanding of the nature of ADHD. Prominent researchers in this area (Barkley, 1998; Sergeant, 1997) describe executive functions in relation to disinhibition, self regulation, working memory or information processing and the internalisation of language. These researchers make the point that children with ADHD

have a variety of problems that affect these domains of functioning. It is evident that it is no longer lack of attention that is the core deficit in ADHD. The problem is rather how attention is managed and regulated, and this is an important aspect of what is referred to as executive functions (Barkley, 1998).

The deficits children with ADHD present with are thought to be related to mild to moderate failures of executive functions. Executive functions are thought to be psychological constructs and not described anatomically as frontal lobe functions, since other neural networks are involved (Damasio, 1994). The failures in executive functioning result in children with ADHD exhibiting poor inhibitory control or poor ability to self regulate. The inability to properly self regulate behaviours will impact upon most areas of daily life of children diagnosed with ADHD (Barkley, 1997; 1998).

Interventions for ADHD need to take cognisance of these findings and assist children with ADHD to self regulate and reduce disinhibition. In order to do this there must be some understanding of the processes that assist in the development of self regulation. There are a variety of developmental theories regarding self regulation. It appears that self regulation develops with cognitive maturation and positive social factors (Kopp, 1982; Wertsch et al, 1980). It has been suggested that there is a neurodevelopmental lag involved in children with ADHD in developing socially acceptable self regulation (Ruff & Rothbart, 1996). Both the neurodevelopmental lag and the developmental theories agree that cognitive and social factors impact upon the emergence of self regulation and that children with ADHD have poor self regulation.

It is important to note that if experimenters are present, children with ADHD can complete tasks almost as well as normal children (Dreager, et al, 1996). Children with

ADHD appear to be unable to use higher cognitive processes to master the ability to do a range of tasks successfully without being supervised.

The inability of children with ADHD to achieve a degree of independent learning can be understood when examining Vygotsky's, (1987) zone of proximal development. This theory is related to the amount of adult assistance needed to help children learn and the stage where children are able to learn independently in order to complete tasks. For children to successfully move through the zone of proximal development, tasks need to be sensitive to the developmental stage children are at. Scaffolding which is a means of providing support for children while they learn, by breaking tasks into sub components, can offer assistance to children with ADHD to enable them to master a task while encouraging and promoting responsibility for independent task completion and increasing self regulation skills (Pratt, et al., 1988; Wood, 1989).

One way of targeting self regulation is via internal language. Children with ADHD cannot use internal language to self regulate (Power, 1992; Sonuga Barke, et al., 1992; Vygotsky, 1987). Internal language, research suggests, is a link that facilitates the development of situationally appropriate responses (Berk, 1986; Vygotsky, 1962). Vygotsky's hypotheses have been examined in several studies, and their results support his research. Internal language that is task relevant has a self regulatory purpose, in that it guides a designated behaviour. Research outcomes indicate how important the internal language link is in the development of self regulated learning skills (Jamieson, 1995; Kronk, 1994; Manning White & Daugherty, 1994; White & Manning, 1994).

As children with ADHD develop cognitive maturity, their internal language often fails to become sufficiently analytical, resulting in poor self-regulation. It is noted that

although internal language is not observable, it is thought it can be used effectively in a treatment intervention to self regulate behaviour (Berk, 1986; Berk & Potts, 1991).

It could be argued that in view of the problems encountered in executive functions it is important to teach these children to use task relevant internal language, as internal language appears to be an important link in the role of guiding behaviour and in the development self-regulation and management. This thesis has explored research outcomes in relation to the contributing factors and conceptualisations regarding the nature of the core deficits in relation to ADHD. The research findings need to be examined in relation to the types of interventions that may already exist and also in relation the the types of intervention frameworks that need to be considered.

CHAPTER THREE

REVIEW OF INTERVENTIONS FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER

The goal is achieved by agreement between client and the clinician on the on their reasons for working together and what they anticipate as the outcomes. The tasks are the activities that the client and clinician agree to do to achieve those outcomes.

Such a therapeutic alliance seems particularly useful in the context of ADHD, as it is a pervasive disorder that requires interventions that can adapt to the changing developmental needs of children with ADHD, which is something that is difficult to accomplish (Hechtman, 1993).

As has been noted previously, the presentation of comorbid disorders with ADHD, add to the multifaceted symptomatology (Biederman, et al., 1991). Comorbid presentation needs to be fully assessed, and if possible, managed concurrently whilst trying to intervene and manage the ADHD symptomatology. Finally, parent and teacher variables dictate that even the most successfully designed intervention will need to address how best to optimise the environment in the classroom and at home.

Before examining the research on interventions for ADHD, it needs to be understood why it is so important to intervene and manage the disorder. What does happen to children with ADHD who are not treated or are not treated adequately to ensure a successful long term outcome?

3.1 Consequences of untreated ADHD

To date there is no cure for ADHD. Research has consistently shown the stability of the cardinal features, inattention, impulsivity and hyperactivity (Du Paul, Guevremont & Barkley, 1991). Children with poorly treated or untreated ADHD may present with a wide range of problems, including higher academic, social, psychiatric and legal problems (Gresham, et al., 2000; Weiss, Hechtman, Milroy & Perlman, 1985). Parent-child interactions can also be detrimentally affected (Biederman, Faraone & Mick, 1996;

Biederman, Newcorn & Sprich, 1991; Shaywitz, Flecher & Shaywitz, 1995; Wilens, 1996). These problems clearly have serious repercussions in the long term for the child, family and society at large.

Three types of potential outcome have been identified for children with ADHD. Cantwell (1985) suggests the first outcome is a developmental delay. Developmental delay outcomes indicate that up to 30% of children with ADHD will overcome the functional impairment of ADHD by adulthood. This outcome replicates research indicating that between 15 to 40% of children “outgrow” the disorder (August, Braswell & Thuras, 1998; Biederman, Faraone, Milberger, Curtis, Chen, Marrs, Ouellette, Moore & Spencer, 1996; Taylor, Chadwick, Heptinstall & Danchner, 1996). The second potential outcome for children with ADHD is continued display of the symptoms. A continued display indicates that functional impairment is still identifiable and this usually continues into adulthood. The third outcome is developmental decay, which involves the continual display of impaired function and is combined with the development of substance abuse and antisocial personality disorder. Highly predictive of a developmental decay is the presentation of a comorbid conduct disorder in childhood. The seriousness of such outcomes indicate how vital is the need to try to use all information available in order to develop interventions that can impact positively within the immediate situation and in the long term.

As noted previously, some children with ADHD can overcome the symptoms of the disorder (August, Steward & Holmes, 1983; Barkley, Fischer, Edelbrock & Smallish 1990; Gittleman, et al., 1985). It was initially thought that most children diagnosed with ADHD would eventually outgrow their symptomatology. However, prospective studies indicate that this is not the case (Cantwell, 1996). There is lack of consensus about the percentage of children who do not “grow out of” the disorder. Most studies seem to

concur that between 60 and 85% of children with ADHD continue to have the disorder into adolescence (August, Braswell & Thuras, 1998; Barkley, et al., 1990; Biederman, et al., 1996; Cantwell, 1985; Taylor, et al., 1996; Weiss, et al., 1985).

General population samples strongly indicate the stability of problems with attention, hyperactivity and impulsivity, and the associated risk of poor outcomes, especially in academic areas (Barkley, 1990; Cantwell, 1985). The behavioural problems of ADHD can manifest themselves in poor learning when in a group, cognitive impulsivity, poor cognitive strategies, disorganisation, language problems and delays, auditory memory and discrimination problems and motor clumsiness. With time, the impact of these problems alerts the child with ADHD to the knowledge that many things have gone unlearnt (Weiss & Hechtman, 1993). When a child starts to perform poorly or fail academically, anxiety and depression can also occur. These symptoms often severely impact upon all aspects of a child's functioning (Cantwell, 1985; 1996; Ferguson, et al., 1991; Frick, et al., 1992).

Poor academic achievement also results in a significant number of school dropouts as well as higher incidences of substance abuse and motor car accidents (Barkley, 1990; Cantwell & Baker, 1991; Gittleman, et al., 1985). However more often when children with ADHD initially experience problems with academic achievement, they become more oppositional. Classroom behaviour deteriorates, leading to a further decline in academic achievement. Disruptive behaviours lead to peer problems and the likelihood that the child will join a deviant peer group (Ferguson, et al., 1991; Frick, et al., 1992). It is suggested Hinshaw, (1992) that as the link between learning problems and externalising behaviour problems has already manifested itself before the child commences schooling, early intervention is essential if negative long term outcomes are to be avoided.

The continuation of ADHD into adolescence is a predictor of cognitive impairments and academic underachievement (Ferguson, Horwood, & Lynskey, 1993; Frick, et al., 1991; Loney, Kramer & Milich, 1981). Poor educational achievement or failure has been found to be correlated with later emergence of anti social behaviours (Nada-Raja, Langley, McGee, Williams, Weiss, et al., 1997). The more failures experienced in the academic setting, the greater will be the problem. In the long term, college students with ADHD were found to be more likely to have poor academic skills and they would in turn be more likely to make up an alibi or excuse, which often resulted in probation (Heiligenstein, Guenther, Savino & Fulwiler, 1999). These studies lend support to the argument, that in order to consider an outcome as successful, academic achievement has to be measured and ways of improving it must be integrated within any intervention for ADHD.

The extent to which the disorder is managed successfully, or even overcome, does appear to depend on what accompanies the disorder (Ferguson, et al., 1991). Children with ADHD who are predominantly an inattentive type appear to exhibit more cognitive deficits, when compared to the predominantly hyperactive/impulsive type children who tend to present more often with conduct disorders (Halperin, et al., 1990).

Hyperactivity, it is suggested Taylor, et al., (1996) increases the likelihood of the development of psychiatric disorders and impaired social adjustment. Both males and females with ADHD and a comorbid conduct disorder commit significantly more driving offences between 15 and 18 years compared to a normal population. Adolescents with ADHD/CD are severely at risk of developing delinquent behaviours and an inability to adjust to socially accepted norms (Nada-Raja, et al., 1997). Therefore, taking this evidence into account the problems that accompany ADHD create serious repercussions for those diagnosed with this disorder. Outcomes for 60 to 85%

of children with ADHD can be severely limited if there is inadequate or no treatment intervention. An important goal of any intervention must be to help children with ADHD gain positive academic and psychosocial functioning.

The interventions to be discussed in this chapter have been examined to determine what long term outcomes are achieved, and also to determine whether they take into account current research regarding the core nature of ADHD. Durability and generalisation issues will also be examined, as these are crucial to successful long term outcome. Each intervention is examined systematically, in terms of, the nature of the intervention, the benefits of the intervention, and finally, the limitations of the intervention.

3.2 Nature of stimulant medication intervention

Neurochemical imbalances, which current research has indicated may be involved in the aetiology of ADHD at present, form the rationale for stimulant medication intervention. Research investigating dopamine related genes has indicated their involvement in ADHD (Gill, Daly, Heron, Hawi & Fitzgerald, 1997). It has been suggested Volkow, et al., (1999) that stimulant medication blocks dopamine transporters and reaches peak brain uptake 60 minutes after administration. There is also the suggestion that children with ADHD appear to have high levels of dopamine and low levels of serotonin. It is assumed that stimulant medication may restore the balance between the two neurochemicals and that with maturity, the need for medication ceases (Berger, 1999). It was suggested by Brown, et al., (1998) that it is unlikely that any one class of drug could act exclusively upon one neurochemical. Therefore, care must be taken when trying to identify specific abnormalities at biochemical and neuroanatomical levels in order to imply causality and consequently rely solely on this rationale for intervening with stimulant medication.

Stimulant medication in the form of methylphenidate (MPH, ritalin), pemoline (cylert) and dexamphetamine (dexadrine) is used in the treatment of ADHD, with MPH being the most widely used. Stimulant medication has been in use for over 60 years, and there is a large body of research supporting the very clear effectiveness of this form of intervention in the short term (Dunne, Arnold, Benson, Bernet, Bukstein, Kinlan, McClellan & Sloan, 1997).

3.3 Benefits of stimulant medication intervention for ADHD

Stimulant medication acts within 30 minutes of ingestion, with noticeable reductions of impulsive behaviours and hyperactivity (Anastopoulos, Shelton, Guevremont & DuPaul, 1992). It also decreases oppositional behaviour, thereby allowing an increase of sustained attention, better short-term memory recall and associative learning and improved family and peer relationships (Anastopoulos, et al., 1992; Cantwell, 1996; Elia, 1993).

There is no doubt that stimulant medication is beneficial for many children, and for this reason it is the most widely used treatment for ADHD (Barkley, 1997). A systematic review of 155 controlled studies of stimulant medication and ADHD across the life span noted a general reduction of the core symptoms, in the short term (Spencer, 1996). Up to 80% of those prescribed stimulant medication exhibit clinically meaningful benefits when compared to 17% of those given a placebo (Anastopoulos & Barkley, 1992; DuPaul, et al., 1991; Rapport, et al., 1980; Swanson, et al., 1998).

A recent study Sharp, Walter, Marsh, Ritchie, Hamburger and Castellanos, (1999) compared the effect of stimulant medication between genders. Girls and boys were matched on psychiatric family history, behavioural ratings and comorbid diagnoses. Results indicated that responses to stimulant medication for girls did not differ from

boys. The study concluded that when carefully screened, stimulant medication is as beneficial for girls as it is for boys.

Research by O'Toole, Abramowitz, Morris and Dulcan, (1997) has indicated that low doses of stimulant medication reduced impulsivity on an attentional task. However, retention and recall of information in a complex nonverbal task was optimised by a higher dose. Overall, it appears that low to moderate doses are better for improving cognitive tasks and higher doses are better for controlling behaviour (Carlson, Pelham, Milich & Dixon, 1992; Douglas, Barr, Desilets, & Sherman, 1995).

While on medication, children exhibit a three-fold improvement in behaviour as found by measurements of attention in academic testing (Swanson, et al., 1998). Other research findings indicate that behaviour shows far greater response to stimulant medication than academic functioning (Rapport, et al., 1994; Spencer, 1998). The positive effects stimulant medication has on behaviours appears to be related to the fact that impulsivity, hyperactivity and oppositional behaviour have been dampened in the short term (Cantwell, 1996; Evans & Pelham, 1991; Famularo, & Fenton, 1987; Faraone, Biederman, Krifcher, Lehman, 1993; O'Toole, Abramowitz, Morris & Dulcan, 1997; Rapport, Denney, DuPaul & Gardner, 1994; Swanson, 1993; Swanson, Cantwell, Kerner & McBurnett & Hanna, 1991).

The relevance of the dampening of behaviours in the classroom should not be underestimated. As has been noted, one of the factors relevant to academic achievement is functional classroom behaviour (Rapport, et al., 1999). The dampening of the impulsive, inattentive and maladaptive behaviours allows an opportunity to facilitate the environment for learning to take place (Grainger, 1997; Weingartner, Ebert, Mikhelsen, Rapport, Buchsbaum, Bunney & Cain, 1990).

3.4 Limitations of stimulant medication for children with ADHD

Despite this impressive research support for the effectiveness of stimulant medication on managing the behaviour of children with ADHD, the issue of long term academic improvement remains a problem. Up to 80 to 90% of children with ADHD at some point receive stimulant medication. For many children, stimulant medication is often the only form of intervention (Bootzon, Acocella & Alloy, 1993).

Controversy surrounds the prescribing of stimulant medication as it is unclear just what is being treated and how the drug works in children with ADHD. Stimulant medication decreases activity and increases functioning for both normal and children with ADHD. Encoding and free recall are enhanced by medication on acoustically processed words in both children with ADHD and normal children. It can be suggested that enhancement cannot be mediated by the reversal of a deficit state in ADHD, as normal children also exhibit enhanced functioning when given stimulant medication. This raises doubts about the diagnostic specificity of medication (Barkley, 1989; Douglas, Varr, Amin, O'Neill & Britton, 1988; Sonnevile, Njiokiktjien & Hilhorst 1991; Tannock, et al., 1989; Whalen & Henker, 1976).

In view of the fact that stimulant medication is the most common intervention for ADHD, concerns have been raised about potential abuse. High doses of amphetamines can cause hypertension, central nervous system damage and cardiovascular problems. For a small percentage of children, side effects can include hallucinogenic responses and some compulsive behaviour (Lippincott-Williams & Wilkins, 2000).

Within the literature, it is noted that for some children, stimulant medication is not an option as an intervention for ADHD. Estimates of this proportion of children for whom medication is not a treatment option, varies from 2% to 30%, with the consensus being

around 20% (Barkley, 1990; Cantwell, 1994; Elia, 1993; Spencer, Biederman, Wilens, Harding, O'Donnell, Griffin, 1996; Swanson, Sergeant, Taylor, Sonuga-Barke, Jensen & Cantwell, 1998; Wilens & Biederman, 1992)

Research evidence also indicates that many children with ADHD who are prescribed stimulant medication can exhibit prohibitive side effects. Barkley, (1990) found that between 79% and 90% of children reported a variety of side effects. The side effects (which include, insomnia, stomach cramps, tics and loss of appetite, spaced out or zombie effects), can dictate whether or not stimulant medication can be tolerated or indeed can produce the desired improvements with behaviour (Whalen & Henker, 1991). Stimulant medication can at times produce no improvement in oppositional, hyperactive or impulsive behaviours. These behaviours can also deteriorate when stimulant medication is used (Barkley, 1990; Gadow & Pomeroy, 1991).

3.5 Contraindications for using stimulant medication as an intervention for ADHD

A proportion of these children with ADHD for whom stimulant medication intervention is not an option have parents who are opposed to medications. Some parents are reluctant to place their children on stimulant medication, especially in light of no real long term research supporting positive academic outcomes (Barkley, et al., 1990). Non adherence to a stimulant medication regime is also a problem facing both parents and children (Firestone, 1982). Side effects are more often noticed by parents, who also see less of the benefits of stimulant medication than their children's teachers. Parents are subjected to more of the "washout", or "rebound" whereby behaviour is perceived to be worse when the child returns from school and the effects of the medication has worn off (Johnston, Pelham & Hoza, 1988; Schachar, Tannock, Cunningham & Corkum, 1997).

Anxiety symptoms can be exacerbated by stimulant medication, therefore placing children with anxiety on stimulant medication is often not recommended. Stimulant medication exaggerates heart rate one hour after ingestion for children with a comorbid anxiety disorder and ADHD, and is one of the reasons stimulant medication should be contra indicated. Where it is recommended the child has to be carefully monitored (DuPaul, Barkley & McMurray, 1994; Tannock, Diamond & Schachar, 1999). The effect of medication on working memory in ADHD with anxiety, when compared to children with ADHD with no comorbid anxiety indicated that the response rate was much poorer in the anxious group. This low response may have a direct impact on academic tasks and put the anxious child more at risk of possible academic failure (DuPaul, et al., 1994; Tannock, Ickowicz & Schachar, 1995).

3.6 Problems with stimulant medication dose and dose response

Within the literature, it is noted that there are problems associated with drug dose, and dose response. Responses to medication differ between children, impacting with variable degrees of success on some domains and not others (Pelham, Bender, Caddel, Booth & Moorer, 1985). When measured on global rating scales, sometimes good predictors of a successful response can be: younger age; lower severity of the symptoms; lower anxiety symptoms; higher IQ. However responses to stimulant medication are in the most part highly variable and other research Pelham and Milich, (1991), Zametkin and Rapport, (1986), indicates that there are perhaps no reliable psychological, physiological and neurological predictors of responses to stimulant medication.

Dose response is also related to the frequency of dosage. There is an ongoing debate on whether to medicate two or three times a day (Douglas, Barr, Desilets & Sherman, 1995). Core symptoms and oppositional behaviour improves with medication at school, on twice daily treatments. However to improve behaviour at home, three daily

treatments may be required. Because benefits do not necessarily impact upon home life, a cycle of coercive parent-child interactions will influence a successful long term outcome (Schachar, Tannock, Cunningham, & Corkum, 1997).

Feedback on classroom behaviours from teachers by the prescribing physicians is often not sought. It is possible that the dose may not be titrated properly for the classroom due to this lack of communication (Denney & Rapport, 1999; Hale, Hoepfner, Dewitt, Coury, Ritacco & Trommer, 1998; Rapport & Kelly, 1991; Schachar, et al., 1997). Medication has to be carefully titrated, but there is confusion in the literature about whether to dose according to weight or to target behaviour or cognition (Swanson, Cantwell, Kerner, McBurnett & Hanna, 1991).

3.7 Problems with stimulant medication in addressing academic functioning problems

What medication does not do, is overcome long term deficits in social skills, problem solving and lack of academic skills (Barkley, 1990; DuPaul, et al., 1991; Elia, Welsh, Gullotta & Rapport, 1993; Evans & Pelham, 1991; Taylor, 1986). Barkley, (1990) found that up 83% of children with ADHD on stimulant medication did not exhibit any increase in performance in academic achievement testing. Long term outcomes also indicate no improvement for classroom behaviour, anti social behaviour, impulsivity or learning, all of which are detrimental to academic achievement (Charatan, 1998; Swanson, et al., 1993; Swanson, et al., 1998). Also, long term outcomes from the Multimodal Treatment Study of Children with Attention-Deficit/Hyperactivity Disorder (MTA) study indicate that the impressive gains made by the children in the stimulant medication group had almost halved at the 24 month follow up (Swanson, personal communiqué, 2001). It has been suggested that one of the reasons for the poor or limited long term benefits experienced in these areas could be due to variability of

responses to stimulant medication, in terms of the differing impacts they have on the cognitive and behavioural domains (Schachar & Tannock, 1993).

Stimulant medication on its own whilst producing good results in the short term does not teach skills to overcome what is thought to be the core deficit in ADHD, that of disinhibition or the inability to self regulate and self manage. This lack of skills could also be one of the contributing factors to lack of long term impact on academic functioning and its associated risks. Unless the child with ADHD is able to successfully learn in the academic environment the problem of academic underachievement or failure will have a detrimental impact on the child.

Thus it can be concluded that there is a need to use a component which will target academic functioning problems and include this component within an intervention for ADHD. Children with ADHD may need an intervention that teaches relevant strategies to develop and use the skills of internal monitoring of behaviour. The ability to internally monitor, may impact upon self control, attention and resultant classroom behaviours, factors that have been identified as extremely important to academic achievement (Denney & Rapport, 1999). The multifaceted nature of ADHD and its various aetiological conceptualisations leads to the realisation that perhaps there is no one treatment modality that can have a significantly successful impact on all the features of ADHD.

3.8 Nature of behaviour modification intervention for ADHD

Behaviour modification approaches to interventions are characterised by assessments that identify problem responses and the environments that trigger and maintain them. Within the behavioural modification model, intervention targets the specific problem behaviours. To identify the problem behaviours, an ABC approach is used. This

involves identifying A, as the antecedent, B, as the behaviour and C, as the consequences of the behaviour. The behaviours that are identified as problematic are monitored. Modelling, role playing and the provision of feedback regarding specific target behaviours help to reinforce learning in situations where the undesirable behaviours have previously occurred. Behaviour modification also involves the monitoring and evaluation of the desired behaviours. Rewards that are valued are given for the correct behaviour and undesirable behaviour is punished (DuPaul, Guevremont & Barkley, 1991).

However, positive reinforcements and basic punishments alone do not appear to be sufficient to develop and maintain the targeted behaviours. Punishment contingencies applied in the form of a response cost component appear to enhance learning (DuPaul, et al., 1991; Hinshaw & Melnick, 1992). Response cost involves children identifying daily activities they most enjoy doing. When target behaviours are achieved, the children are rewarded by being permitted to do the enjoyed activity. However loss of privilege is involved for undesirable behaviour, as the enjoyed activity or reward is not allowed. A way of enhancing response cost involves the use of contracts between parents and their children. A contract that clearly outlines the reward for the desired behaviour and withholding of the reward for undesired behaviour needs to be drawn up between the child and parent, with both parties understanding and agreeing on the terms (Pelham, 1995). Research has indicated the need for response cost to be incorporated into behaviour modification interventions, as the more highly prized the activity, the more significant the results (Pelham, et al., 1993). Studies indicate that children with ADHD are reward driven, thus it makes sense to include this component in an ADHD intervention program (Oosterlaan & Sergeant, 1996).

3.9 Benefits of behaviour modification for ADHD

When expected goals are broken into achievable components, outcomes indicate an improvement in behaviour, social skills and academic performance. The frequent monitoring and feedback of behaviours that have been identified as problematic all improve in the short term with behaviour modification (Weiss & Hechtman, 1993).

Studies indicate that when examining classroom behaviour, behaviour modification produces outcomes that are similar to stimulant medication (Pelham, et al., 1993, Carlson, Pelham, Milich & Dixon, 1992). It has also been found that behaviour modification therapies obtain academic benefits equal to those found with stimulant medication (Anastopoulos & Barkley, 1992).

Behavioural intervention research can produce variability in the gains in functioning that children with ADHD exhibit (Weiss & Hechtman, 1993). The issue of variability in research outcomes may be explained in terms of the response cost used in the program. Response cost components have shown to considerably enhance outcome both on its own within a behaviour modification intervention, but also when combined with stimulant medication (Pelham, et al., 1986; Rapport, Murphy & Bailey, 1982).

Research has indicated that rewards that were highly significant to children with ADHD produced better intervention outcomes (Pelham, et al., 1993). Contingency management in the form of response cost is an important component of a behaviour modification intervention if the skills taught are to be used productively. Within the school environment, response cost, time out and teacher monitoring with feedback and the use of daily teacher report cards regularly improves on task behaviours (Abramowitz, 1994; Abramowitz & O'Leary, 1991; Kelley & McCain, 1995; Pelham & Murphy, 1986).

Identifying the beneficial features of behaviour modification with a view to combining these features within a carefully prescribed multi focussed intervention strategy may be a way forward in trying to achieve successful long term outcomes for the treatment of ADHD.

3.10 Limitations of behaviour modification intervention for ADHD

Research indicates that hyperactivity is not impacted upon to any great extent in the long term with behaviour modification interventions. However there can be a reduction in oppositional behaviour and aggression. Long term academic functioning is also not significantly impacted upon (Pelham, et al., 1993; Swanson, et al., 1998).

Behaviour modification therapies are expensive and are not cost effective, as the training and implementation of strategies are labour and time intensive, requiring motivation and dedication from the teachers and the parents. This places limitations on intervention gains and durability of these gains (Rutter, 1989). Behaviour modification interventions do not generalise very well to home and classroom environments, therefore limiting the effectiveness (Conway & Gow, 1990; Pelham, et al., 1993).

One the reasons for the poor generalisation and durability of gains with behaviour modification could be that behaviour modification is a unimodal intervention, and as such cannot hope to successfully impact upon all the areas of functioning in children with ADHD, (Abikoff, 1985).

As with stimulant medication, behaviour modification cannot teach children with ADHD the skills of self regulation and management they are deficit in, as this form of intervention is based on external monitoring and evaluation of behaviours. Several studies have indicated that the behaviour modification interventions do not enhance self-

evaluation (Carlson, et al., 1992; Hinshaw, et al., 1984; Pelham, et al., 1993). Once the behaviour modification intervention ceases, children with ADHD do not know how to internally monitor, evaluate and control their own behaviour, and rely on external regulation, evaluation and management from parents and teachers. The limitation of behaviour modification in these areas gives strong impetus to develop an intervention that can attempt to overcome the lack of skills in the area of self regulation and self management.

3.11 Nature of cognitive interventions for ADHD

Cognitive interventions were first used over 25 years ago. Their goal was to target verbal, motivational and attention problems in children with ADHD. Meichenbaum, (1977) suggested that this approach allowed children with ADHD to direct their attention to relevant stimuli, enabling them to inhibit automatic responses to stimuli. It was argued that the skill of inhibiting responses could lead to the development of search and select techniques for alternative action. Inhibiting responses can facilitate rule governed behaviour and allow for the use of short term storage of sequential information (Abikoff, 1985; Abikoff & Gittelman, 1985).

3.12 Benefits and limitations of cognitive interventions for ADHD

Cognitive interventions were originally assumed to be targeting behaviours that would produce better maintenance of training and good generalisation. But the majority of results indicated that cognitive interventions did not produce the successful outcomes that were predicted (Abikoff, 1985; Abikoff, 1991; Abikoff & Gittelman, 1985).

The rationale behind the cognitive intervention for ADHD was to teach the children cognitive control. However the techniques employed were essentially unworkable (Shapiro, et al., 1998). Cognitive control requires the identifying of the thought process

that precedes the behaviour. The thought process is then changed in order for the behaviour to be changed. Abikoff, (1991) suggested that one of the reasons for the failure to produce the results this treatment modality hoped for was the techniques involved in identifying the thoughts and behaviours that needed to be modified. It was thought that children with ADHD would learn the internalisation of cognitive skills which would enable them to regulate their thoughts and behaviours (Abikoff, 1991).

However children with ADHD appear to have an inability to inhibit responses and evaluate the consequences of these responses. Gaining cognitive control was not possible, as the children were often unable to identify or invoke the antecedent thought process that controlled the behaviour in order for it to be changed. This resulted in a poor intervention outcome (Shapiro, et al., 1998). Also with this intervention there was no means of reinforcing the learning that was taking place (Abikoff, 1991; Shapiro, et al, 1998).

It was thought that differences in cognitive development could have influenced outcomes with this type of intervention, but it was found that children exhibited no age differences in measures of academic aptitude, academic achievement, impulsivity and behavioural ratings from both teachers and parents (Schleser, Cohen, Meyers & Rodlick, 1984).

Some cognitive interventions attempted to encourage the use of planned effective self talk, particularly when tasks became difficult or frustrating in order to produce appropriate behaviours. Children were taught strategies in the form of “what to say” when problem solving. This involved a format of systematic steps or self statements that were required when attempting to do a task. It was thought that these planned self statements would guide behaviour especially in situations where problem behaviour

occurred (Meichenbaum & Goodman, 1971). The logic or assumptions of this approach seemed to be fundamentally secure, however outcomes were often not successful.

It has been suggested (Abikoff, 1991; Harris, 1990) that a reason cognitive therapy on its own was not successful may have been due to the failure of clinicians to shift from a unimodal approach to a multimodal approach. These suggestions reinforce the point that an intervention that is unimodal cannot possibly hope to manage the multifaceted symptomatology of ADHD. A unimodal intervention cannot facilitate generalisation and durability of intervention gains. The inability to achieve these goals in an intervention puts children with ADHD at risk of poor academic functioning with its subsequent poor long term outcomes.

3.13 Nature of cognitive behavioural interventions for ADHD

Cognitive behaviour therapy approaches (CBT) sought to correct the way in which social and cognitive experiences were responded to, by teaching the child self control, and by producing changes in thinking, feeling and behaviour. It also sought to use behavioural reinforcement approaches to strengthen or weaken behaviours (Kendall, 1985). The CBT approach recognises that changing either the thought process alone, (which was the goal of the cognitive approach,) or the behaviour alone, (which was the goal of the behavioural approach), was too narrow. CBT involves both the external environment and the internal processes. CBT helps individuals to recognise that thoughts and responses about a desired behaviour are related to the behaviour outcome.

When cognitive change is combined with behavioural contingency management, production of wanted behaviour is rewarded and an unwanted behaviour is ignored or punished. CBT is thought to produce a learning change and the development of a functional pattern of socially acceptable behaviour (Kendall, 1985). Embedded within

cognitive behavioural interventions are the components of teaching children to self regulate and to self manage both their thoughts and behaviours.

3.14 Nature of self regulation interventions

Children who learn by self regulation are by nature flexible. They solve their own problems by the development and use of various cognitive strategies. Problems can be anticipated and reflected upon. The ability to successfully use self regulation functions impacts positively on learning. Therefore the ability to self regulate, manage and evaluate thoughts and behaviours cannot be understated. These functions are central to daily life (Corno & Mandinach, 1984). It is thought that one way to gain control over these self regulatory functions is linked to the ability to use internal language to guide behaviour (Berk & Potts, 1991; Luria, 1959; Vygotsky, 1962).

Internal language is an internal monitoring process which influences external behaviours and involves self instruction about the intended behaviour. These self instructions should be relevant to the task at hand, and so guide the child towards situationally appropriate behaviour (Berk, 1994; Luria 1959; Vygotsky, 1962). Internal language is used to assist with the use of self regulation, management and evaluation. Self instruction strategies are taught to facilitate the use of self regulation skills, especially the internalisation of appropriate internal language to guide behaviours.

3.15 Benefits of cognitive behavioural interventions, including self regulation and self management interventions

Kendall, (1991) suggests that an optimal intervention for children with ADHD should combine both cognitive and behavioural elements. Kendall and Braswell, (1992) suggest useful components of CBT interventions are self monitoring and self evaluation which help to increase a sense of control. Kendall, (1991) suggested that the children

within the intervention be actively involved in selecting reinforcers, which in turn encourages self management at the outset.

When comparing CBT with a behaviour intervention, the CBT group showed more significant improvement in self control, on task behaviour and academic performance when rated by the teacher. However when these factors were rated by parents there was no significant improvement in hyperactivity and self control across both groups (Kendall & Braswell, 1985). In a later study, outcomes from CBT interventions for children with ADHD indicated a significant reduction of impulsive behaviour, however, the reduction of hyperactivity and inattention was not successful (Kendall & Braswell, 1992).

Research outcomes from self management CBT interventions indicate that it is possible to successfully teach children to self regulate, evaluate and manage their behaviour. This is achieved through techniques such as self instruction, self monitoring and self evaluating, thus decreasing the need for them to be managed by external agents (Nelson, Smith, Young & Dodd, 1991; Reid, 1996).

Students with learning disabilities were taught self recording, self monitoring and self reinforcement skills within a CBT intervention in order to assess if increases in academic productivity could be achieved. Results indicated that there was a substantial increase in those who used the newly taught skills (Seabaugh & Schumaker, 1994).

McDougall and Bardy, (1998) studied children in a general classroom setting who were participating in a CBT self management intervention. Their results indicated that students continued to increase productivity, fluency and academic engaged time on maths tasks after their reliance on external management was faded.

One of the components used within some CBT interventions is teaching children with ADHD to self instruct. Self instruction can facilitate the remembering of key aspects of the task and so guide children to exhibit appropriate behaviour towards its successful completion (Meacham, 1972). Internal language that is task relevant has been found to be positively associated with successful task performance (Bivens & Berk, 1990). Self instructional training encourages the development of internal verbal mediation, by teaching children how to regulate, manage and evaluate thoughts and behaviours (Kendall, 1977; Meichenbaum, 1977). In a study examining task difficulty, an external format intervention was compared with a self instructional format intervention. Outcomes from a low difficulty task indicated no differences between the groups. However, in the high difficulty task, self instruction that was task relevant was found to be more effective (Evangelisti, Whitman & Maxwell, 1987).

These studies outlining the benefits of self management CBT interventions lend support to the view that whether or not successful outcomes can be achieved may be dictated by the combinations of cognitive and behavioural intervention components within a CBT intervention.

3.16 Limitations of cognitive behavioural and self regulation and self management interventions

Cognitive-behavioural interventions have an intuitive appeal as they combine cognitive strategies and behavioural techniques that appear to directly address the problems of impulse control and self-regulation. Yet despite the intuitive appeal, CBT interventions have often been unsuccessful in the long term in reducing hyperactivity and improving sustained attention and academic functioning ((Fiore; Becker & Nero, 1993; Kendall & Braswell, 1992).

Previously, self instructional training has not shown itself to produce successful outcomes and consequently the validity of the underlying model may be questionable (Kendall, 1991). However, poor internalisation of language is a factor related to disinhibition which Barkley, (1998) suggests is part of the core deficit in ADHD. It has been suggested that children with ADHD have problems using internal language which results in poor self guidance (Berk & Potts, 1991). Therefore, it would seem necessary to attempt to teach children to use internal language that was self guiding

It is suggested that lack of consistent outcomes from CBT interventions may be due to the way the intervention is administered. The amount of time spent in each session and the length of the intervention could also be factors related to inconsistent research outcome. Another reason may be inadequate contingency management schedules. Pelham, et al., (1993) note that it is the strength of contingency management that often dictates how successful an intervention will be.

The ambiguity of CBT outcomes also suggests that teaching an intervention within a clinic setting, with little interaction from teachers and parents could be a reason for the poor outcome this intervention achieves.

Research outcomes from CBT appear to be highly inconsistent. Researchers such as Barkley, (1990), Hinshaw and Erhart, (1991), Shapiro, et al., (1998), all encourage further research into CBT for children with ADHD, especially when combined with other components, such as parent training. It also seems to be logical to re-examine an intervention that addresses internalisation of task relevant language that is used to guide behaviour.

3.17 The rationale for components within multimodal interventions for ADHD

The argument for the use of multimodal interventions for children with ADHD is that as these children present with impairment in multiple areas the obvious method of intervention is one with multiple modalities (Swanson, et al., 1998). Unimodal interventions fail to address all the presenting symptomatology of ADHD (Abikoff, 1985).

Research indicates that combining interventions such as teacher involvement, parental training, drug therapy and cognitive behavioural approaches often produces more successful outcomes than a unimodal intervention (Hinshaw, et al., 1984; Hinshaw & Melnick, 1992). Another reason for using a multimodal approach is that this approach with its involvement of combining individuals involved with the child and different intervention modalities that generalisation and durability of intervention gains can be maximized.

Shapiro, et al, (1998) suggest that it is very important for teachers to be fully involved when trying to intervene with children with ADHD. ADHD symptomatology can produce chronic and persistent disruption within the classroom which can significantly impact upon the learning taking place. Depending upon the degree of disruption that is allowed in the classroom, some teachers may be unable to positively fulfil their roles within the classroom system. This can negatively impact upon the teacher/student relationship, thereby causing a breakdown of classroom function. (Cooper & Ideus, 1995; Pelligrini & Horvat, 1995).

Research has noted Draeger, et al., (1986), Jarman, (1996), Power, (1992), Prior, (1996) that ADHD behavioural problems escalate if learning environments are unstructured.

Children with ADHD respond positively and perform more productively when environments are predictable highly regulated and organised. The close monitoring and corrective feedback given by the teacher while moving around the classroom produces more academic engaged time and decreases disruptive behaviours than when the teacher sits in front of the class (Gettinger, 1986; Westwood, 1993).

Shapiro, et al., (1998) suggest that the clinician give an adequate explanation of the goals of the intervention and the involvement required by the teacher. This may be able to facilitate realistic expectations and go a long way in over coming some difficulties experienced by both teachers and students in the classroom.

It has been suggested Cantwell, (1996) that training parents in management strategies is an essential component of any intervention for ADHD. Results in the short term indicate positive outcomes in management of children (Anastopoulos, et al., 1992; Barkley, 1990). Training parents to teach their children social skills and self evaluation is seen as one way of improving social functioning and peer relationships (Cousins & Weiss, 1993). When mothers were used as adjunct therapists while their children were receiving self instructional training, results indicated that the children exhibited an increase in self control and completion of classroom tasks and less hyperactivity (Guevremont, et al., 1985). The improvements of these factors together are known to positively influence academic achievement (Rapport, et al., 1999).

When children start to learn to regulate themselves, maternal behaviour contributes to the development of self regulation (Silverman & Ragusa, 1992). Berk, (1996) has suggested that an authoritative parenting style contributes to the production of task relevant internal language, which is then used to self regulate behaviours. Therefore,

encouraging parents to take part in their child's intervention is possibly a positive step optimising and maintaining intervention gains.

Parent's cooperation is important when using contingency management and liaising with the school in relation to their children's behaviour within the classroom. Parents who completed management training reported that they felt more competent in dealing with their children and noticed a significant decrease in parenting stress (Pisterman, et al., 1992). In a later study, parents were found to have low self esteem and a lack confidence in dealing with their children with ADHD. After completing parent management training results indicated increases in confidence and self esteem and decreases in family stress (Cantwell, 1996; Johnston, 1996).

Research indicates that ADHD is an inheritable disorder (Levy, et al., 1996; 1997). Therefore, a parent who has ADHD that has not been treated or has been poorly treated, may have poor parenting styles which will result in poor child management and exacerbate the problems being experienced.

Other parental factors that can negatively impact on effective management of children with ADHD are: depression Frankel & Simmons, (1992), Frick, et al., (1992); attribution styles that result in poor locus of control Campis, Lyman and Prentice-Dunn, (1986); Grace, Kelley and McCain, (1993); parental stress Kazdin, (1995); and lack of social support (Miller & Prinz, 1990).

When stimulant medication is used in conjunction with parent training and self-control therapy, the parent ratings on externalising behaviours at a nine month outcome stage were significantly better than the stimulant medication alone condition (Ialongo, Wade, Horn, Pasco, Greenberg, Packard, Lopez, Wagner & Puttler, 1993). Multimodal interventions that combine a psychosocial approach with stimulant medication have

often produced good short term results. However the degree of success that has been achieved beyond research settings has not as yet been established (Pelham, et al., 1991; Richters, Arnold, & Jensen, 1995; Satterfield, Satterfield & Cantwell, 1981; Swanson, 1993).

The Multimodal Treatment Study of Children with Attention-Deficit/Hyperactivity Disorder (MTA) study found that the combined psychosocial and stimulation medication group achieved significantly better results than the community group and psychosocial group alone. However results also indicated that the medicated group did as well as the combined group (Arnold, Abikoff, Cantwell, et al., 1997).

Further research into the medicated group used in the MTA (Arnold, et al., 1997) study, indicated that these children were carefully followed by their doctors, who used feedback of ADHD symptoms from parents and teachers to follow a strict titration regime for each individual child, something that is not often done outside research (Greenhill, Abikoff, Arnold, Cantwell, et al., 1996; Zarin, et al., 1998).

For those children in the MTA study who presented with a comorbid oppositional or conduct disorder, results indicated no significant differences in functioning gains between the medicated group or the combined medicated and behavioural (Jensen, Hinshaw, Kraemer, Lenora Newcorn, Abikoff, et al., 2001).

The rationale for the use of a variety of components in multimodal interventions is empirically sound. It makes sense, that in order to successfully impact upon the multiple problems that children with ADHD present with and to minimize generalisation and durability problems, that this form of intervention modality is crucial.

3.18 Limitations of multimodal interventions

To date, multi-modal interventions run into problems with the lack of compliance and motivation by the child, the parents and the teachers. These factors, either singularly or collectively, can reduce effectiveness of an intervention, produce poor maintenance of intervention gains, and adversely impact upon generalisability and durability of an intervention (Hechtman, 1993).

Other research stemming from the MTA study revealed that only 61 – 63% of children attended more than 75% of the time, in both the psychosocial and combined psychosocial and medication interventions. The researchers recommended that that a collaborative working relationship was essential between the clinician and parents and teachers to overcome poor attendance (Wells, Pelham, Kotkin, Hoza Abikoff, et al., 2000).

Research has also found that many parents who are offered parent management training either intermittently attended or did not attend at all (Sholton, Barkley, Crosswait, Moorehouse, Fletcher, Barrett, Jenkins & Metevia, 2000). Further results from this study indicated that while a multimodal intervention produced short term gains, these were only maintained while the child was in therapy, once therapy ceased, therapy gains were not maintained (Sholton, et al., 2000).

Stimulant medication therapy is unavailable for an intervention for approximately 20% of children diagnosed with ADHD (Barkley, 1990; Cantwell, 1994b; DuPaul, et al., 1993; Elia, 1993; Spencer, et al., 1996; Swanson, et al., 1998; Wilens & Biederman, 1992). The recent MTA study has replicated previous findings in this area, indicating that up to 80% of children exhibited a reduction in impairment. However 20% of children had either side effects or did not benefit (Swanson, et al., 1998). Therefore for

these reasons alone it is essential to develop a multi-modal intervention for these children that does not involve stimulant medication

The development of a multimodal intervention which has the option of not having to combine a stimulant medication regime would appear to be one way to address the fact that a notable proportion of children are unable to take advantage of this form of multimodal intervention.

3.19 Summary

This chapter has examined the nature, benefits and limitations of interventions for children with ADHD, with a view of identifying components that are useful in intervening in order to incorporate them into a multimodal intervention that is available for all children with ADHD.

Long term academic problems are a hall mark of children with ADHD (Barkley, 1990). Poorly treated or untreated ADHD can be detrimental to academic functioning. Failure to achieve academically places these children at risk for a multitude of problems later in life. Problems such as, anti-social behaviours, drug and alcohol abuse, poor peer and interpersonal relationships and also poor academic functioning in higher education, if indeed they get that far (Biederman, et al., 1991; Gresham, et al., 2000; Heiligenstein, et al., 1999; Shaywitz, et al., 1995, 1997; Weiss, et al., 1985; Wilens, 1996).

Stimulant medication alone produces powerful short term gains in the form of less impulsivity, more compliant classroom behaviour, and in some cases improved academic output (Anastopoulos, et al., 1991). Long term outcomes of stimulant medication are hard to evaluate since the initial short term gains do not appear to be improved upon. In many cases, behaviours return to pre medication rates once medication has ceased (Cantwell, 1996). It has been suggested that the poor or limited

long term benefits experienced could be due to variability of dosage and responses to the dosage, as stimulant medication has a variable response on the cognitive and behavioural domains (Pelham & Milich, 1991; Schachar & Tannock, 1993). Despite being the most widely used intervention for ADHD, stimulant medication produces variable responses in relation to academic functioning and indeed in the long term exhibits a distinct lack of success in addressing problems in this area of functioning (Hechtman, et al., 1984; Richters, et al., 1995; Swanson, et al., 1993; 1998)

Another problem experienced with stimulant medication is non compliance by some parents with the treatment regime (Firestone, 1982; Johnson & Fine, 1993). In other cases, there are nil effect outcomes and behaviours to be treated can at times become worse (Whalen & Henker, 1991). Stimulant medication can produce prohibitive side effects (Cantwell, 1994; Elia, 1993; Hale, et al., 1998; Wilens & Biederman, 1992). Stimulant medication is also not recommended for those children who have an anxiety disorder (Spencer, et al., 1996; Swanson, et al., 1998). Up to 20% of children cannot be placed on a stimulant medication intervention (Cantwell, 1994; Elia, 1993; Gadow & Pomeroy, 1991; Spencer, et al., 1996; Swanson, et al., 1998; Wilens & Biederman, 1992).

Interventions that are unimodal fail to adequately address all aspects of ADHD (Abikoff, 1985). This form of intervention does not attempt to develop internal self regulation and management skills so that these children can successfully guide their own behaviour, without relying on external agents.

Behaviour modification on its own produces poor generalisability. Classroom behaviours appear to be impacted upon in a similar way with both behaviour modification interventions and stimulant medication (Carlson, et al., 1992; Pelham, et

al., 1993). However, the inclusion of response cost within a behaviour modification intervention appears to influence successful outcome (Pelham, et al., 1986; Rapport, et al., 1980; Rapport, et al., 1982).

Cognitive interventions did not have the desired outcomes and did not live up to the high expectations of success (Abikoff, 1991). Shapiro, et al., (1998) support Barkley, (1994) in suggesting that inability of children with ADHD to inhibit responding combined with flawed techniques led to the poor outcomes experienced with this type of intervention.

CBT interventions, whilst logically appealing, appear to produce inconsistent results (Kendall & Panichelli-Mindel, 1995). Research indicates that CBT interventions successfully impact upon impulsivity, but do not demonstrate successful outcomes for the hyperactivity and inattention associated with ADHD (Kendall & Braswell, 1993).

Whilst there is scepticism in the literature as to the benefits of teaching task relevant internal language to help children with ADHD to guide their behaviours DuPaul and Stoner, (1994), it appears to be warranted as these children are unable to productively use internal language to guide behaviour (Berk & Potts, 1991). Therefore a skill is being taught which is a valuable function to be used throughout life (Kronk, 1994).

Within the literature, it has been proposed that there is a need to try to intervene with cognitive behavioural self management training for children with ADHD, especially in light of successful outcomes with other populations when this intervention has been used (Kendall, 1991; Kendall & Braswell, 1993; Shapiro, et al, 1998). Response cost strategies have been shown to be effective when used in combination with self management interventions (Shapiro, et al., 1998).

Multimodal interventions are based on a combination of cognitive and behavioural approaches. The multimodal intervention is more able to address the diverse nature of the presenting symptoms (Hechtman, 1993). It is recommended that they are combined with parent management training and teacher involvement is encouraged (Cantwell, 1996; Shapiro, et al., 1998). Multimodal interventions can also include the involvement of stimulant medication (Kendall & Panichelli-Mindel, 1995).

The MTA study indicates that stimulant medication produced as good a result as the multimodal intervention but at 24 months the initial gains in functioning had substantially decreased (Arnold, et al., 1997; Swanson, 2001). However, the involvement of medication excludes the 20% of children for whom medication is not an option (Cantwell, 1994; Elia, 1993; Gadow & Pomeroy, 1991; Spencer, et al., 1996; Swanson, et al., 1998; Wilens & Biederman, 1992).

The next chapter examines future directions of interventions for ADHD. By combining a self instructional and self management intervention with contingency management in the form of strong self generated response cost, this thesis proposes that this component could be a more relevant framework for intervening with all children with ADHD. Involving parents and teachers within an intervention allows the intervention to be systemic.

A multimodal and systemic intervention could help children with ADHD to learn and use self guiding skills to monitor, evaluate and regulate their own behaviour. It would be anticipated that this intervention can be generalised across environments, but it will be especially useful for improving academic functioning in the classroom.

CHAPTER FOUR

THE PRESENT STUDY: THE UNDERLYING ARGUMENT FOR DESIGNING AN INTERVENTION FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER

The central aim of this thesis was to use as much research information as possible to design and implement a multimodal intervention that was suitable for children diagnosed with ADHD. That is, design an intervention whose specific focus was to address the academic functioning problems so many children with ADHD experience.

ADHD is a heterogenous, persistent and pervasive disorder of childhood, for which, at the present time, there is no cure (Barkley, 1990; Cantwell, 1996). These facts suggest that intervening and maintaining a positive change, reducing the symptoms of ADHD and improving functioning over an extended period of time can be highly problematical.

Therefore, when intervening with ADHD, interventions need to:

- Be readily available for as many children with ADHD as possible.
- Address the executive functioning problems related to the acquiring of and adequate use of skills these children are under utilising for which they have deficits or delayed development (Barkley, 1998).
- Be able to teach children with ADHD to guide their own behaviour, especially in an academic situation (Berk, 1994).
- Be able to address the academic functioning problems of children with ADHD in the long term (Cantwell & Baker, 1991; Gadow & Pomeroy, 1991; McGee & Share, 1988; Swanson, et al., 1991).
- Address disruption in the classroom thus facilitating the teacher's role in meeting the needs of students with ADHD (Cooper & Ideus, 1995; Pelligrini & Horvat, 1995).

- Be multimodal and systemic, involving both teachers and parents, as no unimodal intervention will be able to address the multifaceted symptomatology of ADHD that occurs across environments (Abikoff, 1985).

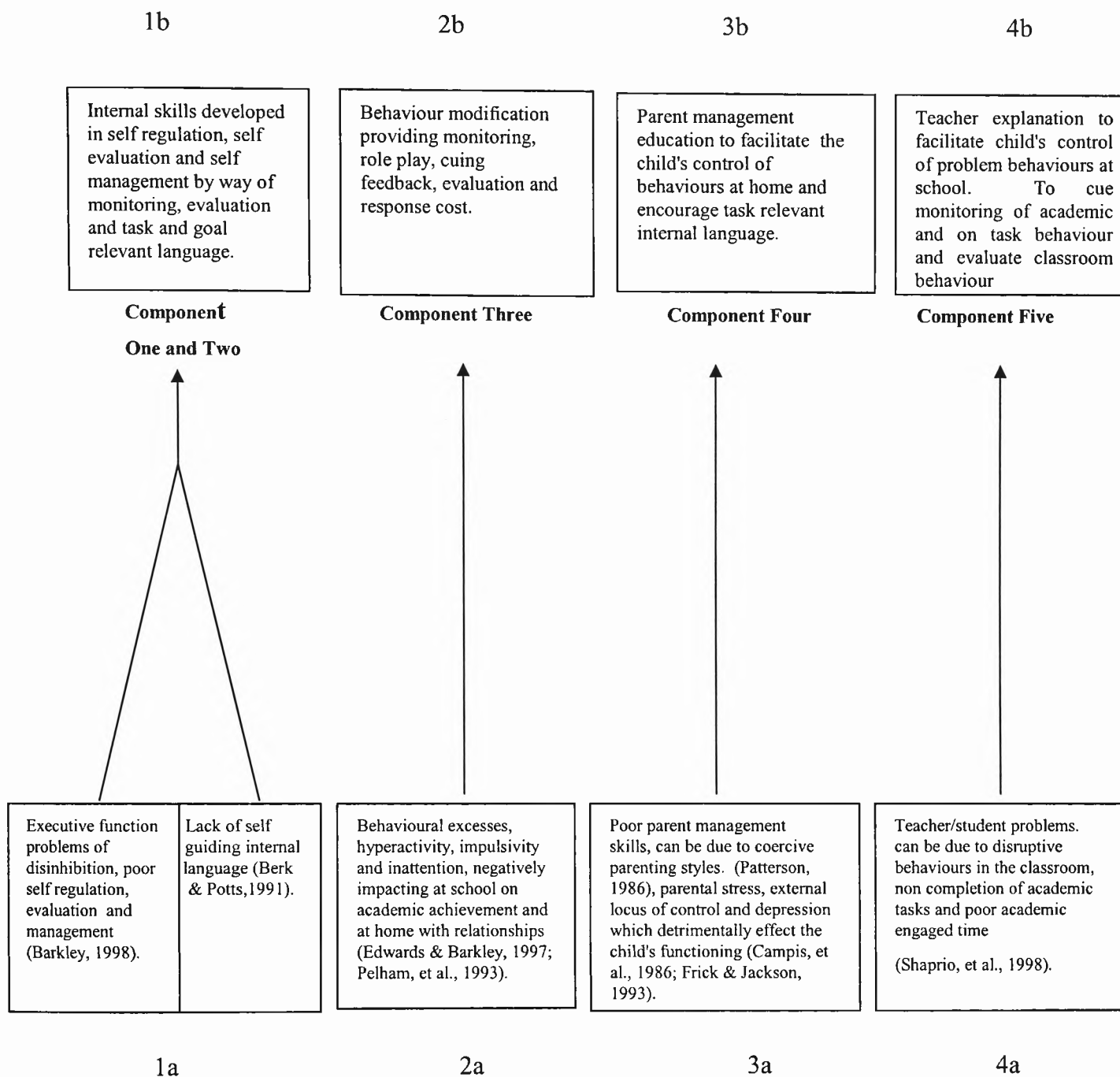
4.1 The Academic Focus

In light of poor academic outcomes experienced by many children with ADHD, the MMS intervention outcomes needed to be evaluated by monitoring general classroom behaviours including impulse control and academic performance. The Academic Performance Rating Scale, DuPaul, Rapport and Perriello, (1991) was designed to monitor and evaluate classroom behaviours, impulse control and academic performance, pre and post intervention in children with ADHD. Therefore due to the specific nature of this scale, it was chosen to evaluate intervention outcomes.

The intervention components identified in this chapter provide a framework and the rationale for designing a multimodal intervention. Each of the identified components attempts to respond to the problem or deficient behaviours that are part of the makeup of ADHD, and these have been delineated in Figure 4.1. Each box in the lower section of Figure 4.1 identifies the problem or deficit behaviour that has been described as part of the ADHD disorder. The boxes in the top section of Figure 4.1 propose a response to managing or reducing the intensity of the problem or deficient behaviours.

The modules of each component are designed to work together and express themselves as a whole, rather than a series of separate management strategies. It would be anticipated that the effect of the combination of all the individual items would be greater than the effect of the individual elements alone.

INTERVENTION COMPONENTS THAT ADDRESS THE PROBLEM AREAS



PROBLEM AREAS THAT NEED TO BE ADDRESSED IN AN INTERVENTION

Figure 4.1: Identification of the problem areas in ADHD and the components required for multimodal and systemic intervention to address the symptoms and facilitate positive change.

4.2 Building a multimodal intervention: Component One: A self management module

There is recent compelling evidence regarding executive functioning problems and failures, which result in children with ADHD being unable to inhibit responses (Barkley, 1998). Figure 4.1, section 1a-2a, identifies the executive functioning problems children with ADHD experience. The problem of poor response inhibition directly impacts on the daily functioning of children with ADHD, as it affects their ability to successfully guide, regulate, evaluate and manage their own behaviour (Barkley, 1998).

With research outcomes into the nature of the core deficit in mind, a self management intervention that attempts to overcome the poor inhibition of responses, and facilitates the acquisition and use of skills that have been identified as poorly used or deficient, would appear to be a necessary feature of any multimodal intervention for ADHD.

Self management requires the child with ADHD to learn strategies that facilitate the use of the skills of monitoring, evaluating and managing behaviours. Shapiro, et al., (1998) suggest that self management interventions are conceptualised on a continuum. At one end the teacher or parent is the external agent, supplying modelling, cuing, feedback and evaluation regarding general and on task behaviour. At the other end of the continuum, children successfully manage and evaluate their own behaviour. Self management interventions therefore can be viewed on an intervention continuum, with external behaviour modification at one end and internal cognitive strategies at the other end.

Most students should be able to achieve some internal management skills in relation to academic tasks. However it is also recognised that developmental factors determine levels of cognitive maturation and some children will be more able to self manage than

others (Evangelisti, et al., 1987; Shapiro, et al., 1998). Therefore some children will need more external monitoring while they are learning to use the skills of self regulation, evaluation and management. Research has consistently shown that using scaffolding allows children to achieve independent learning by recognising children's zone of proximal development (Diaz, et al., 1990). This sensitivity to children's ability to work independently is essential in promoting self regulation (Berk, 1993). Scaffolding techniques are an important factor when intervening in ADHD. With time, children will learn to regulate, evaluate and manage their own behaviour by a conscious act of self supervision, and this will in turn facilitate the subsequent fading of external management.

4.3 Building a multimodal intervention: Component two: A self instructional module

It is important to consider ways of developing some degree of internal self management and this thesis proposes that teaching children with ADHD to use internal language that is task relevant to plan and guide their behaviour needs to be considered as an important component featured in any intervention for ADHD.

DuPaul and Stoner, (1994) have suggested that self instructional interventions may not contribute to the success of an intervention that they are a component of. Indeed, research examining self instructional training indicates that outcomes are not as successful as they were hoped to be (Abikoff, 1991). However earlier research has indicated that no intervention on its own can hope to address the heterogeneity of ADHD (Abikoff, 1985) therefore, attempting to intervene with only a self instructional intervention must dictate that outcomes will not produce successful long term outcomes.

Research has firmly identified that internal language is an important link in self regulated learning Daugherty and Logan, (1996), Winsler, et al., (1997), and if it is task and goal oriented it can successfully guide behaviour (Berk, 1994; Diaz & Berk, 1995; Berk & Potts, 1991). Some children with ADHD appear unable to use internal language to plan and guide behaviour. Internal language, research suggests, is a central component when attempting to guide and control behaviour throughout the life span (Berk, 1994; Vygotsky, 1962). Internal language that is task irrelevant can ultimately result in failure to rise to the challenge of the task at hand (Berk & Spuhl, 1996).

Therefore, as children with ADHD have problems using internal language this thesis argues that it is important to teach self guiding internal language within a multimodal intervention. In order to do this children are taught an "On Task Plan." The use of the plan is to provide a structured framework for children to learn to internalise goal orientated language. The plan draws upon the work of Berk (1986a; 1986b;1994), Meichenbaum (1971) and Vygotsky (1962), and involves scaffolding and facilitating the child move to a higher level of planned behaviour and functioning by the use of learnt, goal orientated internal language.

Children with ADHD need to be taught and encouraged to use planned situationally appropriate internal language, particularly when tasks become difficult or frustrating. Children with ADHD need to be taught "what to say" strategies when problem solving. These systematic planned internal statements are required when attempting to guide behaviour in order to complete required tasks. The inclusion of planned self statements is based on early work with cognitive interventions, Meichenbaum and Goodman (1971), and the extensive work in the area of the development and functions of private speech, Berk (1986; 1994), Berk and Landau, (1993) Berk and Potts, (1998). The self guiding planned internal language taught and used in the intervention involves the

children learning four commands that with overt and covert rehearsal become an automatic part of their internal language. The commands are related to the task the children have been instructed to do. By using planned internal language that is related to on task behaviour in the classroom, it is hoped that there will be a decrease in disruptive behaviour, an increase of self control and this should increase time spent academically engaged and therefore impact positively on academic performance.

4.4 Building a multimodal intervention: Component three: A module that uses behavioural management principles

Behaviour modification is an essential component of any intervention program for children with ADHD (Gumpel & Reid, 1998). Figure 4.1, section 1b-2b, identifies the need to dampen the maladaptive behaviours children with ADHD exhibit, and to gradually shape desirable behaviour. This may be achieved with the behavioural component of a self management intervention. The behavioural component involves modelling, role playing, rehearsal, feedback and evaluation of desired behaviours. It also involves response cost.

External agents such as parents, teachers and clinicians need to be involved when intervening with children with ADHD, in order to facilitate and reinforce learning. Research examining external monitoring and ADHD confirms that if supervisors are present, monitoring, evaluating and giving feedback, (such as "go slower next time"), the accuracy of academic work increases (Draeger, et al., 1986; Power, 1992; Sonuga Barke et al., 1992)

The use of planned self guiding internal language in the classroom also involves a behavioural component of an intervention. When using internal language children are taught to attend to an auditory cue given by a teacher, (as identified by Brady, 1995) and

then to covertly respond to the cue using the four internal language commands that they have been taught. The cognitive components and behavioural components of the intervention are both important. It is essential that children are taught to monitor and evaluate their behaviour and use a check list to verify whether they were following the given instructions. The checklists are a very important part of a classroom based behavioural intervention to give feedback and evaluation on required behaviours, thereby reinforcing learning for children with ADHD (Pelham, 1995).

Research indicates that response cost is an important inclusion within any intervention for ADHD since an intervention that uses response cost produces better results than interventions that do not use this component (Pelham, et al., 1993; Pelham, 1995). A response cost program can be strengthened if the child chooses what is to be rewarded or withheld (Kendall, 1992; Pelham, et al., 1993). This research linked a response cost component to a Daily Student/Teacher Matching checklist. The checklist involved the teacher's evaluation of daily classroom behaviour this was matched against the child's evaluation of those same behaviours. This component taught children how to objectively evaluate their own behaviour and see their behaviour through other people's eyes. The desired behaviour in the classroom has to be clearly identified by the teacher and understood by the child. The checklist is taken home each day by the child where the response cost is carried out.

The response cost component required the children to identify the most valued activity they enjoyed doing each day after school. It was explained how this enjoyed activity was going to be tied into their Student/Teacher Matching checklist. It was also explained that it was important that a contract needed to be written out between the parent and child. It was explained that the contract would identify the desired behaviours in the classroom. The contract would also identify the consequences of

achieving or not achieving the desired classroom behaviours. The contract was agreed to between parent and child. If the child achieved the desired classroom behaviour the identified activity was allowed, however if the desired classroom behaviour was not achieved, the activity was withheld. The use of contracts was based on the research by Pelham, (1995), and Kendall, (1991), identifying that if children are involved in identifying rewards it strengthened the response cost outcomes. By using a response cost that the child had identified as being important and by linking this to classroom behaviour, it was hoped would successfully reinforce learning.

4.5 Rationale for using a systemic framework that targets significant others and environments when intervening in ADHD

This thesis argues that a systemic framework is essential to optimise and maintain intervention outcomes and to generalise learned behaviours. It has been suggested that the home and school environment contribute to the behaviour problems exhibited by some children, therefore, there is a need to involve both these environments when attempting to successfully intervene (Conway, 2001). For children with ADHD, it is important to recognise two primary systems that need to be involved in delivering an intervention, namely;

- The parental system at home, and
- The school system.

4.6 Role of parents within the intervention

Research indicates that parental factors play an important role in intervention outcomes for ADHD. Parental involvement, acting as adjunct therapists within a self instructional

intervention resulted in their children increasing completion of classroom tasks, increasing self control and decreasing hyperactivity (Guevremont, et al., 1988). These three factors have been identified as essential if academic functioning is to be improved (Rapport, et al., 1999). However parents of children with ADHD can often exhibit:

1. Locus of control attribution styles that result in poor child control (Campis, et al., 1986).
2. Depression resulting in inadequate child management (Frankel & Simmons, 1992; Frick, et al., 1992),
3. Parental stress, affecting parental management style (Kazdin, 1995), and
4. Lack of social support, isolating the parent and contributing to depression and poor child management (Miller & Prinz, 1990)

These factors can have a detrimental impact on how parents manage their children. In order to overcome these presenting parental problems, Cantwell, (1996) suggests that training parents in management strategies is an important component of any intervention for children with ADHD. Figure 4.1, section 1c-2c, indicates that parent involvement is an essential component of this intervention. Parental education may help support parents and reduce their levels of stress and locus of control problems, which could impact positively upon parent management styles. Research has indicated that authoritative parenting styles increase the mastery of internal language, as the environment the child is brought up in influences the gaining of self guiding language (Berk, 1994; Berk & Spuhl, 1996).

In order to facilitate compliance of parents within the intervention, parents need to be educated about the aims of the MMS intervention, and how these will be achieved. It is

very important to teach parents the principles of contingency management and response cost, and how this component works in decreasing unwanted behaviours and increasing desired behaviours both at home and school.

Importantly, a full explanation about the role their child's teacher has within the intervention needs to be given. It is hoped that this explanation will help communication between the school and home with the feedback between the two used productively to help the child.

4.7 Role of teachers within the intervention

Within the school system, teacher co-operation is an essential component of a successful intervention involving cognitive behavioural management strategies (Shapiro, et al., 1998). Persistent disruption of classroom activities in many schools affects student/teacher relationships, and can result in the needs of students with ADHD not being met (Cooper & Ideus, 1995; Pelligrini & Horvat, 1995). Within the school environment, many children with ADHD exhibit significant problems with low rates of on task behaviour and academic task completion (Abikoff, et al., 1977). There are also higher rates of negative exchanges and lower rates of positive exchanges with teachers (Whalen, Henker & Hinshaw, 1985). Therefore, it can be concluded that the hyperactivity, impulsivity and inattention often results in children with ADHD creating difficulties for themselves and others in the school environment. The difficulties these children face in the school environment dictates that educational professionals have a crucial and essential role in the intervention team for children with this disorder (Braswell, Bloomquist & Penderson, 1998).

Figure 4.1, section 1d-2d, identifies student/teacher problems in the classroom and identifies a possible way of facilitating positive change with the teacher's involvement in cuing, evaluating and giving feedback on academic and on task classroom behaviours.

At first the teacher is an external monitor needed to cue the children to rehearse self guiding task relevant internal language that has been taught within the initial intervention. The teacher's role is also to evaluate the child's behaviour at the end of each day using a Daily Student/Teacher checklist. The teacher's evaluation is compared to the child's evaluation of the same classroom behaviours. Differences between the teacher's and the child's evaluations not only help children with ADHD learn the skills of self evaluation it also provides valuable feedback for the child in understanding how their behaviour impacts upon others. Involving the teacher utilises research outcomes that suggests that evaluation, feedback and repetition all facilitate self regulated learning (Jarman, 1996; Oosterlaan & Sergeant, 1998; Quay, 1997).

4.8 Durability: An essential factor for successful long term outcomes

ADHD is persistent and pervasive. While it can go into remission, it is known to reappear later in adolescence and extend into adulthood (Cantwell, 1985; 1996). Interventions for ADHD often seem to have difficulty in delivering long term intervention gains (Abikoff, 1991; Weiss & Hechtman, 1993). Within the literature, it is noted that in the long term, intervention effects are short lived as early gains are substantially reduced or even disappear completely over time. It is recommended that interventions are repeated at intervals throughout the child's development (Hechtman, 1993; Whalen & Henker, 1991).

It is suggested that one of the problems of successful long term outcomes from both cognitive and behaviour modification interventions could be related to the length of the interventions. It would appear that interventions need to be delivered over a substantial time period and use feedback from parents and teachers to assess how well the child is utilising the skills that have been taught.

Therefore, one way of overcoming the lack of durable gains may be to design booster sessions that take into account the feedback from parents and teachers. Booster sessions need to be added to the initial intervention and adapted and applied at regular intervals during the child's development.

4.9 Generalisation: An essential factor for successful long term outcomes

Generalisation of the intervention also needs to be considered. As previously stated, parents need to be involved, trained where necessary, and supported during the intervention. Teachers need to be fully informed about their role. By involving parents and teachers the intervention attempts to facilitate generalisation between different environments.

Problem situations at home, school or in the social environment need to be examined and where possible turned into practice role play. Behaviour role play and rehearsal practices can assist children to learn and use skills which can be transferable. Feedback from parents and teachers is needed each day of the initial intervention and each month during booster sessions in order to evaluate the progress made and increase the utilisation of learnt skills.

The children within the intervention are taught to internalise planned self statements, based upon the early work of Meichenbaum and Goodman, (1971), and the research of Berk, (1986; 1994; 1996), which suggests that planned self statements facilitate the skills of self management and self regulation. To help with generalisation, the use of teacher based plans within the classroom would also encourage generalisation of learning.

Teacher based plans also involve cuing, acting, monitoring and verifying (Ashman & Conway, 1993). As the children in the intervention are familiar with these components, a teacher using plans could be a way to help with generalisation problems that may occur. Teacher plans have been identified as facilitating children to stay on task in the classroom. When children are actively involved in and methodically taught to use teacher designed planning strategies, children can increase their independence when attempting to problem solve and learn (Conway & Ashman, 1993).

Both parents and teachers are required to assist with implementing the response cost component of the intervention. Teachers do this by using the The Daily Student/Teacher checklist with each student. Parents do this by sighting the the checklist which is brought home by the child at the end of each day. If the desired behaviours are achieved, the child is allowed to do the negotiated activity. However, if desired behaviours are not achieved, the negotiated activity is withheld. This instrument was designed to give the child evaluation and feedback on identified behaviours. Further discussion of this instrument appears in the method section of this thesis.

It is suggested that designing an intervention that promotes the involvement and co-operation of teachers and parents may help minimise problems with generalisation, by

maximising the opportunity for the child with ADHD to apply learned skills in many situations.

4.10 The role of the therapeutic alliance

This research has identified a significant factor in successful long outcomes for any intervention. When children with ADHD enter therapy, they often have little understanding that there is a problem (let alone that they have a problem). The clinician is sometimes the first person that has taken time to sit and listen and not be negative about their behaviours. It is essential that time is taken to get to know each child and to give them an understanding of what the problem to be addressed is (Kendall, 1991).

The goals and aims of the intervention need to be explained in a language that they can understand. Understanding that the clinician is there to help and encourage them, not judge them, facilitates a bond that it is hoped will improve the environment for learning.

This thesis suggests that the positive relationship between the client and clinician is an important variable in intervention outcomes. If children do not want to partake in interventions, a therapeutic alliance is very hard to achieve. Poor therapeutic alliance not only interacts between therapist and child, it also impacts upon the group as a whole and can be detrimental to outcomes for all in the group (Kendall, 1991).

In conclusion, this chapter has recognised the need to clearly articulate a best practice model of intervention by identifying and using sound research outcomes to base the rationale for the inclusion of each component in the intervention.

The anticipated outcomes of the intervention indicate how each stage of the intervention is related to the next stage and incorporated within the system. The goals of the intervention are:

- To decrease disruptive behaviour, to increase attention to tasks and improvement of self control in the classroom. It is anticipated that these changes will also result in an increase in academic engaged time and on task behaviour and this will positively impact on academic performance (Rapport, et al., 1999).
- To decrease problem behaviours in the home system, thus improving relationships with the family, these changes in the home will also indirectly impact upon positive school functioning.
- To decrease the need for these children to rely on external agents to guide, monitor and evaluate their behaviour. To help these children to gain the necessary skills to monitor and evaluate themselves, so when the external agents withdraw, behaviours which have been changed by reinforcement or control by teachers or parents will not return.

4.11 Development of research hypotheses

This research was undertaken to develop a MMS intervention that was based on sound theory and empirical evidence and that was available for children with ADHD. Whilst current research indicates that stimulant medication produces significant changes in maladaptive functioning, it is important to recognise the fact that stimulant medication is not an option for up to 20% of children with ADHD. The development of an intervention for children who cannot use stimulant medication is a priority. It is also important to acknowledge that the literature on intervening constantly refers to the need to utilise a multimodal approach in which stimulant medication is but one facet of the treatment regime. A multimodal intervention is needed, because no unimodal intervention is capable of addressing the multifaceted symptomatology in ADHD. A multimodal intervention also needs to be cognisant of the importance to use a systems

CHAPTER FIVE

METHODOLOGY

Based on the points outlined in the previous chapter, the following methodology was adopted.

5.1 Subjects

Subjects for this research had been previously referred to either the University Clinic or to an independent private clinic to be assessed for either behavioural and/or educational reasons. Referrals came from a variety of sources: medical practitioners, teachers, other psychologists, social workers or parents of the children. Children referred for these reasons were given a full routine assessment, available at the clinics concerned which involved a Wechsler Intelligence Scale for Children, III (WISC-III 1992), Neale Analysis of Reading (1993), Wide Range Assessment of Memory and Learning (1990), Connors Parent and Teacher Rating Scale (1990), DuPaul and Barkley Attention Deficit Hyperactivity Disorder Rating Scale (1990) and the Academic Performance Rating Scale (1991).

The WISC-III, Connors Rating Scales and DuPaul and Barkley Attention Deficit Hyperactivity Disorder Rating Scale were used in this research, as these were the assessment tools available in both the University and private clinic. The researcher had no control over the availability of assessment tools in the clinics where the research was conducted.

The subjects for the research project were recruited from this population only if they were diagnosed as ADHD. This diagnosis was made from interviews with the parents about their children and the results of the Connors Parent and Teacher Rating Scale (1990) and the DuPaul and Barkley Attention Deficit Hyperactivity Disorder Rating Scale (1990).

In all, 95 children were diagnosed with ADHD. Base line measures of the Academic Performance Rating Scale, (the scale to be used in the statistical analysis to examine intervention gains) were conducted on all the 95 children before they commenced interventions. The ratio of males to females in this research was 16-1. The ages of those participating ranged from 6 to 11 years. The children were allocated to either the MMS group (n = 73) or stimulant medication group (n = 22) dependant upon parental selection and consequently this was not a random selection.

The children in the stimulant medication group had been prescribed stimulant medication either by their paediatrician or child psychiatrist. An attempt was made by the researcher to recruit children who had not yet commenced stimulant medication, however reluctance of the local paediatricians and psychiatrists to identify these children prior to commencement of medication dictated that only children who were referred to either clinic for educational and/or behavioural assessments could be used. Recruitment of children to this group was difficult and time consuming and resulted in a much smaller subject pool than the MMS intervention group. All children in this group had at some stage been prescribed stimulant medication. However every child in this group was medication free for at least 10 days before baseline measures of the Academic Performance Rating Scale and extra confirmatory measures on the Conners Parent and Teacher Rating Scale (1990) and the DuPaul and Barkley ADHD Rating Scale (1991) had been taken. When base line scores were examined for both groups, this group exhibited poorer functioning levels than the MMS intervention group. When comparisons were made between groups, scores at Time 1 were controlled for in both groups (see Table 6.3). Implications related to these issues are talked about in the discussion in Chapter 7.

5.2 Materials

5.2.1 Instrument used to establish IQ

The purpose of using the WISC-III was to assess the IQ of all the children with ADHD participating in the research. Children who fitted into the normal range (85-115) were included in the research and those children who fell below 85 were excluded.

The WISC-III is administered individually and is a norm-referenced test of intelligence for children with an age range of 6.0 - 16.11. The WISC-III contains thirteen subtests which are divided into Verbal and Performance Scales. This provides a Verbal IQ score, a Performance IQ score and a Full Scale IQ score. The WISC-III was standardised on a sample of 2200 American children who were selected as being representative of the population of the basis of the 1980 United States Census. The WISC-III is highly reliable for the three Scales of IQ. The internal consistency reliability coefficients are 0.95 for the Verbal Scale IQ, 0.91 for the Performance Scale IQ and 0.96 for the Full Scale IQ.

The standard errors of measurement are 3.53, 4.54 and 3.20 respectively. Therefore, because of the good internal consistency reliability coefficients and the small standard errors of measurement, the test scores can be seen as highly accurate. Test-retest reliability coefficients are 0.94 for the Verbal Scale, 0.87 for the Performance Scale and 0.94 Full Scale IQ. The construct validity for the Full Scale IQ is 0.66. This indicates that around 43% of the variance associated with the Full Scale IQ score is accounted for by mental ability (g). Validity correlations between the WISC- III Full Scale IQ Scores and other Intelligence tests ranges from 0.74 to 0.92 (WISC-III Administrators Manual, 1992).

5.2.2 Instruments used for the diagnosis of ADHD

5.2.3 Conners Rating Scales 1990 and DuPaul and Barkley Attention Deficit Hyperactivity Disorder Rating Scale 1990

The rationale for using the Conners Teacher and Parent rating scales and the Du Paul and Barkley Attention Deficit Hyperactivity Disorder Rating Scale is that they assist in diagnosing ADHD. These rating scales are DSM-III based, and as a consequence, do not differentiate between subtype, inattentive type, impulsive/hyperactive type and combined type. One of the difficulties of research relates to the need to fit into clinics where subjects are available. In both clinics where subjects for this research were drawn from the protocols used were still tied to DSM-III classification at the time of the commencement of this research. The main implications stemming from DSM-III criteria scales is that no subtyping of subjects could be done and as such this placed limits on the research design.

5.2.4 Conners Teacher Rating Scale

The Conners Teacher Rating Scale was used to determine if the children fitted a diagnosis of ADHD within the school environment, and so qualified for this research. The Conners Teacher Rating Scale is a 39 item scale which yields six factors rated on a four point Likert Scale. Inter rater reliability coefficients between teacher's range from 0.39 to 0.73. The test-retest reliability coefficients display good levels of stability over one year, coefficients ranging from 0.35 to 0.57 (Trites, Blouin, Ferguson & Lynch, 1981). The Hyperactivity Index was used in this research and raw scores on this index were converted into T scores ($X=50$, $S.D =10$) (1969, 1973; 1990). This scale is included as Appendix G.

5.2.5 Conners Parent Rating Scale

The Conners Parent Rating Scale was used to determine if the children fitted the diagnosis of ADHD within the home situation, and qualified for this research. The Conners Parent Rating Scale - Revised is a 48 item scale which yields five factors rated on a four point Likert Scale. The scale identifies behavioural problems from ages 3.0 to 17.0 years. Inter-rater reliability coefficients between parents range from 0.46 to 0.47 (Goyette, Conners, & Ulrich 1978). The Hyperactivity and Learning Problem Index factors were relevant to this research and raw scores were converted to T scores ($X=50$, $S.D.=10$). The congruence coefficients indicate high validity between the factors, with a hyperactivity index of 0.70 and learning problems of 0.63 (Goyette, et al., 1978). The scale is included as Appendix H.

5.2.6 DuPaul and Barkley ADHD Rating Scale

In order to qualify for this research, this scale was given to both teachers and parents to assess if the children fitted a diagnosis of ADHD. The Attention Deficit Hyperactivity Disorder Rating Scale is DSM-III based and was developed by DuPaul and Barkley, (1990) in order to assess the child's organisational and attention skills, accuracy and productivity in completing tasks. This rating scale has a test re-test reliability of 0.93 over a 2 week period. The scale also correlates significantly with classroom observations.

Fourteen items were taken from the DSM-III criteria for this ADHD rating scale. The number of items scoring 2 or more are added together. The summed number is then referred to the tables of norms which are provided for gender and age groups. If the total score is 1.5 standard deviations or higher, then this score is regarded as being clinically significant. The scale is included as Appendix I.

5.2.7 Instrument used to measure the three dependent variables of Academic Performance, Impulse Control and On Task Behaviour

There are very few measures in ADHD research that examine intervention gains in relation to academic performance or achievement. In view of the academic problems experienced by many children with ADHD this research deemed it very important to examine intervention outcomes in relation to academic performance and general on task behaviours. Academic engaged time is a component of on task behaviour and research indicates that increases in academic gains are related to the amount of time spent actively engaged academically (Gettinger, 1988). McDougall and Brady, (1998) suggest that academic performance, as an outcome is often a better predictor of academic achievement than on task behaviour. Therefore this research deemed it important to measure intervention outcome by monitoring and evaluating general on task behaviour, academic performance and impulse control of subjects taking part in the research.

Therefore, intervention outcomes were not measured with Conners Teacher and Parent Rating Scale (1990), the variables to be measured were obtained from the Academic Performance Rating Scale developed by DuPaul, et al., (1991). The scale was designed to monitor academic performance, impulse control and on task behaviour in order to evaluate changes associated with intervention outcomes for children with ADHD. The Academic Performance Rating Scale assesses academic learning ability, productivity, consistency and accuracy of completed school, both individually and within a group. The scale also assesses the attention and organisational skills and the amount of assistance required to complete tasks. Other questions in the scale assess the degree to which the child can inhibit certain behaviours and attend to the tasks allocated.

The Academic Performance Rating Scale yields four factors over 19 questions on a five point Likert Scale. The subscales shared variance with criterion measures of children's

weekly academic performance, achievement and on task behaviour. The subscales are also internally consistent with adequate test-retest reliability. The scale uses teacher assessments of disruptive student's academic performance and on task behaviour to identify deficits in academic skills.

On Task Behaviour is a sub scale and is the first dependent variable used to measure intervention outcome in this research. It consists of the sum of all the scores on the full scale and relates to the all the child's behaviours in the classroom. Academic Performance is a sub scale and is the second dependent variable to be used to measure intervention gain. This subscale is defined by comparing the quality, percentage, accuracy, rate and consistency of school work of children with ADHD. Impulse Control is a subscale and the third dependent variable to be used to measure intervention gain. This subscale measures the ability of the child with ADHD to respond appropriately to situational demands. It is defined by the ability to resist commencing tasks before full instructions have been given, whether or not the child does work in a careless or hasty way, and the ability to pay attention without being instructed to. The scale is included as Appendix J.

5.3 Evaluation and management check lists used

5.3.1 Child Self Monitoring Check Lists and Cue Procedure

This research used a three point Likert scale check list as a means of teaching children to monitor and evaluate their own on task behaviour within a classroom setting. The checklist was linked to the teacher tapping a pencil. The use of a pencil as a cue was based on research evidence which indicates that auditory cues facilitate self monitoring of attention and performance and produce increases in performance (Brady, 1995).

When the pencil was tapped the children had to use the planned internal language they had been taught in the intervention.

The teaching of the planned internal language was based on cognitive self instructional training first designed by (Meichenbaum & Goodman, 1971). It was noted that as normal children used internal language to regulate their behaviour it was a skill that needed to be taught to children with ADHD. It was suggested by these researchers that teaching children with ADHD to use planned statements would facilitate them to master their own actions.

Initially, the teacher tapped the pencil every 5 minutes to cue the child. Each time the teacher tapped a pencil, the child had to monitor and evaluate task performance, asking:

What is my task? Am I doing the task? Am I ignoring others? Am I sticking to the task until it is finished?

The child then ticked the relevant column in the following table:

NO	YES (a little)	YES (a lot)

As the child became more proficient at staying on task, the teacher reduced the number of times per hour that the pencil was used to cue the child to monitor and evaluate.

The reasoning behind the check list was taken from research Pelham, (1995) and was used as a means of reinforcement of what had been learnt and to encourage the child to

self monitor and evaluate their behaviour by using self guiding internal language in the classroom.

Research has also identified that the four principles of cuing, acting upon the cue, monitoring and then verifying the behaviour facilitate the solution and completion of the task at hand (Conway, 1998). The checklist is included as Appendix E

5.3.2 Daily Student/Teacher Matching Checklists

This checklist was designed as an aid that asked the children to evaluate whether they had listened to instructions, ignored others and completed their work throughout the day in the classroom and was based on research (Pelham, 1995). This evaluation was done at the end of the school day. The children had to try to evaluate their behaviour in relation to how they perceived the teacher was going to evaluate the same behaviour.

The check list acted as a reality test, providing a more externally focussed measure than the self report check list. This form of evaluation enabled the children to start to recognise their own behaviour in relation to someone else's evaluation of that same behaviour. Barkley, (1990; 1998), Conway, (1998), suggest that monitoring and feedback are essential for students with behavioural problems, as it enables them to be self critical and understand their own behaviour and the effect it has on others, something these children are usually unable to do.

The daily student/teacher matching checklist was rated on a five point Likert Scale. The daily student/teacher matching check list was linked to the response cost strategy that the child had agreed upon. The child brought the checklist home each day after school and the parents enforced the response cost at home. Behaviours that scored 3, 4 or 5 from the teacher allowed the child to do the valued activity they had chosen each

afternoon after school. However a score of 1 or 2 from the teacher meant that the child would not be able to do the valued activity. The use of this response cost is in response to overwhelming research that indicates that children with ADHD are reward driven Oosterlaan and Sergeant, (1995) and that response cost is an essential component of behavioural interventions (Kendall & Braswell, 1985; 1992; Pelham, 1995). The checklist is included as Appendix F

5.4 Procedure

5.4.1 Parental consent

The parents of all children who fitted the diagnosis of Attention Deficit Hyperactivity Disorder were asked if they wanted to participate in the current research. A detailed explanation of the research was given to the parents. Parents were asked to sign an informed consent form indicating that they understood the research and gave permission to use the data obtained from their child. Parents were informed that their child's data would be completely confidential, being identified only by a number within the group. Parents were told that at any time they were free to remove their child from the research without this effecting other treatment or interventions the child needed.

A procedure for grievance reporting was also explained with contact addresses and telephone numbers being given at the bottom of the consent forms. The consent form is included as Appendix A and the letter of information is included as Appendix B.

Parents were educated about the aims of the intervention. The parents were given education in relation to their role in the use of behavioural, self instructional and evaluation procedures that were required as part of the intervention. Parents were told about differing parenting styles and how these influence children's behaviour. They were taught how to get their children's attention when asking them to do tasks. They

were also given detailed instructions on the response cost component of the intervention. Parents were told that a contract between their child and themselves would need to be drawn up, outlining desired behaviours and rewards for those behaviours, but also undesired behaviours and outcomes for those behaviours. This was based on research (Kendall, 1991; Pelham, 1995). All parents were informed of the parent management training programs being run at the University clinic and the private clinic and were encouraged to join, as this would hopefully give them more skills in effectively managing their children and altering maladaptive parenting styles. Most parents did not think they needed a program of parent management, and as both clinics charged for the course, this could be a factor for non involvement. Of those parents who did participate, very few completed the full course.

5.4.2 Teacher consent

The child's teacher was given a full explanation of the aims and process of the intervention and the role they were to have within the intervention. The teachers were informed about the method of cuing the child's self instruction and showed how this was tied into the child's self monitoring check list. The rationale behind the auditory cue of a tapped pencil was explained. The use of the teacher/student matching check list was also explained. It was explained how this check list was to be tied into the response cost module of the intervention. The research into the use of The Academic Performance Rating Scale was given along with instructions on how it was to be used. The teachers were told that each scale was confidential and their student would be identified as a number within group data. Teachers were asked to sign informed consent forms and the line of procedure for grievance reporting was explained and addresses and telephone numbers were given at the bottom of the consent forms if this process needed to be followed. See Appendix C for consent form and Appendix E for letter of information.

5.4.3 Research design and group allocation

ADHD subtype differentiation was not included in the research design as the scales used in the research had DSM-III criteria and as such did not differentiate subtype.

The issue of research into ADHD in a clinic and real world situation often may not permit the choice of random allocation, as parental wishes and the dictates of prescribing stimulant medication all present as barriers. Hence, groups were established for the multimodal and systemic (MMS) intervention and the stimulant medication group by parental selection and were therefore not random.

This research used a quasi experimental design, and employed a pre and post test intervention approach, with parents dictating subject allocation to two different conditions, namely the MMS intervention and stimulant medication intervention.

The primary aims of this research were to examine if children would exhibit intervention gains from a specific MMS non medication intervention, but also to examine if gains from the MMS intervention were comparable to stimulant medication gains. The research needed to examine if gains in the MMS intervention group could be maintained with booster sessions and also if the stimulant medication group would produce additive gains if given the MMS intervention.

The secondary aim of this research was to examine the way an MMS intervention could impact upon such factors as environment, age and a comorbid conduct disorder. However examining these factors did not involve discrete groups due to difficulties in recruiting a significantly larger sample size. Nonetheless the research design conducted separate post hoc analyses on intervention effects.

In the MMS group, the intervention was conducted in a clinic or classroom environment, and intervention outcomes were compared and analysed between both environments. Within the MMS group intervention outcomes were also analysed and compared between children in the age range 6-8 years and age range 9 to 11 years. Finally, intervention outcomes within the MMS group were analysed and compared between children with no comorbid conduct disorder and children with a conduct disorder.

Nine subjects did not complete the initial intervention due to the disruption of two groups by children who had a comorbid conduct disorder. Implications for this are discussed in chapter 7. Also within the MMS intervention group data from seven subjects could not be used due to the incompleteness or non return of the Academic Performance Rating Scale by parents or teachers.

The MMS intervention was conducted for all children in this group for 90 minutes each day for one week, commencing 2 weeks after base line measures were taken. Post intervention measures were taken two weeks after completion of the initial intervention.

The second stage of the MMS intervention consisted of subjects either going on to have booster sessions, or only completing the initial intervention, dependent upon parental selection. Forty children initially took part in the booster sessions which were conducted in a 90 minute monthly session over a period of 9 months. Final intervention measurements were taken one week after completion of the last booster session.

Within the booster group five sets of data were either not returned or incompletely filled in, and nineteen subjects failed to complete all sessions, (because parents did not bring the child to all sessions). Only fourteen sets of data could be obtained from children who did not go on to have booster sessions, due to parental non involvement.

Within the stimulant medication group base line measures using the Academic Performance Rating Scale and the Conners Parent and Teacher Rating Scales were taken 10 days after their last dose of stimulant medication. Post stimulant medication measures were taken three weeks after commencing stimulant medication. Data from four subjects could not be used due to the non return of the Academic Performance Rating Scale by teachers, despite requests from the clinician for them to be completed.

The second stage of intervention for the stimulant medicated group was to deliver the MMS intervention in order to evaluate whether there would be significant additive effects. The MMS intervention was given to this group on average six weeks after they had commenced stimulant medication. Two subjects did not attend the additive MMS intervention, due to parental non involvement. The MMS intervention was given 90 minutes a day for 5 days. Four booster sessions were given monthly in a 90 minute session, before the additive measure at Time 3 was obtained.

Recruitment to this group was difficult and produced time constraints which dictated that only four booster sessions could be given to this group, as the long summer break interrupted the flow of the booster sessions and it was decided that the disruption would influence outcome due to the commencement of a new school year with a new teacher.

5.5 On Task Training

The theory and rationale based on empirical outcome for the use of each of the components used in this intervention has been explained in Chapter 4. The intervention itself consists of 25 pages and it was considered too bulky to include in this section. Therefore, the intervention has been explained in less detail in this section. Phases one and two were conducted over five days.

Phase 1: Introductory Activities

On day one, the clinician spent a considerable amount of time getting to know each of the children. This was based on the concept of a “therapeutic” or “working alliance” raised by Bordin (1979) and “posture of the therapist” Kendall, (1991). The children were asked if they knew the reason why they were attending the intervention and whether they really wanted to attend the intervention. They were all asked about likes and dislikes and how well they got on with their parents, teachers and friends. The clinician inquired about their concentration and ability to carry out orders and ignore distractions both at home and in the classroom. The purpose and aims of the program were discussed and each child was asked if they understood what was going to happen and what was expected of them. These inquiries and explanations gave each child an understanding of why they were attending the intervention, and addressed any reluctance to attend and participate in the intervention.

The clinician explained to the children the meaning of the two crucial key terms, what on-task and off-task behaviour was, giving them concrete examples of situations where these behaviours occurred, both in the home and at school.

The self instructional component of intervention was designed using information from the cognitive literature relating to the empirical evidence suggesting that children with ADHD have poor planning abilities (Barkley, 1990; 1997; 1998) and this can be linked to the fact that children with ADHD also do not use internal language in order to guide their behaviour in a situationally appropriate manner (Berk, 1986a; 1986b; 1993; 1994; Berk & Potts, 1991). Therefore, a self instructional plan that could be rehearsed overtly until it was learnt, and then rehearsed covertly until it became an essential part of internal language was considered a strengthening component of this intervention and

was based on the cognitive literature related to teaching impulsive children to talk sensibly to themselves (Michenbaum & Goodman, 1971). The On Task Plan consisted of three questions and a self statements:

What is my task?

Am I on task?

Am I ignoring others?

I must stick to the task until I have finished.

The children were required to memorise each part of The Plan in a variety of ways. Initially, repetitive overt rehearsal was used with the children reading it while sitting down.

This part of the intervention taught the children to be aware of speech and how it can affect behaviour. The intervention was further extended by the clinician demonstrating how to use self instruction while doing a task. (The details of the activities described here and in subsequent parts of the intervention are lengthy and are included for reference in Appendix K). The clinician gave the children instructions to carry out a number of tasks and encouraged the overt rehearsal of these instructions before they carried out the tasks. It was demonstrated how self talk kept their attention focused on the task they were to do.

A reward system was set up and used. At no stage were children rewarded if they had not performed well. They were always encouraged to try again, and often encouraged to do the tasks at a slower pace.

Phase 11: Developing Task Skills

The children were taught how they were to be cued to rehearse The Plan and to self evaluate and monitor on-task or off-task behaviour using the self monitoring check list. Pelham, (1995) suggests the use of task sheets to monitor behaviour. Therefore this research tied in a cognitive strategy, The Plan, to a behavioural strategy, a check list, in order to reinforce learning, and teach children a means of evaluating their performance.

The cue consisted of a pencil being tapped twice on the desk, (Brady, 1995) as it was a common classroom sound. They were taught that within the classroom setting the cue may not necessarily come from the teacher. However, because it has become a habit, the child may automatically examine internal language to see if it is task relevant, regardless of who tapped the pencil.

The Plan was continually rehearsed and tasks (see appendix for full explanation of tasks and activity book) were carried out with low, moderate and high levels of distractions. The children were taught that there would always be distractions when they were trying to stay on task, and that they needed to be able to ignore the distractions. The clinician demonstrated some the distractions that the children could face, by asking one child “what did you watch on television last night”, or “what do you do after school”, or “can I borrow a pencil? The children were given the task of being a distracter themselves. The other group members gave feedback of how they stayed on task and what it felt like to be distracted. This made them to aware of how easy it is to be distracted and enhanced the gaining of skills to continue with the task and ignore the others in the group. This part of the intervention was based on the need to make the intervention as close as possible to classroom disruptions thus facilitating the transfer of learning.

An activities book was given to each child at the beginning of the intervention (see appendix L). Activities in the book consisted of tasks which required the use of selective and sustained attention within a simulated classroom and home setting. These tasks were selected by the researcher. These structured tasks were implemented to allow the introduction and awareness of intra and inter distractions. These distractions helped to teach the children skills which would allow them to allocate their attention to the task voluntarily and to practice sustaining their attention whilst carrying out tasks.

To enhance and reinforce the skills gained each day, the children's parents were given instructions on how to implement tasks the children were required to carry out at home. The parents were also given instruction in ways of gaining their children's attention. When giving instructions, the parents were told to always use the child's name and make sure they had eye contact.

Phase 111: Adding the Response Cost Involving Parents and Teachers

On day five, it was explained to the group of children how the program was going to be implemented into the classroom and home. They were informed of how the response cost strategy was linked into the Daily Student/Teacher Matching checklist. The use of a checklist is also based on research outcome (Pelham, 1995). Pelham suggests that in establishing a daily report card, two factors need to be taken into account, the selection of goals to be achieved, and how those goals are defined in terms of specific behaviours to facilitate change. A full explanation needs to be given to the child and the required behaviours decided upon and by all parties involved. Contracts as suggested by Pelham, (1995) using defined goals for the desired behaviour were outlined, and a full understanding of the consequences if the desired behaviours were not achieved was acknowledged.

Pelham, (1995, p. 60) suggests that a “prudent punishment program” is important and should involve loss of privileges or response cost. The children negotiated what response cost they would receive if they did not obtain a score of > 3 on the checklist. This was based on Kendall, (1991) who suggests response cost is more effective if the child chooses the response cost. The children understood that this was an effective way of receiving evaluation and feedback on their academic performance and behaviour in the classroom. It was explained that to start with, they would perhaps evaluate their behaviour to be better than the teacher had. It was then explained that this would teach them to understand how their behaviour was seen by other people.

The children had a clear understanding of what was expected and what would occur if their performance levels dropped. The session ended with the parents joining in the session for the last 20 minutes. Feedback regarding how the parents saw the program, and how the children had progressed throughout the week was discussed. The parents and children discussed and agreed on response cost strategies. The Academic Performance Scale was sent to the children's teachers to be completed by the end of the second week after the initial intervention and was to be returned to the clinician. See Appendix K for full MMS intervention "On Task Training".

Phase 1V: Booster On Task Program

In order to address durability of the intervention, it was deemed necessary to continue the intervention by having 90 minute booster sessions of the intervention at monthly intervals for nine months. The Child Self Monitoring check list and the Student/Teacher Matching checklist were brought in by the parents for the clinician to examine and talk over with the children. The response cost component was discussed and it was important for the clinician to gain an understanding of how well this

component was being carried out. This feedback from parents and teachers about the child's behaviour at home and school was utilised. The session was flexible enough to take into account areas of difficulties some of the children were having. The children were asked to demonstrate their ability to guide their behaviour with their own language, and this was reinforced using a variety of tasks similar to the initial program. At all times throughout the booster sessions, the emphasis was on how they guided themselves through tasks.

5.6 Ethical issues related to this thesis

Informed consent is a compulsory component of any research in the behavioural sciences. Within this research, informed consent was obtained from both the parents and the teachers. Informed consent from the participants of the research (the children themselves) was not a criterion of the research. However, this fact is very relevant. The recruited children often had no idea that their behaviour problems needed an intervention. The children were asked what their relationships were like with their family, their teacher and their friends. They were asked if they thought their behaviour impacted on these relationships. They were specifically asked about how they thought their behaviour influenced how they did their school work, and what was the outcome if they did not do their school work properly. With this in mind, the aims were explained to the children.

Each child who participated in the research was asked if they wanted to be involved in the intervention. Most of the children within the intervention agreed that they did want to be involved in the research. However, within two groups some of the children stated quite clearly that they did not want to be there. These issues were taken up with the parents, who decided that they wanted their children to continue with the intervention.

These children became highly disruptive within the groups, and after three sessions, it was decided to halt the intervention.

This outcome raises an important ethical issue regarding a child's right to consent. When children either do not accept that they have a problem or do not want to participate in an intervention, a means of enlisting their co-operation would appear essential if they are not to disrupt the group intervention.

CHAPTER SIX

RESULTS

The aim of this research was to develop, deliver and evaluate an MMS intervention for ADHD. In order to do this, the MMS intervention was delivered to an initial group size of 73. However, due to dropout, the final analysis of the initial intervention outcomes had full sets of data for 57 subjects.

To examine the durability of the MMS intervention, a group of subjects ($n = 40$) went on to receive 9 booster sessions. The group of subjects who completed all 9 booster sessions ($n = 16$) were compared with a group of subjects who did not have booster sessions of the MMS intervention ($n = 14$).

The MMS intervention was designed to offer an alternative intervention option to children who were unable to use stimulant medication. Therefore, the MMS intervention outcome needed to be compared with a stimulant medication outcome. Accordingly, a group of subjects who were diagnosed with ADHD by their psychiatrist or paediatrician and had been referred to the clinic by medical staff, teachers or parents were placed in this group ($n = 18$). All subjects were medication free for 10 days before base line measures were taken. When examining base line scores for this group and the MMS group, observations reveal that having been previously on medication did not influence outcome (see Table 6.3), as when the comparisons were made between groups, scores at Time 1 were controlled for.

The stimulant medication group was compared with the MMS intervention group three weeks after they commenced medication to examine if similar intervention outcomes could be achieved. All but two sets of parents agreed for their children to take part in an additive MMS intervention ($n = 16$) three to four weeks after the stimulant medication intervention measures at Time 2 were taken. This was done to evaluate if the MMS

intervention produced an additive effect after the initial MSS intervention and four booster sessions. Only four sessions were able to be delivered due to time constraints.

6.1 Issues of statistical significance and clinical significance:

Before examining the results it is important to consider the issue of determining effective intervention gains that indicate that improvements are clinically significant. This research examined effect sizes due to the importance of an intervention being clinically significant. Effect sizes are a means of examining the differences between statistical and clinical significance.

The effect size calculation examines the differences in the means prior to intervening and post intervention, in order to estimate the degree to which subjects have improved clinically. It is normally accepted that the effectiveness of an intervention should be at least equal to half or even a full standard deviation before concluding that the intervention has been clinically successful. An effect size of $<.30$ is considered a small effect size. An effect size of $.50$ to $.70$ is considered a medium effect size and an effect size greater than $.80$ is considered a large effect size. Any effect size $<.60$ is **not considered clinically significant**. However an effect size of $.50$ does indicate definite improvement (Jaccard & Becker, 1990).

The results in this research are examined in relation to each of the hypotheses. On Task Behaviour was examined in one analysis as this provides the overall score of the Academic Performance Rating Scale. Academic Performance and Impulse Control are sub-scales of the Academic Performance Rating Scale and are not independent and consequently examined in a second analysis.

6.2 Hypothesis 1

It was predicted that the MMS intervention would significantly improve scores on the dependent measures of Academic Performance, Impulse Control, and On Task Behaviour.

Table 6.1 displays the descriptive statistics obtained for the subjects at pre intervention (Time 1) and at post intervention (Time 2), for the three dependent variables.

Table 6.1: Means and standard deviations (in parentheses) for On Task Behaviour, Academic Performance and Impulse Control at Time 1 and Time 2, for the MMS intervention group. (n = 57).

	On Task Behaviour	Academic Performance	Impulse Control
Time 1	42.96 (5.94)	20.40 (3.68)	14.02 (2.77)
Time 2	54.72 (9.10)	28.12 (5.90)	18.12 (3.47)

Table 6.1 shows that the means for the dependent variables of on task behaviour, academic performance and impulse control all improved across time. In order to examine these differences, a one way repeated measure analysis of variance (ANOVA) was conducted for the dependent variable on task behaviour, and a one way repeated measure multivariate analysis of variance (MANOVA), was conducted for the dependent variables of academic performance and impulse control. The independent variable was Time, Pre measure (Time 1) and Post measure (Time 2).

The ANOVA analysis for on task behaviour indicated a significant univariate effect for Time, $F(1,56) = 181.89$, $p < .01$, using the Greenhouse-Geisser correction. These results indicate a statistically significant improvement in scores between Time 1 and Time 2. The effect size was .77 and indicates that these results were in the moderate range of clinical significance.

Results for the MANOVA indicated a significant multivariate effect for Time, Pillai's Trace = .77, $F(2,55) = 91.93$, $p < .01$, with an overall effect size of .76. The univariate analysis for academic performance and impulse control respectively indicated a statistically significant effect for Time, academic performance, $F(1,56) = 147.73$, $p < .01$, and impulse control, $F(1,56) = 104.79$, $p < .01$, using the Greenhouse Geisser correction. These results indicate that the intervention produced a statistically significant improvement in scores between Time 1 and Time 2. The effect size for academic performance was .73, and for impulse control .65. The effect sizes indicate that these results were in the moderate range of clinical significance.

Therefore results from this analysis support the first hypotheses which predicted that the MSS intervention would improve scores between Time 1 and Time 2 on the three dependent variables.

6.3 Analysis of stimulant medication intervention.

Evaluation of stimulant medication across the three dependent variables of Academic Performance, Impulse Control and On Task Behaviour.

Previous research has consistently found that stimulant medication decreases impulsivity and increases time spent on tasks in the classroom (Swanson et al., 1998). This research developed an intervention to offer children with ADHD as a viable option to stimulant medication. Therefore, to obtain a valid comparison of gains between both the MMS intervention and stimulant medication the impact of stimulant medication on the three dependent variables used in this research needed to be examined. As previously mentioned 10 subjects had previously been prescribed medication however all subjects were medication free for 10 prior to base line measures being obtained.

Table 6.2 displays the descriptive statistics obtained for the subjects in the stimulant medication group at pre intervention (Time 1) and at post intervention (Time 2).

Table 6.2: Means and standard deviations (in parenthesis) for On Task Behaviour, Academic Performance and Impulse Control at Time 1 and Time 2 for the stimulant medication group. (n = 18).

	On Task Behaviour	Academic Performance	Impulse Control
Time 1	38.61 (5.67)	18.61 (3.16)	2.94 (1.69)
Time 2	66.72 (8.53)	35.33 (5.69)	21.05 (3.70)

Table 6.2 shows that the means for the three dependent variables of academic performance, impulse control and on task behaviour all improve across time. In order to examine these differences, a one way repeated measures ANOVA was conducted for the dependent variable of on task behaviour and a one way repeated measures MANOVA was conducted for the dependent variables of academic performance and impulse control. The independent variable was Time, Pre measure (Time 1) and Post measure (Time 2).

The ANOVA analysis of the dependent variable on task behaviour indicated a significant univariate effect for Time, $F(1,17) = 171.53$, $p < .01$, using the Greenhouse Geisser correction. The results indicate that there was a statistically significant improvement of scores between Time 1 and Time 2. The effect size for on task behaviour was .91, and shows that stimulant medication produced results of good clinical significance.

Results from the MANOVA indicated a significant multivariate effect for Time, Pillai's Trace = .94, $F(2,16) = 13.78$, $p < .01$, and an overall effect size of .94. The univariate

analysis for the dependant variables, academic performance and impulse control indicated a statistically significant effect for Time, academic performance, $F(1,17) = 28.99$, $p < .01$, and impulse control, $F(1,17) = 59.11$, $p < .01$ using the Greenhouse Geisser correction. These results indicate a statistically significant improvement in scores between Time 1 and Time 2. The effect size for academic performance was .94, and for impulse control was .84, and shows that stimulant medication produced results of good clinical significance.

6.4 Hypothesis 2

It was predicted that the MMS intervention group of children with ADHD and the stimulant medication group of children with ADHD would exhibit comparable intervention outcomes.

The second hypothesis examined intervention gains from the MMS intervention group and compared them to the intervention gains in the stimulant medication group. Table 6.3 displays the descriptive statistics obtained for the subjects in both groups at pre intervention Time 1 and at post intervention Time 2.

Table 6.3: Means and standard deviations (in parentheses) for On Task Behaviour, Academic Performance and Impulse Control for the MMS group and the stimulant medication group at Time 1 and Time 2.

Group	On Task Behaviour		Academic Performance		Impulse Control	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
MMS n = 57	42.96 (5.94)	54.72 (9.10)	20.40 (3.68)	28.12 (5.90)	14.02 (2.77)	18.12 (3.47)
Stimulant Medication n = 16	38.61 (5.67))	66.72 (8.53)	18.61 (3.16)	35.33 (5.69)	12.94 (1.69)	21.05 (3.70)

Table 6.3 shows that the means for academic performance and impulse control and on task behaviour were different across time. In order to examine these differences, a 2 X 2 repeated measure ANCOVA (using Time 1 as the co-variate) was conducted for the dependent variable of on task behaviour, and a 2 X 2 mixed design MANOVA, where Time was a repeated measure, was conducted for the dependent variables of academic performance and impulse control. In both analyses, the independent variables were Time, Pre measure (Time 1) and Post measure (Time 2) and Group (MMS intervention) and (Stimulant Medication).

The ANCOVA analysis for on task behaviour indicated a significant main effect for Group, $F(1,73) = 59.56$, $p < .01$ using the Greenhouse Geisser correction. The results indicate a statistically significant difference in scores between groups at Time 2.

Results of the MANOVA for academic performance and impulse control indicated a significant multivariate effect for Time by Group, Pillai's Trace = .43, $F(2,73) = 27.12$, $p < .01$. The univariate analysis for academic performance and impulse control showed a significant interaction effect for Time by Group, academic performance $F(2,73) = 50.81$, $p < .01$, and impulse control, $F(2,73) = 21.45$, $p < .01$, using the Greenhouse Geisser correction. The results indicate a statistically significant difference in scores between groups at Time 2.

In order to examine the interaction effects for academic performance and impulse control, an analysis of simple main effects was done for Group and Time. Results for Group indicated that differences between the groups at Time 2 were statistically significant, academic performance, mean difference, $MD = 7.21$, and standard error, ($SE = 1.58$), $p < .01$, and impulse control, $MD = 2.93$ ($SE .95$), $p < .01$.

Results for Time indicated there were statistically significant differences between groups at Time 1 for academic performance, $\underline{MD} = 7.72$ ($\underline{SE} = .62$), $p < .01$, and impulse control $\underline{MD} = 4.11$ ($\underline{SE} = .42$), $p = < .01$.

Given that there are significant differences in scores at Time 1, two ANCOVAS were conducted on academic performance and impulse control, controlling for Time 1. The results from this analysis indicated that controlling for the differences at Time 1, at Time 2 there were significant interaction effects, academic performance, $\underline{F} (1,74) = 47.52$, $p < .01$, and impulse control, $\underline{F} (1,74) = 18.30$, $p < .01$. Results from the analysis examining simple main effects indicated that the differences at Time 2 were statistically significant, academic performance $\underline{MD} = 16.72$ ($\underline{SE} = 1.10$), $p < .01$, and impulse control, $\underline{MD} = 8.11$ ($\underline{SE} = .75$), $p < .01$.

These results do not support the second hypothesis that predicted that the MMS intervention group of children with ADHD would exhibit comparable intervention gains with the children with ADHD in the stimulant medication group, as there are statistically significant differences between groups at Time 2.

In order to examine the clinical implications of the differences in intervention scores, effect sizes for both the MMS intervention group and the stimulant medication group can be seen in Table 6.4.

Table 6.4: Effect sizes for the MMS intervention group and the stimulant medication group for On Task Behaviour, Academic Performance and Impulse Control between Time 1 and Time 2

	On Task Behaviour	Academic Performance	Impulse Control
Group	Effect Size	Effect Size	Effect Size
MMS n = 57	.77	.73	.65
Stimulant Medication n = 16	.91	.94	.84

The comparison of effect size results indicate that the MMS intervention group exhibited a medium effect size, whilst the stimulant medication group exhibited a large effect size. As such, the gains made by the MMS intervention are moderately clinically significant. Whilst the MMS intervention is valuable, stimulant medication produces clinical effects that are significantly greater than the MMS intervention.

6.5 Hypothesis 3

It was predicted that combining stimulant medication with the MMS intervention would produce an additive effect on stimulant medication intervention gains.

Previous research has found that when non-pharmacological interventions are combined with stimulant medication, additional gains in functioning are not exhibited (Swanson et al., 1998). Children in this group had been on stimulant medication for six weeks before the MMS intervention was given. Table 6.5 reports the descriptive statistics for the three dependent variables for all subjects at post stimulant medication (Time 2) and additive MMS intervention (Time 3).

Table 6.5: Means and standard deviations (in parenthesis) for On Task Behaviour, Academic Performance and Impulse Control for the stimulant medication group Time 2 and Time 3. (n = 16)

	On Task Behaviour	Academic Performance	Impulse Control
Time 2	66.56 (9.04)	34.75 (5.72)	20.43 (3.44)
Time 3	70.06 (9.61)	37.37 (7.03)	22.12 (3.00)

Table 6.5 indicates that the means for the three dependent variables of academic performance, impulse control and on task behaviour all increase across time. In order to examine these differences, a one way repeated measure ANOVA was conducted for the dependent variable of on task behaviour and a one way repeated measure MANOVA was conducted for the dependent variables of academic performance and impulse control. In both analyses, the independent variables were Time, Post measure, (Time 2) and Additive measure, (Time 3).

The analysis examining the dependant variable on task behaviour indicated a significant univariate effect, $F(1,15) = 7.03$, $p < .02$, using the Greenhouse Geisser correction. This indicates a statistically significant increase in scores between Time 2 and Time 3. However the effect size of .32 was not clinically significant.

Results for the MANOVA indicated a significant multivariate time effect for Time, Pillai's Trace = .30, $F(2,14) = 4.63$, $p < .05$. The univariate analysis for the dependent variable academic performance and impulse control respectively showed a statistically significant effect of Time, academic performance, $F(1,15) = 9.62$, $p < .05$, and impulse control, $F(1,15) = 5.63$, $p < .05$, using Greenhouse Geisser correction. These results indicate a statistically significant increase of scores between Time 2 and Time 3. The

effect size was .39 for academic performance and .27 for impulse control and therefore, while these results were statistically significant they were not clinically significant.

These results showed that the addition of the MMS intervention increased stimulant medication gains over time for on task behaviour, academic performance and impulse control. However the increases in intervention gains were not clinically significant. The third hypothesis was not supported due to the lack of clinical significance.

6.6 Hypothesis 4

It was predicted that children who did receive booster sessions of the MMS intervention would exhibit durability of intervention gains across all three dependent variables 9 months after the initial intervention, when compared to a group of children who did not receive booster sessions of the MMS intervention.

Durability of intervention gains has been a problem that has plagued all interventions for ADHD (Swanson et al., 1998; Weiss & Hechtman, 1993). It has been recommended that one way to maintain intervention gains is to deliver interventions at regular intervals during the child's development (Weiss & Hechtman, 1993). Accordingly, this research developed booster sessions of the MMS intervention to be delivered at monthly intervals after the initial intervention.

Table 6.6 displays the means and standard deviations for subjects in both groups at Pre intervention (Time 1), Post Intervention (Time 2), and Post Booster/Non Booster (Time 3).

Table 6.6: Means and standard deviations (in parentheses) for On Task Behaviour, Academic Performance and Impulse Control for the Booster group (n = 16) and the Non Booster group (n = 14) at Time 1, Time 2 and Time 3.

	On Task Behaviour		Academic Performance		Impulse Control	
	Booster	No Booster	Booster	No Booster	Booster	No Booster
Time 1	41.88(4.67)	42.71 (4.54)	19.63(3.48)	20.14 (3.28)	13.94 (2.62)	12.57 (2.71)
Time 2	54.31 (4.37)	53.57 (4.01)	27.75 (3.94)	26.64 (3.46)	17.56 (3.14)	17.07 (2.46)
Time 3	52.13 (4.63)	44.36 (4.78)	26.13 (3.83)	22.57 (3.96)	16.19(2.90)	12.71 (2.16)

Table 6.6 shows that the means for the three dependent variables of on task behaviour, academic performance and impulse control all indicate there are differences between groups at Time 2 to Time 3. Therefore in order to test if the observed differences in means between groups were statistically significant, a one way repeated measure 2 X 3 ANOVA was conducted for the dependent variable on task behaviour, and 2 X 3 mixed design MANOVA was conducted for academic performance and impulse control where Time was a repeated measure. In both analyses the first independent variable was Group, (booster, $n=16$) and (non booster, $n=14$), and the second independent variable was Time, Pre measure, (Time 1), Post measure, (Time 2) and Booster and Non Booster, (Time 3).

The ANOVA analysis for on task behaviour showed a statistically significant interaction effect $F(1.346, 37.68) = 15.99, p < .001$, using the Greenhouse-Geisser correction.

In order to examine the interaction effects, an analysis of simple main effects was done for Group and Time. Results for Group indicated that at Time 1 there were no

significant group differences between the Booster and No Booster groups, $\underline{MD} = .84$ ($\underline{SE} = 1.69$), $p = > .05$. The results also indicated that at Time 2 there was no statistically significant group differences, $\underline{MD} = .74$ ($\underline{SE} = 1.54$), $p > .05$.

However, at Time 3 there were statistically significant group differences, $\underline{MD} = 7.77$ ($\underline{SE} = 1.72$), $p < .01$. Overall these results indicate that there were no group differences at Time 1 or Time 2. However at Time 3 there were statistically significant group differences in long term outcomes.

The results examining Time for the Booster Group indicated that there was a statistically significant difference in scores between Time 1 and Time 2, $\underline{MD} = 12.44$, ($\underline{SE} = 1.20$), $p < .01$, indicating that scores had significantly increased across time. There was also a statistically significant difference in scores between Time 1 and Time 3, $\underline{MD} = 10.25$, ($\underline{SE} = 1.35$), $p < .01$, indicating that the increases in scores were maintained in the long term with intervention booster sessions.

The results examining Time for the Non Booster Group indicated that there was a statistically significant increase in scores between Time 1 and Time 2, $\underline{MD} = 10.86$, ($\underline{SE} = 1.29$), $p < .001$, indicating that the Non Booster group improved their scores between Time 1 and Time 2.

However, there was no significant difference between Time 1 and Time 3, $\underline{MD} = 1.64$, ($\underline{SE} = 1.45$), $p > .05$, indicating that scores had decreased and results indicate no statistical difference to pre intervention scores.

Conclusions from the results examining scores on task behaviour suggest that intervention gains were not maintained at Time 3 for the Non Booster group. However for the Booster group, scores indicate that intervention gains were maintained at Time 3 and show that the MMS is durable over time with booster sessions.

The results examining academic performance and impulse control indicated a significant multivariate effect, Pillai's Trace = .64, $F(2,28) = 11.14$, $p < .01$. The univariate analysis showed a significant interaction effect for academic performance $F(1.412, 39.526) = 5.26$, $p < .01$, and for impulse control $F(1.512, 42.340) = 8.44$, $p < .01$, using the Greenhouse-Geisser correction.

In order to examine the interaction effects, an analysis of simple main effects was done for Group and Time. Results from the analysis for Group indicated that at Time 1 there were no significant group differences for academic performance, $MD = .52$ ($SE = 1.24$), $p > .05$ and for impulse control, $MD = 1.37$ ($SE = .97$), $p > .05$. The results also indicated that at Time 2 there was no statistically significant group differences for academic performance, $MD = 1.11$, ($SE = 1.36$), $p > .05$, for impulse control, $MD = .49$ ($SE = 1.04$), $p > .05$.

However, the results at Time 3 indicated that there were statistically significant group differences for academic performance, $MD = 3.55$, ($SE = 1.42$), $p < .01$, and for impulse control, $MD = 3.33$, ($SE = .95$), $p < .01$. Overall these results indicate that there were no group differences at Time 1 or Time 2. However at Time 3 there were statistically significant differences between the Booster group and the Non Booster group in long term outcomes.

The results examining Time for the Booster Group indicated that there was a statistically significant difference between Time 1 and Time 2 for academic performance, $MD = 8.13$, ($SE = .94$), $p < .01$, and impulse control, $MD = 3.63$, ($SE = .55$), $p < .01$. There was also a statistically significant difference between Time 1 and Time 3, for academic performance, $MD = 6.50$, ($SE = 1.04$), $p < .01$, and impulse control, $MD = 2.25$ ($SE =$

.48), $p < .01$, indicating that intervention increases in scores were maintained over time with intervention booster sessions.

Results examining Time for the Non Booster Group indicated that there was a statistically significant difference between Time 1 and Time 2 for academic performance, $MD = 6.50$, ($SE = 1.00$), $p < .01$, and impulse control, $MD = 4.50$, ($SE = .59$), $p < .01$.

However, the results indicated a statistically non significant difference in scores between Time 1 and Time 3 for academic performance, $MD = 2.45$, ($SE = 1.11$), $p > .05$ and for impulse control, $MD = .29$ ($SE = .51$), $p > .05$, indicating that scores had returned to almost pre intervention measures.

Conclusions from the results for academic performance and impulse control suggest that scores were not maintained at Time 3 for the Non Booster group. However, the Booster group results indicate that scores were maintained at Time 3

Therefore, hypothesis four was supported. Children who received booster sessions of the MMS intervention maintained initial intervention gains, when compared to children who did receive intervention booster sessions.

6.7 Environment outcomes

This research was interested in examining whether or not the environment an intervention for ADHD was conducted in would influence intervention outcomes.

Table 6.7 displays the descriptive statistics for the three dependent variables for subjects allocated to a school environment and subjects allocated to a clinic environment, at Pre intervention (Time 1) and Post intervention (Time 2).

Table 6.7: Means and standard deviations for On Task Behaviour, Academic Performance and Impulse Control for the school group and for the clinic group at Time 1 and Time 2.

Group	On Task Behaviour		Academic Performance		Impulse Control	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
School n = 26	42.61(6.45)	54.25(10.36)	20.55 (3.85)	28.51 (6.53)	13.90 (2.69)	17.77 (3.81)
Clinic n = 31	43.38 (5.36)	55.27 (7.48)	20.23 (3.53)	27.65 (5.13)	14.15 (2.92)	18.53 (3.05)

The descriptive statistics in Table 6.7 indicate that there are minor differences between scores from Time 1 to Time 2. Therefore in order to examine whether or not differences in intervention outcomes were significant, a 2 X 2 repeated measures ANOVA was conducted for the dependent variable of on task behaviour and a 2 X 2 mixed design MANOVA was conducted for academic performance and impulse control where Time was a repeated measure. In both analyses the first independent variable was Group, (school, $n = 31$) and (clinic, $n = 26$). The second independent variable was Time, Pre measure (Time 1) and Post measure (Time 2).

The ANOVA analysis for on task behaviour non significant interaction effect, ($F(1,40, 22.03) = .02, p > .05$), using the Greenhouse-Geisser correction. These results also indicate no statistically significant group differences in intervention outcomes.

Results for the MANOVA also indicate a non significant multivariate effect, Pillai's Trace = .016 ($F(2,54) = .44, p > .05$). The univariate analysis for academic performance and impulse control showed a non significant interaction effect for Time by Group, academic performance, ($F(1,55) = .18, p > .05$) and impulse control, ($F(1,55) = .40, p > .05$), using the Greenhouse Geisser correction, indicating no significant differences in intervention outcomes between groups at Time 2.

These results indicated that intervention gains were not statistically different whether the MMS intervention was conducted in a school environment or a clinic environment.

6.8 Hypothesis 5

It was predicted that age differences would have an impact on overall intervention scores, when two age groups were examined. The younger age group would exhibit smaller intervention gains when compared to an older age group.

Previous research has noted that age can influence cognitive and social development (Kopp, 1982; Ruff & Rothbart, 1996). This research was interested to examine whether or not the age of the subject participating in the research would influence intervention gains. A component of the intervention taught cognitive strategies and these strategies were essential if children were to benefit from the intervention.

Table 6.8 displays the descriptive statistics for all subjects in both groups at pre intervention (Time 1) and post intervention (Time 2).

Table 6.8: Means and standard deviations (in parentheses) for age groups, 6-8 years, and 9-11 years, for the three dependent variables, On Task Behaviour, Academic Performance and Impulse Control at Time 1 and Time 2.

Group	On Task Behaviour		Academic Performance		Impulse Control	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Age 6-8 n = 33	42.36(5.67)	54.12 (9.34)	19.91 (3.77)	27.57 (5.91)	13.33 (2.57)	17.15 (3.89)
Age 9-11 n = 24	43.79 (6.32)	55.54 (8.90)	21.0 (3.52)	28.88 (5.92)	14.95 (2.82)	19.46 (2.28)

Table 6.8 shows that means for both groups exhibit minor differences. Therefore, in order to examine whether or not differences in intervention were significant, a 2 X 2 repeated measures ANOVA was conducted for the dependent variable of on task behaviour and a 2 X 2 mixed design MANOVA was conducted for academic performance and impulse control where Time was a repeated measure. In both analyses, the first independent variable was Group (age 6-8 years, n = 33) and (age 9-11 years, n = 24) and the second independent variable was Time, Pre measure (Time 1) and Post measure (Time 2).

The ANOVA analysis for on task behaviour indicated a non significant univariate effect, ($F(1,55) = .57, p > .05$), using the Greenhouse Geisser correction. This result indicates no statistically significant differences in intervention outcomes between groups at Time 2.

Results of the MANOVA also indicated a non significant multivariate effect, Pillai's Trace = .01 ($F(2,54) = .37, p > .05$). The univariate analysis for academic performance and impulse control indicated a non significant effect for Group by Time, academic performance, ($F(1,55) = .09, p > .05$), and impulse control, ($F(1,55) = .701, p > .05$) using the Greenhouse Geisser correction. These results indicate that the age of the subject receiving the MMS intervention did not influence outcomes as there were no statistically significant group differences in intervention outcomes at Time 2.

Therefore, the fifth hypothesis which predicted that the younger age group would exhibit poorer intervention outcomes than the older age group was not supported.

6.9 Hypothesis 6

It was predicted that there would be a significant difference in intervention outcomes between the group of children with ADHD who had no comorbid

conduct disorder and the group of children with ADHD who were diagnosed with a comorbid conduct disorder.

Children with ADHD who present with a comorbid conduct disorder display far greater oppositional behaviour than children with ADHD with no comorbid conduct disorder. The percentage of children with ADHD that exhibit a comorbid conduct disorder is between 50 and 60% (Anastopoulos, et al., 1992). Due to the fact that such a high percentage of children with ADHD present with a co-morbid conduct disorder, this research was interested in examining whether a comorbid conduct disorder would influence intervention outcomes.

Table 6.9 displays the descriptive statistics for both groups between pre measure (Time 1) and Post measure (Time 2).

Table 6.9: Means and standard deviations (in parentheses) for conduct disorder group (CD) and no conduct disorder group (NCD) for the three dependent variables, On Task Behaviour, Academic Performance and Impulse Control at Time 1 and Time 2.

Group	On Task Behaviour		Academic Performance		Impulse Control	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Conduct Disorder n = 15	41.73(5.11)	52.13 (8.76)	19.91 (3.52)	26.80 (6.24)	13.66 (2.49)	18.83(3.72)
No conduct Disorder n = 42	43.30 (6.21)	55.64 (8.90)	20.86 (3.67)	28.59 (5.78)	14.14 (2.88)	17.97 (3.43)

The descriptive statistics in Table 6.9 indicate small differences between groups across time. Therefore to examine whether or not differences in intervention were significant, a 2 X 2 repeated measures ANOVA was conducted for the dependent variable of on task

behaviour and a 2 X 2 mixed design MANOVA was conducted for academic performance and impulse control where Time was a repeated measure. In both analyses the first independent variable was Group, (conduct disorder (CD), $n = 15$) and (no conduct disorder (NCD), $n = 42$). The second independent variable was Time Pre measure, (Time 1) and Post measure, (Time 2).

The ANOVA analysis for on task behaviour indicated a non significant univariate effect, ($F(1,55) = .86, p > .05$) using the Greenhouse Geisser correction and indicates that there were no statistically significant group differences in intervention outcomes at Time 2.

Results from the MANOVA also indicated a non significant multivariate effect, Pillai's Trace = .02 ($F(2,54) = .76, p > .05$), which indicates that there were no significant differences in scores between groups at Time 2. The univariate analysis for academic performance and impulse control indicated a non significant interaction effect for Group by Time, academic performance, ($F(1,55) = .02, p > .05$), and impulse control, ($F(1,55) = 1.29, p > .05$), using the Greenhouse Geisser correction. These results indicate no statistically significant differences in intervention outcomes between groups at Time 2.

These results suggest that if the subject had a comorbid conduct disorder this did not influence MMS intervention outcome. Therefore, hypothesis six was not supported.

CHAPTER SEVEN

DISCUSSION

7.1 Discussion of results of each hypothesis.

In this chapter, the trends emerging from the outcomes of each hypothesis will be discussed. As several factors have implications for the research aims as a whole, these factors will be examined and discussed after reviewing each hypothesis outcome.

The MMS intervention used an Academic Performance Rating Scale in order to evaluate intervention gains made on academic performance, impulse control and general on task behaviour within the classroom. The decision to use this scale was made on research evidence which indicates that maladaptive behaviour of children with ADHD in the classroom impinges on the amount of time they are academically engaged on a task, and this often has a detrimental effect on academic achievement (Barkley, 1990; Cantwell, 1996; DuPaul & Stoner, 1994; Hinshaw, 1992; McGee & Share, 1988; Swanson, et al., 1998). As has been noted in previous chapters, the time actively spent engaged on a task in the classroom impacts on academic functioning. Children who are not being disruptive, and who are who controlling their behaviour and paying attention, will spend more time academically engaged. These are essential behaviours for academic achievement (Rapport, et al., 1999). Also, if children with ADHD are not disrupting other students, teacher/student relationships as well as peer relationships all benefit (Cooper & Ideus, 1995; Pelligrini & Horvat, 1995).

7.2 Outcomes from the first hypothesis

The findings from the evaluation of the first hypothesis, predicting that the MMS intervention would produce significantly improved changes in academic performance, impulse control and general on task classroom behaviours was supported. This research deemed it important that the MMS intervention needed to be clinically effective. The

results indicated effect sizes in the moderate range, (between .65 and .75), and these outcomes suggest the MMS intervention has a relevant place in managing ADHD.

When examining the raw data for each individual child, it was noted that there were differences in gains at post intervention measures. It might have been possible to further examine the nature of the differences in outcomes in a case study format, but limited qualitative data was collected on each child, parent or teacher involved within the intervention, and as such prevents an in depth examination of factors specific to one case that may have contributed to differences in outcomes.

As ADHD is a heterogeneous disorder, children present with differing levels of symptomatology impacting upon different domains of functioning (Barkley, 1998; Cantwell, 1996). Therefore, the MMS intervention was designed to be adapted to the levels of functioning of individual children. Groups were small and as such made it possible to structure the learning environment to each child. However, specific factors that may have contributed to the differences in gains between some children and these factors will be examined and discussed under general headings later in this chapter.

The overall results from the MMS intervention indicate that for most of the children participating in the intervention it was possible to increase levels of impulse control which can assist children with ADHD to pay more attention to the task, be more academically engaged and spend more productive time on task, thus increasing academic performance. Most children also exhibited increases in their on task behaviours which also in turn increased levels of academic performance.

The positive results in relation to academic performance cannot be underestimated. The outcomes of persistent poor academic achievement or academic failure have been shown

by many researchers to have a disastrous impact on the daily functioning of some children with ADHD (Barkley, 1990; Cantwell, 1985, 1994; Cantwell & Baker, 1991; Ferguson, et al, 1993; Frick, et al., 1992; Gittleman, et al., 1985; Loney, et al., 1981; Nada-Raja, et al., 1997; Weiss, et al., 1985). It is suggested that when children start to notice that they are becoming successful in the academic arena, this can increase their feelings of self worth and self esteem. These changes may in turn re-engage them in academic tasks as they can begin to try harder after experiencing success.

7.3 Outcomes from the second hypothesis.

The second hypothesis predicted that there would be comparable intervention gains exhibited by both the MMS intervention group and the stimulant medicated group. However this hypothesis was not support.

The scores for this group appear not to have been influenced by the fact that the subjects had been prescribed stimulant medication prior to taking part in the study. As has been noted, all subjects in the group were medication free for 10 days before base line measures were taken. There were no significant differences between subjects in the stimulant medication group on base line scores.

It was noted that the base line scores measuring Academic Performance, Impulse Control and On Task Behaviour exhibited by the stimulant medication group were lower than the MMS intervention group's base line scores. This finding may be related to the level of their initial behavioural problems both at home and at school, necessitating the need to see a paediatrician or psychiatrist for medical intervention instead of a psychologist for a psychosocial intervention.

The stimulant medication group's base line score differences could also be related to research outcomes which indicate that when children cease medication, behaviours often

become worse (Johnston, et al., 1988; Schachar, et al., 1997). The literature also identifies that gains experienced from stimulant medication disappear when medication ceases, and children often return to their previous level of maladaptive functioning (Cantwell, 1996). All these factors, either individually or collectively may have contributed to the differences in base line scores between groups. It could be suggested that this finding reinforces the need to teach these children the skills of self regulation and management in order to overcome this problem with stimulant medication interventions.

The differences in base line scores between groups were controlled for in the statistical analysis and therefore did not influence comparisons between groups on intervention outcomes.

The children in the stimulant medication intervention group exhibited far greater increases in intervention gains across all three dependent variables when compared to the MMS intervention group, and therefore, the second hypothesis of this research was not supported. Effect sizes were between .83 and .94 for the stimulant medication intervention group, indicating good clinical significance. The outcome exhibited by the stimulant medication group replicates previous research in relation to the efficacy of stimulant medication in the short term (Spencer, 1996).

These outcomes do not mean that the MMS intervention does not offer an alternative intervention for those children who are unable to avail themselves of a stimulant medication intervention. The intervention gains experienced within the MMS intervention group, whilst not as robust as the stimulant medication group, do justify this form of intervention for ADHD as an alternative for those children. It is suggested that it may take a lot longer for children not on stimulant medication to exhibit these

increases in functioning. Stimulant medication dampens maladaptive behaviour far more efficiently in the short term than conventional interventions, and this may be the reason that the improvements in functioning are so substantial.

Caution needs to be taken when interpreting short term outcomes from stimulant medication, as the long term outcomes from the stimulant medication group involved in the MTA study indicate that at 24 months the initial medication gains had almost halved. These children were very closely monitored with feedback being used from all those involved with the child, something that rarely happens outside clinical trials (Barkley, 2001; Swanson, 2001). Therefore the question needs to be asked, what happens in the long term to children prescribed stimulant medication and not followed up so rigorously?

On the scale measuring academic performance, the children in the stimulant medicated group improved their time spent on task, the accuracy of the tasks and completion of the tasks. These results lend support to the research outcomes with stimulant medication which indicate that in the short term, if inappropriate behaviours in the classroom are dampened a window of opportunity facilitates learning (Grainger, 1997).

7.4 Outcomes from the third hypothesis.

The third hypothesis examined whether or not the stimulant medication group when given the MMS intervention would exhibit an additive effect in intervention gains. The results indicated that the hypothesis was supported. However, the effect size of the additive intervention was around .35, indicating that the increases were statistically significant but not clinically significant. However, scores of $>.30$ do indicate improvement (Jaccard & Becker, 1991). The combined effect size indicates that children on stimulant medication who also had the MSS intervention exhibit overall

intervention gains between 1.10 to 1.30, which is a positive indication of the improvement in functioning that can be achieved over and above stimulant medication alone.

Teaching children with ADHD the use of self management and regulation skills this thesis suggests, does enhance the learning environment. In view of the poor long term outcomes experienced with stimulant medication interventions in the area of academic performance every advantage needs to be made use of with these children (DuPaul, et al., 1991; Elia, et al., 1993; Evans & Pelhan, 1991; Taylor, 1986).

The fact that there was a small clinical additive effect for academic performance should give hope for improved long term outcomes in academic performance for these children. The additive effect experienced in the stimulant medication group was achieved after an initial intervention program, and four booster sessions. Due to time constraints related to difficulty in recruiting sufficient subjects to this condition, these children could only have four booster sessions due to the commencement of the summer holidays and the starting of a new school year with a new teacher. Therefore it was decided that the disruption caused by these factors may have compromised the intervention. If longer booster sessions were given to the stimulant medication group the gains exhibited may have been improved upon.

7.5 Outcomes from the fourth hypothesis.

Research outcomes indicate that for most interventions, including stimulant medication, that gains in the short term are not continued into the long term (Cantwell, 1986; 1996; Hechtman, 1993; Meador & Ollendick, 1984; Nathan, 1992; Whalen & Henker, 1991). Results from hypothesis four which predicted that children who had regular booster sessions of the MMS intervention over a period of 9 months would retain initial

intervention gains and also predicted that children who did not have booster sessions would not retain initial intervention gains was supported. The children in both groups exhibited no differences in scores at base line Time 1 and both groups exhibited comparable intervention gains at Time 2. However, results indicated a significant group differences in scores at Time 3.

The analysis of the scores for the non booster group indicated that at Time 3 there was no statistically significant difference found from Time 1 scores. In fact this group returned almost to base line scores. The outcome from these results is in line with previous research that indicates that intervention gains are good in the short term for most interventions, however if there is no follow up the gains disappear (Cantwell, 1986; 1996; Hechtman, 1993; Meador & Ollendick, 1984; Nathan, 1992; Whalen & Henker, 1991).

The MMS intervention produced very good short term gains. These gains were only maintained while the child was in the intervention. Once the intervention ceased, intervention gains were not maintained. These outcomes reinforce the need to continue to teach children with ADHD to use the knowledge and skills that have been taught within the initial intervention. This thesis argues that in order to manage ADHD successfully there is a need to intervene continually throughout the developmental years of the child with ADHD.

7.6 Outcomes from examining the environment the intervention was conducted in.

Research has consistently shown that interventions for ADHD have difficulty generalising to other environments from a clinic or laboratory setting (Abikoff, 1985). Conducting interventions designed to not only improve classroom behaviours, but also

academic performance in general classrooms with this population is not often done (McDougal & Brady, 1998). Accordingly, this research randomly divided the MMS intervention group, and conducted the intervention within a classroom or clinic environment to assess the influence this may have on intervention outcomes. Results indicated that there was no statistically significant difference in intervention outcomes related to the environment the intervention was conducted in.

A factor contributing to this lack of difference could be group size. The groups consisted of 4 to 5 children, and whilst one group was in a classroom, it was unlike the usual classroom atmosphere. The intervention was conducted before school started and there were no everyday distractions to get the children off task, thus influencing outcome. With small groups, it was easy to supervise each child, give constant feedback and maintain control.

The MMS intervention is based on internal language and self management cognitive behavioural strategies which actively involved each child in the learning process. The children in the clinic and school environment were often asked "what they did in their classroom" and then asked to see how this impacted upon their work. The clinician modelled and role played classroom tasks and this could have contributed to there being no difference in environments, as the strategies taught in both environments enhanced the chances of successful generalisation.

7.7 Outcomes from the fifth hypothesis.

The fifth hypothesis examined whether or not the age of the children would influence the outcome. The skills of efficient self regulation are in part, dependent upon the emergence of cognitive maturation and positive social factors. Therefore, with cognitive development, children take more responsibility for their attention to, and

performance of a task (Wertsch, et al., 1981). As the problems associated with ADHD change with development, appropriate interventions should be designed to fit these stages of development (Anastopoulos & Barkley, 1990; Gittelman, 1983; Pollock & Gittelman, 1981; Robin, 1990; Whalen & Henker, 1991).

Results from this analysis indicated that age did not significantly influence intervention gains therefore the fifth hypothesis was not supported. These results support previous research Schleser, et al., (1984), who also found that children who were involved in a cognitive intervention exhibited no age differences in measures of academic aptitude, academic achievement and behavioural ratings taken from both teachers and parents

One of the reasons there were no age effects could have been that the initial intervention was kept very simple, and the nature of the tasks were adapted to the level of functioning within the group. A considerable amount of time was spent getting to know the children and establishing the reasons why they were attending the intervention. The intervention was kept at an even pace and adapted to the ability of each group member.

The children were encouraged to help each other with shared experiences of problems at home and school. These were often used as a means of highlighting maladaptive thinking and behaving. Adaptive ways of behaving were sought, then used as role play and rehearsed. All children were rewarded immediately for desired outcomes and only praised when they did well. Corrective feedback was also done immediately. The children repeated the task after the clinician had given clear instructions again and then checked that the instructions were understood. The children were also asked to overtly say what the task was. It is suggested that when interventions are able to be adapted to each child's ability that outcomes will be similar across different age groups.

7.8 Outcomes from the sixth hypothesis

The sixth hypothesis predicted that children with a no comorbid conduct disorder would exhibit greater intervention outcomes than those children who did have a comorbid conduct disorder. This hypothesis was not supported. Once again group size could have had an influence in this outcome. Groups were small and therefore relatively easy to control and in all but two groups, there was only one child with conduct disorder.

However, outcomes from this study may have been compromised. Within two of the MMS intervention groups, the group make up consisted of two members in each group having a comorbid conduct disorder. The two children with conduct disorder encouraged each other in disruptive behaviours and disturbed the two other group members. The outcome of two children with conduct disorder in one group was that these groups were hard to control making it necessary to cease the initial intervention before it was completed. No Time 2 data could be collected from either group. These outcomes support suggestions by Weiss and Hechtman, (1993) that comorbid conduct disorder children do not perform well in group situations. Therefore, it might be useful for some children with conduct disorder to have an individual compliance intervention before they are integrated into a group environment to manage ADHD.

This research has replicated findings in the MTA study. Results from this study indicated no significant differences in functioning gains between children with or without a conduct disorder in either the medicated group or the combined medicated and behavioural (Jensen, Hinshaw, Kraemer, Lenora Newcorn, Abikoff, et al., 2001). However while no differences in outcomes were exhibited by children with or without a conduct disorder in this research, it cannot be concluded with certainty that this was the case, due to four sets of data not being able to be analysed, which may have altered the comparison of outcomes between children with and without a conduct disorder.

More research would need to be done with the inclusion of children with conduct disorder into the group with no conduct disorder. However it could be suggested that if there is only one child with a conduct disorder within a group, that the group is not at risk of disruption as one child is far easier to keep on task. It could be beneficial to the child with conduct disorder to be in a group of children with no conduct disorder, as research indicates that children with a comorbid conduct disorder often have poor peer relationships and social skills (McConaughy & Achenbach, 1994; Taylor, et al., 1996). Encouraging children with a conduct disorder to work within a group context may help to overcome some of these problems and facilitate these children in exhibit meaningful gains in function both in the classroom and external environments.

7.9 General discussion

The first part of this section will examine and discuss factors may have that impacted upon the MMS intervention outcomes. This discussion is needed due to the variability in a few of the children's gains within the intervention. These findings support previous research (Abramowitz, et al., 1992; Hoza, et al, 1992) which suggests that group data often masks individuals who exhibit poorer gains. These researchers suggest that caution needs to be taken when using group findings, as the outcomes may not be as relevant to all individuals. However the main advantage of using group design is that valuable generalisations can be made to this population, something that cannot be done with single case design studies. It is suggested that the research would have benefited from a combination of both group design and single case studies, however there was a lack of sufficient qualitative data collected to allow this to be done.

However outcomes from the MMS intervention indicate that most children exhibited significant intervention gains and the few children who exhibited poorer intervention gains did not skew the overall outcome. The reasons for individuals within a group

exhibiting poorer gains are complex and variable, and an attempt has been made to examine some of the specific factors that could have influenced outcomes.

The specific factors influencing intervention outcome will then be discussed in relation to how future researchers may consider altering some aspects of intervening with children with ADHD in the classroom and in the home environments. The limitations of the research and critical issues related research design will highlight areas that could have been improved upon. The general conclusion will examine the nature of the research outcome and the significance of the research in relation to future interventions and the nature of developing interventions for all children with ADHD.

7.10 Multifaceted symptomatology contributing to intervention outcome

While all the children in the research qualified for the diagnosis of ADHD they exhibited different levels of impairments in functioning. ADHD impacts on domains of functioning with varying degrees of severity and these differences may have compromised the child from the outset. Whilst every attempt was made to adapt the intervention to each child, pervasiveness of ADHD symptomatology as identified by research Abikoff, (1991), Hechtman, (1993), Weiss and Hechtman, (1993), could have been more difficult in some individual children to remediate within the time limits of the intervention. Indeed, research has indicated Applegate, et al., (1997) that differing times in onset of ADHD produce different symptomatology, and it could be beneficial when making the initial diagnosis to examine this factor and the influence it may have on successfully intervening.

A factor influencing discrepancies in individual intervention gains could be related to the subtype of ADHD the children present with. This research did not differentiate

between sub types. Reasons for this were outlined in Chapter 6. Limitations placed upon the intervention because of subtyping not being available at the time this research commenced will be discussed in that section of this chapter. However, it needs to be noted that the MMS intervention was designed to be flexible and adaptable to the different functioning levels of the children. Children who are high on hyperactivity and impulsivity often have a conduct disorder (Babinski, et al., 1999; Taylor, et al., 1996). This research examined the influence of conduct disorder within the MMS intervention and it could be suggested that results from this analysis could be a means of examining the impact of hyperactive/impulsive subtype may have had on the intervention outcomes. However, future research into the MMS intervention should examine the impact differing subtypes may have on outcomes.

It was observed that a small number of children's levels of impulsivity were higher than other group members. These children did not stop to listen properly to the clinician's instructions. They were turning pages or playing with their pencil and the clinician often had to call their name twice to get them to watch her as instructions were given. These children also rushed tasks in order to be finished first and appeared unconcerned by the many mistakes they made. The clinician needed to always make sure that they stayed on task and completed the task correctly. The intervention was adapted to take into account of this factor and at no time did the intervention not work within their exhibited abilities. However, it is posited that a much longer initial intervention may needed for some children with high impulsivity in order to help them in controlling this behaviour.

7.11 Therapeutic alliance and how it may have influenced outcome

An appropriate "goodness of fit" between the therapist and the child is essential if intervention gains are to be produced. Many children in this research had little understanding that there was a problem that needed addressing, let alone that they had a problem. It was deemed essential that time be taken to get to know as much as possible about every child based on research (Kendall, 1991). It was found that these children shared so many experiences both at home and at school, and that within the group situation these shared experiences formed a bond between many of the children.

One way of facilitating therapeutic alliance is for a clinician to attempt to understand the happenings in the child's daily life in order for the child to understand that what they think and feel is deemed important and accepted by the therapist (and parents and teachers). Most of the children attending the groups were enthusiastic and often did not want to go back to school. The small group allowed them to understand their behaviours in relation to engagement to a task and completion of that task. Within the small group it was relatively easy for the clinician to supervise and give them feedback. They were also rewarded for work well done.

The attitude of the supervisor, whether it is the clinician, the teacher or the parent must impact upon how a child functions in every aspect of their daily lives. It is important when intervening with children with ADHD that full explanations about tasks and what is required of them be given and that the children give feedback to indicate that they understand and know what to do.

This thesis raises the issue of the importance for children participating in discussions about the intervention before it is commenced (Kendall, 1991). Explanations about

what was involved, the goals of the intervention and what was expected of each child were given once the child was in the group. However, despite these explanations regarding the intervention and why each child was attending, some children did not see that the problems being experienced required them to participate fully. The "goodness of fit" with these children was less than optimal, with the clinician often spending a considerable amount of time getting them to comply with the intervention structure. The children who were reluctant to participate often tried to disrupt other group members or not carry out tasks in the required way. Therefore the reluctance of some children to be in an intervention may have influenced therapeutic alliance and this in turn could have impacted negatively upon intervention outcome.

7.12 Variations in compliance and involvement in the intervention

When evaluating intervention gains it is important to ensure that the intervention delivered by clinicians is essentially the same each time. The MMS intervention was done by the researcher for every group.

However also of importance is the adherence to instructions given to others who have a role within the intervention. A systems approach was deemed necessary as many problem behaviours are exhibited or contributed to by both the home and school environments (Conway, 2001). Therefore a successful outcome could be compromised if interventions only attempted to address problems occurring in one environment. The MMS intervention structure meant that outcomes were in part dependent upon teachers and parents implementing strategies designed to reinforce the learning taking place.

Together the school environment and the home environment are the most significant influences on a child (Conway, 2001). It has been noted previously that with stimulant medication and psychosocial interventions compliance from all participants is often a

problem and can play a significant role in intervention outcome (Firestone, 1982; Johnson & Fine, 1993). In principle this intervention needed parent/teacher collaboration but also clinician/parent and clinician/teacher collaboration. There had to be good communication for the Academic Performance Rating Scale to be completed by teachers and returned by parents. Both parents and teachers had to be willing to comply with the need to externally cue, monitor, evaluate, and give positive feedback on behaviours. They needed to model and rehearse internal language, often getting the child/student to repeat instructions.

Before the interventions commenced both parents and teachers were given explanations of the components and goals of the interventions and education about the roles they were to have within the intervention. It was thought that giving a full explanation of the each aspect of involvement and using informative education about all aspects of the intervention that some of the problems with compliance that have plagued other interventions could be overcome. However, in practice there were limitations that impacted upon the full implementation of the intervention. These limitations in turn would also have influenced intervention gains.

In reflecting on the MMS intervention some complex issues related to the variability of implementation and adherence need to be examined and these include:

- Variability of parental involvement and their intention to comply with their role within the intervention.
- Variability of teacher compliance within the intervention and attitude towards their student.
- Variability of teacher involvement in supervision of classroom behaviours, evaluation and feedback

7.13 Parental variables that may have influenced intervention outcome

This research involved and educated parents from the outset. The aims and expected outcomes of the MMS intervention were also explained in detail. One of the reasons for doing this was to increase compliance to the role they were to have within the intervention. As has been previously noted compliance to interventions by parents is at times unreliable and therefore will influence outcome (Kendall, 1991).

Parents were told that parental interaction styles and management skills could be positively influenced by parent training (Pisterman; et al., 1998). Parents were also offered parent management training programs at either the University clinic or the private clinic. A recent study found that many parents who are offered parent management training program either attended intermittently, or did not attend at all (Sholton, et al., 2000). This research replicated the above findings. Many parents did not want to participate and of those who did attend, very few completed the full course. This was not foreseeable before the research commenced. As has been noted in Chapter 5, the cost of the parent management program could have been a factor in an unwillingness to join the program.

Parental compliance factors with the intervention could explain why some children exhibited differences in intervention gains. One of the roles of the parent was to return their child's Academic Performance Rating Scale after the teacher had completed it. However in some cases this was not done and this factor contributed to lack of data.

This thesis strongly argues the point that the environment the child is in must influence the course of the disorder, and consequently influence any intervention outcome. Research outcomes highlight the importance of environmental factors in the acquisition

and use of self regulation and self guiding internal language (Berk, 1994; Berk & Spuhl; 1996; Luria, 1958; Vygotsky, 1962). It has been also noted that one of the factors that influences intervention outcomes positively is parental style. The MMS intervention involved many of the parents changing their own patterns of behaviour towards their child with ADHD. Patterns of child/parent interactions can be very well learned by the time the child is 6 to 11 years old. A coercive parenting style can create an environment where behaviours targeted for change actually become worse (Patterson, 1986).

If the parenting styles are coercive and authoritarian, or permissive, the child may not fully benefit from the intervention. An authoritative parenting style which uses reasoning and strict boundaries is considered to be the best parenting style (Berk, 1994). This style also facilitates the acquisition of internal language (Berk & Spuhl, 1996). The parent education component of the intervention attempted to demonstrate the differences in parenting styles and how these different styles could influence how their children behaved.

Another important component of the MMS intervention was the response cost aspect of the intervention. Due to the extensive literature related to problems of implementing the response cost component of behavioural interventions, this research attempted to overcome the problems previously experienced with parent education, as recommended by research outcomes (Canwell, 1996; Kendall, 1991; Pelham, 1995; Pelham, et al., 1993). The response cost component of this intervention involved the child choosing a desired activity that was to be rewarded or withheld each day as a result of good or poor outcome measured on the teacher/student matching checklist. The response cost was to be carried out in the home as parents had been educated about the role they were to play in carrying out this aspect of the intervention.

Often the rewarded or withheld activity was a television program that other family members watched. With information gathered at the booster sessions it was found that following through with the response cost in some homes caused family conflict, therefore some families decided it was far easier not to use the response cost. This in turn stripped the intervention of a clearly identified means of reinforcing learning and may have had a detrimental effect on intervention outcome in some of the children. Overcoming problems with intervention compliance with some families of children with ADHD is a variable that may be impossible to overcome, even when education and support are available.

Another parental factor that may have influenced intervention outcome was the involvement of both parents. Some parents failed to bring their children to complete the booster sessions or they turned up sporadically. While many parents were involved together, it was noticeable that it was usually the mothers who sought help. Some fathers were not involved at all and some were reluctant participants. The latter dropped their children off early and picked them up late. All these issues raised link back to the issue of parental compliance to their designated role within the intervention. It may be beneficial for future research to examine the attitudes of both parents related to interventions for their children with ADHD.

The parental role was deemed an important factor in obtaining optimum improvements from their children. It is perhaps understandable why some parents view stimulant medication as an easier intervention option, as involvement with a psychosocial intervention requires the whole family to change its functioning in order for the child with ADHD to gain the maximum benefit. However as has been previously noted, compliance is also a problem when intervening with stimulant medication intervention (Firestone, 1984; Johnson & Fine, 1993). In view of poor long term outcomes for most

interventions for ADHD, it is suggested that perhaps the effort and motivation required for change is too difficult for some parents.

7.14 Teacher variables that may have influenced intervention gains

The classroom environment may also have influenced the differences in intervention gains. It has been noted previously, that disruptive patterns of behaviour by children in the classroom impact upon teacher style and classroom functioning (Cooper & Ideus, 1995; Pelligrini & Horvat, 1995). The teacher's attitude to the child who had previously been a problem to manage within the classroom may also be a factor that could have been difficult to change. This factor could influence how well the teacher complied with the role that was expected within the intervention.

When classroom environments are highly structured and the children closely supervised, children exhibit less disruptive behaviours, more self-control and better attention (Dreager et al., 1988, Jarman, 1996). These three factors according to Rapport, et al., (1999), need to occur together, not in isolation, to impact successfully on academic achievement. Children are more disruptive and spend less time academically engaged when they are not being supervised to monitor if they are complying with instructions (Gettinger, 1986; Westwood, 1993). Being less academically engaged will result in poor academic performance. Therefore, classroom supervision and monitoring of the child directly influences academic performance, and as academic performance was one of the dependent measures in this research, these factors related to academic outcomes would have directly influenced intervention gains.

However it has to be noted that the majority of the teachers were willing to involve themselves in the role they had within the intervention and gave valuable feedback which was utilized within the booster sessions of the intervention.

Some teachers made time for a fortnightly meeting in the staff room to discuss the child's progress. Many of the teachers went out of their way to help the child involved in the intervention. In one school, the special needs teacher gathered up all the completed Academic Performance rating scales herself and placed them in a folder. The effectiveness of any intervention will be augmented when teachers are so actively involved.

When children brought their Self Monitoring check lists back to the booster sessions it was difficult to assess some teacher's compliance in cuing the child to self monitor, due to the non completion of some of the checklists. If the cuing was not complied with by the teacher, it would not have encouraged the child to use the skill of self guiding internal language and this skill would become underutilised and as such would impact upon intervention gains. The above mentioned factors are crucial in the reinforcement of teaching the child to use the skills of self evaluation. If the child is not cued to monitor, not evaluated and corrective feedback is not given, then strategies developed to encourage the development of self regulation will not be used. The lack of utilisation of these important strategies will significantly contribute to a continuation of maladaptive behaviours, as children with ADHD show a marked inability to be aware of the impact of their behaviours and thus an inability of how to correct them (Barkley, 1997; 1998).

This thesis built a strong argument for a systems approach when intervening with ADHD. A systems approach should have in principle overcome many of the difficulties other interventions designed for ADHD have had in the past. However in practice, the

variables that have been discussed meant that the intervention was not consistent across all of the children. This in turn resulted in some children, for reasons not related to their ADHD, not being able to take full advantage of the MMS intervention.

7.15 Limitations:

A major problem experienced in conducting this research was the high drop out in subject numbers due to variables beyond the clinician's control. Parental and teacher variables related to compliance with designated roles within the intervention were responsible for the non completion or non return of the rating scale and for children not attending the intervention at designated times.

More time spent by the clinician with both the parents and teachers before the intervention commences could address this problem. It would be advantageous to compile more detailed handouts to give parents and teachers about the nature of the intervention and about the difficulties that may be encountered due to the length of the intervention. Therefore it is suggested that there needs to be more intergration within the systems approach to assist and support parents and teachers more effectively.

7.15.1 Critical issues with design and implementation

This research used a quasi experimental design as there was no random group allocation due to the fact that many parents did not want their child to take stimulant medication. Parental preferences dictated which children were in either group. There were also no discrete groups of subjects in this research due to insufficient numbers recruited. In not having discrete groups of age, gender, conduct disorder and environment, some outcome information may have been lost. However it was possible to do post hoc analyses on the variables of environment, age and conduct disorder and attempt to generalise these

outcomes. The ratio of males to females indicated that gender separations would not be useful.

In retrospect it would have been useful to examine the influence of subtype on intervention. The study would have benefited from DSM-IV based questionnaires rather than DSM-III based DuPaul and Barkley's (1990) ADHD Rating Scale, and Conners Parent and Teacher (1990) Rating Scales, (which did not contain subtype separation). The subtype diagnosis would have facilitated the comparison of intervention effectiveness by using DSM-IV criteria but a larger number of subjects would have been needed for sufficient power. It could be argued that a different intervention is needed for each subtype, however the intervention was designed to be flexible and great care was taken with each group to ensure that the intervention was adapted to that group's level of functioning. Such separation of subtypes would need to be included in a future design, although the design would have to take into account the availability of the subject pool.

The consequences of not incorporating such a separation into the research design may have contributed to the reasons some subjects failed to achieve greater gains. The separation of subtype groups could have clarified the issue and raised other questions in connection with failure to achieve greater gains.

There was also no group of medicated subjects who did not have an additive MMS intervention. There were ethical reasons behind this decision as parents were informed of the availability of the MMS intervention as an additive intervention before the research commenced. However future research may have a more objective examination of outcomes if one group of subjects on stimulant medication was able to wait 6 -9 months before commencing an additive intervention.

Due to time constrictions resulting from problems recruiting sufficient numbers into this group, booster sessions for the stimulant medication group were shorter than originally planned. This may also have influenced intervention outcomes and it could be that had they been longer, this group would have exhibited far greater gains in functioning across all the dependent variables. Care must be taken when commencing long term interventions for children with ADHD in order for the intervention to have as much continuity as possible.

It was decided to include children with a comorbid CD into each group, despite the evidence that these children often do not function well in groups (Hechtman, 1993). This decision was made due to the fact that the intervention was designed to be sensitive and flexible to the needs of different levels of functioning of the children. As a consequence of the decision, two groups had to be cancelled due to excessive disruption before completion of the initial intervention. Because data could not be collected from these groups, it may have influenced the outcomes obtained from the conduct disorder group. As the data collected on the other children with a comorbid CD did not indicate significant differences in intervention outcome from those children with no CD. This outcome would be more revealing had it been possible to include four more sets of data, and may have indicated that CD does indeed negatively influence outcome.

While there are reasons for and against group data, there are also problems related to using single case designs. The major one is the lack of generalisation of results. It was decided for this research that group design was the better option. Nonetheless, the study would have benefited from the information that could have been obtained by documenting single cases and therefore lack of such cases is a limitation of this study. In future research a combination of single case and group design would produce a more rounded study.

This study was further limited by a lack of formal data on parental and child compliance to the response cost component of the intervention. Again in retrospect it would have been very productive to use information from the feedback times with parents at the beginning of each session as a source of formal data. In this way reasons for non compliance could have been presented in an ongoing and systematic way and strategies could have been similarly presented. This data collection and also an evaluation of the intervention component for the parents and children could be added to any future design.

Due to the ongoing nature of the intervention, it needs to be delivered as close to the start of the school year as possible. However, if this cannot be achieved, it could be set up to start at the commencement of each term. This will enable some continuity within the classroom. Disruption due to short holidays did not impact negatively, however, the long summer break and the return to school with a different teacher interrupted the flow of the intervention. Structuring the intervention this way may overcome some of the difficulties experienced in maintaining numbers.

Finally, ways of ensuring that all parents of children with ADHD take advantage of Parent Management Training need to be put in place, and where there is financial difficulty, allowances need to be made for such an essential program for this population.

7.16 Directions for future research

Social and environmental factors are central in the development of self regulation and self guiding internal language therefore maternal and paternal patterns of behaviours need to be researched as soon as they present their child with ADHD for assessment. Research in this area is needed if the crucial functions of self regulation and management are to be successfully acquired and used by the child with ADHD.

While this study found no age effects, it is recommended that future research examine the level of each child's ability to work without external monitors pre intervention and use this information when delivering the intervention. Some children need far greater levels of external monitoring for a longer period of time before they acquire and use the skill of self regulation and management, and it would be beneficial to examine the influence this variable has on intervention outcome.

In view of the strong empirical research outcomes into how children academically achieve, the factors of supervision and feedback need to be assessed with teachers who have children with ADHD in their classrooms. The three factors needed for academic achievement - less disruptive behaviour, increased self control and better attention - are all influenced by supervision and feedback. Therefore, it would be advantageous to research ways of optimising the classroom environment for children with ADHD in order to overcome academic functioning problems.

7.17 Significance of this research

The aim of this thesis was to design, implement and evaluate a multimodal and systemic intervention based on sound empirical evidence. It was deemed essential to address poor academic functioning in children with ADHD. In order for academic functioning to improve, a combination of three factors together needed to be addressed in the classroom, self control, attention and general on task behaviours (Rapport et al., 1999). These were all measured with the Academic Performance Rating Scale as a means of evaluating intervention gains as this scale was designed specifically for measuring intervention outcomes for children with ADHD in the classroom.

This study is significant because:

- It developed and delivered a clearly articulated and conceptually sound multi modal and systemic intervention that was available for all children diagnosed with ADHD. The MMS intervention was not designed with the aim of competing with stimulant medication, rather it was designed to provide an alternative intervention for children with ADHD for whom stimulant medication for a variety of reasons is not an option. Whilst outcomes from the MMS intervention were not as great as stimulant medication outcomes, (as indicated by the differences in effect sizes), the outcomes are still clinically valuable. These results suggest there is an alternative intervention for the 20% of children who for whatever reasons do not have stimulant medication as an intervention option.
- The intervention addressed the specific problem of poor academic functioning in children with ADHD. Intervention gains were measured and evaluated in relation to attention, accuracy and completion of classroom tasks. General classroom behaviours including impulse control were also measured and evaluated. The above factors have been identified in the literature as being crucial for academic achievement.
- Intervention outcome results examining durability at the nine month post booster stage identified the need to continue with the delivery of interventions for ADHD into the long term. The nine month outcomes indicate that to manage ADHD symptomatology and to successfully develop and use self regulation skills, children with ADHD need ongoing interventions to maintain the momentum. If this does not happen, these children revert to pre intervention maladaptive functioning.

7.18 Conclusion

In conclusion, this research developed and evaluated a multimodal and systemic intervention for children with ADHD that was conceptually based and clearly articulated. It was based on a conceptual framework derived from current research which indicates that children with ADHD have executive functioning problems resulting in an inability to inhibit responding. This inability negatively influences their ability to self regulate and use internal language to guide behaviour (Barkley, 1998).

The MMS intervention used a cognitive behavioural self management intervention that was combined with self instructional training. This was done in order to address poor behavioural inhibition and to teach strategies that would enable children with ADHD to guide their behaviour with internal language and to self regulate and manage their problem behaviour, especially in the classroom. Accordingly, the MMS intervention had a specific task in attempting to improve academic functioning, in order to overcome the academic problems experienced by many children with ADHD.

The MMS intervention used a systems approach as it was recognised that both the school and home environments contribute to maladaptive behaviours and the intervention would be limited if it only addressed one environment. However, in practice, a small number of people in both systems for a variety of reasons did not comply with their designated role within the intervention. The lack of compliance meant that some of the children were not able to take full advantage of the intervention, as the intervention cannot be delivered in practice to all children who have ADHD. Nonetheless, overall the intervention did produce clinically significant intervention gains, which reinforce that a systemic approach is needed for interventions to be fully effective. There is a recognised need to offer more parent and teacher education and to also provide more professional support throughout lengthy interventions

One of the aims of this research was to design an intervention that could produce gains that were comparable to stimulant medication. The gains exhibited by the MMS intervention were not as great as the gains exhibited by the stimulant medication group. However the results obtained do indicate that the MMS intervention produces outcomes that are moderately clinically effective, and as such this intervention has a significant role to play when attempting to intervene with children with ADHD.

Overall, however, there is cautious optimism in relation to the MMS intervention. The additive effect of the MMS intervention experienced by the stimulant medication group could perhaps be built upon if the interventions are continued for a greater period of time. These children are being taught to guide their own behaviour, and this is something stimulant medication is incapable of teaching. This research suggests that many children with ADHD do exhibit meaningful gains from the MMS intervention and if the intervention were to continue for longer, these gains can be improved upon.

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APPENDIX A

CONSENT FORM FOR PARENTS

NORTHFIELDS CLINIC

(Incorporating the Psychological Services Unit
Learning and Behavioral Support Unit)

UNIVERSITY OF WOLLONGONG

Department of Psychology

Address: Northfields Avenue, Wollongong 2522. Telephone (02) 42213747 Fax: (02) 42214163

Dear Parents,

Your child has been accepted into a research intervention program for Attention Deficit Hyperactivity Disorder. The Intervention requires your child to attend the Clinic for one and a half hours a day Monday to Friday. The time slot will be 8.30 - 10.00 am.

If for any reason during the research you wish to withdraw your child from participation you are completely free to do so.

Your child's data results will be combined with other children's data to be used as group data, and as such no individual can be identified and therefore results are all confidential and no one will be able to identify the source of the data. The results will be statistically analyzed and will help in the development of better interventions in the treatment of ADHD.

We are seeking your consent for your child's participation in the intervention and permission to use the data collected. Please complete the attached consent form if you want your child's data to be included in the research.

If you have any enquiries please do not hesitate to contact the case worker assigned to your child or ring the secretary at the Northfields Clinic on (042) 213747. If you are concerned about the conduct of the research please contact the Ethics Officer, Karen McRae at the University of Wollongong Human Research Ethics Committee on (042)213555.

Yours sincerely,

Evelyn Goodison
Northfields Clinic

APPENDIX B

LETTER OF INFORMATION FOR PARENTS

NORTHFIELDS CLINIC

(Incorporating the Psychological Services Unit
Learning and Behavioral Support Unit)

UNIVERSITY OF WOLLONGONG

Department of Psychology

Address: Northfields Avenue, Wollongong 2522. Telephone (02) 42213747 Fax: (02) 42214163

Dear Parents,

This letter is a follow up after the interview I have had with you. The Psychology Department at the University of Wollongong is currently doing research into Attention Deficit Hyperactivity Disorder (ADHD). Your child is to attend an On Task intervention program. This Intervention attempts to teach children diagnosed with ADHD to learn to use strategies to help them to gain the ability to self regulate, manage and evaluate their classroom behaviours..

As I have already told you, the On Task intervention is divided into three segments. The first part aims to teach the child self guiding self instructional statements. An On Task Plan is taught, this consists of:

What is my task?

Am I on task?

Am I ignoring others

I must stick to the task until I have finished

Your child is taught to say "the plan" when he/she is cued by an external noise, i.e. a pencil tapped on the desk. When your child hears the pencil tapping he/she will recite "the plan" overtly and they answer yes, they were on task or no, they were not.. This is then tied into a self monitoring check list, which I have already shown you. Your child fills in each time a cue is given, Yes, they were on task, yes, a little on task, no, not on task. Your child will be given an activity book and tasks will be set from the book. The tasks are chosen to help your child learn to pay attention and reduce their impulsive behaviours. The plan is then taught to be learnt silently, and is rehearsed until he/she can do this. When the pencil is tapped it should automatically cue your child to monitor whether or not the task that was given is being done.

The second stage of the intervention consists of practicing on task behavior under low, moderate and high levels of distraction. Once again, cueing is done by external means, the pencil being tapped and your child will fill in their monitoring check list. This allows for the generalisation into the classroom, as the child's teacher will be informed on ways of external cueing, so the child can self-monitor.

The third stage of the intervention consists of a contingency management system. This is a response cost management system, whereby on task behavior is monitored both at home and at school, and if within acceptable limits, a reward system that has previously been worked out with the child and you as parents is enacted. A Teacher/ Student Checklist has been given to you child's teacher, and is filled out at the end of each the school day. It teaches your child to assess behavior through someone else's eyes. If your child scores 3 and above, your child is allowed to do what has been agreed upon when they get home, i.e. riding their bike or watching a favourite television program.

The teachers co-operation is an important aspect of the On Task program. It is important that your child gets supervision and reminders from the teacher to check that your child is in fact using the strategies that they have been taught in the intervention program. It is hoped that your child will learn to self monitor and evaluate their own behaviour and this will help them stay on task. On occasions that your child is not on task, it should require only the pencil to be tapped to bring the student back to task.

The teacher's co-operation is also needed to fill in the Academic Performance Scale, which I will give to you. When your child's teacher has completed the form, it will be given to you to return to the Clinic. This scale will have to be filled in before your child commences the On Task intervention and also the second week after the intervention has finished. The data that is gained from this scale will enable me to assess if the intervention is successful. This scale examines your child's impulsivity, the amount of academic work completed and its accuracy, and general on task behavior in comparison to other children in the class. This scale is in no way meant to be a competitive device, merely a reliable way of collecting data.

Any queries you have, please feel free to contact me at the University of Wollongong, on 02-42214491 or 0242213147.

Yours sincerely,

Evelyn Goodison,
Northfields Clinic

APPENDIX C

CONSENT FORM FOR TEACHERS

NORTHFIELDS CLINIC

(Incorporating the Psychological Services Unit
Learning and Behavioural Support Unit)

University of Wollongong
Department of Psychology

Address: Northfields Avenue, Wollongong 2522. Telephone: (042) 21 3747 Fax: (042) 21 4163

Dear

Your student..... has been referred to the Northfields Clinic, which is attached to the Psychology Department at the University of Wollongong. I have been assigned to your student and I would like to carry out a number of tests and assessments on your student to obtain a picture of behavioural and academic functioning and need your consent and assistance to observe these functions.

Enclosed are a Connors Teacher Rating Scale which is a list of 39 questions, which need to be answered by ticking one of the four boxes. An Academic Performance Scale assesses childrens productivity and accuracy of completed school work. It also looks at their organizational abilities and attention. Could you indicate how your student performs in these categories by circling a number from 1-5. The Attention Deficit Hyperactivity Rating Scale evaluates Attention Deficit symptoms in children and is also scored by circling where you think the childs behaviours fall.

By collecting this data from you, we will be assisted in assessing your student needs. You will receive a full report outlining the relevant information which has been obtained from you and from clinicians and researchers. Information from the assesements of your student will be collected over a number of weeks and recommendations will be included in your report. The report information provided will be discussed by the case worker with your student's parents. It would be appreciated if you could give the completed assesement sheets to your student's parents on Friday, so they can be returned to the Unit. Your student will be put on Intervention training as soon as possible and your inital assessments will be used as base line data, to be compared to the assessments that will be gathered after the Intervention training. You will be sent the same assessment scales to be completed the same way the inital ones were, when your student has completed the Intervention training.

The treatment intervention aims to teach your student to ignore distractions while completing a number of different tasks, similar to classroom tasks and in conditions similar to the classroom. The treatment intervention will take place daily for one and a half hours over five consecutive days. It is hoped that the time slot will be 8.30 - 10.00am.

Enclosed is a consent form to obtain your permission to complete the assessment on your student and giving your permission for the information you have provided to be used in the ongoing research into Attention Deficit Hyperactivity Disorder.

If you require any more information, please ring the Northfields Clinic on 042-213747 and leave a message for Evelyn Goodison. I will be only too pleased to discuss any of this with you, and appreciate the help you are giving.

If you are concerned about the ethics or have any ethical concerns, please do not hesitate to contact Ethics Officer, Karen McRae at the University of Wollongong Human Research Ethics Committee on 042/213555.

Yours sincerely,

Evelyn Goodison,
Northfields Clinic,
University of Wollongong,
119 Northfields Ave, Wollongong, 2522.

Outcome of ADHD Studies and Research:

I..... am giving my consent to assist in assessing my student by completing the enclosed assessment sheets and I am interested in receiving a copy of results obtained from the research project carried out by the University of Wollongong, examining ADHD. I give permission for the assessments of my student to be used in this research project.

Students Name.....
Surname

School Address:

Signed:

NORTHFIELDS CLINIC

(Incorporating the Psychological Services Unit
Learning and Behavioral Support Unit)

UNIVERSITY OF WOLLONGONG

Department of Psychology

Address: Northfields Avenue, Wollongong 2522. Telephone (02) 42213747 Fax: (02) 42214163

Dear Teacher,

Your student has been accepted into a research intervention program for Attention Deficit Hyperactivity Disorder. The Intervention requires your student to attend the Clinic for one and a half hours a day Monday to Friday. The time slot will be 8.30 - 10.00 am.

Your student's data results will be combined with other student's data to be used as group data, and as such no individual can be identified and therefore results are all confidential and no one will be able to identify the source of the data. The results will be statistically analyzed and will help in the development of better interventions in the treatment of ADHD.

We are seeking your consent for your students participation in the intervention and permission to use the data collected by you from the Academic Performance Rating Scale. Please complete the attached consent form if you agree to your student's data to be included in the research.

If you have any enquiries please do not hesitate to contact the case worker assigned to your student or ring the secretary at the Northfields Clinic on (042) 213747. If you are concerned about the conduct of the research please contact the Ethics Officer, Karen McRae at the University of Wollongong Human Research Ethics Committee on (042)213555.

Yours sincerely,

Evelyn Goodison
Northfields Clinic

**Teacher Consent for the Utilisation of Assessment Data in a University of Wollongong
Research Project.**

I _____ (Teacher's Name)

Agree to permit the assessment data obtained from the Academic Performance Rating Scale of my student to be used as part of a university of Wollongong research project which is examining classroom performance of children who are diagnosed with Attention Deficit Hyperactivity Disorder. I have fully understood the explanation of the nature of the intervention to be delivered to my student.

If you have any enquiries regarding the conduct of the research, please contact the Secretary of the University of Wollongong Human Research Ethics Committee on (02, 42213079).

APPENDIX D

LETTER OF INFORMATION FOR TEACHERS

NORTHFIELDS CLINIC

(Incorporating the Psychological Services Unit
Learning and Behavioral Support Unit)

UNIVERSITY OF WOLLONGONG

Department of Psychology

Address: Northfields Avenue, Wollongong 2522. Telephone (02) 42213747 Fax: (02) 42214163

Dear Teacher,

This letter is a follow up of our conversation about your student. The Psychology Department at the University of Wollongong is currently doing research into Attention Deficit, Hyperactivity Disorder (ADHD). Your student is to attend an On Task intervention at Northfields Clinic from Monday to Friday, 8.30am to 10.30am. The intervention attempts to teach children diagnosed with ADHD to learn and use strategies to enable them to develop the ability to self regulate, manage and evaluate their behaviour in the classroom.

The On Task intervention is divided into three segments. The first part aims to teach the child self guiding self instruction. An On Task Plan is taught, this consists of:

What is my task?

Am I on task?

Am I ignoring others

I must stick to the task until I have finished.

The child is taught to recite the plan overtly initially, and they answer yes, they were on task or no, they were not. The child is given tasks to do whereby they repeat what the task is, and while they are doing the task, they ask themselves "the plan" questions.

The child has an activity book and during the intervention, tasks are given from the book. The activities in the book are designed to help the child improve selective and sustained attention and to decrease impulsive behaviours. The child is then taught that a pencil being tapped on a desk is a cue for them to use "the plan" and check if they are doing the task they were assigned. This pencil tapping cue is then tied into a self monitoring check list. The child evaluates whether or not they were on task and fills in the check list each time a cue is given. Yes, they are on task, yes, a little on task, no, not on task.

The training goes on to the second stage which consists of practicing on task behaviour under low, moderate and high levels of distraction. Once again, cueing is done by external means, the pencil being tapped. This it is hoped allows for the generalisation into the classroom. The child is taught self statements throughout the intervention that should help guide their behaviour in the classroom.

The third stage consists of a contingency management system. This is a response cost management, whereby on task behavior is monitored and evaluated, and if within acceptable limits, a reward system that has previously been worked out with the child is enacted.

A Teacher/ Student Checklist has been explained to you and is to be filled out at the end of each the school day. It teaches the student to assess their own behavior through someone else's eyes. The student's evaluation of their own behaviour is then compared to how you evaluated the same behaviour. If the student scores 3 and above, the student is allowed to do the activity they have chosen in conjunction with their parents when they get home, i.e. riding their bike or watching a favourite television program.

Your co-operation is an important aspect of the On Task intervention. It is important that the student gets supervision and reminders from the you, to check that the child is in fact using the strategies that they have been taught in the intervention program to stay on task and complete the task accurately. To help your student to monitor on task behaviour, the Self Monitoring Check list that was used in the intervention will be used in the classroom also. You can get your student to self by tapping a pencil at certain intervals during any given task, i.e., after asking the student to commence an English task. It is suggested that initially the pencil be tapped every 5 minutes for the first two days back at school and then gradually increasing the time between reminders.

Your co-operation is also needed to fill in the Academic Performance Scale, which are given to the parents to give to you, and when you have completed it, they will return them to the Clinic. This scale will have to be filled in before your student commences the On Task intervention, and again the second week after the initial intervention, and then at three monthly intervals while they do booster sessions.

The data that is gained from this scale will enable me to assess if the intervention is successful in the long term. This scale is in no way meant to be a competitive device, merely a reliable way of collecting data.

Any queries you have, please feel free to contact me at the University of Wollongong, on 02-42214491 or 0242213147.

Yours sincerely,

Evelyn Goodison,
Psychologist Researcher in Training.

APPENDIX E

CHILD SELF MONITORING CHECK LIST

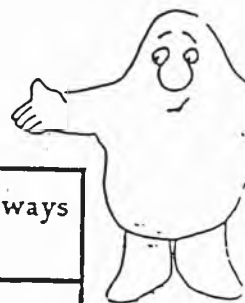
APPENDIX F

DAILY STUDENT/TEACHER MATCHING CHECKLIST

DAILY STUDENT / TEACHER MATCHING CHECKLIST

STUDENTS NAME: DATE: .../.../...

HOW DO I THINK THE TEACHER WILL RATE MY BEHAVIOUR?



Behavioural Observations	Never	Sometimes	Moderately Often	Very Often	Always
1. Did I follow the teachers instructions today?	1	2	3	4	5
2. Did I ignore the distractions within the classroom today?	1	2	3	4	5
3. Did I complete the set tasks and activities for today?	1	2	3	4	5

TEACHERS NAME: DATE: .../.../...

HOW DID THE TEACHER RATE MY BEHAVIOUR?

Behavioural Observations	Never	Sometimes	Moderately Often	Very Often	Always
1. Did I follow the teachers instructions today?	1	2	3	4	5
2. Did I ignore the distractions within the classroom today?	1	2	3	4	5
3. Did I complete the set tasks and activities for today?	1	2	3	4	5



APPENDIX G

CONNER'S PARENT RATING SCALE (1990)

PARENT'S QUESTIONNAIRE

Name of child _____ Date _____
 Date of birth _____ Name of parent _____
 Age _____ Sex _____

Please answer all questions. Beside each item below, indicate the degree of the problem by a check mark (✓)

	Not at all	Just a little	Pretty much	Very much
1. Picks at things (nails, fingers, hair, clothing).				
2. Sassy to grown-ups.				
3. Problems with making or keeping friends.				
4. Excitable, impulsive.				
5. Wants to run things.				
6. Sucks or chews (thumbs; clothing; blankets).				
7. Cries easily or often.				
8. Carries a chip on his shoulder.				
9. Daydreams.				
10. Difficulty in learning.				
11. Restless in the "squirmy" sense.				
12. Fearful (of new situations; new people or places; going to school).				
13. Restless, always up and on the go.				
14. Destructive.				
15. Tells lies or stories that aren't true.				
16. Shy.				
17. Gets into more trouble than others same age.				
18. Speaks differently from others same age (baby talk; stammering; hard to understand).				
19. Denies mistakes or blames others.				
20. Quarrelsome.				
21. Fouts and sulks.				
22. Steals.				
23. Disobedient or obeys but resentfully.				
24. Worries more than others (about being alone; illness or death).				
25. Fails to finish things.				
26. Feelings easily hurt.				
27. Bullies others.				
28. Unable to stop a receptive activity.				
29. Cruel.				
30. Childish or immature (wants help he shouldn't need; cries; needs constant reassurance).				
31. Distractibility or attention span a problem.				
32. Headaches.				
33. Mood changes quickly and drastically.				
34. Doesn't like or doesn't follow rules or restrictions.				
35. Fights constantly.				
36. Doesn't get along well with brothers or sisters.				
37. Easily frustrated in efforts.				
38. Disturbs other children.				
39. Basically an unhappy child.				
40. Problems with eating (poor appetite; no between meals).				
41. Stomach aches.				
42. Problems with sleep (can't fall asleep; up too early; up in the night).				
43. Other aches and pains.				
44. Vomiting or nausea.				
45. Feels excluded in family circle.				
46. Bores and brags.				
47. Lets self be pushed around.				
48. Bowel problems (frequency loose; irregular habits; constipation).				



APPENDIX H

CONNER'S TEACHER RATING SCALE (1990)

CHILD DEVELOPMENT UNIT - CONNERS TEACHER RATING SCALE*

RATES ACTIVITY AND ATTENTION, THEIR EFFECTS AND RESPONSE TO TREATMENT

CHILD'S NAME:.....
 D.O.B.....SCHOOL:.....
 OBSERVED DATE:.....TIME:.....AM/PM
 OBSERVER:.....CLASS TEACHER/REMEDIAL TEACHER/AIDE/OTHER
 MEDICATION: YES/NO DRUG: RITALIN/DEXAMPHETAMINE/OTHER.....
 USUAL DOSE:.....MGS.....TIMES A DAY LAST DOSE:.....MGS
 USUAL TIMES:.....A.M.....A.M./P.M.....P.M. LAST DOSE GIVEN:.....A.M./P.M

Item: Please Circle As Appropriate	Not At All	Just A Little	Pretty Much	Very Much

Sits fiddling with small objects	0	1	2	3
Hums and makes other odd noises	0	1	2	3
Falls apart under stress of examination	0	1	2	3
Co-ordination poor	0	1	2	3
Restless and overactive	0	1	2	3
Excitable`	0	1	2	3
Inattentive	0	1	2	3
Difficulty in concentrating	0	1	2	3
Oversensitive	0	1	2	3
Overly serious or sad	0	1	2	3
Daydreams	0	1	2	3
Sullen or sulky	0	1	2	3
Selfish	0	1	2	3
Disturbs other children	0	1	2	3
Quarrelsome	0	1	2	3
"Tattles" (chatters/gossips)	0	1	2	3
Acts "smart"	0	1	2	3
Destructive	0	1	2	3
Steals	0	1	2	3
Lies	0	1	2	3
Temper outbursts	0	1	2	3
Isolates self from other children	0	1	2	3
Appears to be unaccepted by group	0	1	2	3
Appears to be easily led	0	1	2	3
No sense of fair play	0	1	2	3
Appears to lack leadership	0	1	2	3
Does not get along with the opposite sex	0	1	2	3
Does not get along with the same sex	0	1	2	3
Teases other children/interferes with their activities	0	1	2	3
Submissive	0	1	2	3
Defiant	0	1	2	3
Impudent	0	1	2	3
Shy	0	1	2	3
Fearful	0	1	2	3
Excessive demands for teacher's attention	0	1	2	3
Stubborn	0	1	2	3
Overly anxious to please	0	1	2	3
Unco-operative	0	1	2	3
Attendance problem - late	0	1	2	3

*From Connors, C.K. (1969). A Teacher Rating Scale For Use In Drug Studies With Children. American Journal of Psychiatry, 12.

APPENDIX I

DuPAUL AND BARKLEY'S ADHD RATING SCALE (1991)

ADHD RATING SCALE

Child's Name _____ Age _____ Grade _____

Completed by _____

Circle the number in the one column which best describes the child:

	Not at all	Just a little	Pretty much	Very much
1. Often fidgets or squirms in seat.	0	1	2	3
2. Has difficulty remaining seated.	0	1	2	3
3. Is easily distracted.	0	1	2	3
4. Has difficulty awaiting turn in groups.	0	1	2	3
5. Often blurts out answers to questions.	0	1	2	3
6. Has difficulty following instructions.	0	1	2	3
7. Has difficulty sustaining attention to tasks.	0	1	2	3
8. Often shifts from one uncompleted activity to another.	0	1	2	3
9. Has difficulty playing quietly.	0	1	2	3
10. Often talks excessively.	0	1	2	3
11. Often interrupts or intrudes on others.	0	1	2	3
12. Often does not seem to listen.	0	1	2	3
13. Often loses things necessary for tasks.	0	1	2	3
14. Often engages in physically dangerous activities without considering consequences.	0	1	2	3

Note. From *The ADHD Rating Scale: Normative Data, Reliability, and Validity* by G. J. DuPaul, 1990, unpublished manuscript, University of Massachusetts Medical Center, Worcester. Reprinted by permission of the author. This form may be reproduced for personal use.

APPENDIX J

ACADEMIC PERFORMANCE RATING SCALE (1991)

ACADEMIC PERFORMANCE RATING SCALE

Student _____ Date _____
 Age _____ Grade _____ Teacher _____

For each of the below items, please estimate the above student's performance over the past week. For each item, please circle *one* choice only.

1. Estimate the percentage of written math work completed (regardless of accuracy) relative to classmates.	0-49%	50-69%	70-79%	80-89%	90-100%
	1	2	3	4	5
2. Estimate the percentage of written language arts work completed (regardless of accuracy) relative to classmates.	0-49%	50-69%	70-79%	80-89%	90-100%
	1	2	3	4	5
3. Estimate the accuracy of completed written math work (i.e., percent correct of work done).	0-64%	65-69%	70-79%	80-89%	90-100%
	1	2	3	4	5
4. Estimate the accuracy of completed written language arts work (i.e., percent correct of work done).	0-64%	65-69%	70-79%	80-89%	90-100%
	1	2	3	4	5
5. How consistent has the quality of this child's academic work been over the past week?	Consistently poor	More poor than successful	Variable	More successful than poor	Consistently successful
	1	2	3	4	5
6. How frequently does the student accurately follow teacher instructions and/or class discussion during <i>large-group</i> (e.g., whole class) instruction?	Never	Rarely	Sometimes	Often	Very often
	1	2	3	4	5
7. How frequently does the student accurately follow teacher instructions and/or class discussion during <i>small-group</i> (e.g., reading group) instruction?	Never	Rarely	Sometimes	Often	Very often
	1	2	3	4	5
8. How quickly does this child learn new material (i.e., pick up novel concepts)?	Very slowly	Slowly	Average	Quickly	Very quickly
	1	2	3	4	5

9. What is the quality or neatness of this child's handwriting?	Poor 1	Fair 2	Average 3	Above average 4	Excellent 5
10. What is the quality of this child's reading skills?	Poor 1	Fair 2	Average 3	Above average 4	Excellent 5
11. What is the quality of this child's speaking skills?	Poor 1	Fair 2	Average 3	Above average 4	Excellent 5
12. How often does the child complete written work in a careless, hasty fashion?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5
13. How frequently does the child take more time to complete work than his/her classmates?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5
14. How often is the child able to pay attention without you prompting him/her?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5
15. How frequently does this child require your assistance to accurately complete his/her academic work?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5
16. How often does the child begin written work prior to understanding the directions?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5
17. How frequently does this child have difficulty recalling material from a previous day's lessons?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5
18. How often does the child appear to be staring excessively or "spaced out"?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5
19. How often does the child appear withdrawn or tend to lack an emotional response in a social situation?	Never 1	Rarely 2	Sometimes 3	Often 4	Very often 5

Note. From *Teacher Ratings of Academic Performance: The Development of the Academic Performance Rating Scale* by G. J. DuPaul, M. Rapport, and L. M. Perriello, 1990, unpublished manuscript, University of Massachusetts Medical Center, Worcester. Reprinted by permission of the authors. This form may be reproduced for personal use.

APPENDIX K

MULTIMODAL AND MULTISYSTEMIC INTERVENTION

"ON TASK"

**MULTIMODAL AND SYSTEMIC
INTERVENTION FOR ATTENTION DEFICIT
HYPERACTIVITY DISORDER**

CLINICIANS MANUAL

COMPILED BY: EVELYN GOODISON-FARNSWORTH

MATERIALS NEEDED THROUGHOUT THE INITIAL INTERVENTION

Large container

Leaders manual of "On Task" Multimodal and Systemic Intervention

On Task Activity Books for each group (4-5) 4 white board markers

6 plain lead pencils 5 packets of coloured pencils

5 rubbers 5 pencil sharpeners

5 rulers 4 different soft toys

1 plastic cup 1 egg timer without a bell

5 lengths of string or fishing line container of assorted beads

6 novelty stamps and stamp pad packet of current stickers

16 on task check lists 16 student/teacher checklists

blank pieces of paper that can be written upon

5 folders

INTRODUCTION: SESSION 1. (90 minutes)

The clinician introduces her/himself to the children and asks them all to say who they are and what school they go to and where they live. They are also asked to describe the family they come from. The clinician must take the time to get to know each and every child. It is important to understand what it is like for them often having criticism in their daily lives about their behaviours. **The parents then leave the session.**

The children must be fully informed as to the reasons they are attending the intervention: Therefore they are asked:

- Why are you attending the intervention?
- Importantly, do you want to be there?
- They are asked “do you see you have a problem with some of behaviour” and if so “how do you see the problem”?
- Tell me about your life at home.
- Tell me about your life at school.
- Tell me about your friends.
- Do you have any problems with your friends?
- What do you think is the best thing that ever happened to you?
- What do you think was the worst thing that happened to you?
- Do you think your behaviour upsets other people?
- Do you find your behaviour generally pleases other people?

The children are then given their On Task Activity book and it is explained that it is to be used in later sessions. However, they are allowed to go through the book.

It is explained to the children, that there are two terms it is important that they know the meaning of. These are:

- On task behaviour (defined as doing as they have been asked and completing the task) and
- Off task behaviour (either not completing a task or not doing what they have been asked).

The children are asked to identify what they thought on and off task behaviours were through a variety of self revealing statements.

Children are actively encouraged to identify as many on task behaviours and off task behaviours they can about themselves, but also when they have noticed others around them being on or off task.

They are asked what happens when they are not on task, and what happens when they do successfully complete a task either at home or at school.

The children are asked how many of them have problems in the classroom staying on task.

They are asked what happens when they are:

1. not on task at school and
2. not on task at home.

They are asked if they have things they can do to help them do a task.

They are asked if they can ignore distractions within the classroom.

They are asked how they could get their work done if they could not ignore distractions.

They are asked what it feels like if someone distracts them when they are doing a task.

They are asked what happens when they distract other students in the classroom.

They are asked what they think it would feel like for the students that they are distracting.

They are all asked what happens in the classroom if they do not do all their work properly.

When one of the children states that they will start to fail, this issue is then explored fully and sympathetically in terms of what academic failure may mean in our society.

If a child does not bring up this issue, the clinician does, and it is pointed out that if they do not finish their classroom work, they do not learn, and if they do not learn properly it is explained how this affects all aspects of their lives. The children are asked to participate in this discussion and feelings are explored that are related to not being able to complete school work or home work.

Examples of what disruptive behaviour can do in a classroom are modelled and role played where necessary. This gives the children a real example of disruptive behaviour and how it affects their work and the work of those around them.

The children are asked if they ever talk to themselves when they are doing things. Often, a demonstration of what talking to themselves means needs to be given, for example by talking about a puzzle and how to find out which piece fits where. This is continued until all children fully understand what internal language is and how it can both help them or make them give up a task if it becomes too hard.

A game of standing up and sitting down is then played. The children are instructed by the clinician to listen carefully and do as they are instructed. This game allows some excess energy to be expended, but also teaches them to listen to instructions before doing something, and is a good learning tool to point out impulsive behaviour.

Introducing "The Plan"

It is then explained to the children that they are going to be taught to question themselves about staying on a task that they have been given. This is done by using "The Plan" which is a strategy to help them to stay on task.

The clinician instructs the children to be aware of an external cue, the "tapping of a pencil on a desk twice". They are told that the tapping of a pencil cues them to be aware of whether or not they are doing what they have been asked to do. When they hear a pencil tapping, they are to ask themselves "The Plan" in order to keep them doing the task they have been asked to do.

"The Plan" consists of 3 questions and 1 statement.

- 1. What is my task?**
- 2. Am I on task?**
- 3. Am I ignoring others?**
- 4. I must stick to the task until I have finished.**

The children learn "The Plan" continuously through the rest of the session. This is done by constant repetition but also by role modelling of on task behaviours, feedback and evaluation, and by rewards. The rewards are an ink stamp placed on the front page of their activity books. A certain number of ink stamps earns a colourful sticker. Stamps and stickers are routinely used with great success at both clinics during childhood interventions. The choice of these rewards was prompted by that success.

"The Plan" is written on the white board, with the children reciting each stage. This is left on the white board at all times and is a useful prompt for the children.

The children are shown how to do a task using "The Plan".

The clinician says she has been told she has to place the soft toy on the window sill.

The clinician then asks herself overtly, before commencing the task:

- "What is my task". The clinician replies overtly, "my task is to put the soft toy on the window sill". On the way to the window sill, the clinician overtly says, "my task is to put the soft toy on the window sill". The clinician then asks:
- "Am I on task? "Yes".
- "Am I ignoring others"? "Yes".
- "Am I finishing the task"? "Yes".

The children are then given a variety of tasks. They are taught that the clinician will always address them by their name and make eye contact. They are shown how easy it is not to pay attention to instructions if their name is not used, or eye contact with them is not made. The children are instructed as to what the task is. They are required to recite what they have been asked to do overtly before commencing the task. They are instructed that while they are doing the task they have to repeat what they are doing. They are also asked to use "The Plan" while they complete the task. When the child successfully completes the tasks set and uses "The Plan", stamps are placed on the front of the On Task Activity book.

The children are asked to recognise how talking out aloud helps guide them through the task they have been given and also helps them to remember it.

The children are then asked if they think that this will help them in the home in the evening? The children tell of tasks that they are asked to do at home, and these are role played. The number of stamps are added up, and if they are greater than 5, a sticker is chosen from several different packets and can be taken home or placed on the cover of the activity book. These stickers are valued by each child and much time is taken

choosing them at the end of each session. All materials are placed into the large container.

At the end of the session, the parents are asked to come in. Before the intervention starts, parents are educated in management styles, in getting their children's attention and on the response cost of the intervention. Parents are also informed about how their parenting styles influence their children's behaviour.

Parents were encouraged to set up a reward system at home for the initial part of the intervention that will allow the child to complete tasks using "The Plan". This reward system is not a response cost. It can be a token economy or a simple reward system.

It is emphasised that it is important not to give more than 3 tasks at any one time, and if possible to limit them to 1 task at a time, and encourage the child to talk out aloud to help to remember and guide them through the task.

SESSION 2 (90 minutes)

Parents are asked into the session and feedback is sought on how the previous day had evolved. The parents are asked if their task giving was successful and if any problems were encountered. The children are asked how the previous day went and if there had been any problems. Problems are discussed from both the parents and child perspectives. **The parents then leave the session.**

"The Plan" is written on the white board and is rehearsed several times overtly.

Each child is addressed by their name and eye contact is made before the clinician gives them a task that involves memorising two components, such as getting the ruler and putting it on the window sill, and getting the egg timer and putting it beside the chair.

The child has to state what the tasks are before commencing the task. Throughout the child is talking overtly through the tasks.

At the successful completion of the tasks, a reward of a stamp is given.

All children are encouraged to try to remember "The Plan". If any child can say "The Plan" overtly without being prompted, this is rewarded with a stamp. Each child is encouraged to write "The Plan" on the white board, with the other children helping where needed.

The children then play the game of standing up and sitting down, which requires them to listen carefully to the clinician's instructions. A game of "Simon says" can also be played, as this requires them to attend to what the clinician is saying but also teaches them about inhibiting impulsive responses.

Introducing "The Child Self Monitoring Checklist"

The children are given the checklist and told about how important it is to monitor and evaluate their own behaviour when they are doing a task.

The checklist is double sided and each side is divided into two. The checklist can be folded down the centre to fit discreetly beside the page of work the child is engaged in.

The checklist is comprised of three columns

- On Task a lot
- On Task a little
- Not on Task

NO	YES (a little)	YES (a lot)

The children are taught how the pencil being tapped will cue them to ask themselves "The Plan". The children are then instructed how to use their checklist to mark whether or not they are on task. The use of the check list after the cue of the tapped pencil is practised until the children fully understand how to use it. Stamps are given as rewards when this is completed.

The clinician instructs the children to open the activity book at the required page number in order to do a task. The clinician explains that this is how the teacher instructs them to do tasks from books in the classroom. It is pointed out that sometimes the teacher uses several instructions, and if they are not attending, they can often hear

incorrectly or not hear at all, and end up not doing the task or doing the wrong task.

They can also cause a disruption in the classroom by asking a friend what the teacher has said. It is pointed out that it is important to tell the teacher if the instructions have not been fully heard.

The first task in the Activity Book that the children are asked to do is on the beginning of the story pages.

- The children are instructed to look at the white board.
- The clinician asks the children to do a task that involves not reading the story, but rather to underline all words that start with t or T.
- They are also asked to underline every word that ends in s.
- They are told that they will be cued with the tapping of a pencil while doing the task, and they will have to say "The Plan" out aloud, and then mark their checklist whether or not they were "on task a lot", "on task a little" or "not on task".

When first asked to do this task, the children are often highly impulsive. It is important to check and double check that they know what is being required of them. Demonstrating may take some time.

Most children will finish in a hasty fashion and it will need to be pointed out that it does not matter who comes first - it is how accurate the work is that is important. This is a complex task for the children to do properly, and most of the session will be taken up in teaching them how to do it. Reference can be made to performance at school work and not following through with the teacher's instructions. The children can practice self statements related to the task, such as "I must underline every T or t that starts a word and I must underline every s that ends a word".

Reward stamps are still given for good attempts and for overtly repeating "The Plan" without having to look at the place it is written and for filling in the check list.

If there is time at the end of the session, giving the children a series of tasks and getting them to talk themselves through the tasks can be done.

At the end of the session, stamps are counted and rewards given. All materials, activity books and check lists are placed into the large container provided.

The parents are called in at the end of the session and it is explained what has been done. Parents are shown the child self monitoring checklists and are given some to take home. It is demonstrated how the check lists are linked to tasks that have been given and shown how they are to be filled in by the child. A reward system in the home can be linked into the on task checklists. Parents are told the importance of calling the child by their name and making eye contact with their child before giving a task. They are taught that if possible not to give tasks while the child is watching a television show, but to wait until the advertisements come before giving instructions.

If the child is given homework from school that evening, the parents are encouraged to use pencil tapping to try to keep the child on task so homework is finished.

Parents are asked to give tasks frequently to encourage "The Plan" being used in the home.

SESSION 3 (90 minutes)

The parents and children are asked to give feedback on the previous day. The child is asked to evaluate how they thought they behaved and if they were on task or not. Any problems are brought up and ways that were used to resolve the problems if any were discussed. **Parents then leave the session.**

The children are given their on task activity books and it is demonstrated how the next task involved them in sorting out words and sentences from an alphabet. This is an intra distraction and adds a degree of difficulty and frustration to a task. Selective and sustained attention are required to be used. It is important to demonstrate task relevant self guiding statements related to what they are doing.

Throughout the structured tasks, the children are cued with pencil tapping, and asked to fill out their checklists. Stamps are given for work well done, but also for being able to say "The Plan" and fill in the checklist.

The next two tasks are similar and they involve the children forming a word from a jumble of numbers, once again, this is an intra distraction task and some children will become frustrated by the task. They will often miss out finding letters in the right sequence. Get them to demonstrate a self statement related to the task they are doing.

A game of "Simon says" or standing up and sitting down can be done at this stage.

The introduction of the "sitting still" task can be done after they have played the previous game. "Sitting still" requires the children to be instructed to sit perfectly still until the egg timer runs through. The children are taught to place their hands on their knees and to self instruct to stay still and quiet. A demonstration of self instructions is important and each child should understand how self instructions can guide their behaviour. The clinician role models the required self instructions. "I must sit quietly

until the egg timer runs out" "If I count my breathing it will help me stay still." "If I count quietly to myself it will help me stay still."

The next tasks are the mazes in the on task activity book. Another activity that requires attention, self guiding talk and frustration control. Some children familiar with mazes will complete them quickly, however most children will experience a degree of difficulty. Demonstrate a positive self statement such as "This is hard, but I know there is a way out, I will try going this way". Throughout it all, the children are cued to check if they are on task and need to fill out the checklist.

It is important to get the children to talk out aloud to themselves to guide their behaviour and help stay on task if the task becomes difficult. Demonstrations of self guiding language can be done to give the children a wider range of strategies to help them overcome frustration levels. Always reward, however if things are not done properly, a full explanation is given but no reward. Every child has to be encouraged and helped when frustration levels get too high.

Introducing "Distractions"

Within the maze tasks, levels of distraction are introduced into the intervention. It was shown, how the clinician would start to try to distract them while they were doing a task. The distractions are initially low, but increase to moderate as the session continues. Distractions include asking about television shows they watch, getting them to look out the window or asking them other questions about school or home. Some children can become upset at being distracted. When this happens get them to talk it through, ask other group members if this is how they feel also. Try to get the group members to say out aloud what it is that they are thinking to themselves when someone

annoys them like this. Point out that what they think influences how they behave and show them how this works by giving a demonstration.

Tasks given in the activity book have a range of difficulty and can be swapped around, depending upon the child's abilities. Throughout all activities the clinician cues the children with a pencil to overtly say the plan and fill in the checklist, and always encourages task relevant self guiding internal language.

The "draw a line slowly" task requires a great deal of impulse control. The clinician demonstrates how the pencil is not to leave the page, that it is to progress steadily from the "x" in one corner to the "x" in the other corner. The egg timer is used and children often finish the line in a hasty fashion. Frustration levels can rise. Point out that they do not have to finish first, but have to finish according to the instructions. This task can be revisited at any stage throughout the intervention.

Getting the children to write "The Plan" on the white board is done where time permits in the session. At all times throughout the session, the saying of "The Plan" is actively encouraged.

Within this session, it will need to be pointed out that the self monitoring has to be accurate, and when asked if they are on task and they are not, having been distracted, the children must mark whether they were not on task at all, or whether it was a little on task. This is often quite hard for them to do, as there can be competition between members of the group. Therefore, it needs to be fully explained that they are here to learn how to stay on task against all distractions, and that they must be honest with evaluating themselves.

At the end of the session, stamps are counted and reward stickers given. Parents are then invited in and are encouraged to set appropriate tasks for the children to do at

home. It is reinforced how important it is to gain eye contact when giving a task and not to set more than 3 tasks at any one time. The parents are reminded to help cue their children and give them feedback on how well they are doing. Parents are also reminded that praise has a positive effect on behaviours their children exhibit. The parents are asked what distractions their children often could not ignore. The parents were told to encourage the child to learn to ignore and reward them when successful.

SESSION 4 (90 minutes)

Parents and children are asked how the previous day was and how the child handled the tasks that were being given. The parents are asked about any problems that had been encountered. The children and parents are actively encouraged to discuss these problems and options discussed on how to overcome them. The children's involvement is very important, as they are learning how to evaluate their own behaviour, but also how others evaluate their behaviour. **The parents then leave the session.**

"The Plan" is rehearsed and the children are all asked if they think that "The Plan" is helping them stay on task. They are asked what is happening at school and if being aware of being on task or off task was making any difference to the way they did their work.

The children are given the on task activity book, and the task of doing the underlining was set again.

The children often do not like this task and this induces some frustration. It must be pointed out that they are often asked to do things that they do not like doing, however, it is important that they learn to do it. The use of self guiding language once again is brought up and the children are asked to come up with some statements that they think will help them stay on task and to help them over their frustration when given a task that they do not like or find difficult to do.

If they do not like doing the task, ask them to tell about other things they do not like doing. Get them to tell everyone what they are saying to themselves when they do tasks they do not like. This gives the children more understanding of how what they are thinking impacts how they behave.

The clinician then asks the children how important it is to do some tasks even though they do not like doing it, especially in the classroom. Once again the clinician must point out what happens when they do not complete classroom tasks and start to fall behind with their classroom work.

A game of "sitting still" is done and self statements used to guide their behaviour are encouraged. The children are allowed to say these statements quietly to themselves if they feel that saying them silently is not helping them.

A game of "Simon says" or standing up and sitting down can be done at this stage also.

A variety of tasks can be done from the on task activity book. The tasks given will depend upon the child's age and ability. At all times the same activities from the on task activity book must be given to each child in the group. Each child is instructed to turn to the numbered page containing the task to be done. Always check that each child is on the right page before commencing. Get the children to repeat the instruction out aloud to reinforce the instruction. A full explanation of the requirements of that particular activity must always be given and the children are actively encouraged to repeat the task they have been given.

At this the clinician is being a distracter as well as a cuer.

The checklist needs to be filled out every time the clinician cues the child. Often the child will be absorbed in what they are doing and will need to be reminded to stop and ask themselves "The Plan" and then fill out the checklist.

The next part of the session involves the children being taught to say "The Plan" covertly. This can be taught by taking time out to get them to close their eyes and move there lips but inhibit the sound. This is done throughout the session, until they have

mastered how to do it. At times, a task can be set for each group member to write "The Plan" on the white board, while the other children are finishing activities in the book.

Towards the end of the session, each child can have a turn of being a distracter as well as a cuer. What is being asked of the children must be explained in full.

Care must be taken in giving the distracter role.

Strict boundaries must be given of what is acceptable and what is not an acceptable form of distracting the other group members. Frustration levels of some children will rise, especially if they are doing an activity they enjoy or is requiring a lot of mental effort on their part.

The children are all asked what it is like being distracted by other children, and what strategies they use to stop themselves becoming distracted. If they became annoyed with the child distracting them, it is important to get them to say out aloud what they were saying to themselves. This gives the children insight and helps them see how what they say affects them.

Stamps are counted and rewarded with stickers where appropriate.

Parents are once again encouraged to give tasks at home and now asked to get the child to evaluate how well they carried out the task, if they did the task. If the task was done poorly or not at all, the parents are asked to sit quietly with the child and get the child to say why the tasks were not done or not done properly.

SESSION 5 (90 minutes)

Parents and children meet again and the previous day's behaviour is discussed. How the children were at evaluating their own behaviour is discussed. Problems are discussed and options on resolving them explored. A strategy is agreed upon that might overcome the problems being experienced. **Parents then leave the session.**

The number of tasks the children are required to do are increased in this session. The clinician demonstrates how to do two tasks using the plan covertly to remember what has to be done.

The children are asked if they can see how important it is to repeat directions to remember what is to be done.

When they have mastered how to do two tasks, they are asked to reverse the order of the tasks that they have just done.

The clinician demonstrates how this is to be done, by using self statements. "My task is to place the ruler on the window sill and my task is to place the soft toy by the door".

Clinician then starts the task, saying what the task is while doing the task. "My task is to place the ruler on the window sill and my task is to place the soft toy by the door".

The clinician then does the tasks in reverse using a self statement. "My task is to get the soft toy from beside the door and place it back where I got it from and my task is to get the ruler from the window sill and place it back where I got it from"

Each child is then told to do two tasks, and then to reverse the tasks. They have to say what the tasks are that they have been told to do before doing the task, then, while they carry out the tasks, they are to use the self statements to guide them.

Stamps are given for successful learning.

When this has been achieved, the tasks are then increased to three. The clinician shows how to do three tasks, using the self talk to guide them to remember what is to be done. This can take some time for them to remember to self talk effectively through the reverse stage of the tasks.

The clinician can at all times show how it is done and encourage the child to do it.

The clinician points out constantly how effective self talk is in helping to remember.

The clinician can then introduce distractions when the child is carrying out the three tasks, once again pointing out how easy it is to be distracted, but how to continue to self guide by talking themselves through the tasks.

This is done throughout the final session.

Tasks from the on task activity book can be done with the clinician distracting and cuing the children. Tasks are always given the same way. Always state clearly what the task is and on what page it is to be found. A full explanation of the tasks must be given and feedback from the children is always obtained in order to see if they fully understood the instructions for the task. It is always shown to the children that if they do not understand, they are to ask the clinician for instructions again. This helps the child in the classroom by recognising that if they do not hear the instructions, they can always ask the teacher. The cuing is monitored and evaluated with the on task checklist and stamps given for on task behaviours.

An activity of threading beads which are differently shaped and coloured onto a line is explained. The children have to follow a set pattern of threading the beads. One of the patterns can be that the colour order has to be the same, but the shape does not matter. Therefore, a red bead is followed by a blue bead, which is followed by a green bead and finally a yellow bead is added before the sequence is started again. In another pattern,

no similar shapes can be used together. These activities encourage a child to sustain attention and facilitate self guiding speech.

1 The children are now shown the teacher/student matching checklist.

Introducing the "Teacher/Student Matching Checklist

It is explained how the teacher/student matching checklist is to be used in the classroom. It is explained that at the end of each day, the teacher will give them the teacher/student matching checklist and ask them to fill out how they thought they were behaving in class and staying on task. The numbering system on the teacher/student matching checklist is fully explained.

The children are then shown where the teacher will evaluate their classroom behaviour. The questions that the teacher has to fill in are the same questions the child has filled in. It is shown that it is important that the teacher's evaluation of the children's behaviour be as close to their own evaluation as possible. It is shown how they can sometimes forget that they were off task or were distracting others in the classroom.

They are then taught to understand the scoring system on the student/teacher evaluation checklist.

Behaviours that score 3, 4 or 5 from the teacher allow them to do the valued activity.

However, 1 and 2 from the teacher means that they will not be able to do the valued activity.

The children must be made aware of how the teacher/student matching checklist works and are tied into a response cost. It is explained that their parents will be following through with the response cost when they see what scores are on the teacher/student matching check list that is brought home from school each day.

They are reminded that in the first session they talked about what it was that they liked to do most after school.

The children are asked again what it is they most value to do in the afternoon after school. This can be a favourite television program or riding their bike with friends. Again, it is shown that when they take the teacher/student matching checklist home, the response cost will mean that they are rewarded by being allowed the activity or punished by loss of the activity.

The parents are then brought into the session. As the intervention aims and goals have been fully explained to the parents before the children commenced the intervention, the parents will have had exposure to the teacher/student matching checklist and been instructed on their role with the response cost. However, it may need to be gone over again with the children and parents to make sure it is understood by all parties. At this stage an agreement or contract is made between parents and children on what activity is to be rewarded or lost dependant on the teacher/student matching checklist scores.

Parents are asked to call if problems arise or they are unsure of what to do. An appointment is made for 1 month later for a booster session of the intervention. Parents are told to try to keep a diary of both the good things that are being done and where any problems occur. Final rewards are given and the initial program has finished.

BOOSTER SESSIONS OF THE MULTIMODAL AND SYSTEMIC INTERVENTION

Large container

Leaders manual of "On Task" Multimodal and Systemic Intervention

On Task Activity Books for each group (4-5)	4 white board markers
6 plain lead pencils	5 packets of coloured pencils
5 rubbers	5 pencil sharpeners
5 rulers	4 different soft toys
1 plastic cup	1 egg timer without a bell
5 lengths of string or fishing line	container of assorted beads
6 novelty stamps and stamp pad	packet of current stickers
16 on task check lists	16 student/teacher checklists
blank pieces of paper that can be written upon	
5 folders	

SESSIONS 1-9 (90 minutes each)

Each booster session is similar to the session outlined below. The clinician adapts the session depending upon the problems experienced by parents, teachers and children in the past month. Feedback is sought from parents, teachers and children and strategies and options are discussed and decided upon.

The session begins with parents and children talking about how the previous month has been since the initial intervention. The children's self monitoring checklists and the teacher/student matching checklists are examined. The parents are asked about how well the response cost has been working and the problems that have been encountered with its use. If there have been problems, strategies to overcome these problems are discussed and options chosen to be used over the next month are agreed upon. At all times, the child has to be involved in these discussions, as it teaches the child how others see their behaviours. The child learns valuable lessons in monitoring and evaluating their own behaviour.

Feedback from the teacher is also discussed. The child is asked how school has been. Strategies to overcome problems experienced at school are discussed and the child is asked how these would help them stay on task and complete work given in the classroom. **Parents leave after full feedback has been given.**

The children are asked how the internal self talk has been guiding their behaviour. They are asked if they find it helpful to guide themselves by their language. If they are having problems, these are discussed and ways of overcoming the problems experienced are examined.

Each child is given back the folder that they were given in the initial intervention, and the on task activity book is used again. Throughout the session, stamps are rewarded for on task behaviour and tasks completed well. Stickers are given out at the end of session for 5 or more stamps.

The children are asked to recite "The Plan" and write it on the white board. They are asked how successful they think this has been in keeping them on task.

The children are asked to demonstrate some self guiding statements that they use both at home and at school to keep them on task or to help them overcome the frustration of not being able to do tasks.

The children are asked if they were distracting other students in the classroom. If they had been, reasons are asked for. If the children have been distracting others, they are asked how they would be able to stop themselves from doing this. They are also asked if they got into trouble when they distracted others, and whether or not they liked getting into trouble. The children are asked to demonstrate self guiding statements that related to them trying not to distract others in the classroom.

The children are also asked how they ignored distractions within the classroom. They are asked if they use self guiding statements to help them ignore the distractions. If they had been unsuccessful at doing this, ways of using self statements are rehearsed.

The importance of self guiding statements, the monitoring and evaluation of behaviour is stressed throughout the sessions. The children are always asked how these skills are helping them and if there are other ways they have of helping them stay on task and ignore distractions.

Tasks from the activity book such as the underlining are done.

The games of "Simon says," "sitting still" and "standing up and sitting down" are done where the clinician thinks they are suitable.

The bead activity can also be done.

Ways of getting the children to be distracters for the other group members is done. One task can be getting a child to say the ABC, and another child distracting by saying numbers or odd alphabet letters. The child being distracted is told to focus on doing the task. At the completion of the task, the ways the child had of ignoring being distracted are asked for. Each child has a turn at being a distracter as well as doing the task.

Other distracter tasks can be two children talking about television programs, cards collected, holidays, what sort of bike they have or food that they really like. These distractions can be taking place while another two children have been told to draw a line slowly, taking 2 minutes to do it, or a maze, or a maths task. Always at the end of the tasks, ask the children how they managed to ignore the distractions and also how they felt being distracted.

The sessions are drawn to a close with the self monitoring checklist and the teacher/student matching checklist given out.

The parents are invited in and the Academic Performance Rating Scale is given to them. Parents are told what happened in the session. They are also told that if they have problems they can telephone so they can be discussed. An appointment is made for the following month.

APPENDIX L

ON TASK ACTIVITY BOOK

ON TASK ACTIVITY BOOK

BELONGS TO:

THE PLAN

WHAT IS MY TASK?

AM I ON TASK?

AM I IGNORING OTHERS?

I MUST STAY ON TASK UNTIL I HAVE FINISHED.

COMPILED BY: EVELYN GOODISON-FARNSWORTH.

LITTLE RED RIDING HOOD AND THE WOLF

As soon as Wolf began to feel
That he would like a decent meal,
He went and knocked on Grandma's door.
When Grandma opened it, she saw
The sharp white teeth, the horrid grin,
And Wolfie said, 'May I come in?'
Poor Grandmamma was terrified,
'He's going to eat me up!' she cried.
And she was absolutely right.
He ate her up in one big bite.
But Grandmamma was small and tough.
And Wolfie wailed, 'That's not enough!
'I haven't yet begun to feel
'That I have had a decent meal!'
He ran around the kitchen yelping,
'I've got to have another helping!
Then added with a frightful leer,
'I'm therefore going to wait right here
'Till Little Miss Red Riding Hood
'Comes home from walking in the wood.'
He quickly put on Grandma's clothes,
(Of course he hadn't eaten those.)



He dressed himself in coat and hat.
He put on shoes and after that
He even brushed and curled his hair.
Then sat himself in Grandma's chair.
In came the little girl in red.
She stopped. She stared. And then she said.
'What great big ears you have, Grandma.'
'All the better to hear you with,' the Wolf replied.
'What great big eyes you have, Grandma.'
said Little Red Riding Hood.
'All the better to see you with,' the Wolf replied.
He sat there watching her and smiled.
He thought. I'm going to eat this child.
Compared with her old Grandmamma
She's going to taste like caviare.
Then Little Red Riding Hood said. *'But Grandma,
what a lovely great big furry coat you have on.'*

'That's wrong!' cried Wolf. 'Have you forgot
'To tell me what BIG TEETH I've got?
'Ah well, no matter what you say,
'I'm going to eat you anyway.'
The small girl smiles. One eyelid flickers.
She whips a pistol from her knickers.
She aims it at the creature's head
And *bang bang bang*, she shoots him dead.
A few weeks later, in the wood,
I came across Miss Riding Hood.
But what a change! No cloak of red,
No silly hood upon her head.
She said, 'Hello, and do please note
'My lovely furry WOLFSKIN COAT.'



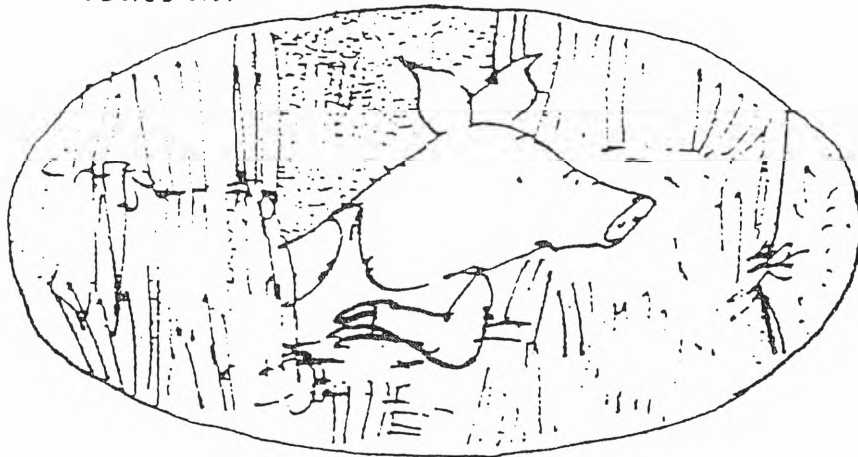
THE THREE LITTLE PIGS

The animal I really dig
Above all others is the pig.
Pigs are noble. Pigs are clever.
Pigs are courteous. However,
Now and then, to break this rule.
One meets a pig who is a fool.
What, for example, would you say
If strolling through the woods one day,
Right there in front of you you saw
A pig who'd built his house of STRAW?
The Wolf who saw it licked his lips. -
And said, 'That pig has had his chips.'

'Little pig, little pig, let me come in.'

'No, no, by the hairs on my chinny-chin-chin!'

*'Then I'll huff and I'll puff and I'll blow your
house in!'*



The little pig began to pray,
But Wolfie blew his house away.
He shouted, 'Bacon, pork and ham!
'Oh, what a lucky Wolf I am!'
And though he ate the pig quite fast,
He carefully kept the tail till last.
Wolf wandered on, a trifle bloated.
Surprise, surprise, for soon he noted
Another little house for pigs,
And this one had been built of TWIGS!

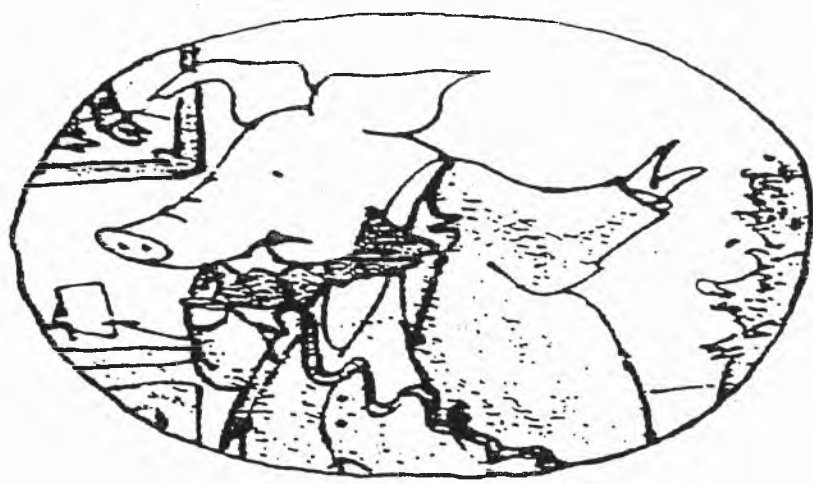
*'Little pig, little pig, let me come in!'
'No, no, by the hairs of my chinny-chin-chin!'
'Then I'll huff and I'll puff and I'll blow your
house in.'*

The Wolf said, 'Okay, here we go.'
He then began to blow and blow.
The little pig began to squeal.
He cried, 'Oh Wolf, you've had *one* meal!
'Why can't we talk and make a deal?'
The Wolf replied, 'Not on your nelly!'
And soon the pig was in his belly.
'Two juicy little pigs!' Wolf cried.
'But still I am not satisfied!
'I know full well my Tummy's bulging,
'But oh, how I adore indulging.'



So creeping quietly as a mouse.
The Wolf approached another house,
A house which also had inside
A little piggy trying to hide.
But this one, Piggy Number Three,
Was bright and brainy as could be.
No straw for him, no twigs or sticks.
This pig had built his house of BRICKS.
'You'll not get *me!*' the Piggy cried.
'I'll blow you down!' the Wolf replied.
'You'll need,' Pig said, 'a lot of puff,
'And I don't think you've got enough.'
Wolf huffed and puffed and blew and blew.
The house stayed up as good as new.
'If I can't blow it *down!*' Wolf said,
'I'll have to blow it *up* instead.
'I'll come back in the dead of night
'And blow it up with dynamite.'
Pig cried, 'You brute! I might have known!'
Then, picking up the the telephone,
He dialled as quickly as he could
The number of Red Riding Hood.





'Hello,' she said. 'Who's speaking? *Who?*'
'Oh, hello Piggy, how d'you do?'
Pig cried, 'I need your help, Miss Hood!
'Oh help me, please! D'you think you could?'
'I'll try, of course,' Miss Hood replied.
'What's on your mind?' . . . 'A *Wolf!*' Pig cried.
'I know you've dealt with wolves before.
'And now I've got one at my door.'
'My darling Pig,' she said, 'my sweet,
'That's something *really* up my street.
'I've just begun to wash my hair.
'But when it's dry, I'll be right there.'
A short while later, through the wood,
Came striding brave Miss Riding Hood.
The Wolf stood there, his eyes ablaze
And yellowish, like mayonnaise.
His teeth were sharp, his gums were raw,
And spit was dripping from his jaw.

Once more the maiden's eyelid flickers.
She draws the pistol from her knickers.
Once more, she hits the vital spot,
And kills him with a single shot.
Pig, peeping through the window, stood
And yelled, 'Well done, Miss Riding Hood!'
Ah, Piglet, you must never trust
Young ladies from the upper crust.
For now, Miss Riding Hood, one notes,
Not only has *two* wolfskin coats,
But when she goes from place to place,
She has a PIGSKIN TRAVELLING CASE.

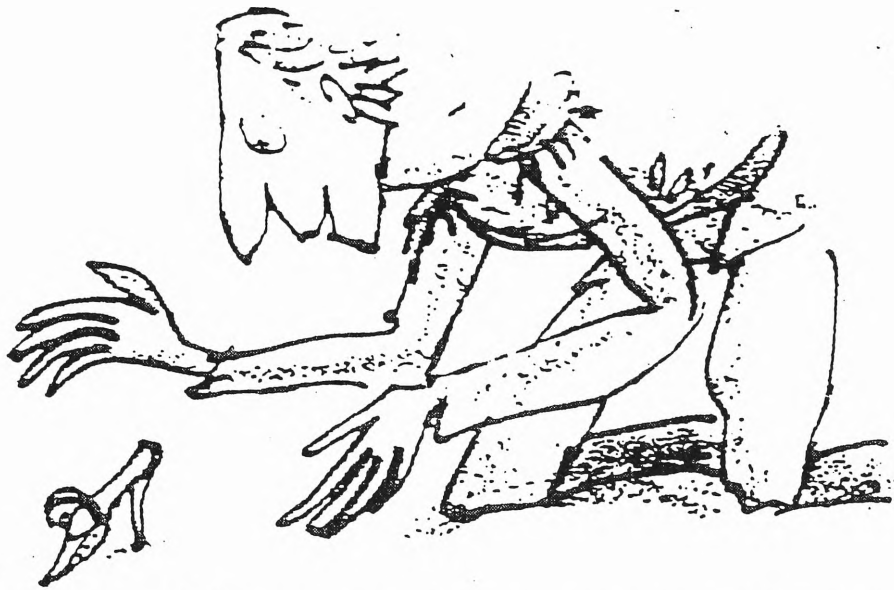


CINDERELLA

I guess you think you know this story.
You don't. The real one's much more gory.
The phoney one, the one you know,
Was cooked up years and years ago,
And made to sound all soft and sappy
Just to keep the children happy.
Mind you, they got the first bit right,
The bit where, in the dead of night,
The Ugly Sisters, jewels and all,
Departed for the Palace Ball.
While darling little Cinderella
Was locked up in a slimy cellar,
Where rats who wanted things to eat,
Began to nibble at her feet.

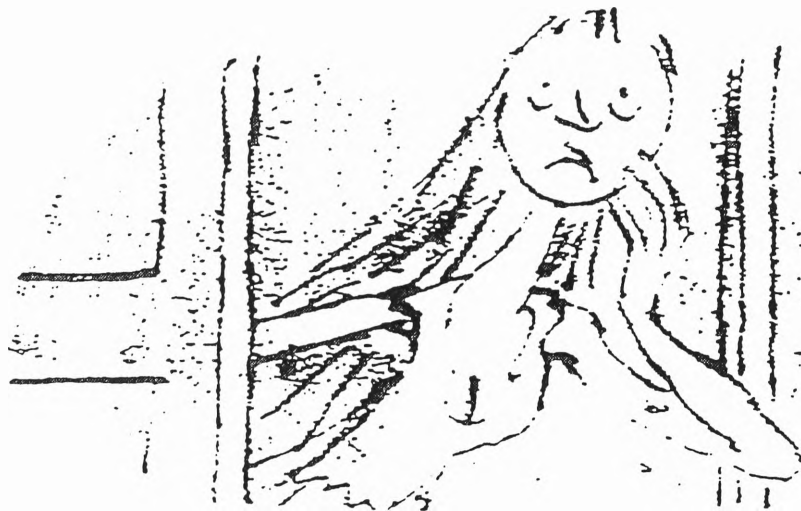


She bellowed 'Help!' and 'Let me out!'
The Magic Fairy heard her shout.
Appearing in a blaze of light.
She said, 'My dear, are you all right?'
'*All right?*' cried Cindy. 'Can't you see
'I feel as rotten as can be!
She beat her fist against the wall,
And shouted, 'Get me to the Ball!
'There is a Disco at the Palace!
'The rest have gone and I am jealous!
'I want a dress! I want a coach!
'And earrings and a diamond brooch!
'And silver slippers, two of those!
'And lovely nylon panty-hose!
'Done up like that I'll guarantee
'The handsome Prince will fall for me!
The Fairy said, 'Hang on a tick.'
She gave her wand a mighty flick
And quickly, in no time at all,
Cindy was at the Palace Ball!
It made the Ugly Sisters wince
To see her dancing with the Prince.
She held him very tight and pressed
herself against his manly chest.
The Prince himself was turned to pulp,
All *he* could do was gasp and gulp.



Then midnight struck. She shouted, 'Heck!
'I've got to run to save my neck!
The Prince cried, 'No! Alas! Alack!
He grabbed her dress to hold her back.
As Cindy shouted, 'Let me go!
The dress was ripped from head to toe.
She ran out in her underwear,
And lost one slipper on the stair.
The Prince was on it like a dart,
He pressed it to his pounding heart.
'The girl this slipper fits,' he cried,
'Tomorrow morn shall be my bride!
'I'll visit every house in town
'Until I've tracked the maiden down.'
Then rather carelessly, I fear,
He placed it on a crate of beer.
At once, one of the Ugly Sisters,
(The one whose face was blotched with blisters)
Sneaked up and grabbed the dainty shoe,
And quickly flushed it down the loo.

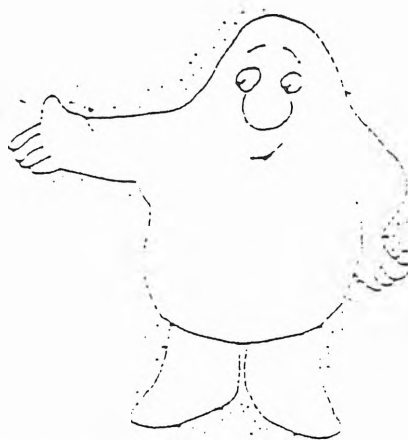
'There's no way you can back out now!'
'Off with her head!' The Prince roared back.
They chopped it off with one big whack.
This pleased the Prince. He smiled and said,
'She's prettier without her head.'
Then up came Sister Number Two,
Who yelled, 'Now I will try the shoe!'
'Try this instead!' the Prince yelled back.
He swung his trusty sword and *smack* –
Her head went crashing to the ground.
It bounced a bit and rolled around:
In the kitchen, peeling spuds.
Cinderella heard the thuds
Of bouncing heads upon the floor.
And poked her own head round the door.
'What's all the racket?' Cindy cried.
'Mind your own bizz,' the Prince replied.
Poor Cindy's heart was torn to shreds.
My Prince! she thought. He chops off *heads*!



NUMBER TUMBLE

INSTRUCTIONS

Read each line of the number jumble as if it were a page in a book. Hidden among the numbers are letters. To find the mystery word, write the letters down in the order that you find them. I and O are letters not numbers.



START
HERE



6 2 3 4 C 7 5 6 2 3 8 9 9 5 8 4 5 6 3 7 4 8 5 2 6 9 7 8 4 6 8 4 3 5 2 3 7 9 5
3 8 3 3 2 8 7 O 9 4 5 3 2 9 3 5 7 5 6 8 2 3 5 4 7 5 9 N 2 8 5 3 4 2 5 4 9 C 3
2 6 5 4 E 8 5 6 8 5 N 7 9 8 2 3 6 5 9 4 5 9 6 3 7 8 3 7 2 4 5 8 2 6 5 4 3 8 7
5 9 3 6 8 8 4 5 2 T 8 7 5 6 9 8 R 3 7 5 8 9 A 3 7 6 2 5 T 8 4 2 9 3 5 2 4 5 8 6
5 9 4 3 7 4 5 6 2 8 4 5 8 9 I 9 5 8 4 3 2 5 5 9 9 5 9 6 8 7 9 4 O 3 8 4 5 3 2 6
6 7 4 8 5 2 6 9 7 8 4 6 8 4 3 N 5 2 3 7 9 5 6 2 3 4 8 7 5 6 2 3 8 9 9 5 8 4

The Word Is:

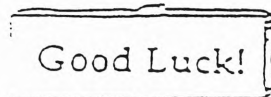
NUMBER JUMBLE

INSTRUCTIONS

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Good Luck!

Good Luck!



START
HERE



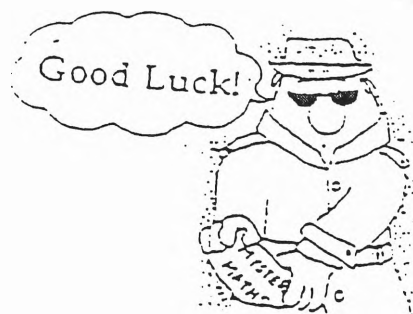
6 2 3 4 8 7 5 6 2 3 8 9 9 5 8 4 5 6 3 7 4 8 5 2 6 9 7 8 4 6 8 4 3 5 2 3 7 9 5
3 8 3 3 2 8 7 0 9 4 5 3 2 9 3 5 7 5 6 8 2 3 5 4 7 5 9 N 2 8 5 3 4 2 5 4 8 T
2 6 5 4 A 8 5 6 8 5 4 7 9 8 2 3 6 5 9 4 5 9 6 3 7 8 3 7 2 4 5 8 2 6 5 4 3 3
5 9 3 6 8 S 4 5 2 K 8 T 5 6 9 8 R 3 7 5 8 9 A 3 7 6 2 5 I 8 4 2 N 3 5 2 4 5
5 9 4 3 7 4 5 6 2 8 4 5 8 9 I 9 5 8 4 3 2 5 5 9 9 5 9 6 8 7 N 4 3 9 4 5 2 6 6
4 8 5 2 6 9 7 8 4 6 8 4 3 5 2 3 7 9 5 6 2 G 4 8 7 5 6 2 3 8 9 9 5 8 4 5 6 3 8

The Word Is:

DECODING MESSAGES

INSTRUCTIONS

Decode this message by changing each letter into the one which comes before it in the alphabet. For example change Z into Y and Q into P.



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

J B N I O W P M W F E J O

B O P O - U B T L U S B J O J O H

Q S P H S B N . J I B W F

M F B S O U B O

P O - U B T L Q M B O

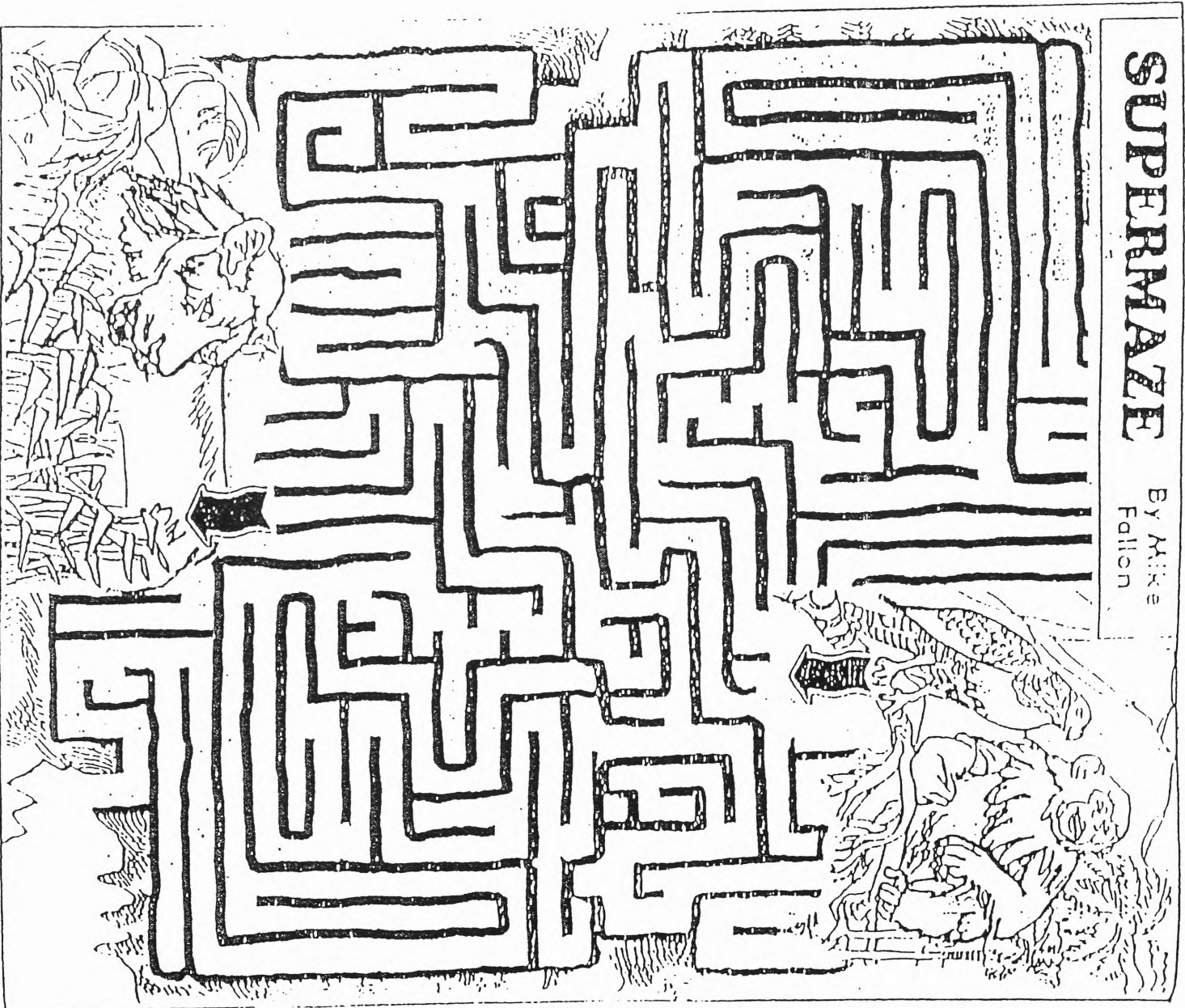
U I B U

X J M M J N Q S P W F

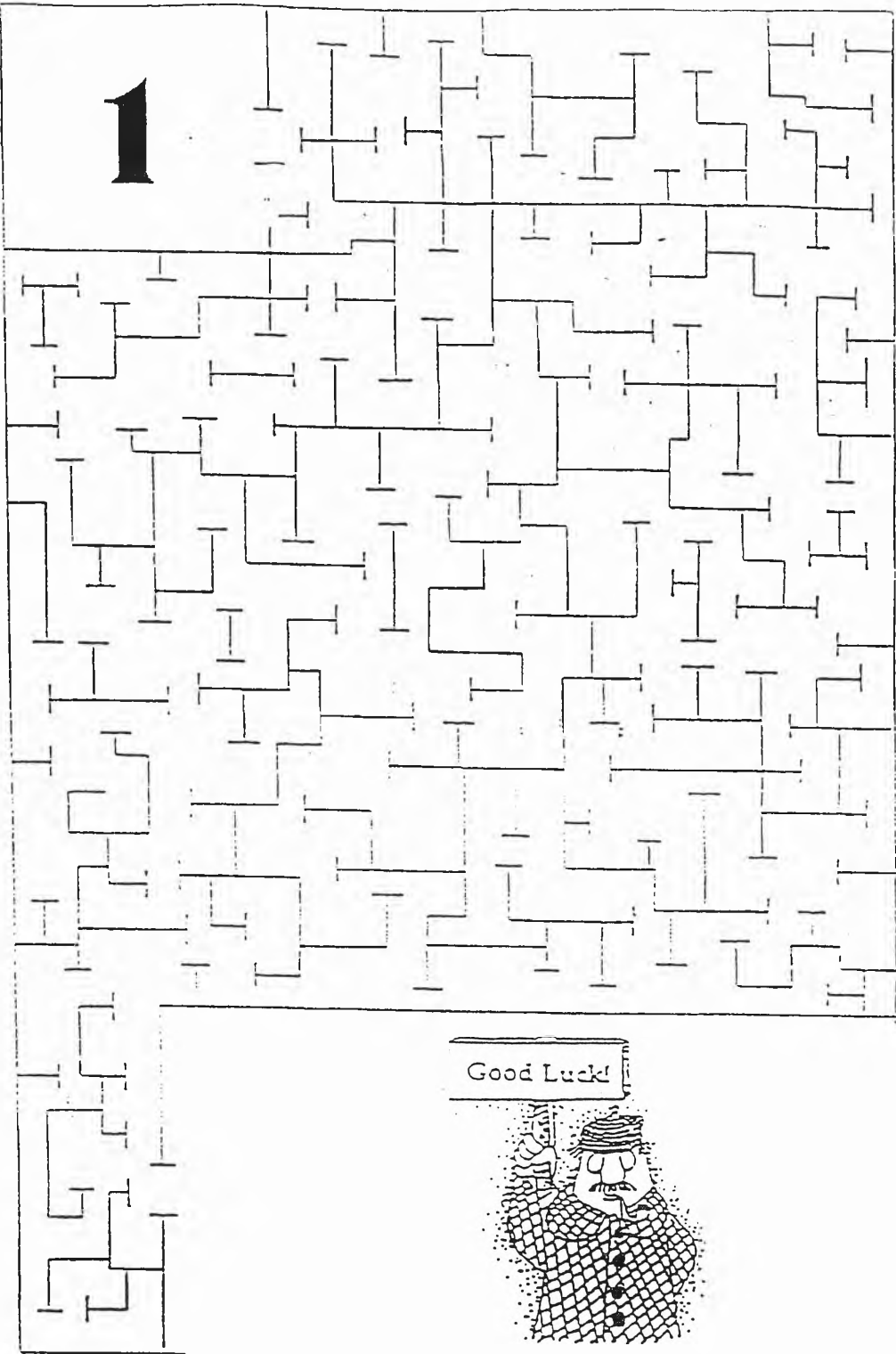
N Z D P O D F O U S B U J P O

SUPERMAZE

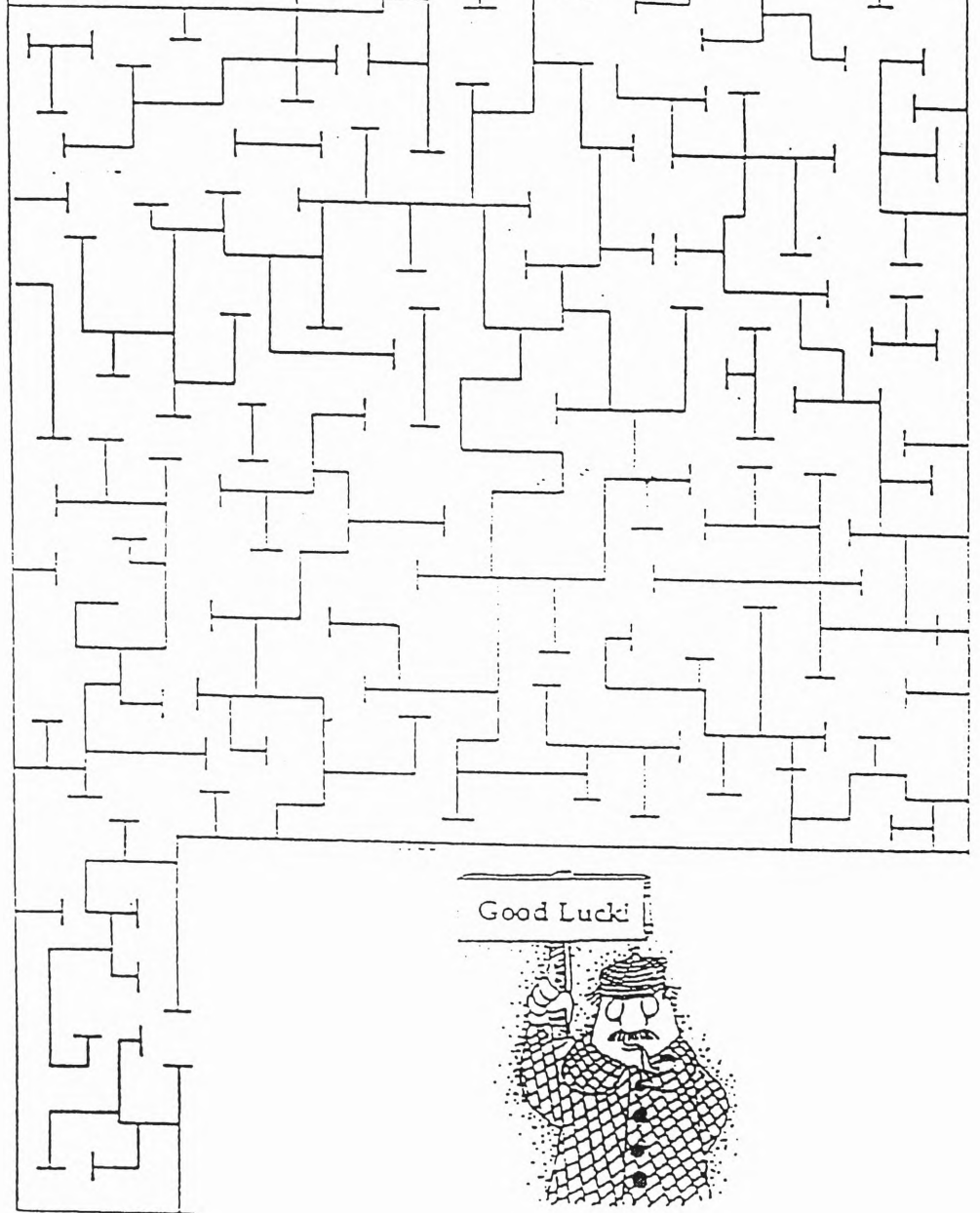
By Mike
Folton



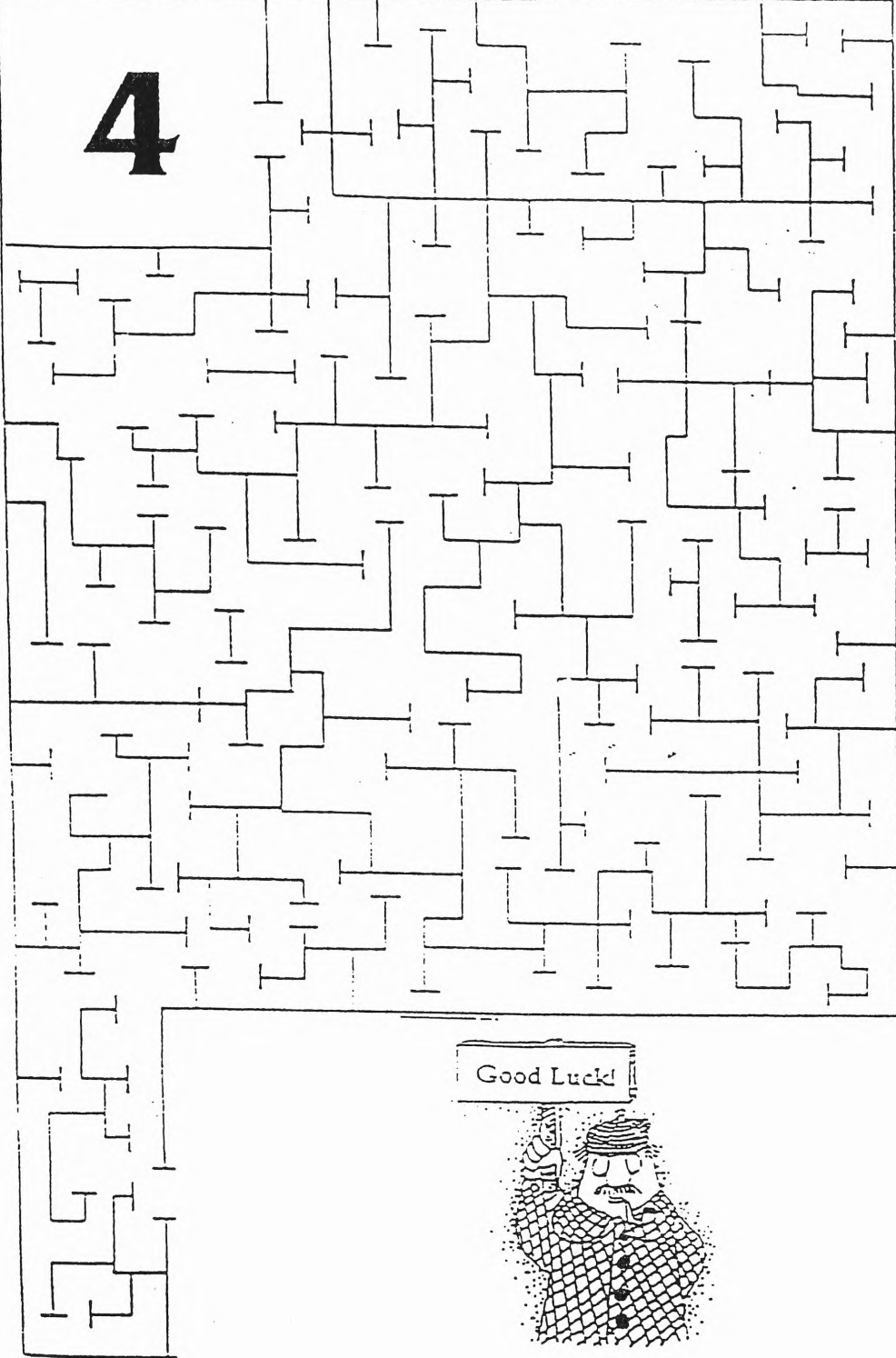
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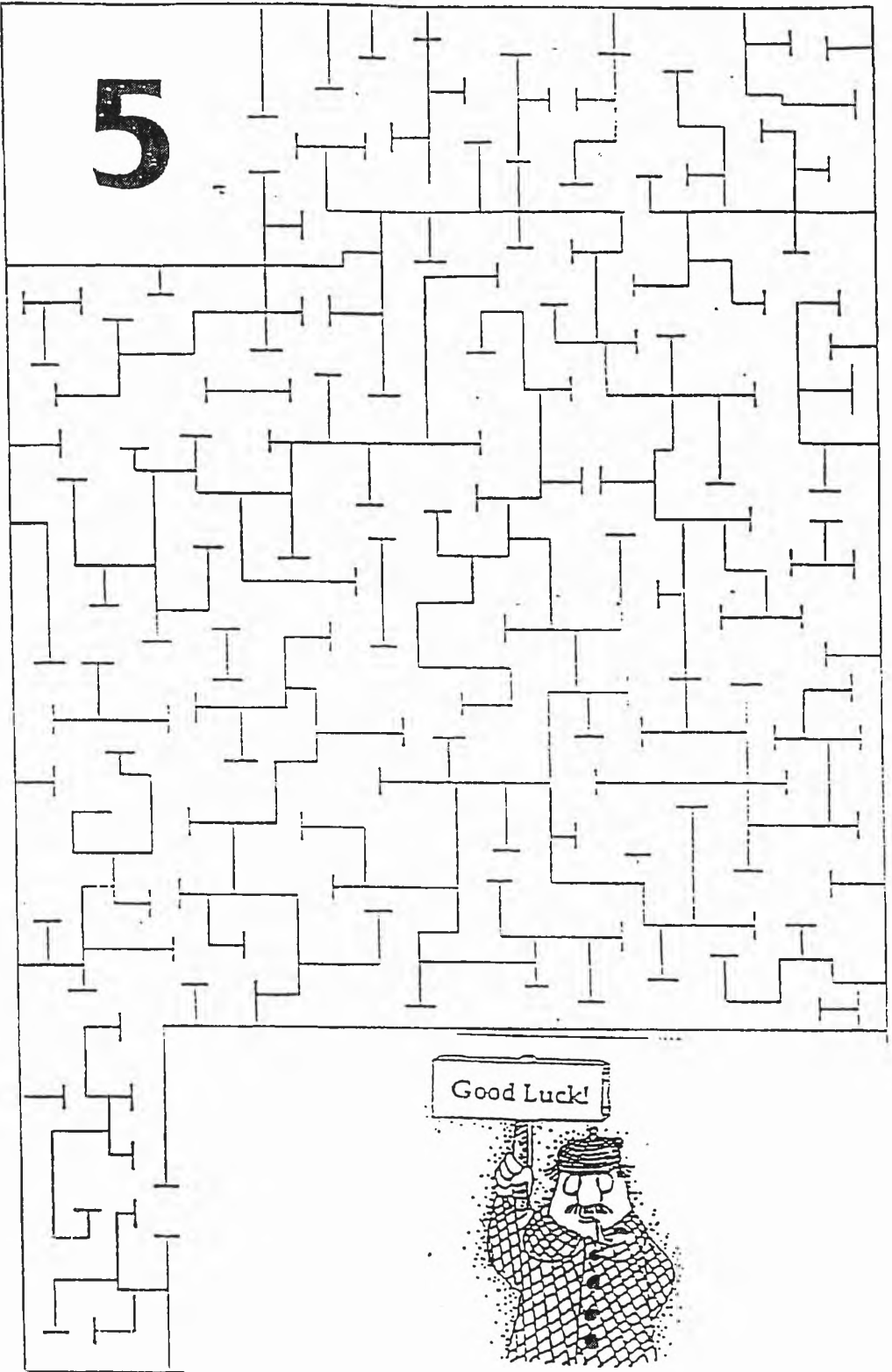
2



4



5



DRAW A LINE SLOWLY TASK

X

X

DRAW A LINE SLOWLY TASK

X

X

DRAW A LINE SLOWLY TASK

X

X

DRAW A LINE SLOWLY TASK

X

DRAW A LINE SLOWLY TASK

X

X

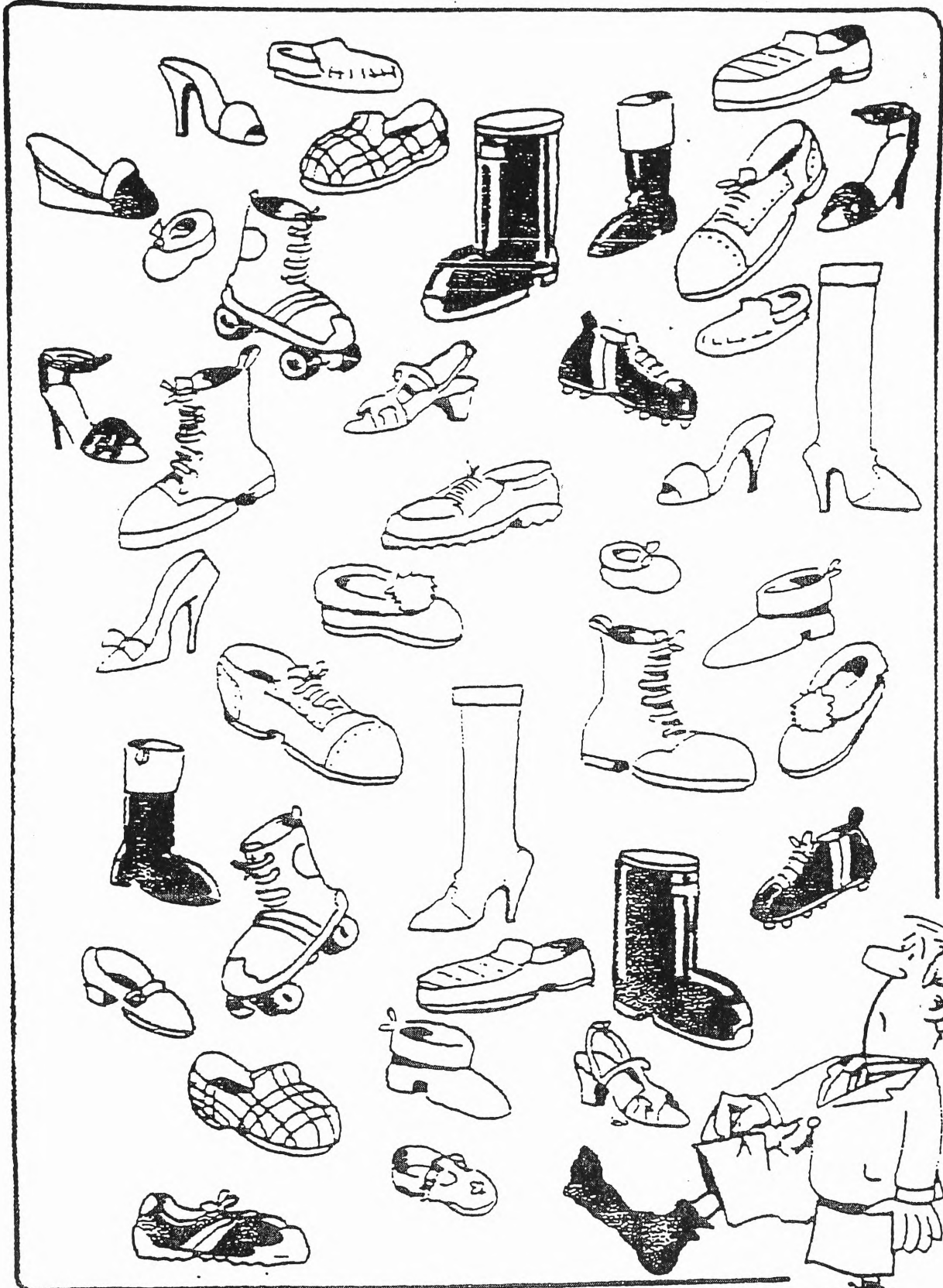
DRAW A LINE SLOWLY TASK

X

X

SHOE SHUFFLE

Count how many pairs and how many odd items of footwear are in this picture.



Snowed under!



Basil, the born loser, is starting to wish he hadn't suggested a snowball fight. Exactly how many snowballs has he been hit by?

Complete the numbers in this rectangle.

1	2	3	4	5	6	7	8	9
11	12	13	14	15	16	17	18	19
21	22	23	24	25	26	27	28	29
31	32	33	34	35	36	37	38	39
41	42	43	44	45	46	47	48	49
51	52	53	54	55	56	57	58	59
61	62	63	64	65	66	67	68	69
71	72	73	74	75	76	77	78	79
81	82	83	84	85	86	87	88	89
91	92	93	94	95	96	97	98	99



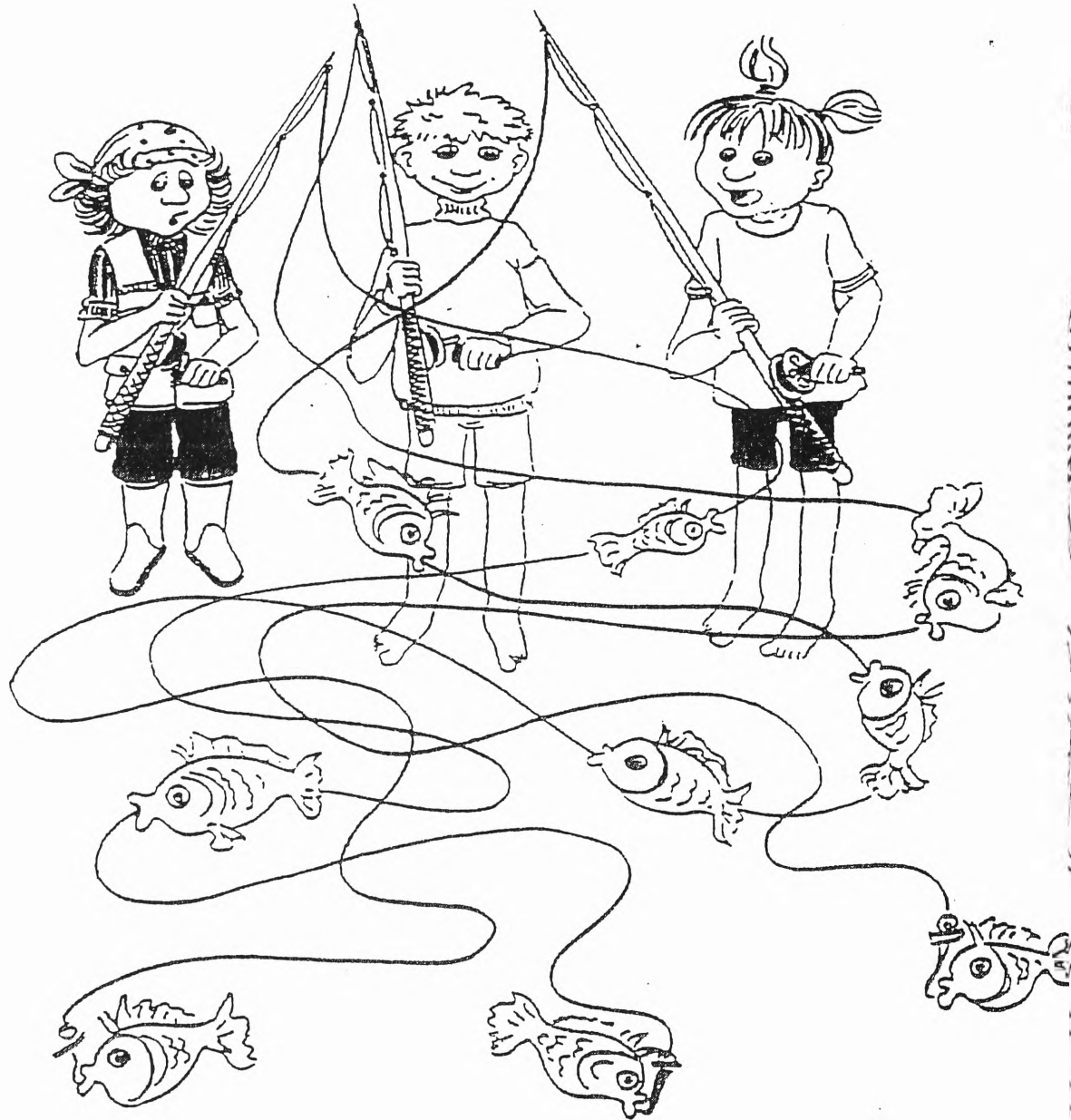
Follow the Lines

Two girls and a boy went fishing. Follow each of their lines and count the fish they caught.

Jan

Jim

Sue



Jan caught _____

Jim caught _____

Sue caught _____

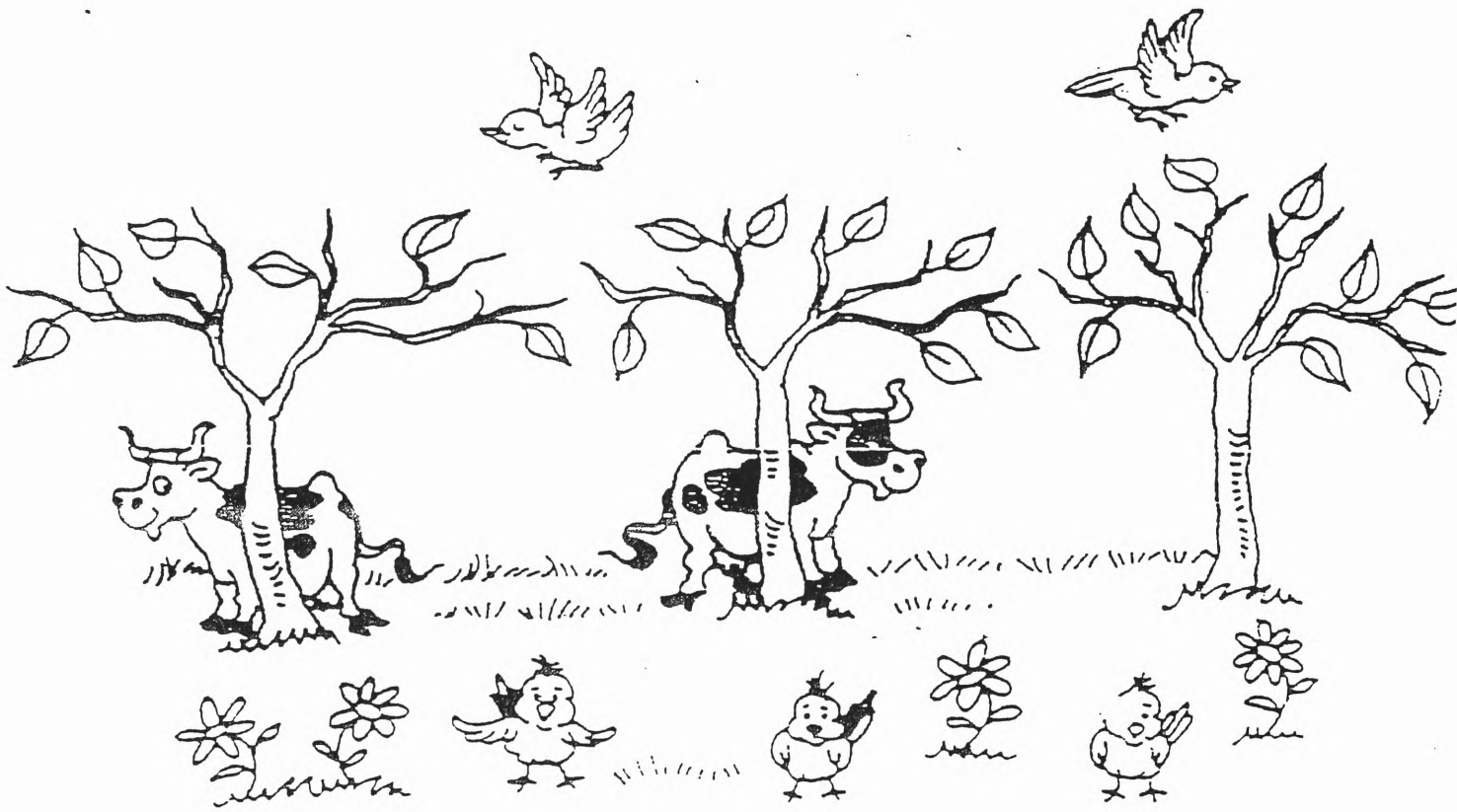


LACE TRACE

Tom and Tina have got in a terrible tangle. Can you find out which two of the lettered laces belong to each of them?



Answer the questions which relate to the picture.



- A How many leaves are on the left-hand tree? _____
- B How many leaves are on the middle tree? _____
- C How many animals are behind the trees? _____
- D How many flowers are in front of the trees? _____
- E How many birds are above the trees? _____
- F How many birds are in front of the trees? _____



Match the Figure

Look at the figure on the left. Then look to the right and find the same figure. Circle the letter next to it.

1



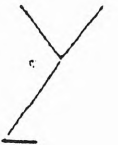
a



b



c



2



a



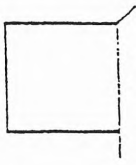
b



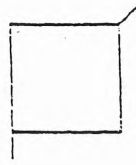
c



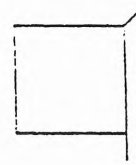
3



a



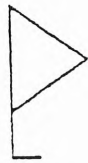
b



c



4



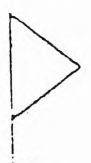
a



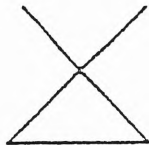
b



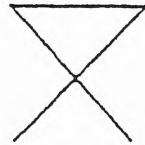
c



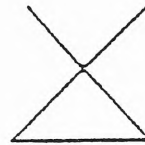
5



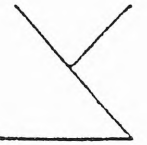
a



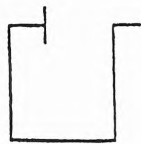
b



c



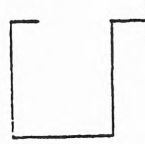
6



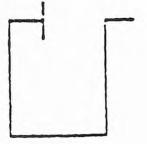
a



b



c

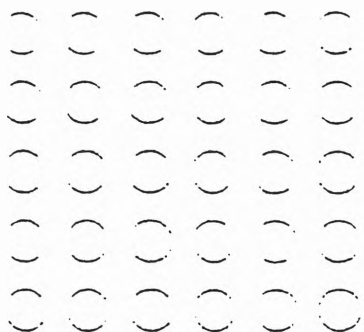


SCORE
6

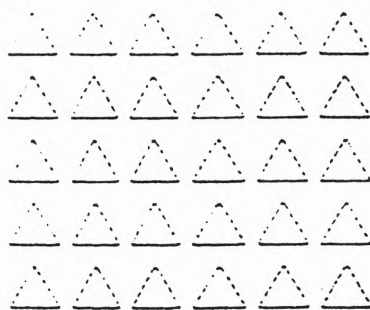
Counting—Rows of Shapes

Colour the correct amount in each group. Use one complete row of shapes each time you colour. If the shapes are not coloured in a complete row, they are wrong.

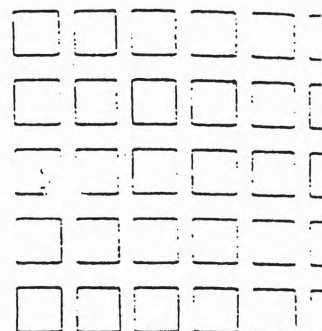
24



18



20

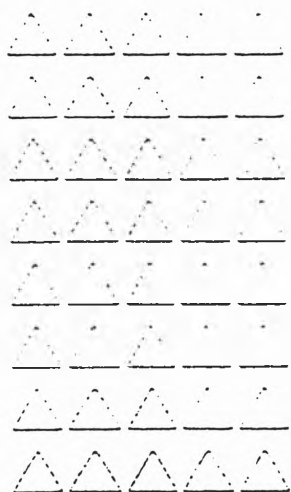


A _____

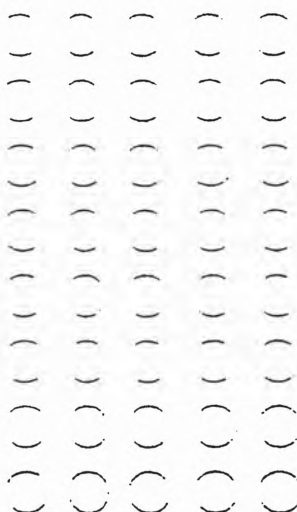
B _____

C _____

24



20



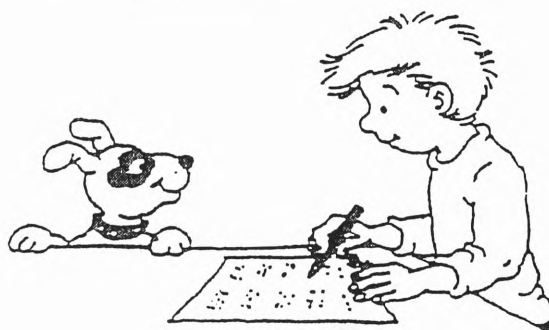
30



D _____

E _____

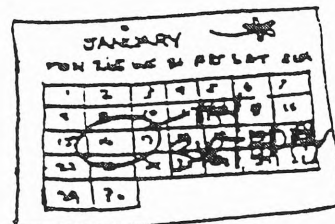
F _____



Days of the Week

Monday Tuesday Wednesday
Thursday Friday Saturday Sunday

- 1 Write the day it is the day after tomorrow. _____
- 2 Write the second school day of the week. _____
- 3 What is the second day of the weekend? _____
- 4 What is the middle school day of the week? _____
- 5 What day comes between Wednesday and Friday? _____
- 6 Two days are spelt with 3 vowels. Which of these days has less letters? _____
- 7 How many days are there between Tuesday and Sunday? _____
- 8 If your birthday was on Sunday, and it is Monday today, how many more days before your birthday? _____
- 9 How many different letters has the word 'Wednesday'? _____



Ordinal Numbers

Look along the row of animals. The first is on the left.



1 Colour the 2nd, 6th and 7th animal.

Write the letters in order to make a word.

2 the 2nd, 4th, 5th and 6th letter of **a n y o n e** _____

3 the 1st, 3rd, 5th and 6th letter of **s h o u l d** _____

4 the 1st, 4th, 5th and 6th letter of **s p r i n g** _____

5 the 2nd, 3rd, 5th and 6th letter of **c h i c k e n** _____

6 the 2nd, 4th, 5th and 9th letter of **a f t e r n o o n** _____

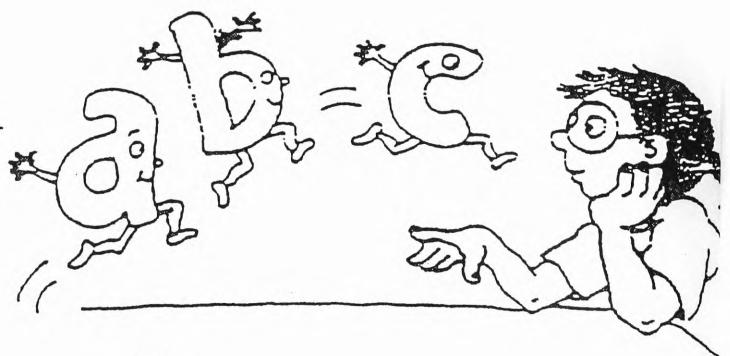
a b c d e f g h i j k l m n o p q r s t u v w x y

7 The 11th letter is _____

8 The 15th letter is _____

9 The 20th letter is _____

10 The 26th letter is _____



Association of Words I

One word in the brackets is not associated or does not go with the word on the left outside the brackets. Write the word in the space.

- 1 farm (hay sheep bus tractor fence) _____
- 2 dogs (bite bark dig sing sniff) _____
- 3 football (run swim tackle ball kick) _____
- 4 gardening (paint weed plant pick water) _____
- 5 family (uncle sister cousin mother friend) _____
- 6 cats (mew lick grunt purr scratch) _____
- 7 fire (burns glows flickers rages wets) _____
- 8 circus (clown juggler doctor acrobat rider) _____
- 9 hospital (bed pills shark needle nurse) _____
- 10 bicycle (chain sail tyre seat wheel) _____



Which One Is Different? I

Look along each row of pictures. Find the one that is different from the other two. Circle the letter underneath the picture that is different.

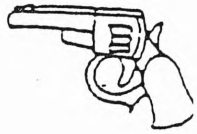
1



a



b



c

2



a



b



c

3



a



b



c

4



a



b



c

5



a



b



c

6



a



b



c



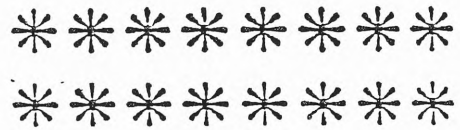
Finding the Difference

How many are needed to make the groups equal? Write your answer on the right.

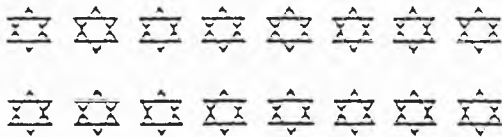
A



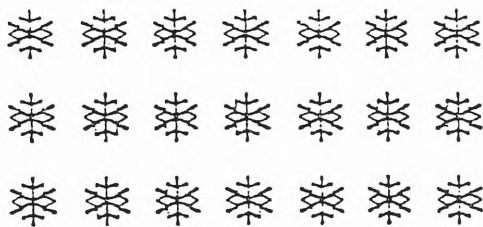
B



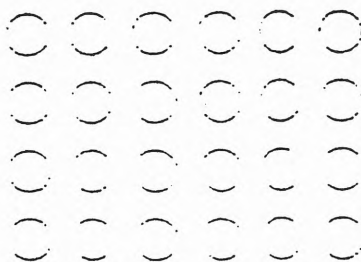
C



D



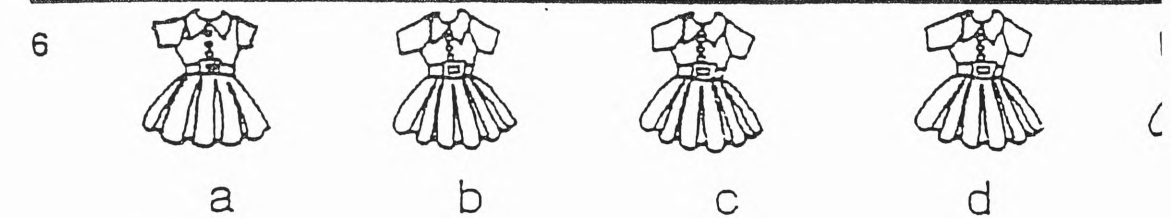
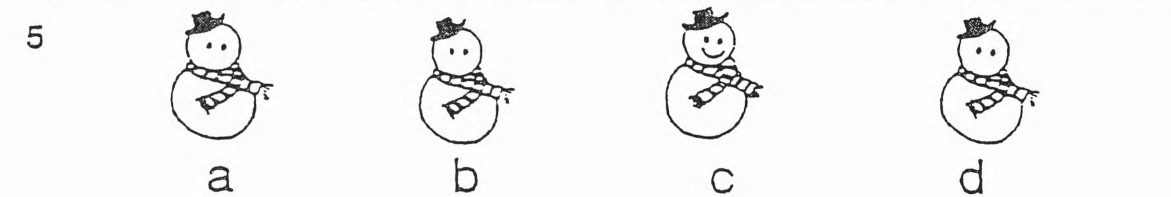
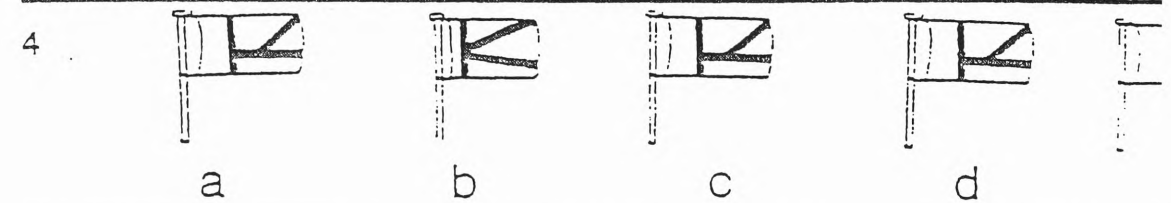
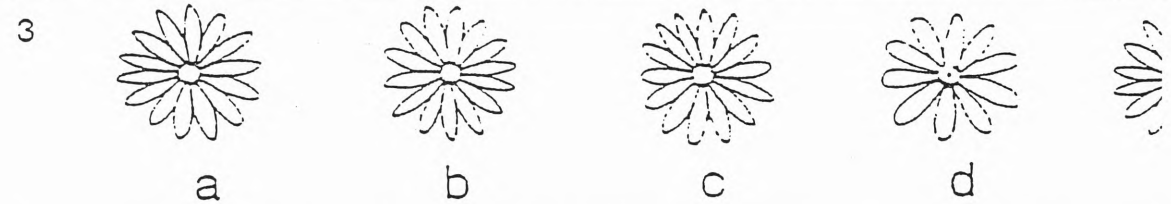
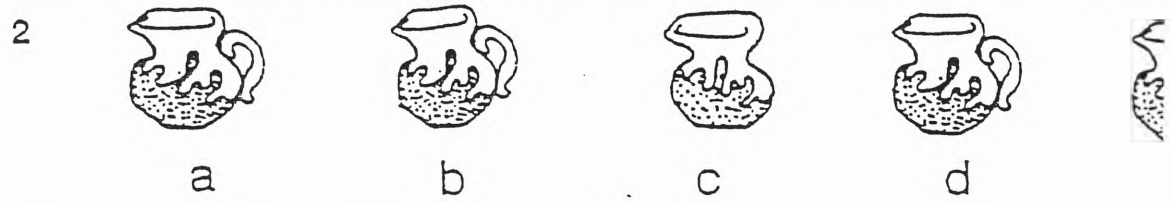
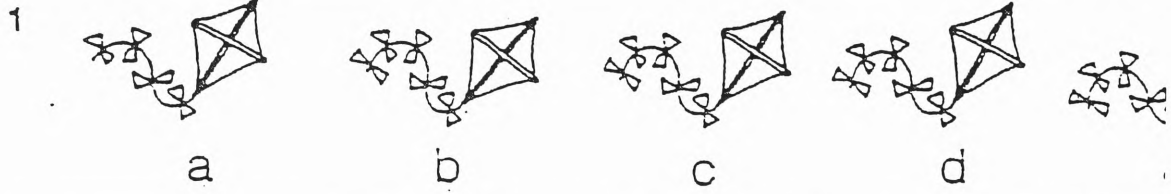
E





Which One Is Different? 3

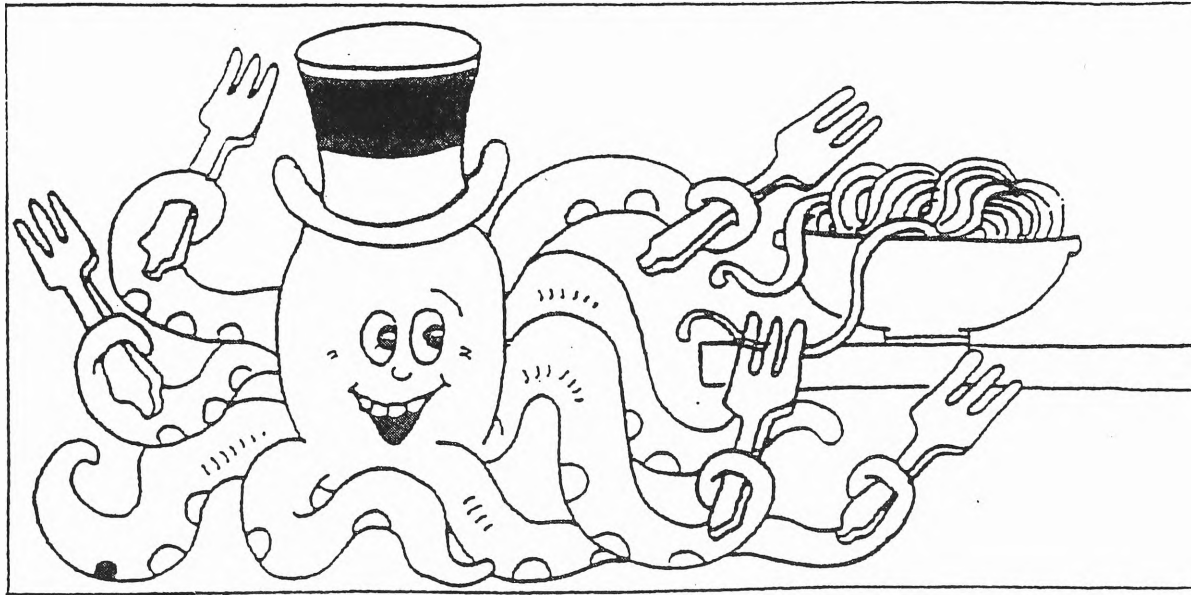
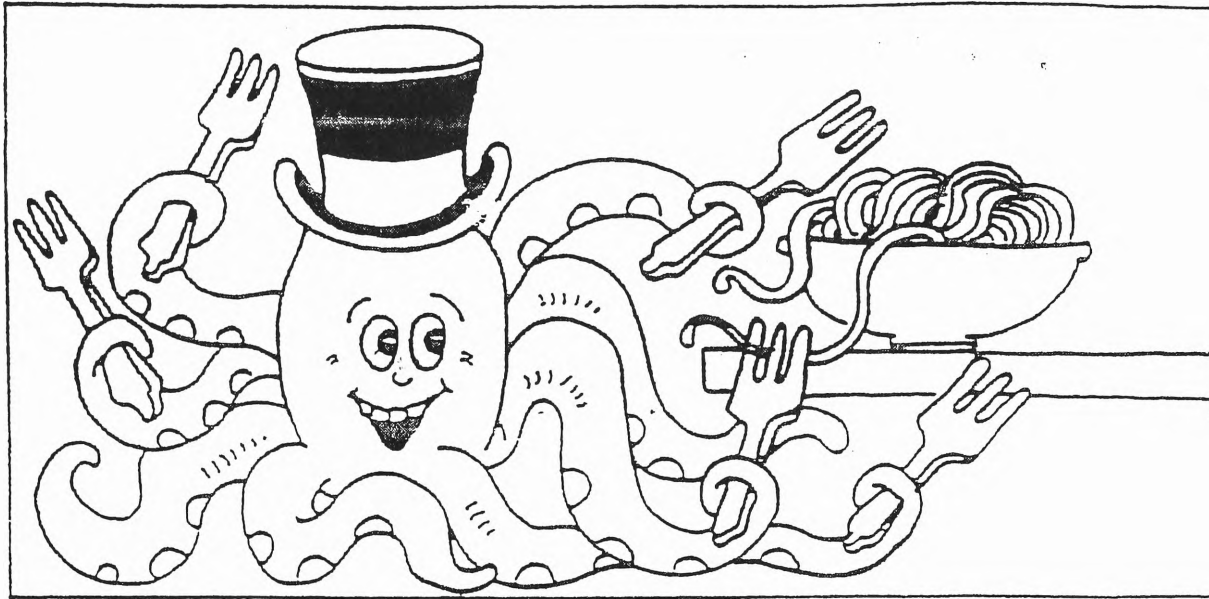
Look along each row of pictures. Find the one that is different from the other. Circle the letter underneath the picture that is different.



SCORE
6

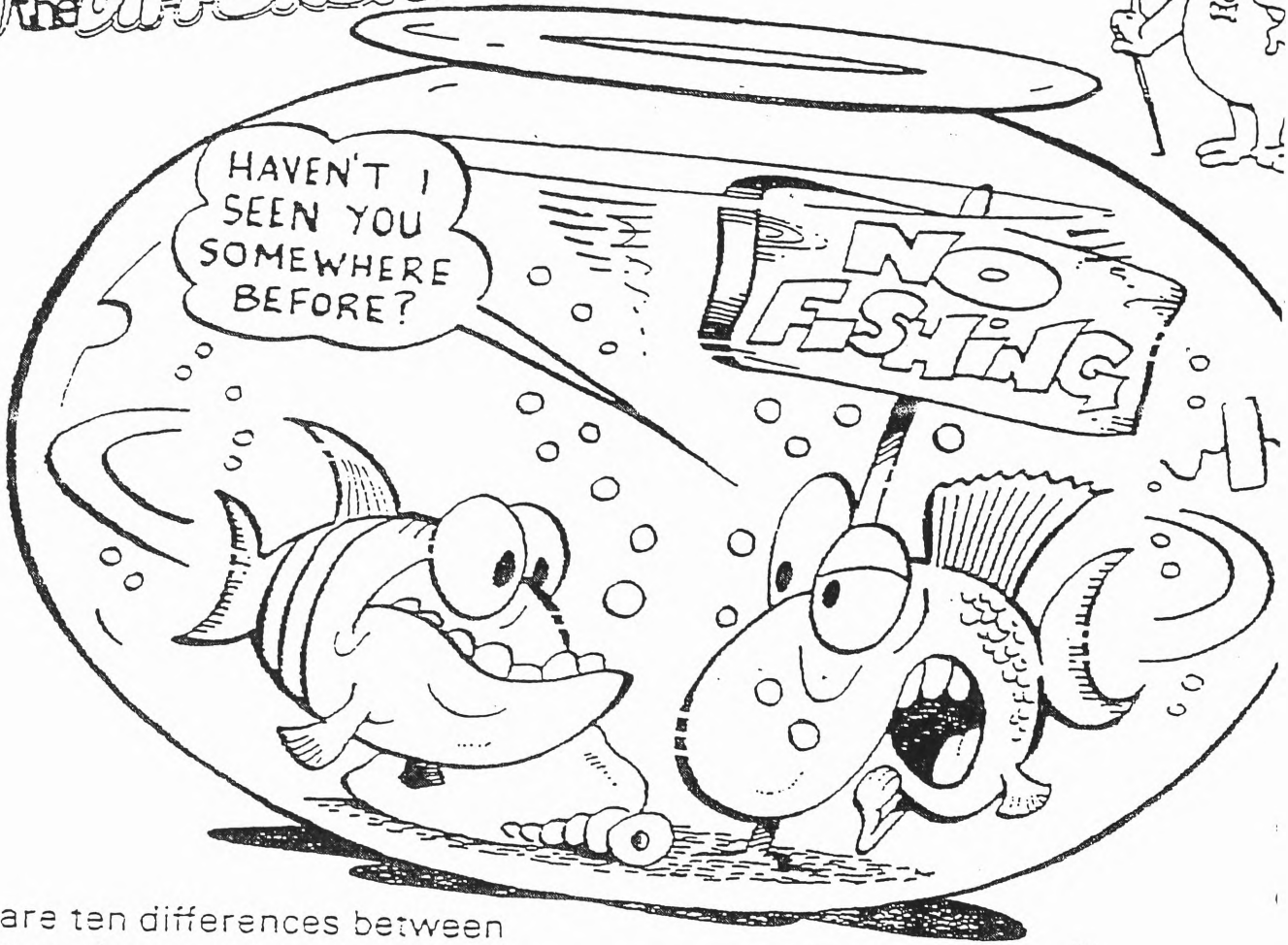
Spot the Difference 3

In the second picture below, Five differences which have been made to the first picture above. Circle the differences.

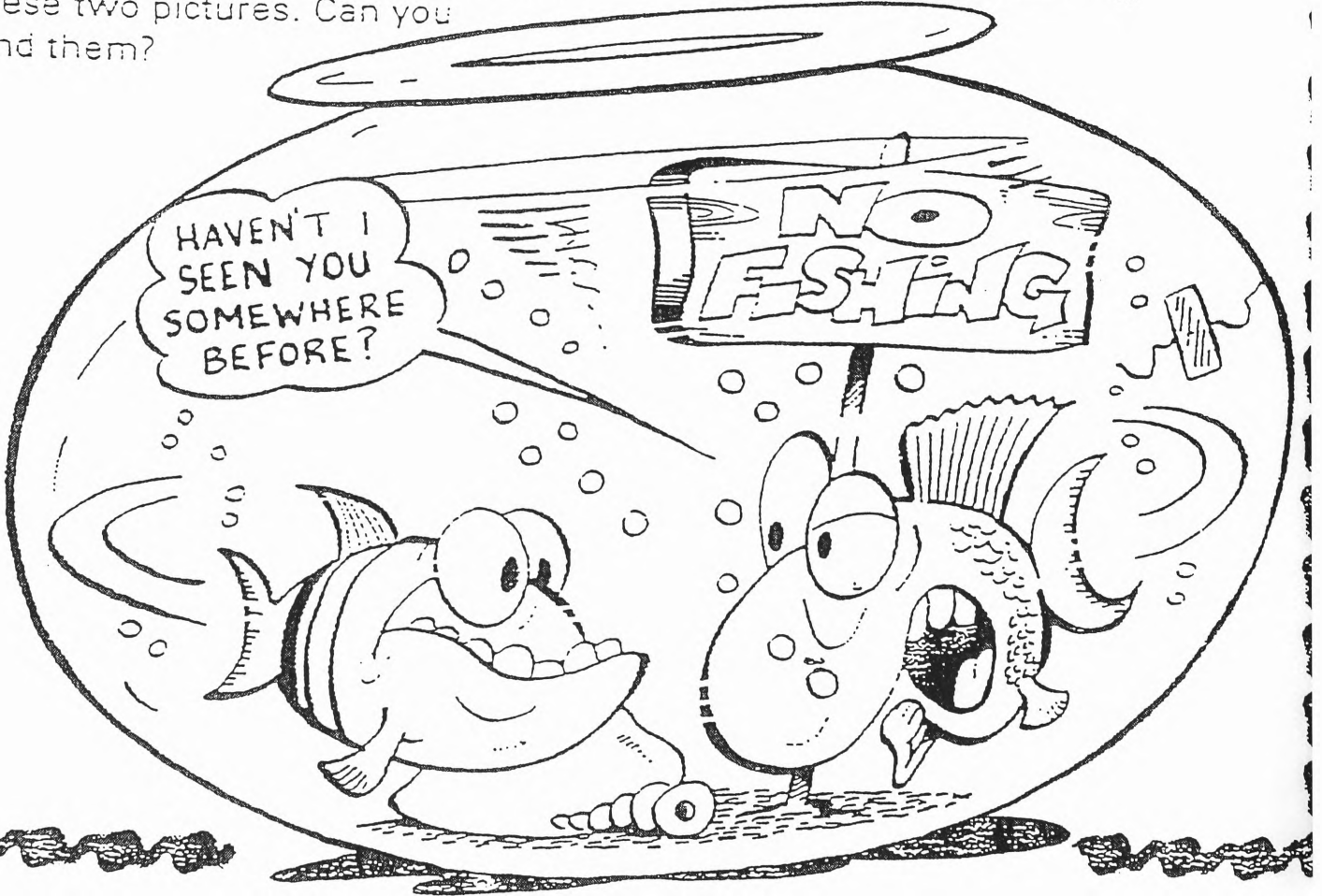


SCORE
/ 5

Spot the Difference



There are ten differences between these two pictures. Can you find them?



Which One Is Different? 2


Look along each row of pictures. Find the one that is different from the other two. Circle the letter underneath the picture that is different.

1



a b c d

2




a b c d

3



a b c d

4



a b c d

5



a b c d

6



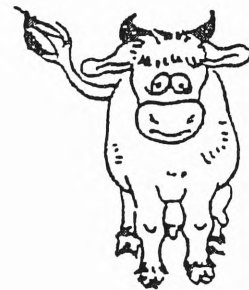
a b c d

SCORE
6

Find the Farm Animal

There are five hidden farm animals in the squares. Words run across or down. Circle each animal, then write them in the spaces below.

g	o	a	t	s
s	p	i	g	h
s	c	o	a	e
h	o	r	s	e
e	w	a	s	p



SCORE
5

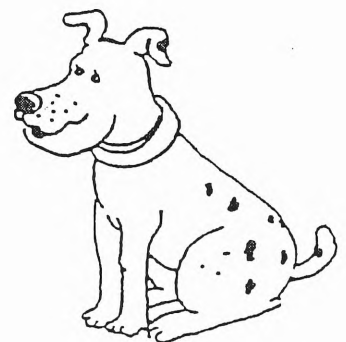
Find the Pets

There are six pets hidden in the squares. Words run across or down. Circle each pet, then write them in the spaces below.

p	u	t	r	s	b
a	c	a	u	m	a
r	a	b	b	i	t
r	t	u	m	c	e
o	d	o	g	e	b
t	u	r	t	l	e

SCORE

	6
--	---



Find the Largest 2

Look along each row of pictures. Find the one that is larger than the other two. Circle the letter underneath the larger picture.

1



a



b



c



d

2



a



b



c



d

3



a



b



c



d

4



a



b



c



d

5



a



b



c



d

6



a



b



c



d



Find the Largest I

Look along each row of pictures. Find the one that is larger than the other two. Circle the letter underneath the larger picture.

1



a



b



c

2



a



b



c

3



a



b



c

4



a

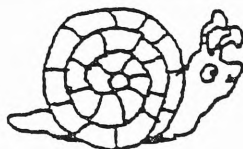


b

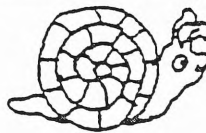


c

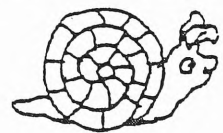
5



a

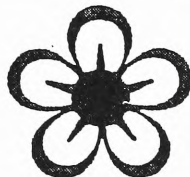


b

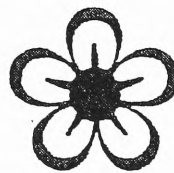


c

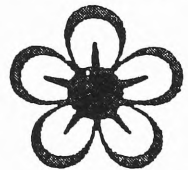
6



a



b



c



Find the Number

Each row of numbers goes along in order or in a pattern. Write the correct number that is missing from each space.

a 1 2 3 4 5 ____

b 7 8 ____ 10 11 12

c 8 7 6 5 4 ____

d 12 11 ____ 9 8 7

e 15 16 17 ____ 19 20

f 25 24 23 22 ____ 20

g 2 4 ____ 8 10 12

h 3 5 7 ____ 11 13

i 6 9 12 15 ____ 21

j 10 ____ 30 40 50 60



Letters or Numbers in Series

Each row of letters goes along in order or in a pattern. Write the correct letter that is missing from each space. In the last 3 examples numbers are used with letters. Write the correct letter and number.

1 A B C D E _____

2 G H _____ J K L

3 n o p _____ r s

4 u v w x _____ z

5 F _____ D C B A

6 Z Y _____ W V U

7 r q p _____ n m

8 C3 D4 E5 _____ G7 H8

9 J1 L3 N5 P7 Q9 _____

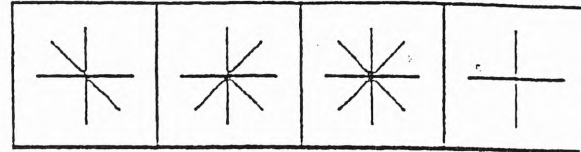
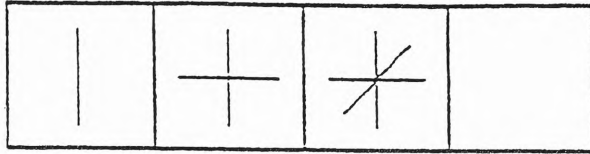
10 m10 _____ k6 j4 i2 h0



What Happens Next?

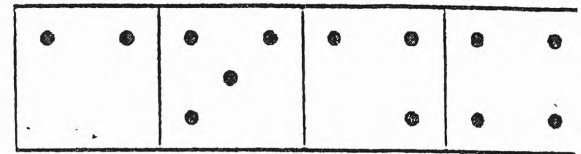
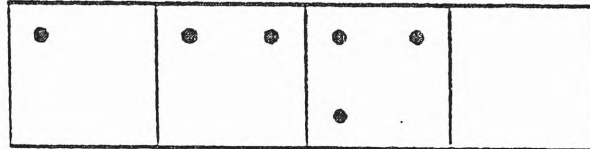
The figures on the left form a series. Look to the right and choose one of the four figures which would be next in the series. Circle the letter underneath it.

1



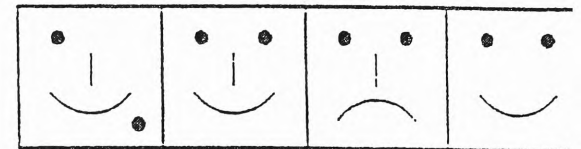
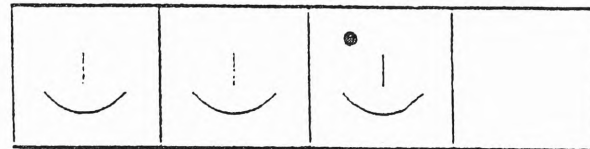
a b c d

2



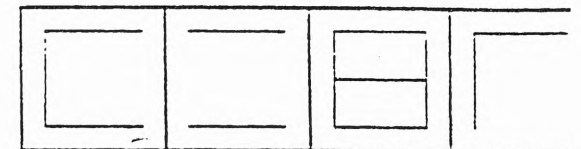
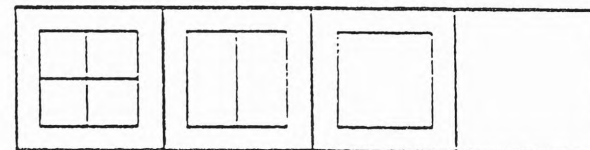
a b c d

3



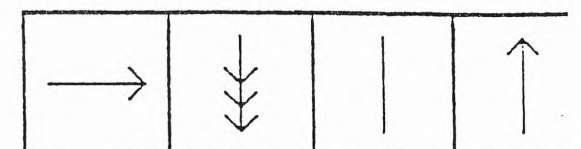
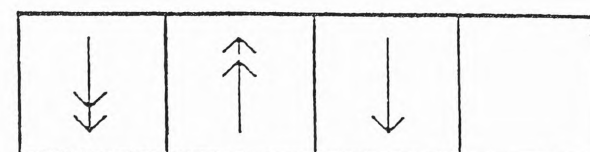
a b c d

4



a b c d

5



a b c d



NUMBER-FIND

The number 2 is the only even prime number. 2:00 was the time on the clock that Captain Hook threw into the crocodile's mouth in the 1952 movie "Peter Pan!"



1283

1380

1482

2089

2758

2875

3380

3753

3868

6220

6847

8367

8729

8880

8910

9331

12113

16778

17285

22435

27693

28167

30378

38566

8 3 9 5 1 2 0 9 5 8 3 1 6 7 4

0 9 2 7 5 8 3 1 5 6 3 7 2 1 3

5 1 2 8 5 9 2 0 3 8 6 7 4 8 9

9 8 9 2 4 6 8 4 9 3 1 2 8 5 3

5 9 2 8 4 7 6 9 3 6 4 7 3 1 5

4 2 7 6 9 3 1 5 8 6 7 8 0 9 3

2 8 4 1 2 8 5 9 6 7 4 8 6 3 8

9 0 2 7 6 8 4 7 6 1 3 8 5 7 2

6 9 8 4 7 6 1 2 1 1 3 0 2 9 5

4 8 6 9 2 8 3 6 8 4 9 9 3 8 6

8 5 9 2 7 3 1 5 7 6 9 3 8 6 6

9 2 0 1 3 8 6 8 2 9 3 8 5 6 6

1 3 9 2 1 5 7 6 3 8 3 7 6 4 3

3 4 2 5 9 9 7 3 0 5 8 3 7 5 5

5 1 1 2 7 4 8 3 5 2 9 3 1 5 3

48352

53198

54539

66897

68230

83167

93389

93666

95646

97874

137463

161148

283684

381877

393538

450294

521294

562795

646215

684931

766386

843310

861727

893266

918928

995243

MOTHERS AROUND THE WORLD

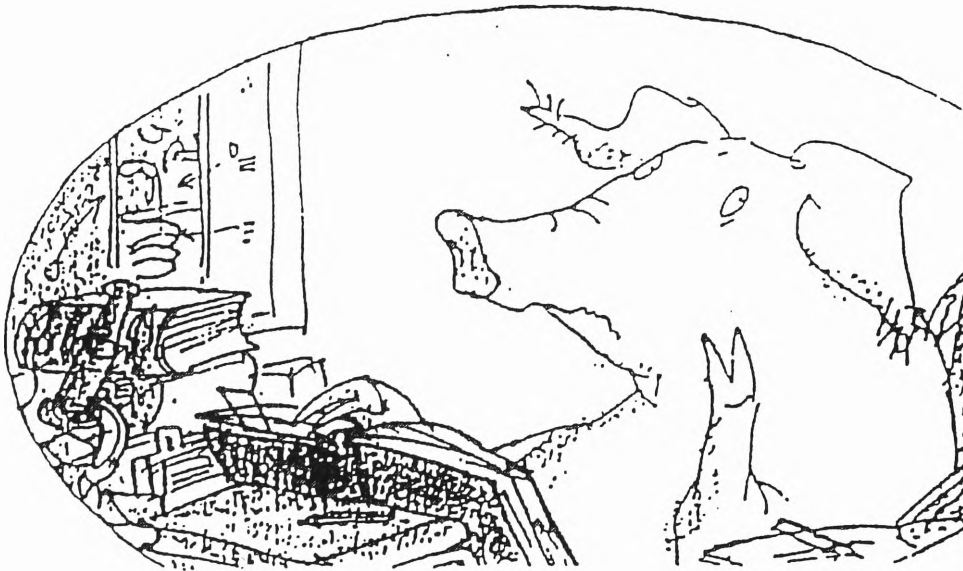
Here different languages are matched with their ways of saying "mother." The languages are given first, then the word "mother" in each language, and finally a list of related items.

	H	M	A	M	M	Y	G	I	R	A	T	A	M	A	P
<i>Language</i>	S	S	U	N	E	A	R	T	H	I	L	P	N	N	O
1. ANGLO-SAXON	I	E	I	M	E	W	R	O	R	N	A	G	D	A	L
2. DUTCH	D	S	R	L	M	R	V	K	D	D	L	H	U	I	I
3. ENGLISH	E	G	I	E	G	O	S	H	R	O	M	R	T	L	S
4. FRENCH	W	C	T	T	M	N	R	D	S	E	M	V	C	A	F
5. GAELIC	S	E	A	I	A	E	E	A	U	H	A	H	T	M	
6. GERMAN	R	G	R	S	D	M	X	M	T	R	M	T	T	I	A
7. GREEK	M	A	T	E	R	O	A	T	M	O	L	F	O	K	M
8. ICELANDIC	N	O	O	Q	N	E	E	T	T	P	R	A	M	M	A
9. INDO-EUROPEAN	A	M	D	M	A	R	R	H	R	E	K	H	T	H	P
10. IRAN	M	O	E	E	M	C	I	D	N	A	L	E	C	I	S
11. ITALIAN	R	R	D	T	R	R	G	C	A	N	H	T	E	O	N
12. LATIN	E	S	M	K	E	R	H	E	A	M	U	V	S	R	L
13. NORWAY	G	Y	N	P	O	R	T	U	G	U	E	S	E	P	G
14. POLISH															
15. PORTUGUESE															
16. SANSKRIT															
17. SWEDISH															
"Mother"															

- | | | |
|------------|-----------|--------------------|
| 1. MODOR | 9. MAT | <i>Other Items</i> |
| 2. MOEDER | 10. MATAR | 18. AMMA |
| 3. MOTHER | 11. MADRE | 19. EARTH |
| 4. MERE | 12. MATER | 20. EVE |
| 5. MATHAIR | 13. MOR | 21. MAMA |
| 6. MUTTER | 14. MATKA | 22. MAMMY |
| 7. METER | 15. MAE | 23. MUM |
| 8. MOTHIR | 16. MATR | 24. RHEA |
| | 17. MODER | |

THE PIG

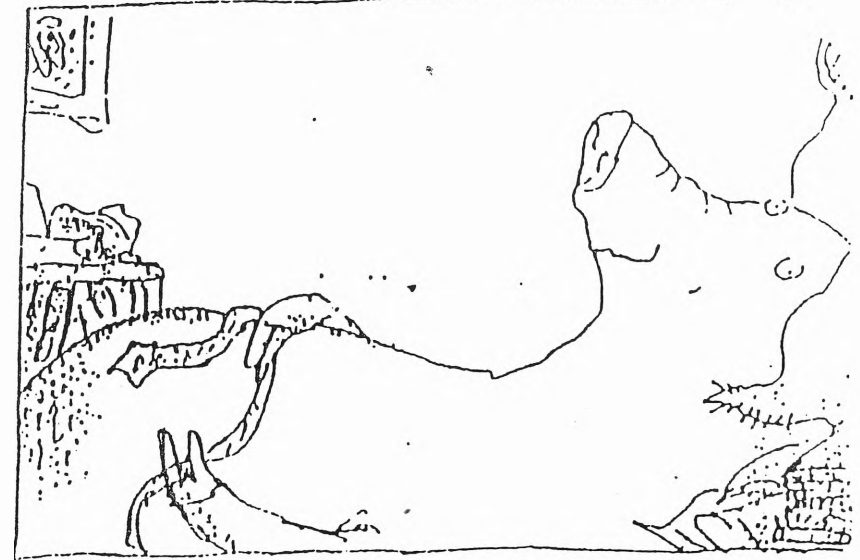
In England once there lived a big
And wonderfully clever pig.
To everybody it was plain
That Piggy had a massive brain.
He worked out sums inside his head,
'There was no book he hadn't read,
He knew what made an airplane fly,
He knew how engines worked and why.
He knew all this, but in the end
One question drove him round the bend:
He simply couldn't puzzle out
What LIFE was really all about.
What was the reason for his birth?
Why was he placed upon this earth?
His giant brain went round and round,
Alas, no answer could be found,
'Till suddenly one wondrous night,
All in a flash, he saw the light.
He jumped up like a ballet dancer
And yelled, "By gum, I've got the answer!"





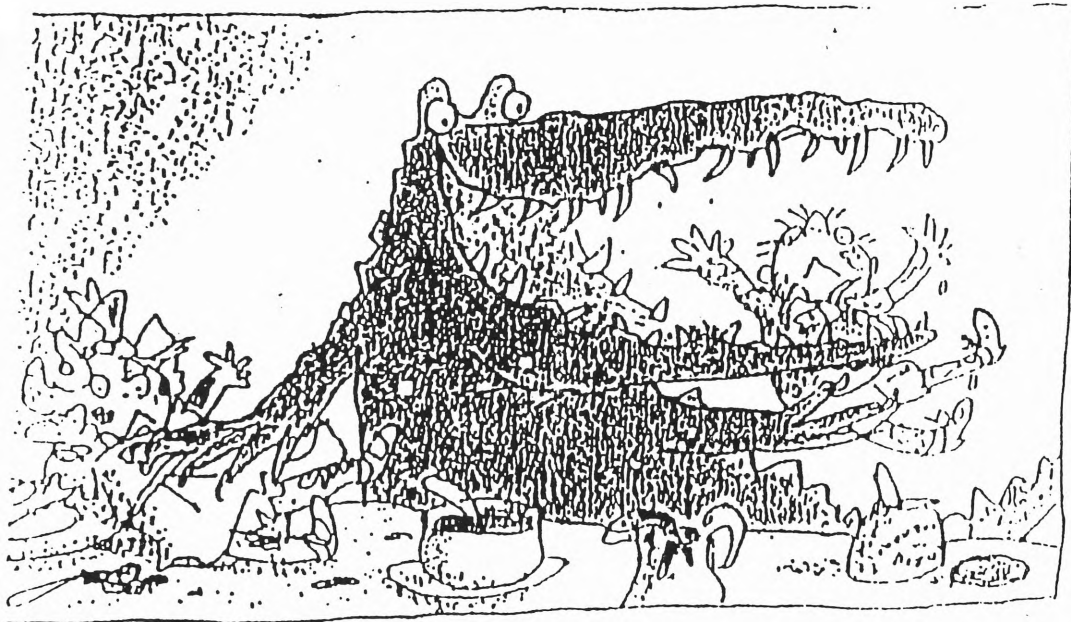
"They want my bacon slice by slice
 "To sell at a tremendous price!
 "They want my tender juicy chops
 "To put in all the butchers' shops!
 "They want my pork to make a roast
 "And that's the part'll cost the most!
 "They want my sausages in strings!
 "They even want my chitterlings!
 "The butcher's shop! The carving knife!
 "That is the reason for my life!"
 Such thoughts as these are not designed
 To give a pig great peace of mind.

Next morning, in comes Farmer Bland,
 A pail of pigswill in his hand,
 And Piggy with a mighty roar,
 Bashes the farmer to the floor . . .
 Now comes the rather grizzly bit
 So let's not make too much of it,
 Except that you *must* understand
 That Piggy *did* eat Farmer Bland,
 He ate him up from head to toe,
 Chewing the pieces nice and slow.
 It took an hour to reach the feet,
 Because there was so much to eat,
 And when he'd finished, Pig, of course,
 Felt absolutely no remorse.
 Slowly he scratched his brainy head
 And with a little smile, he said,
 "I had a fairly powerful hunch
 "That he might have me for his lunch.
 "And so, because I feared the worst,
 "I thought I'd better eat *him* first."

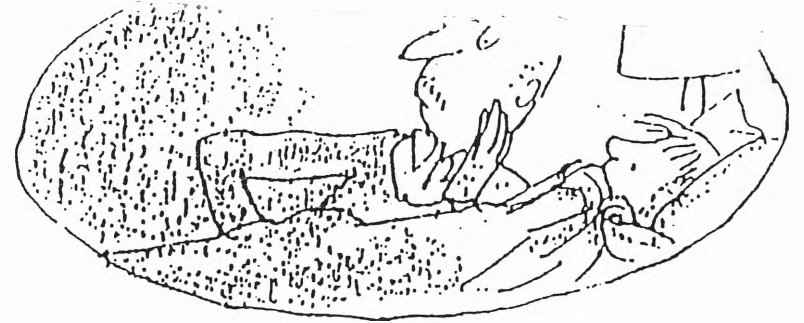


THE CROCODILE

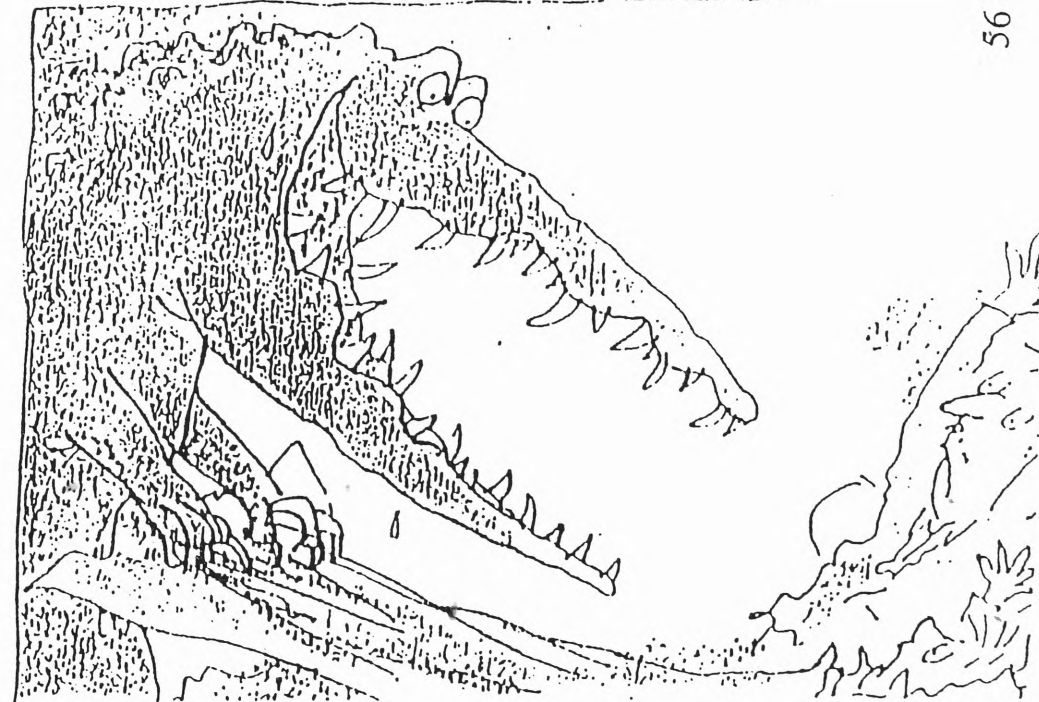
No animal is half so vile
As Crocky-Wock the crocodile.
On Saturdays he likes to crunch
Six juicy children for his lunch,
And he especially enjoys
Just three of each, three girls, three boys.
He smears the boys (to make them hot)
With mustard from the mustard pot.



But mustard doesn't go with girls,
It tastes all wrong with platts and curls.
With them, what goes extremely well
Is butterscotch and caramel.
It's such a super marvellous treat
When boys are hot and girls are sweet.
At least that's Crocky's point of view.
He ought to know. He's had a few.



That's all for now. It's time for bed
Lie down and rest your sleepy head . . .
Ssh! Listen! What is that I hear
Gullumphing softly up the stair?
Go lock the door and fetch my gun!
Go on, child, hurry! Quickly, run!
No, stop! Stand back! He's coming in!
Oh, look, that greasy greenish skin!
The shining teeth, the greedy smile!
It's CROCKY-WOCK, THE CROCODILE!



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