SOCIAL STORY INTERVENTIONS FOR YOUNG CHILDREN WITH AUTISM SPECTRUM DISORDERS: A COMPARATIVE STUDY

by

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Abstract

Impairments in the area of social development is a core deficit in individuals with autism (Kanner, 1963). Some theorists suggest that these problems stem from an inability to understand mental states and take the perspectives of others (Baron-Cohen et al., 1985; Leekam & Perner, 1991; Leslie, 1987). Regardless of whether or not this is the primary reason that people with autism are often unsuccessful in social settings, it is important that they are provided with adequate social supports. Social stories, created by Carol Gray (1993), are designed to help people with autism negotiate the intricacies of social exchanges by providing accurate social information about the perspectives of other people.

The present study was designed to examine the effectiveness of a social story intervention with three young children diagnosed with autism spectrum disorders. The single-subject design compared two treatment conditions and measured changes in the child participants' targeted problem behaviors. In the social story condition, a caregiver read the child a social story that described a problem situation, provided insights into the perspectives of others, and offered desired responses. In the non-social story with reminder condition, the caregiver read a regular storybook to the child and then provided a verbal reminder of the appropriate behavior in the targeted situation. It was expected that a comparison of these two conditions would determine whether any changes in behavior were the result of the content of the social story or the extra adult attention with verbal reminder.

Results indicated that, for one participant, the social story was more effective than the non-social story condition. For the other two subjects, the results were more difficult to interpret. These two children received the social story intervention prior to the non-social story treatment. They did not return to baseline levels of performance after the withdrawal of
the social story. Thus, the controlling effects of social stories could not be isolated, nor could the relative impact of the second treatment (non-social story) be assessed.

These results contribute to the existing empirical data on social studies and extends previous findings in a number of ways. First, a more methodologically sound design was implemented to control for a host of threats to internal validity. Second, the study was conducted with much younger participants than those used in past studies. Third, follow-up data suggest that gains were maintained up to 4 weeks after intervention, despite the fact that the social story was not read during that time and no verbal reminders were provided to the children. This suggests that learning of appropriate social behaviors may have occurred during the course of the intervention.

Social story interventions appear to be a promising avenue for providing people with autism accurate social information (i.e. other people’s perspectives) as well as appropriate responses in social settings. Further research is necessary to extend these findings within the context of a multiple baseline design, as well as to extend the current knowledge base regarding factors that influence the success of this intervention.
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CHAPTER 1
Introduction

This chapter will outline the characteristics, prevalence, gender ratio, and etiology of Pervasive Developmental Disorder (PDD). Although there are a number of core deficits related to the cluster of PDD conditions, social impairments will be emphasized and discussed from a developmental perspective. The concept of “theory of mind” and its relationship to the social dysfunction associated with the class of PDD also will be addressed, followed by the empirical research indicating that individuals with PDD fail to demonstrate this ability. Finally, a social story intervention to assist people with these conditions will be proposed, and a critique of the existing research will highlight the major methodological shortcomings. Because there are so few social story studies completed to date, and more importantly, because of the mediocre quality of the existing studies, it will be argued that there is a need for further research to contribute to the understanding and viability of this intervention with individuals who meet the criteria in the PDD category.

Pervasive Developmental Disorder (PDD)

Pervasive Developmental Disorder (PDD) is a class of conditions characterized in the American Psychological Association’s (APA) Diagnostic and Statistical Manual 4th edition (DSM-IV) by severe and pervasive impairment in several areas of development: reciprocal social interaction skills, communication skills and the presence of stereotyped behaviors, interests and activities (APA, 1994). The PDD class includes autism (autistic disorder), Pervasive Developmental Disorder - Not Otherwise Specified (PDD-NOS), Asperger’s syndrome, Fragile X syndrome, Rett’s syndrome, and Childhood Disintegrative Disorder (Siegel, 1996). Currently, disorders in the PDD category are estimated to affect 10-15 per 10,000 children, when broad definitions of the disorders are applied (Siegel, 1996).
Conditions in the PDD class are considered to be developmental disorders because they are congenital conditions that are life-long in nature. The disorders in the PDD category also are used interchangeably with the term “autism spectrum disorders” to convey the fact that they are related and can be viewed along a continuum of severity.

**Autism & PDD-NOS**

In 1943, Dr. Leo Kanner described a group of children who had impoverished or absent social relations from the very first year of life, and whose language (when present) was distinctly deviant. He used the term “autistic” to describe the children because they appeared to be aloof and unable to competently manage social interactions. With minor modifications, Kanner’s diagnostic criteria have withstood the test of time and have been echoed in all subsequent psychiatric classification systems. To receive a diagnosis of autism (i.e. Autistic Disorder), a child must have at least 6 of 12 criteria from the DSM-IV. These criteria are outlined below:

**Qualitative impairments in reciprocal social interaction:**

1. Marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction.

2. Failure to develop peer relationships appropriate to developmental level.

3. Lack of spontaneous seeking to share enjoyment, interests, or achievements with others.

4. Lack of socio-emotional reciprocity.

**A. Qualitative impairments in communication:**

1. A delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime).
2. Marked impairment in the ability to initiate or sustain a conversation with others despite adequate speech.

3. Stereotyped and repetitive use of language or idiosyncratic language.

4. Lack of varied spontaneous make-believe play or social imitative play appropriate to developmental level.

B. Restricted, repetitive, and stereotyped patterns of behavior, interests, or activity:

1. Encompassing preoccupation with one or more stereotyped and restricted patterns of interest, abnormal either in intensity or focus.

2. An apparently compulsive adherence to specific nonfunctional routines or rituals.

3. Stereotyped and repetitive motor mannerisms (e.g. hand or finger flapping, or twisting, or complex whole body movements).

4. Persistent preoccupation with parts of objects.

A total of at least six items from (A), (B), and (C), with at least two from (A), and one each from (B) and (C) must be meet to receive this diagnosis. A diagnosis of PDD-NOS is given if the child meets fewer criteria, either by displaying fewer symptoms in each category and/or symptoms in either one or two of the three areas.

In addition, diagnosis requires the presence of abnormal or impaired development prior to age three manifested by delays or abnormal functioning in at least one of the following areas: (1) social interaction, (2) language as used in social communication, or (3) symbolic or imaginative play.

Autism. The prevalence of autism is estimated to affect 7.5 per 10,000 people (Fombonne, 1999). The ratio of males to females varies, depending on the definition used (Wing & Gould, 1979; Siegel, 1996). With broader definitions, males are reportedly affected three times more often than females (Wing & Gould, 1979). A 4:1 ratio of males to females
is estimated when Kanner's (1943) description of “classic” autism (affective aloofness and elaborate rituals) is applied. These two main syndromes are considered to be the most severe manifestations of this condition.

Although there is no known cause of autism, research indicates that the disorder can be caused by a variety of etiologies. For instance, there is reason to believe that autism has a genetic component. Both monozygotic (i.e. identical) twins were much more likely to receive a diagnosis of autism than dizygotic (i.e. fraternal) twins (Bailey, Couteur, Gottesman, Bolton, Simonoff, & Yuzda, 1995). The concordance rate for monozygotic pairs ranged between 36 and 91%, compared to less than 10% concordance in dizygotic pairs. More recent research has focused on locating an ‘autism gene’ or sets of genes that may be associated with this disorder (Bolton, MacDonald, Pickles, Rios, Goode, & Crowson, 1994; Bailey et al., 1995).

Infectious agents such as cytomegalovirus, herpes simplex, and various vaccines have been speculated as causes of autism, but are unlikely to account for a large percentage of this population (Stubbs & Williams, 1984). Environmental teratogens such as immune deficiency and nutritional diet have also been discussed but, to date, causal evidence is lacking (Todd, 1986). Finally, some researchers have argued that a genetic predisposition for autism must be present and paired with environmental variable(s) before this disorder is triggered (Folstein & Rutter, 1977).

**PDD-NOS.** Because of the changes in diagnostic criteria with the DSM over the years, the prevalence rate of PDD-NOS is unclear (Towbin, 1997). Also, the definition of Autistic Disorder is critical to the prevalence of PDD-NOS and “may inadvertently affect the size of the nonautistic PDD population” (p. 136). There have only been a few studies that allow for the estimation of PDD-NOS (Burd, Fisher, & Kerbeshian, 1987; Wing & Gould,
Wing & Gould (1979) reported that 21 per 10,000 people have PDD-NOS. Burd and his colleagues (1987) used the DSM-III criteria for PDD-NOS in North Dakota and reported 2 per 10,000 people were affected. Towbin (1997) concluded that “all other forms of nonautistic PDD are more common than autism, but until specific criteria are applied to large community-based populations, the prevalence of PDD-NOS will remain speculative” (p. 136). Similar to autism, the etiology of this disorder is unknown, but there is speculation that genetic or congenital factors (singly or in combination) may contribute to this condition. The male-to-female ratio is similar to autism as well, affecting boys 3-4 times more than girls.

**Asperger’s Syndrome (AS)**

A diagnosis of AS is different from autism in that the overall symptoms are less severe and IQs are higher (particularly verbal IQ) (Siegel, 1996). Detection is often later than the other spectrum disorders because these children generally possess age-appropriate language skills. Asperger’s syndrome is believed to affect boys as much as ten times more often than girls. Gillberg and Gillberg (1989) reported that between 10 and 26 per 10,000 people are affected by AS. More recently, Ehlers and Gillberg (1993) estimated that the minimum prevalence rate is 3.6 per 1,000 individuals. The cause(s) of AS are believed to be similar to that of autism and PDD-NOS.

One of the greatest challenges for individuals with AS is in the area of social interactions (Siegel, 1996). People with AS tend to interpret things very literally and have difficulty understanding social cues. Some of the common features of people with AS include impairments in facial and gestural expressions, incoherent speech that is often one-sided, intense interests in one or more particular area, poor ability to relate to other people’s emotions, and clumsiness and poor body awareness (Klin & Volkmar, 1997). They often are described as odd, eccentric, and inflexible in social situations. It is not uncommon for people
with AS to use their exceptional rote-memory skills to acquire factual knowledge in a particular area(s), and to perseverate on these topics in conversation with others.

Rett’s Syndrome

Rett’s Syndrome is the only autism spectrum disorder that occurs more often in girls; in fact, no boys are believed to be affected (Siegel, 1996). One in 100,000 children are estimated to be diagnosed with this extremely rare disorder. At birth, these girls are considered typically developing, but lose the acquired skills over time. Similar to autism, there is loss of language and deficits in social relations; however, unlike autism, almost all children with Rett’s syndrome lose the ability to walk and eventually develop profound mental retardation. Hand-wringing is a prominent feature, and it must occur frequently to meet the diagnostic criteria. As this behavior increases, it disrupts movement and makes it almost impossible for the child to complete tasks independently. Moreover, these children spontaneously become more socially competent after the preschool years, which is not commonly seen in children with autism. Rett’s Syndrome does not appear to be degenerative in nature (as was first speculated); but rather it is, a disorder “characterized by arrested neurodevelopment of unknown cause” (p. 85). Researchers are examining a genetic basis for this disorder, but the findings have been inconclusive (Killian, 1986; Riccardi, 1986).

Childhood Disintegrative Disorder (CDD)

CDD is a rare form of PDD in which the child is normally developing at birth, but “disintegrates” during the first five years of life (Siegel, 1996). The symptoms include significant loss of language, decreased use of nonverbal gestures (i.e. eye contact and pointing), and fewer social initiations and reciprocity. A marked difference between children with CDD and those with autism/PDD-NOS is that those in the latter group tend to have only 20 or fewer words before losing them, while the children with CDD generally possess a
much greater vocabulary consisting of phrases and full sentences before any loss of language is noted.

Burd, Fisher, and Kerbeshian (1989) reported that CDD affects 1 in 100,000 people. Initially, CDD was believed to affect both genders equally. More recently, Volkmar (1992) reported that males are affected three to four times as often as females — a pattern similar to that of autism. The origins of this disorder remain unknown, but there is an association with EEG abnormalities and seizures, suggesting the involvement of neurobiological mechanisms (Volkmar, Klin, Marans, & Cohen., 1997).

Fragile X Syndrome

Of all the inherited disorders that include mental retardation, Fragile X syndrome is the most common (Siegel, 1996). As the name suggests, Fragile X syndrome is caused by a break on the X chromosome during early cell division. Hence, males are much more susceptible to the disorder, since they have only one X chromosome. Thus, if damage occurs to the X chromosome, there is no buffer against impairment such as occurs in girls (who have two X chromosomes). Approximately one-third of boys with Fragile X syndrome also have characteristics associated with PDD-NOS, and about 3-5% meet the criteria for autism. Similarly, a small portion of females receive a dual diagnosis of Fragile X and PDD-NOS. Fragile X anomaly is believed to occur at a similar rate to autism, affecting 1 per 1,000 people (Rutter, Bailey, Simonoff & Pickles, 1997).

Children identified as having Fragile X syndrome and autism often exhibit behavioral symptoms such as poor eye contact, a sing-songy rhythm to their speech, echolalia (repetition of another’s utterances, often in the same tone and intonation as it was produced), and stereotypies such as hand-flapping (Siegel, 1996). They may also have difficulties in social interactions, although they are not as significantly impaired as in individuals diagnosed with
autism alone. In children with Fragile X and PDD-NOS, social relations with others tend to be idiosyncratic; however, the children are described as “somewhat friendly and sociable in their own way.” (p. 23).

To summarize, a common thread among people with autism spectrum disorders is the difficulties in social relationships and interactions. This is true of all individuals on the autism spectrum, regardless of intellectual functioning. It is considered a core deficit in this disorder because it is so pronounced and because it affects social development in significant ways. The next section will briefly examine the social developmental pattern in this population across a life span.

Social Impairment in Autism: A Developmental Perspective

The social development of individuals with PDD differs both quantitatively as well as qualitatively from other childhood disorders (Rutter & Garmezy, 1983). Historically, clinicians have described these children as being ‘alone’; this description is perhaps most appropriate during the preschool years (ages 0-5) when the social deficits appear to be most severe (Kanner, 1963; Rutter, 1978). One of the first signs is the lack of reciprocal eye contact and social smiling that newborns typically display a few months after birth (Volkmar, Carter, Grossman, & Klin, 1997). Ornitz and his colleagues (1977) collected retrospective data from parents of children with autism and found that many basic interpersonal skills also were lacking. For instance, eye contact was scarce or non-existent, gaze was not used to regulate interactions, social games in early infancy were lacking, and preferential attachment to caregivers was not exhibited. Volkmar et al. (1997) asserted that the human face does not seem to convey meaningful information, as it does for typically developing infants.

There has also been retrospective review of home videos of children with autism when they were infants (Osterling & Dawson, 1994). Compared to typically developing
children, the tapes of children who were later diagnosed with autism were markedly different; fewer social and joint-attention behaviors were witnessed and more autistic-like symptoms were noted. Some key differences included a lack of behaviors such as pointing, showing objects to others, looking at others, and responding when hearing one’s name.

Increased social responsiveness is generally seen in the later childhood years, particularly with familiar adults (Mundy & Sigman, 1989; Rutter & Garmezy, 1983). Nonetheless, social behaviors are often deviant, and facial expressions and vocalizations tend to be idiosyncratic (Mundy & Sigman, 1989). A significant percentage of children with autism continue to be content when left by themselves to engage in stereotypies and other unusual activities (Wing & Gould, 1979). Volkmar and his colleagues (1997) noted that social exchanges become increasingly difficult as the child is unable to take another person’s perspective into consideration.

Clinical observations suggest that individuals with autism have impairments in the recognition and communication of emotions. For instance, Hobson (1986) found that a sample of 13 older children, teens, and young adults with autism had significantly more trouble matching emotional gestures to recorded emotional vocalizations, compared to a control group that was matched on mental and chronological age. In addition, Weeks and Hobson (1987) reported that the children with autism in their sample were less able to sort human faces according to affective facial expression than were controls matched for verbal IQ. In fact, 9 of their 15 participants with autism did not spontaneously sort by expression, and were inconsistent when prompted on the task.

According to Rutter (1974), social relationships may improve during the later childhood years and adolescence but cooperative group play and lasting friendships are generally uncommon. Without the skills to develop peer relationships, adults often become
the primary source of social interactions (Volkmar et al., 1997). Despite expanded social interests in some individuals, problems persist due to the inability to negotiate "social rules and conventions and the reciprocal give-and-take inherent in social situations" (Volkmar et al., 1997 p. 179). According to Schopler and Mesibov (1983), learning and then generalizing the rules of social interactions is an extremely difficult and challenging task, even for adults with autism.

In adulthood, a wide range of social outcomes is observed. It appears that early verbal skills are the best predictor of both academic functioning and adaptive behavior in later life (Venter, Lord, & Schopler, 1992). Kanner and his colleagues (1972) noted that even those less severely impaired tend to be alone or socially awkward and suggested that those individuals with favorable outcomes are able to see the peculiarities in themselves and to develop strategies to cope with their social impairments. Nevertheless, unable to manage the "social dance" in interacting with others often results in feelings of inadequacy and isolation.

To summarize, for individuals with autism, challenges in social settings are pervasive and continue to present difficulties throughout the life span. Even individuals at the higher functioning end of the autism spectrum show considerable difficulties in negotiating social situations. A model that has been proposed to account for the social impairments in autism is the "theory of mind" paradigm. This perspective postulates that the root of the problem lies in a cognitive deficiency – namely, the inability to infer what other people think and feel. As a result, individuals with autism are not able to adequately respond in social exchanges.

Theory of Mind

Having a 'theory of mind' includes the ability to attribute mental states to oneself and others (Baron-Cohen, Leslie, & Frith, 1985; Leekman & Perner, 1991; Leslie, 1987). It
allows one to empathize, communicate, and imagine other’s hopes and desires, as well as to cheat, deceive, and outsmart others. Those that have this ability are said to be able to “mind read,” while those who cannot infer the thoughts, beliefs, knowledge, and intentions of others are said to suffer from “mindblindness.” Being able to take on the perspective of another is a critical component in developing a theory of mind. Only when one can impute independent mental states to self and others can this knowledge be used to predict and explain behavior.

The theory that people with autism have a specific impairment in the ability to take the perspective of others allows for specific predictions with regards to which skills are deficient as well as which competencies should be preserved (Happe, 1994). According to this theory, tasks that do not require representation of mental states such as abilities in rote memory and spatial orientation should be unaffected by “mindblindness.” The theory postulates that only those social behaviors that require mentalizing (i.e. taking hints, keeping secrets) should be impaired. Further, the primary language impairments one might expect from a theory of mind deficit are those related to the figurative use of language and the ability to make inferences. This prediction is supported by findings from a study examining the use of gestures. Attwood, Frith and Hermelin (1988) found that children with autism displayed many gestures that did not require mental states, such as signals to come, be quiet, and go away. Conversely, the use of gestures that signified mentalizing (i.e. expression of embarrassment, goodwill, and consolation) were absent compared to control participants with mental handicaps.

In summary, theory of mind encompasses the ability to take the perspective of other people, to infer their beliefs, and to predict their behavior on the basis of their beliefs. Research in this area suggests that the ability to “mind-read” is impaired in children with autism (Baron-Cohen, Leslie, & Frith, 1985; Leekman & Perner, 1991; Leslie, 1987).
Consequently, social exchanges might be expected to be problematic for these individuals, since they are unable to readily understand that others have thoughts and feelings that differ from their own. An intervention called “social stories” has been designed to provide people with autism information they are missing (i.e. the perspectives of others) and to help foster appropriate behaviors in specific situations.

Overview of Social Stories

If individuals with autism lack the ability to infer the mental states of other people, they are at a grave disadvantage in the social arena. If these individuals suffer from “mindblindness,” then they are incapable of “reading” social situations and responding appropriately. A social story is designed to assist individuals with this disorder by providing accurate social information. Because perspective-taking abilities in this population tend to be poor, social stories always include information as to what other people are thinking or feeling. In addition, since persons with autism may assess social situations quite differently from those without autism, social stories also include statements about what actually happens in a particular situation. Finally, since people with autism are not able to predict the behavior of others due to this inability to mentalize, social stories provide suggestions about how to act in specific situations as well as rationales for why particular behaviors are appropriate.

Social stories may be utilized for numerous purposes across settings. A story may be written to help an individual adjust to changes (i.e. in routines), to provide insight about what others are thinking/feeling, and to teach academic or social skills.

Social Stories Research

There is very limited empirical information about the effectiveness of social stories to date (Hagiwara & Myles, 1999; Kuttler, Myles & Carlson, 1998; Norris & Dattilo, 1999; Swaggart, Gagnon, Bock, Earles, Quinn, Myles & Simpson, 1995). In addition, the studies,
completed thus far lack the scientific rigor necessary to determine the efficacy of this treatment. In particular, the methodological shortcomings include: (a) the use of simple A-B designs, (b) combining other treatments with social story interventions, (c) lack of a placebo-control group/phase, (d) varying the guidelines of the social story recommended by Gray and Garand (1993), and (e) insufficient treatment length.

**A-B design.** The use of simple A-B designs make interpretation of the results difficult because changes in the B phase may have occurred regardless of whether or not the intervention was introduced, and/or changes may be attributed to some uncontrolled event apart from the treatment (Barlow & Hersen, 1984). The major shortcoming of this design is that one cannot rule out the possibility of confounds such as history and maturation (Ottenbacher, 1986). At best, only correlational inference can be drawn from this quasi-experimental design. Both the Norris and Dattilo (1999) and Swaggart et al. (1995) studies employed such a design.

**Combining other treatments.** According to Barlow and Hersen (1984), manipulating two variables simultaneously makes analysis of the findings difficult because one does not know which of the two factors (or how much of each) contributed to improvements in the target behavior. Three of the studies (Kuttler et al., 1998; Norris & Dattilo, 1999; Swaggart et al., 1995), incorporated other features with the social story intervention, so it is difficult to ascertain whether or not the implementation of social stories alone might have produced the same effects.

**Lack of a placebo-control group/phase.** Barlow and Hersen (1985) noted that it is possible and quite likely that certain environmental events in a no treatment control group or phase will yield substantial improvements. Thus, it is unclear whether the treatment (in this
case, a social story) is responsible for the results, or whether simply giving the child individual time and attention with an adult was sufficient. None of the studies to date have employed an attention-placebo control group, nor included a phase C to rule out this effect (Hagiwara & Myles, 1999; Kuttler et al., 1998; Norris & Dattilo, 1999; Swaggart et al., 1995).

**Varying social story guidelines.** According to Gray and Garand (1993), a social story should include 0-1 directive sentence for every 2-5 descriptive and perspective sentences. This ratio is recommended because the main purpose of a social story is to provide relevant social and environmental cues to the child, as opposed to a set of instructions on how to respond in a given situation. All four of the studies to date have (Hagiwara & Myles, 1999; Kuttler et al., 1998; Norris & Dattilo, 1999; Swaggart et al., 1995) violated these guidelines by using stories that were primarily composed of directive sentences. In so doing, these studies demonstrated the effects of a highly instructive recipe for prosocial behavior, rather than showing the potential of a “true” social story intervention.

**Insufficient treatment length.** Finally, the length of the intervention in the studies to date may also have influenced the results in a number of ways. In general, the duration of the studies was relatively short, ranging from 11-28 days. Baseline observations were quite brief (5-10 days), and showed considerable range in variability. Barlow and Hersen (1984) suggest that baseline measures should be continued until a clear stable pattern emerges in the data. This was not the case in three of the studies (Kuttler et al., 1998; Norris & Dattilo, 1999; Swaggart et al., 1995), which makes it is difficult to determine the natural frequency of the targeted behaviors. Barlow and Hersen (1984), also recommended that three separate data points indicating either an upward or downward trend be established before proceeding...
to the intervention phase. Once again, this was not the case in three of the studies (Kuttler et al., 1998; Norris & Dattilo, 1999; Swaggart et al., 1995).

**Research Problem**

Support for the use of social stories has largely come from anecdotal evidence. Empirical research attesting to the efficacy of this intervention is extremely limited, with only four studies completed to date. Unfortunately, all four of these studies lack the scientific rigor necessary to determine the impact of a social story intervention. The methodological shortcomings discussed previously leave the results open to a variety of alternative explanations. Collectively, the existing research is inconclusive and the relationship between social stories and the changes in target behaviors is ambiguous at best. Future research needs to address these design flaws in order to determine the relationships between these variables. In doing so, an understanding of social stories will be enhanced and the applicability of this intervention can be examined carefully.

**Purpose of the Study**

In order for future social stories research to be valuable, the shortcomings of past studies must be avoided by eliminating as many of the extraneous variables as possible. Furthermore, design features that permit a clear determination of impact of the social story intervention must be incorporated. For instance, an attention-placebo condition/phase may be required to determine if extra adult attention is sufficient to account for any changes in behavior that may occur.

The purpose of the proposed research is to determine the efficacy of a social story intervention, using a scientifically rigorous design. Hence, the present study will address the following questions:
1) Is there a functional relationship between a social story intervention and changes in specific target behaviors in three children with autism spectrum disorders?

2) Is a social story intervention more effective than a non-social story + verbal reminder intervention in decreasing rates of problem behavior?
CHAPTER 2

Review of the Literature

In this Chapter, three main areas of research that pertain to the proposed study will be summarized. The first of these involves theory of mind, which will be described from a developmental perspective. This will be followed by descriptions of and results from the basic theory of mind research studies that have been conducted with individuals with autism. Second, a variety of criticisms related to theory of mind research with this population will be summarized and reviewed. Finally, the social stories literature will be summarized in terms of the existing research and critiques thereof.

Theory of Mind

Developmental Perspective

As noted in Chapter 1, having a theory of mind involves the ability to attribute mental states to oneself and others (Baron-Cohen, Leslie, & Frith, 1985; Leekman & Perner, 1991; Leslie, 1987). It allows one to empathize, communicate, and imagine other's hopes and desires, as well as to cheat, deceive, and outsmart others.

Theory of mind does not develop suddenly. From a very young age, toddlers begin to demonstrate an understanding of others' minds that develops into an ability to make attributions about what others are thinking and feeling. Research with typically developing infants indicates evidence of mentalizing abilities from as early as 18 months of age, in the form of pretend play (Leslie, 1988). Around age two, children are able to talk about internal states such as hunger and cold (Bretherton & Beeghly, 1982). Also, perceptions and emotions like love, taste, happiness, and want are readily understood around this age (Bretherton & Beeghly, 1982). Predictions based on desires also are understood, although predictions based on beliefs are difficult for two-year-olds. By three years of age, children
have a more explicit understanding of the link between perception and knowledge. That is, there is understanding that knowledge comes from seeing, and that not knowing results from not seeing something occur (Pillow, 1989). Also, at age 3, children can predict a person’s actions based on what that person thinks, as long as it is not a false belief. By age 4 or 5, understanding of intentions becomes more sophisticated – i.e., distinguishing between actions that are intended versus unintended (Astington & Gopnik, 1991).

In general, it seems clear that typically developing children show an increasingly sophisticated understanding of mental states as they grow older. On the other hand, children with autism (as a group) fail to demonstrate these abilities. Thus, in terms of social development, individuals with autism are at a great disadvantage. If they are unable to infer the thoughts of others, their competence in social situations are likely compromised. Whereas typically developing children can readily assess and respond appropriately in social exchanges, people with autism show considerable difficulties in this regard.

The following section will examine the origins of the theory of mind hypothesis and summarize two of the most significant studies in this area.

Theory of Mind Research

There is a substantial body of research motivated by the theory of mind account of autism. The literature on the development of this theory has grown exponentially over the last decade. Piaget (1929) was among the first psychologists to study children’s comprehension of the mental world. He asserted that, prior to age 7, children are incapable of distinguishing between mental and physical states. This issue resurfaced when Premack and Woodruff (1978) published their results on animal research. Specifically, they conducted a number of experiments to test theory of mind abilities in a chimpanzee named Sarah. Previously, the chimp had learned a symbol system for communication and had
demonstrated the ability to predict and interpret human actions using mental states such as intentions. The researchers concluded that Sarah’s performance suggested that she had a theory of mind. Happe and Frith (1995) argued that the results could easily be interpreted as the chimp’s “learning the means to a behavioral end” (p. 182). From this experiment, discussion arose around what constitutes a sound test of theory of mind. Dennett (1978) suggested that comprehending a false belief (in which one’s mental state is inconsistent with reality) would serve as a legitimate litmus test for theory of mind ability. Thus, this became the acceptable criterion among researchers in the field.

Within a few years, a host of experiments were designed to specifically tap children’s understanding of mental states. One of the first studies examining the emergence of false beliefs was Maxi and the chocolate scenario (Wimmer & Perner, 1983).

**Maxi and the chocolate scenario.** In this famous study, small paper cut outs of a young boy and a woman were used to represent two characters, Maxi and Maxi’s mother. In the story, the boy doll (Maxi) is waiting for his mother, who is shopping. When she returns, she asks Maxi to put some chocolate in a blue cupboard. The research participant then watches while Maxi puts the candy in a blue match box used to represent the cupboard. The participant is told that Maxi loves chocolate and that he remembers where it is kept. While Maxi is at the playground, his mother takes the chocolate from the blue cupboard to bake a cake. She puts the remaining chocolate into a green cupboard, not the blue one in which it was previously kept. The mother then leaves for a neighbour’s house to borrow some eggs. Maxi returns from the playground, hungry, and wants to eat some chocolate. He still remembers where he put the chocolate before he went out to play. The participant is then asked the belief question, “Where will Maxi look for the chocolate?” and is required to point to one of three boxes.
Wimmer and Perner (1983) reported that none of the typical 3 to 4 year-olds in their study could appreciate Maxi's false belief, while 57% of typical 4 to 6 year-olds and 86% of 6 to 9 year-olds indicated understanding of this mental state. The researchers concluded that the older group of children were more likely to understand these "representational complexities" (p. 124). This study, which examines understanding of false beliefs in young children, was a milestone for the theory of mind paradigm and generated a flurry of studies designed to tap the mentalizing abilities of young children. However, until 1985, the inquiry into theory of mind development was confined to typically developing children. It was not until this time that Baron-Cohen and his colleagues investigated whether children diagnosed with autism had a theory of mind.

Sally-Anne task. In this experiment, two dolls, Sally and Anne, are introduced to the research participant (Baron-Cohen et al., 1985). The participant is asked to identify each doll by name (naming question), and this is repeated until both dolls are correctly labeled. Then, the researcher acts out the following scenario using the dolls: Sally first places the marble in a basket and leaves the room. Anne takes the marble out of the basket and hides it in a box. After the transfer of the marble, two control questions are asked: "Where is the marble, really?" (reality question) and "Where was the marble in the beginning?" (memory question). Incorrect responses to the control questions result in the experimenter repeating the entire protocol from the beginning, until both questions are answered correctly. Sally then returns to the room and the participant is asked, "Where will Sally look for her marble?" (false belief question). The experiment is then repeated using the experimenter's pocket (instead of the box) as the new location in which the marble is hidden by Anne.

The Sally-Anne task was administered to three groups of children: 27 typical preschoolers, 14 children with Down Syndrome, and 20 children with autism. All of the
children with autism had a mental age well over four years, while the mental ages of the children in the other two groups were lower. Results indicated that the typical children and the children with Down Syndrome performed equally well, passing the task at 85% and 86%, respectively. Conversely, only 4 of the 20 children with autism (20%) passed the false belief test. Even when the experiment was repeated using the new location for the marble, the children with autism who initially failed the false belief question were unsuccessful.

Baron-Cohen and his colleagues (1985) controlled for the possibility of the children misunderstanding or forgetting components of the task by asking them the naming, memory, and reality questions. The fact that the children with autism answered these questions without error indicate that neither a lack of understanding nor poor recall could account for the results. Furthermore, the success of the control children with Down Syndrome was particularly important, as it indicated that a developmental delay alone was not responsible for failure in the false belief task. Thus, the researchers concluded that a failure to impute the mental state of false beliefs appeared to be exclusive to autism and may explain the lack of social competence and pretend play exhibited by children with this condition. The authors also concluded that children with autism, as a group, fail to demonstrate theory of mind. However, the implications of these findings did not go unchallenged; the next section briefly reviews some of the major criticisms against this paradigm.

Theory of Mind Criticisms

The theory of mind account of autism advocated by Baron-Cohen et al. (1985) has been and continues to be controversial. In this section, I will explore the criticisms of this theory and the related research addressing these issues. First, competence-based criticisms will be examined; critics have suggested that problems with language comprehension, the use of a play context to conduct theory of mind experiments, and the use of dolls instead of real
people are unfair and impede children with autism from demonstrating their true capacity for theory of mind. Second, a performance-based criticism that hypothesizes a lack of motivation on the part of children with autism will be presented as a rival hypothesis. A third concern relates to the mixed results of the existing studies, which have indicated that at least some participants with autism are able to pass theory of mind tasks. Finally, two alternative explanations, the executive dysfunction model and the interpersonal impairment hypothesis, both of which claim to be more encompassing of both the features and the deficits related to autism, will be addressed.

**Competence-Based Criticisms**

Although Baron-Cohen et al. (1985) employed rigorous controls in their study, some critics have asserted that concluding that children with autism have a specific impairment in acknowledging false beliefs is unwarranted. De Gelder (1987) questioned the interpretation of the results because of the language inherent in the Sally-Anne experiment. De Gelder’s criticism stemmed from the fact that autism is primarily a communication and language disorder, and includes problems with maintaining topics and understanding questions. Further, abstract concepts like “think” and “know” are especially challenging. Therefore, it is difficult to ascertain if the children with autism understood the experimental question in the Sally-Anne task as it was intended (De Gelder, 1987). That is, they might have interpreted the question about “what Sally knows” to mean “where the marble is.”

De Gelder (1987) also noted that pretend play is often lacking in children diagnosed with autism; hence, it may be inappropriate to expect them to make belief attributions in pretend situations. De Gelder concluded that children with autism may fail false belief tasks because their “autism” prevents them from being able to understand make-believe situations (i.e. Sally-Anne task). If De Gelder’s assessment is correct, then the Baron-Cohen et al
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(1985) study merely confirms what is already known about children with autism – namely, that they are unable to engage in pretend play.

Transfer test of false belief. Leslie and Frith (1988) addressed the issues raised by De Gelder (1987) by including a control group of participants with language impairments, by using a real as opposed to pretend situation for the experimental task, and by using real people instead of dolls. In this experiment, two researchers and a participant together place a penny underneath an inverted cup. One of the researchers leaves the room, and the second researcher and the participant transfer the penny to another inverted cup that is distinctly different from the first. When the first researcher returns, the participant is asked to predict where he thinks the penny is.

Similar to the results attained by Baron-Cohen et al. (1985), the majority of the children with autism were unsuccessful at predicting the first researcher’s behavior, while the typical and language-impaired participants were largely successful (Leslie & Frith, 1988). Thus, it appears that the use of real people instead of dolls and the use of a real life context instead of a pretend situation did not affect the ability of the children with autism to perform this task. It also appears that a language impairment alone cannot account for their performance, since the language-impaired participants were able to predict the researcher’s behavior accurately.

Smarties task. Although a language-impaired group was included in the transfer test of false belief, some critics (Eisenmayjer & Prior, 1991) still complained that this and previous studies (Baron-Cohen et al., 1985) involved “think” questions (e.g., “Where does Sally think the marble is?”). They asserted that failure on false belief tasks in children with autism could be attributed to pragmatic difficulties with the abstractness of the “think” question. Perner, Frith, Leslie, and Leekam (1989) avoided this problem of abstractness by
employing a “look” question instead of a “think” question in their task. Participants are shown a familiar Smarties box and asked, “What’s in here?” (In the Perner et al. study, all of the participants responded with “sweets” or “Smarties”). The experimenter then opens the box to reveal that it actually contains a pencil, returns the pencil to the box, and closes the lid. Participants are then asked to predict what another child, who has never seen the box, will say it contains.

Similar to the results by Baron-Cohen et al. (1985), only 4 of 26 children with autism (M.A. = 5.5) were able to predict accurately what their peer would say (Perner et al., 1989). This methodology was interesting in that the children first experienced the false belief situation for themselves before they were asked to judge the reaction of another person in the same situation. Thus, this task should have been easier than the standard Sally-Anne task, since the experience of being misled should have helped the participants appreciate the false belief of someone who had not seen the contents of the container. In this sense, the task was less cognitively demanding (i.e. less abstract) compared to previous studies. Nonetheless, the vast majority of children with autism were unable to provide the correct response.

For both children with autism and typical children, “knowing” in terms of visual access appears to be relatively easier than understanding false beliefs, because it does not involve mental states (Perner et al., 1989). For instance, typical 3-year-olds and about one-third of children with autism in this sample appeared to be able to understand that one can know something because one has seen it and that, conversely, one can not know something if one has not witnessed it (Perner et al., 1989). “Knowing” appears to be a prerequisite skill in comprehending false beliefs, since each of the four children with autism who passed Perner et al.’s false belief question also showed an understanding of this “knowledge-ignorance
distinction” (p. 698). However, an additional four children indicated that they understood this distinction, and yet failed the false belief task. This suggests that the knowing/not knowing distinction is a skill that is developed prior to comprehension of false beliefs.

**Performance-Based Criticisms**

Chomsky (1965) was amongst the first theorists to make the distinction between competence and performance. Competence refers an individual's knowledge (usually subconsciously) about a particular topic, while performance relates to what learners do habitually under day-to-day conditions, often without others watching. This distinction raises the issue of which type(s) of performance should be used to credit children with competence. Chomsky argued that performance factors such as hesitation, problems with recall, and poor articulation may mask competence, just as De Gelder (1987) argued that children with autism may lack motivation (a performance factor), which can account for their inability to demonstrate their competence in false belief tasks.

**Sabotage & deception.** Sodian and Frith (1992) tackled the issue of motivation by examining the ability of children with autism to keep a sweet from a puppet competitor through the use of deception and sabotage. In this task, a seal puppet is introduced as a nice “Smartie friend” who gives Smarties to children. Then, a wolf puppet is introduced as a nasty puppet who takes Smarties away and eats them. After each puppet demonstrates its respective role (i.e., give Smarties/eat Smarties), a participant is asked to identify both puppets accordingly. The experimenter then tells the participant that the object of a game is to help the Smartie friend puppet find the Smarties, and to keep them away from the Smartie eater puppet. In the sabotage condition, the participant is shown a key and a box with a padlock on it, and is instructed to hide a Smartie in the box. One of the puppets is presented and says, “I am the nice/nasty Smartie friend/eater. When I find a Smartie, I will give you
another one/eat it up.” The experimenter then asks the test question, “Do you want to lock the box or do you want to leave it open?”

In the deception condition, no key is available for the padlock. The Smartie friend/eater asks the participant “Is this box locked or is it open?” and the experimenter then asks the test question, “Do you want to say it is locked or do you want to say it is open?” If the participant lies to the Smartie eater, he/she is allowed to keep/eat a Smartie; but if the participant tells the truth, the Smartie eater takes the Smartie away. Conversely, if the participant tells the Smartie friend the truth, he/she is given an additional Smartie.

Results indicated that, in the sabotage condition, 16 out of 19 children with autism were able to prevent the Smartie eater (i.e., a competitor) from getting a sweet by locking the box in which it was hidden (Sodian & Frith, 1992). Furthermore, this action was used discriminatively, as the participants also left the box unlocked for the Smartie friend puppet. Sodian and Frith (1992) made the claim that this was quite remarkable because children with autism often engage in perseverative behavior with regard to particular thoughts or actions, and thus might have been expected to lock the box regardless of the type of puppet.

However, in the deception condition, only 6 of the 19 children with autism passed both trials. The researchers concluded that, when a physical means (i.e., locking the box) was not available to attain a reward, the participants with autism were incapable of employing a mental state (i.e. lying) to achieve the desired outcome. They concluded from these findings that it was unlikely that motivational problems hindered the performance of the participants, and that theory of mind deficits alone could account for the results.

Mixed Results Criticism

Aside from the various methodological shortcomings noted previously, the theory of mind deficit theory in autism has been challenged because not all children with autism fail
theory of mind tests (Ozonoff, Pennington, & Rogers, 1991). In every study conducted to date, some percentage of participants with autism, ranging from 15% (Reed & Peterson, 1990) to 55% (Prior, Dahlstrom, & Squires, 1990), have been able to demonstrate mentalizing abilities. In addition, the theory has been challenged by the fact that participants with autism have achieved near-ceiling performance on a “false photo task” (Leekam & Perner, 1991; Leslie & Thaiss, 1992). In this task, the participant helps the experimenter place an object in location X and takes a picture of it with a Polaroid camera. The experimenter then moves the object to location Y while the participant is watching. Without showing the participant the photo, the experimenter then asks the test question, “In the picture, where is the object?”

This experiment was originally designed by Zaitchik (1990) and was tested with typically developing children. The findings indicated that typical 3 and 4-year-olds found the false photo task to be as difficult as the false belief task; however, by age 5, most children were able to pass both. This suggests that the cognitive demands of the false belief and false photo tasks are the same. However, two independent studies of this task conducted with children with autism (Leekam & Perner, 1991; Leslie & Thaiss, 1992) showed that nearly all of these participants, who previously failed the Sally-Anne and/or Smarties tasks, were able to pass the false photo task.

Why do participants with autism seem to find the false photo task easier than standard tests of false belief? Leekam and Perner (1991) suggested that their unexpected performance may reflect their ability to “interpret the photograph as a fixed, unchanged situation rather than as a representation.” (p. 216). Leslie and Thaiss (1992) argued that the two sets of tasks “tap dissociable mechanisms” (p. 238), and that understanding false photographs is not a necessary nor sufficient precursor to understanding false beliefs. Mitchell (1997) offered
three additional explanations for the anomalous findings. At the one extreme, one could
close that individuals who are able to pass tests of false belief do not have autism. At the
other extreme is the possibility that the entire theory of mind hypothesis as it applies to
individuals with autism is erroneous. In between these two extremes is the suggestion that
the ability to infer the thoughts and feelings of others may not be a primary deficit in autism
that explains the triad of impairments in communication, socialization, and imagination.

**Second-order belief attribution.** Baron-Cohen (1989) attempted to rescue the theory
of mind hypothesis by investigating the ability of children with autism to understand second-
order belief attributions. This experiment makes use of a toy village comprised of two
houses, a church, a fence, four figurines representing people, and an ice cream van. First, the
participants with autism are asked to label each of the toys (an easy task for most). Then, a
boy doll (John) and a girl doll (Mary) are introduced, and the participant is asked to name
them both (naming question). The experimenter then tells the following story while acting it
out with the corresponding dolls: John and Mary are in the park and along comes an ice
cream truck. John wants to buy ice cream, but he left his money at home. The ice cream
man says he will be in the park all afternoon, so John goes home to get his money while
Mary stays at the park. At this point, participants are asked a prompt question to ensure that
they are following the story: “Where did the ice cream man tell John he would be all
afternoon?” Then, the ice cream man changes his mind and decides to drive to the church to
sell ice cream. He tells Mary of his new plan. Two prompt questions are asked: “Where did
the ice cream man say he was going?” and “Did John hear that?” While the ice cream man is
driving over to the church, he passes John’s house and sees John. He tells John of his new
plan. Two more prompt questions are asked at this point: “Where did the ice cream man tell
John he was going?” and “Does Mary know that the ice cream man has talked to John?”
Mary goes to John’s house to tell him of the change in the ice cream man’s plan, but is told by John’s mother that he has gone to buy ice cream. The critical belief question is, “Where does Mary think John has gone to buy an ice cream?” and “Why?” (justification question). Similar to the rationale for the Sally-Anne task, a reality question (“Where did John really go to buy ice cream?”) and a memory question (“Where was the ice cream man in the beginning?”) are asked to rule out alternative explanations for the results, such as forgetting or misunderstanding components of the task. Then, the story is repeated with the locations (the park and the church) reversed.

Three groups of 10 participants each (autism, Down Syndrome, and no disabilities) were utilized in this study (Baron-Cohen, 1989). The ability to pass a first-order belief attribution, that is, the “ability to think about another person’s thoughts about an objective event” (p. 288) was a requirement for inclusion in this study. The mean chronological ages (CA) and mental ages (MA) on the Expressive One-Word Picture Vocabulary Test for each of the groups were as follows: participants with autism (CA=15.3; MA=12.2), participants with Down Syndrome (CA=14.3; MA=7.5) and participants with no disabilities (CA and MA=7.5). No formal assessments were administered to the last group, since it was assumed that their CA would be equal to their MA. Results indicated that 90% of the participants without disabilities, 60% of those with Down Syndrome, and none of the participants with autism passed both trials of the belief question. From this experiment, Baron-Cohen (1989) concluded that the results support his prediction that children with autism who demonstrate the ability to understand false beliefs at the lower level (first-order) are nonetheless impaired in the ability to think about “another person’s thoughts about a third person’s thoughts about an objective event” (second-order attribution) (p. 288). Although these findings were
successful in salvaging the theory of mind account in autism, some critics continued to argue for more comprehensive explanations.

**Executive Dysfunction Criticism**

Some researchers (e.g., Hughes & Russell, 1993; Ozonoff, et al., 1991) have suggested that deficits in theory of mind do not account for some of the well-documented characteristics seen in individuals with autism, such as their insistence on sameness, narrow range of interests, and tendency toward anxiety caused by changes to routines. Because of these limitations in the explanatory power of Baron-Cohen’s hypothesis, interest has turned toward an “executive function deficit” as an explanation for autism (Ozonoff et al., 1991). According to Ozonoff and her colleagues, executive function is the ability to “maintain an appropriate problem-solving set for attainment of a future goal” (p. 1083). Executive function allows for planning, organizing, controlling impulses, and suppressing irrelevant responses.

The executive function deficit theory is based on the fact that typically developing individuals are able to control and shift their focus of attention and to “tune out” distractions, depending on the circumstances. However, individuals with autism appear to be unable to co-ordinate these aspects of attention, resulting in the characteristics described previously. Russell, Mauthner, Sharpe, and Tidswell (1991) suggested that impairment in executive functioning may be responsible for their attention deficits and impulsivity and might also explain their inability to pass false belief tasks.

**Wisconsin Card Sorting Test and the Tower of Hanoi.** To test the executive dysfunction hypothesis, Ozonoff and her colleagues (1991) employed two tests typically used to measure executive functioning: the Wisconsin Card Sorting Test and the Tower of Hanoi. In the card-sorting task, a deck of cards with images that can be sorted along two dimensions
(e.g., by shape and by colour), is presented to the participant, along with two trays. The participant is then directed to sort the cards, one at a time, into the trays, but is not provided with any information about how to do so. After each card is placed in a tray, the experimenter provides feedback on whether the card was correctly or incorrectly placed, using one of the dimensions as the sorting criterion (e.g., by colour). At a certain point, the experimenter switches the criterion (i.e. from colour to shape), rendering the first criterion ineffective. The task for the participant is to then figure out the new “rule” on the basis of the feedback provided by the experimenter.

In the Tower of Hanoi experiment, a three-pronged wooden pegboard is presented to the participant. On the far-left prong, three wooden circles of different diameters are placed on top of each other. The bottom circle is the largest in diameter, while the top circle is the smallest. The object of the task is to move the circle pieces (one at a time) from the far left prong to the far right prong, with the restriction that a larger circle can never be placed on top of a smaller one.

All of the participants with autism who were involved in these experiments had measured intelligence quotients in the normal range, but exhibited various impairments while engaged in these tests (Ozonoff et al., 1991). Impulsivity and difficulty in shifting focus of attention were common. For instance, in the card sorting activity, participants with autism often continued to employ the same sorting criterion, even after it became apparent that it no longer resulted in correct responses. In the Tower of Hanoi activity, individuals with autism seemed unable to plan their strategy a few steps ahead. These results suggested that an executive functioning deficit, rather than a theory of mind deficit, may be common in people with autism.
Interpersonal Impairment Criticism

In his critique of the theory of mind hypothesis, Hobson (1993) did not deny the fact that individuals with autism may have difficulty with tasks that require mentalizing. Rather, he suggested that a more basic primary impairment contributes to these individuals' inability to understand other minds. He suggested that this core deficit is an interpersonal impairment that affects the ability of infants with autism to engage in joint attention and shared affect with others. Hobson postulated that this innate impairment hinders the social experiences of infants with autism from the beginning of life. Consequently, in childhood, they lack the cognitive structures that are necessary for social understanding and are thus unable to infer the mental states of others. To date, this theory has been neither accepted nor rejected, due to the fact that it is not empirically testable.

From this brief review, it is clear that there are many accounts for the social impairments related to autism and that consensus has not been reached by researchers. Regardless of why individuals with autism show difficulty relating to other people, it is important that they be provided with strategies for handling social situations successfully. One potential strategy in this regard is the use of "social stories" (Gray & Garand, 1993). The next section of this chapter will explore the existing research related to social stories for children diagnosed with a PDD condition. Summaries of the four social stories studies that have been completed to date will be examined, followed by critiques pertaining to internal validity concerns.

Social Stories Research

As described previously, the theory of mind paradigm asserts that people with autism are unable to think about or predict mental states and that, as a result, they have difficulty understanding the perspectives of others. Social story interventions (Gray & Garand, 1993)
are linked to the theory of mind research in that they attempt to remediate this "mind blindness" by providing the perspective-taking information that many individuals with autism lack. Such information is included in the form of "perspective sentences" that explain the reactions and feeling of others. It is the inclusion of this type of information that makes social stories unique in comparison to more traditional social/behavioral interventions, in which individuals with autism are provided only with information about desired behaviors (i.e. stimulus-response).

Overview of Social Story Interventions

Social stories are short stories that are used to teach appropriate behavioral responses in people with autism. Social stories are written for specific individuals and are tailored to their individual needs. Authors of social stories are encouraged to write them from the child's perspective and use vocabulary and concepts that the child will be able to understand (Gray & Garland, 1993). In addition, it is important that the story is written as accurately as possible, especially since individuals with autism frequently comprehend statements literally (Kanner, 1943).

Social stories are comprised of three types of sentences: descriptive, directive and perspective. Descriptive sentences provide descriptions about specific social settings or situations that are problematic for the person with autism (Gray & Garand, 1993). These sentences objectively define where a situation occurs, who is involved, what other people are doing, and why they behave in certain ways. Directive sentences provide information about desired behavior in the targeted situation. Perspective sentences describe the internal status of the person or persons involved as well as information about their thoughts, feelings and/or moods. Regardless of the length of a social story, Gray and Garand (1993) suggested that the most effective stories maintain a proportion of two to five descriptive and perspective
sentences for every directive sentence. The following is a sample social story from Gray’s

*Original Social Story Book (1993):*

**Riding in the Car**

Sometimes, I ride in the car. (Descriptive sentence)

I get in and put on my seat belt. (Directive sentence)

Mom likes it when I sit quietly when she drives. (Perspective sentence)

I can look at the things outside my window. (Descriptive sentence)

Riding in the car can be a lot of fun. (Descriptive sentence)

I wait until I am told to get out of the car. (Directive sentence)

Mom feels great when I am good in the car. (Perspective sentence)

Gray and Garand (1993) suggested that the best candidates for this intervention are individuals who have basic receptive communication skills or who are in the “trainable mentally impaired range” (p. 2) of intellectual functioning. In addition, those who are interested in letters, words, and written material seem most likely to benefit from social stories. The ability to read is not required, although if an individual is literate, he or she may be able to read the story independently. Social stories are appropriate for school-aged individuals across the age range and can easily be modified to accommodate individual strengths and deficits.

Despite the widespread use of social story interventions in educational and other settings, there is limited empirical research related to their effectiveness. The focus of the sections that follow is to examine the existing research in this area and to evaluate the methodologies used to conduct social stories experiments. Specifically, criticisms regarding the internal validity of these studies will be addressed, including: (a) experimental design, (b) combining other treatments, (c) no attention-placebo control, (d) varying social story
guidelines, and (e) measurement issues. Table 1 summarizes the major threats to internal validity pertinent to research in the area of social stories that were discussed previously in Chapter 1.

Table 1
Threats to Internal Validity in Social Stories Research

<table>
<thead>
<tr>
<th>Threat to Internal Validity</th>
<th>Description of Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental design</td>
<td>Use of A-B design permits only correlational inference. Barlow &amp; Hersen (1984)</td>
</tr>
<tr>
<td>Changing more than one variable at a time</td>
<td>Difficult to determine the contribution of each individual factor in producing the results. Barlow &amp; Hersen (1984)</td>
</tr>
<tr>
<td>No attention-placebo control group/phase</td>
<td>Does not control for improvements due to extra adult attention. Barlow &amp; Hersen (1984)</td>
</tr>
<tr>
<td>Varying social story guidelines</td>
<td>Does not allow for the evaluation of a “true” social story intervention. Gray &amp; Garand (1993)</td>
</tr>
<tr>
<td>Measurement issues</td>
<td>Variability during baseline calls into question the representativeness of the data. Barlow &amp; Hersen (1984)</td>
</tr>
</tbody>
</table>

Swaggart et al. (1995)

Swaggart and her colleagues (1995) were the first researchers to examine the effectiveness of a social story intervention. Three children (ages 7-11) participated in this study. They were recruited from a university medical center and were being educated in a self-contained classroom due the severity of their behaviors. Two of the participants were diagnosed with autism and one child was diagnosed as having PDD-NOS. All had some
expressive language skills but, for the most part, could not be easily understood. For example one child “often mumbled or dropped the final syllable or consonant of a word.” (p. 8). Additionally, each child demonstrated a number of aggressive behaviors such as pulling hair, hitting, and choking others.

Greeting behaviors were the targets of the first intervention for Danielle, an 11-year old girl with autism, because she would often run up to and hug strangers and/or engage in hair pulling if she did not receive a hug. The social story written for her included two descriptive and three directive sentences and provided information about appropriate adults to hug and how to respond (i.e., keep walking) if she received no response to a greeting (“hi”). The format of the social story presentation included one or two sentences on each page and a picture or verb icon that related to the text, showing the desired behavior. The story was read once every morning for nine days. In addition, whenever Danielle approached a person (e.g., in the school hallway), the staff member accompanying her would tell the person that Danielle was suppose to say “hi” and wave. Verbal prompts (i.e. “wave and say ‘hi’”) or physical redirection along with the verbal prompts were used to elicit the desired behaviors when Danielle was within three feet of the person she was greeting. During baseline (9 days), 15% of Danielle’s greeting opportunities were considered to be appropriate – that is, they did not involve threatening touches and aggression. During the social story intervention, 74% of her encounters with others were deemed appropriate. Aggressive acts did not occur at all during intervention, and threatening touches decreased from 82% to 26%.

A second story was also written for Danielle to reduce aggression when she was upset. The social story was titled “How I Earn a Cola” and included three descriptive and three directive statements describing desired behaviors (i.e. “nice hands”) and positive consequences such as colas and hugs that would be available to her if she engaged in them.
The social story was read to Danielle by the classroom teacher, once each morning. A response-cost procedure was paired with the social story, in which five cola icons were placed on a picture chart in her classroom. Whenever Danielle became aggressive, she lost one cola icon. If she had at least one icon left at snack time, then she would earn a can of cola. Baseline data were collected for 51 days and indicated between 0-19 incidences of aggression per day; there was only one day on which no aggressions occurred. When the social story plus response-cost procedure was implemented, there was a decrease in aggressive episodes to between 0 and 14 per day; and on eight of the days during treatment phase, no aggressive acts occurred.

A social story designed to encourage sharing behavior during toy play was also written for two 7-year-old boys who screamed and exhibited aggressive behaviors when others approached them to play. One directive and three descriptive sentences were included in the social story, which was read to each of the boys individually each morning. No additional intervention was paired with the social story. For both boys, baseline data were collected for 10 days and indicated no occurrences of sharing behavior. Inappropriate behaviors such as screaming and grabbing toys from another playmate occurred in 100% of the sessions. After the implementation of the social story, sharing behavior (which had not occurred during baseline) was noted in 22% and 35% of the observations, while screaming and grabbing decreased by 44% and 65%, respectively.

The following sections provide a brief critique of the Swaggert et al. (1995) study with regard to internal validity.

Experimental design. An A-B experimental design was implemented in this study, permitting only correlational inferences. However, the study reported direct replication with
two other participants, thus increasing the likelihood that the results were due to the intervention.

Combining other treatments. In the first intervention with Danielle, Swaggart et al. (1995) used physical redirection and verbal prompts when she failed to exhibit the desired behaviors outlined in the social story. In Danielle's second intervention, a response-cost procedure was paired with the social story. In both cases, the addition of other treatments made it impossible to determine if and to what extent the social story alone was effective in producing the desired behaviors.

Attention-placebo control. The researchers did not control for the possibility that the additional adult attention that was inherent in the experiment could account for the positive changes in behavior.

Varying the social story guidelines. The guidelines for composing social stories by Gray and Garand (1993) was not upheld by the experimenters (0-1 directive sentences for every 2-5 descriptive and perspective sentences). In two of the social stories, there were far more directive statements than descriptive or perspective ones.

Measurement issues. A stable baseline was not established before implementing the treatments for Danielle. For instance, her appropriate greeting behavior showed variable rates and only two data points in an upward direction prior to the introduction of the social story. Baseline data were not graphically represented for the two boys.

Kuttler et al. (1998)

A single subject design was implemented in this study with Jon, a 12-year-old boy diagnosed with autism, Fragile X syndrome, and intermittent explosive disorder. Jon attended a self-contained classroom in a residential school for children with special needs. He spoke in two-word utterances but was difficult to understand and used manual signs,
gestures, and a communication book with 100 icons to communicate. He engaged in frequent tantrum behaviors during unanticipated transitions, waiting times, and free time. Before a tantrum occurred, Jon usually produced inappropriate vocalizations (i.e. screaming and cursing) and dropped to the floor. The experimenters reasoned that if these antecedent behaviors could be controlled, a full-fledged tantrum might be avoided.

Two social stories were written for the times of the day in which Jon appeared to have the most difficulty, morning work time and lunch time. The first morning work story included one directive and four descriptive sentences, and the lunchtime story included three descriptive and four directive sentences. For each sentence in the stories, there was a corresponding icon. An A-B-A-B design was implemented to assess changes in Jon’s precursor tantrum behaviors. During the A phases, the usual classroom strategies were employed, which included picture schedules, sticker charts, and verbal and physical prompting. During the B phases, the social stories were read just prior to work time and lunch time. Access to the stories was unlimited and Jon was asked to review the desired behaviors immediately after exhibiting tantrum behavior.

The results indicated a dramatic change in precursor tantrum behaviors. Baseline measures (A) indicated an average of 15.6 incidences of tantrum behaviors during morning work time and mean of 11.6 behaviors at lunch time. When the social stories were implemented (B), the problem behaviors decreased to a mean of 0 during work time and 2.0 during lunch time. When the social story intervention was withdrawn (A), the behaviors increased to rates similar to baseline, with a mean of 15.3 during work time and 18.0 during lunch time. Finally, when the social stories were reintroduced (B), there was an average of 0 tantrum behaviors during work time and 1.0 during lunch time.
Overall, the Kuttler et al. (1998) study was more methodologically sound than the Swaggart et al. study; however, there were still significant problems, which will be summarized below.

**Combining other treatments.** Besides reading the social story during the intervention phases, the child participant had access to it at all times and was instructed to review the contents of the social story after a tantrum had occurred. These procedures make it difficult to ascertain the lone effects of the social story (if any) on the changes in the precursor tantrum behaviors reported by the researchers.

**Attention-placebo control.** The extra adult attention that Jon received while he was engaged in the social story reading activity may have contributed to the changes in behavior.

**Varying the social story guidelines.** In one of the stories, there were four directive statements and three descriptive ones. In proportion to the other types of sentences, too many directive sentences are used, according to Gray and Garand’s (1993) guidelines.

**Measurement issues.** During baseline, no directional trend in the data was established either during the morning work time or during lunchtime. In addition, the number of precursor tantrum behaviors during lunch time showed an extreme range (5-20) during baseline observations.

**Hagiwara & Myles (1999)**

Three boys, ages 7-9, participated in this study. All three had been diagnosed with autism and had "basic listening or written language skills." (p. 83). In order to qualify for the study, participants had to exhibit behavior problems or social skill deficits. In addition, adequate fine motor skills were essential because the intervention utilized a computer and a computer mouse. For participants I and II, hand washing was targeted for intervention, while
the target behavior for participant III was on-task behavior. The target behaviors were identified after consulting with their classroom teachers and paraprofessionals.

The hand washing task was divided into six steps: (a) turn on the water, (b) put soap on hands, (c) rub both hands under the water, (d) take paper towel, (e) dry both hands with paper towel, (f) throw away paper towel. There were three categories for scoring: (a) independent response in which the child completed the entire task without any adult assistance, (b) verbal prompts or cues if the child did not respond within 5 seconds, and (c) physical assistance if the child did not respond to the verbal prompt within 5 seconds. For Participant III, on-task behavior included the following behaviors: (a) reading or reading out loud, (b) making eye contact with the teacher, (c) writing, (d) commenting that was related to the task, (e) answering questions from the teacher, and (f) watching objects related to the task.

The development of the multimedia social stories was made possible using HyperCard (Apple Computer, 1994) software. The program allowed a synthesized computer voice to read the text from a social story while the participant viewed a movie depicting the actions related to the text. The participants were taught how to operate the mouse to begin the movie. The social stories were read once a day, just prior to the desired targeted behaviors.

For Participant I, baseline measures indicated that hand-washing completion (in all three settings) ranged from 55% to 83%. His performance improved 17% from the first day to the last day of intervention prior to morning snack. During the pre-lunch and pre-recess settings, 8% and 9% gains were reported. Overall, Participant I’s successful hand-washing completion ranged from 75% to 83% during intervention. Baseline measures for participant II indicated that he completed the task independently 75% to 83% of the time. During
intervention, his completion rate increased in all settings: to 80% before going to the resource room, to 92% before lunch and to 95% after recess. For participant III, lunchtime on-task behavior ranged from 26 to 38 seconds prior to intervention. After the social story was introduced at lunch, a 66 second gain was documented for four days, after which the data returned to rates similar to baseline. No significant changes were reported in either the resource room nor the general education classroom.

To summarize, Participant I improved in all three settings, and independently washed his hands on the last day of intervention in two of the three settings. For Participant II, gains were noted in two of the three settings, with a 93% completion rate. For Participant III, a stable rate of on-task behavior was not established, although slight improvement was noted in the lunch setting. Although the experimenters avoided changing more than one variable at a time, the major shortcomings of this study are similar to the Swaggart et al. (1995) and the Kuttler et al. (1998) studies. The specific internal validity concerns are listed below.

Experimental design. Only correlational inferences can be drawn, due to the simple A-B design employed in this study. However, the findings are strengthened in that the experimenters documented improvements during the intervention phase with two other participants and across two other settings.

Attention-placebo control. There was no control phase to determine if the improvements noted were due to the multimedia social stories or to the additional attention given to the participants during the intervention.

Varying the social story guidelines. Nine of the ten statements used in the social story on hand washing were directive. This proportion grossly deviates from the recommended proportion of sentences suggested by Gray and Garand (1993). The multimedia social story for Participant III was not included in the article.
Measurement issues. Three stable data points in either an upward or downward direction were not established for Participant III (in the resource room setting) prior to intervention.

Norris and Dattilo (1999)

An 8-year-old African-American girl named Jennifer participated in this study. Jennifer was diagnosed with mild to moderate autism and was assessed as performing in the average range of general intellectual functioning at age 7. Her strengths were in areas such as spelling, reading recognition, and life skills; math, social skills, and general knowledge were areas of relative weakness. Jennifer was included in the study because of her diagnosis and her level of cognitive functioning, and because she was included in a regular education classroom (unlike the participants in the other three studies).

Jennifer’s social stories focused on the behaviors of talking and singing to herself in unstructured situations (i.e., lunch). These behaviors were pervasive and had been documented by professionals working with her for five years. The social stories were 7-8 pages long and included 2-4 sentences on each page. In addition, 2-5 coloured Picture Communication Symbols (Johnson, 1994) were placed alongside the text. Three social story variations were written to maintain her interest. Since Jennifer was literate, she read the story out loud while the experimenter offered help as necessary, answered questions, provided examples, and asked her questions about the story to test her comprehension.

The use of a video camera and a microphone assessed the natural frequency of Jennifer’s social interactions. Specifically, the researchers were interested in the percentage of intervals of occurrences of appropriate, inappropriate, and no social interactions. After each 10-second interval, the participant’s behavior was coded as one of these three types of behavior. Appropriate social interactions included initiating or responding to other students,
and producing verbalizations that were appropriate in the context of the exchange.

Inappropriate social interactions included echolalic speech, bizarre utterances, and singing to herself. Absence of social interactions included no attempts to gesture or verbalize.

Inappropriate social interactions occurred at a mean level of 34% at baseline. With the introduction of the social story, these behaviors ranged from 44% on the first day to 23% on the last. Interestingly, when inappropriate interactions decreased, the absence of social interactions increased. However, no significant changes in appropriate social interactions were noted, suggesting that Jennifer did not acquire more desirable replacement behaviors for her singing and echolalia.

Similar to past studies, there were a number of internal validity concerns in this experiment. Interestingly, however, the specific methodological flaws were somewhat different compared to prior studies. These issues are briefly addressed below.

**Experimental design.** The use of an A-B design, without direct replication does not permit demonstration of the effects of the intervention beyond correlational inferences.

**Combining other treatments.** The experimenters noted that concurrent changes at home and in the behavior management program that was utilized in Jennifer’s classroom may have contributed to the results.

**Attention-placebo control.** The target behaviors may have improved as a result of the extra adult attention that occurred during reading of the story.

**Varying social story guidelines.** Although the authors did not deviate from the prescribed ratio by Gray and Garand (1993), they introduced three social stories simultaneously. The researchers themselves suggested that varying the content in this way may have hindered Jennifer’s ability to fully grasp the information provided in the stories.
Measurement issues. A stable baseline was not achieved prior to implementation of the social story.

Reactivity. The behaviors may have been influenced by the presence of the video camera and by the experimenter having to periodically check the camera.

Summary

Each of the four social story studies completed to date suffer from a variety of methodological shortcomings. Table 2 briefly summarizes the specific concerns reviewed in the section with regard to internal validity including: (a) experimental design, (b) changing more than one variable at a time, (c) attention-placebo control, (d) varying recommended social story guidelines, (e) measurement issues, and (f) reactivity. Due to these unresolved issues, the efficacy of a social story intervention has not been demonstrated adequately at this point in time.
<table>
<thead>
<tr>
<th>Internal Validity Issues</th>
<th>Research on Social Stories</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental design</td>
<td>A-B</td>
<td>A-B-A-B</td>
<td>A-B</td>
<td>A-B</td>
</tr>
<tr>
<td>Changing more than one variable at a time</td>
<td>Physical redirection, verbal prompts, &amp; response-cost</td>
<td>Review social story after tantrum &amp; unlimited access to social story</td>
<td>N/A</td>
<td>Changes in the home &amp; behavior management program at school</td>
</tr>
<tr>
<td>Attention-placebo control</td>
<td>Did not control for this</td>
<td>Did not control for this</td>
<td>Did not control for this</td>
<td>Did not control for this</td>
</tr>
<tr>
<td>Varying recommended directive social story guidelines</td>
<td>Too many directive statements</td>
<td>Too many directive statements</td>
<td>Too many directive statements</td>
<td>Introduced three social stories simultaneously</td>
</tr>
<tr>
<td>Measurement issues treatment</td>
<td>Unstable baseline before treatment</td>
<td>Unstable baseline before treatment</td>
<td>Unstable baseline before treatment</td>
<td>Unstable baseline before treatment</td>
</tr>
<tr>
<td>Reactivity</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Videotaping</td>
</tr>
</tbody>
</table>
To summarize, this chapter has explored the origins of theory of mind and the classic studies designed to test “mind-reading” in young children. Criticisms of this theory and corresponding research studies were also examined. Then, a social story intervention was proposed as a potential avenue for providing accurate social information to children with autism. In the final section of the chapter, the existing empirical studies were examined, along with critiques of their methodological soundness. It seems clear from this summary that several important methodological issues remain to be addressed in future social stories research.
CHAPTER 3

Method

Participant Selection

An email correspondence was sent to several pre-schools and agencies supporting children with autism spectrum disorders to recruit potential participants. Potential candidates were required to have basic receptive communication skills (i.e., the ability to comprehend simple spoken and/or written language) as well as specific additional skills related to the social story intervention (see section on Assessment). Participants also had to be identified by the interventionists as having a moderate to severe behavior problem. Children with prior experience with social stories were not excluded from the study. Parents who responded to the recruitment notice received a letter describing the purpose, procedures, and timeline of the study before signing consent forms.

Participants

Three pre-school-aged boys, Andrew, Henry, and Neil (pseudonyms), were selected for participation in the study.

Andrew. When the study commenced, Andrew was 3 years 10 months old. He had been diagnosed with autism at the age of two. He is the middle child in a middle class, Italian-Canadian family, and has one older and one younger brother. For 1.5 years prior to the study and concurrent with it, Andrew received 1:1 behavioral therapy at home (~30 hours/week). At the time of the study, Andrew also attended a Montessori pre-school once weekly for 3 hours. He had no previous experience with social stories. Andrew's mother indicated that Andrew was reluctant to share toys with his siblings at home, and would become aggressive (mostly toward his older brother), cry, and yell whenever he was asked to
do so. Thus, toy sharing behaviors were the focus of the social story intervention for Andrew.

**Henry.** Henry is a Caucasian/First Nations boy who was 5 years 9 months old at the time of the study. Henry lives with his parents and older sister. Shortly after receiving a diagnosis of autism at the age of two, Henry began to receive intensive behavioral intervention at home (between 15-30 hours/week). He also attended an inclusive pre-school classroom and received one-on-one discrete trial teaching for part of the day. With the help of a full-time aide, Henry completed a regular kindergarten curriculum and was planning to enter grade 1 in the subsequent school year. Prior to this study, social stories had been written for Henry to manage behavior problems such as those related to his intense interest with trains. The social story for the study addressed his eating problems at summer school; during snack time and lunch time, Henry often made sounds (e.g., screamed, squealed, & cried), threw up food, and put his hand(s) inside his pants/genital area.

**Neil.** Neil was 6 years 4 months old at the onset of the experiment. After his second birthday, he had been diagnosed with PDD-NOS by a multidisciplinary team. He is the only child in a middle class, Chinese-Canadian family. Prior to the study, he had attended preschool 5 days a week for 5-6 hours each day, and had also completed kindergarten successfully with the help of a classroom assistant. At home, Neil had received behavioral intervention (discrete trial teaching) on a one-to-one basis (~15 hours/week) since the age of three. In the past, a number of social stories had been written for him at home and at school to address various behavioral issues. For the present study, a social story was written to address problem behaviors that arose when he played games with his peers; these behaviors included cheating, taking extra turns (e.g., moving/touching another player's hand/game
piece), and making negative comments about losing. Table 3 summarizes the participants' profiles.

Table 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Participant</th>
<th>Andrew</th>
<th>Henry</th>
<th>Neil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>3 years, 10 months</td>
<td>5 years, 9 months</td>
<td>6 years, 4 months</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
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<td>PDD-NOS</td>
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<tr>
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<td>&amp; 2 siblings</td>
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<td>Home</td>
<td></td>
<td>Applied behavioral analysis</td>
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<td>Behavior</td>
<td></td>
<td>Aggression, crying, and</td>
<td>Sounds, hands in pants,</td>
<td>Cheating, taking extra</td>
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<tr>
<td></td>
<td></td>
<td>yelling</td>
<td>and throwing up</td>
<td>turns, and making</td>
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<td></td>
<td></td>
<td></td>
<td>negative comments</td>
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<tr>
<td>Context</td>
<td></td>
<td>Sharing toys at home</td>
<td>Mealtime and snack</td>
<td>Playing games with</td>
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<td></td>
<td></td>
<td></td>
<td>time at school</td>
<td>peers at school</td>
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</table>
Screening Assessment

The Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1981) was administered by a registered speech-language pathologist with experience testing children with autism spectrum disorders. The PPVT-R was chosen because the skills required to complete this test are similar to those that are necessary for a social story intervention. For instance, a participant must be able to follow one step instructions, focus his or her attention for up to 10 minutes on an adult-directed task, tolerate close proximity to another person, and understand the one-to-one correspondence between objects and pictures.

The PPVT-R measures receptive (hearing) English vocabulary (Dunn & Dunn, 1981). It is a popular assessment tool with preschoolers because vocabulary acquisition is an important measure of child development and because this test is considered easy to administer, even to very young children. The PPVT-R is particularly advantageous for children with autism since it does not require the ability to read, write, or respond verbally. Not only are items within a particular form of the test consistent, but alternate forms are very similar. Scores on the PPVT-R are considered quite stable for up to one month. The revised version of this test is more reliable than the original version; Dunn and Dunn (1981) reported a test-retest reliability coefficient of .82 for the revision. The PPVT-R correlates highest with other measures of vocabulary, and “correlates moderately well with other tests of scholastic aptitude (verbal intelligence)” (Dunn & Dunn, 1981, p. 67). Although the PPVT-R is associated with measures of school achievement when they are tested at the same time, it does not appear to be a powerful predictive measure of success in school.

The actual score that child participants received on this assessment was not critical to the proposed study. Rather, the assessment was used to determine whether or not the child
was able to attend at a sufficient level during the testing session and thereby obtain a score. By doing so, the child showed evidence of most of the skills necessary for participation in a social story intervention, as noted previously. Thus, the criterion for eligibility was the ability to achieve a basal score on the PPVT-R. According to Dunn and Dunn (1981), this consists of obtaining eight consecutive correct responses. Table 4 summarizes the PPVT-R scores by each child participant using Form L of the test.

Table 4

Results from the PPVT-R for each Participant

<table>
<thead>
<tr>
<th>PPVT-R Results</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Andrew</td>
</tr>
<tr>
<td>Raw Score</td>
<td>35</td>
</tr>
<tr>
<td>Standard score equivalent</td>
<td>95</td>
</tr>
<tr>
<td>Percentile rank</td>
<td>37</td>
</tr>
<tr>
<td>Stanine</td>
<td>4</td>
</tr>
<tr>
<td>Age equivalent</td>
<td>3-7</td>
</tr>
<tr>
<td>Chronological age</td>
<td>3-10</td>
</tr>
<tr>
<td>Comment from examiner</td>
<td>Reliable results</td>
</tr>
<tr>
<td></td>
<td>prior to the testing</td>
</tr>
</tbody>
</table>

Other skills that were necessary for this intervention and that were assessed separately included (a) identification of pictures of facial expressions and (b) interest in books.
Assessment of facial expressions was considered important, given that social stories often include simple perspective sentences that refer to how other people feel. Picture Communication Symbols (PCS) (Johnson, 1994) were used to assess understanding of facial expressions. The experimenter introduced two symbols depicting a happy and sad face. These two symbols were randomly placed on a table and then the child was asked to "point to" or "give" the experimenter one of them. This procedure was repeated for a total of 8 trials for each participant (4 trials per symbol). All of the participants completed this task without error (i.e., with 100% accuracy).

Interest in books was assessed by asking the interventionists a number of yes/no questions. If the interventionist had responded "no" to more than one of the statements, the child would have been excluded from the study. The statements included: (a) The child usually looks at books right-side up, (b) The child turns pages, starting from the beginning of the book to the end, (c) The child enjoys looking at pictures in books, and (d) The child can pay attention to a story for 5 minutes with an adult. All of the participants showed interest in books, according to these statements.

**Functional Assessment**

A functional assessment of each child's target behavior(s) was conducted, using the Motivation Assessment Scale (MAS; Durand & Crimmins, 1992), which was completed by the experimenter and the interventionist(s). The MAS is a 16-item questionnaire designed to determine the function(s) of problem behaviors. The MAS poses common situations and asks the rater to determine how likely it is that a specific problem behavior will occur in those situations, using a 6-point scale on which 0 = never and 6 = always. Durand and Crimmins (1992) recommended that the MAS be completed for a specific setting/situation (e.g., circle time at school) and for specific behaviors. This assessment scale was considered...
appropriate for this study because the problem behaviors of concern were all contextually-based and operationally defined.

Durand and Crimmins' 1988 study (as cited in Durand & Crimmins, 1992) reported inter-rater reliability of the MAS, using Pearson correlation coefficients, as $r = .80 - .95$. In the same study, test-retest reliability was found to range from $r = .89 - .98$ when responses were taken 30 days apart. The study also examined the validity of the MAS by having teachers complete the scale in a "variety of analogue assessment conditions" (p. 48). They found that the ratings were predictive of how the individual with problem behaviors would respond in the analogue settings. For instance, someone assessed as performing self-injurious behaviors for tangibles would engage in this behavior most often when favorite tangibles were removed or reduced.

The results from the MAS for the three participants in the study are summarized in Table 5.
Table 5

Results From the MAS

<table>
<thead>
<tr>
<th>Participant</th>
<th>Motivation for Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tangibles</td>
</tr>
<tr>
<td>Andrew (all behaviors)</td>
<td>23</td>
</tr>
<tr>
<td>Henry (hands in pants)</td>
<td>3</td>
</tr>
<tr>
<td>Henry (sounds &amp; throwing up)</td>
<td>0</td>
</tr>
<tr>
<td>Neil (all behaviors)</td>
<td>22</td>
</tr>
</tbody>
</table>

Andrew

The results of the MAS suggested that Andrew's behaviors were motivated by both escape and tangible reinforcement. Andrew would typically yell, cry, and hit others to avoid sharing his toys. These behaviors were negatively reinforced when the other person withdrew his or her demands to share the toys. Secondarily, tangible reinforcement was provided because Andrew would get to keep all of the toys for himself.

Henry

For Henry, hands in pants appeared to be motivated primarily by sensory consequences, while sounds and throwing up appeared to be escape-motivated. Although hands in pants was not incompatible with eating, Henry often would engage in this behavior instead of eating during mealtime. According to the MAS, the behavior persisted because it had more reinforcing value (i.e. sensory feedback) than did eating his lunch/snack. As for the sounds and throwing up behaviors, they were clearly incompatible with eating in that Henry could not perform both types of behaviors simultaneously. Making sounds and
throwing up were negatively reinforced in that, when he engaged those behaviors, Henry could avoid/delay eating his lunch/snack. Furthermore, demands placed on Henry to finish everything in his lunch were sometimes withdrawn as a result of these behaviors; for instance, he might be asked to eat only half of his food after the behaviors occurred.

Neil

The MAS results for Neil suggested that his problem behaviors were both escape- and tangible-motivated. When asked why he did not want to play games with peers, Neil typically responded “I don’t want to lose.” This is consistent with findings from the MAS. By cheating, moving other player’s pieces, touching their hands, and making negative comments around losing, Neil was able to both avoid losing (escape-motivated) and increase his chances of winning (tangible-motivated).

Setting and Interventionists

Andrew

Andrew’s intervention took place at his home and was implemented by his mother, who had a B.Ed degree. Andrew’s problem behaviors occurred in the context of sharing toys with his older brother. The study was carried out in either the living room or in a toy room while Andrew sat on the floor or at a table playing with his brother. The toys varied from day-to-day depending on their interests, but included, for example, playdoh, jungle animals and a garage set.

Henry

Henry’s intervention occurred during both lunch time (12:00 PM) and snack time (3:00 PM) in his summer preschool program. Two female staff members with early childhood education certificates from community college programs implemented the intervention. The interventionists had known Henry for less than a year when the study
commenced. On most days, the study took place in a 20’ X 20’ room used for both snack and lunch times, while Henry was seated at a table along with approximately 5 other children. On a few occasions, the study took place during community outings in which Henry and 30 classmates participated.

**Neil**

The experiment was conducted at Neil’s summer school by three early childhood interventionists (staff members) who had known him for almost 1 year prior to the study. The room was a portable classroom (30’ X 30’) in which Neil and 20 of his classmates played games either on the floor or at a table. The games included both board games such as Junior Monopoly and Frustration and card games such as Go Fish, Memory and Jenga.

Table 6 summarizes the interventionists and their backgrounds.

**Table 6**

<table>
<thead>
<tr>
<th>Description of Interventionists Executing Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
</tr>
<tr>
<td>Interventionist</td>
</tr>
<tr>
<td>Profile</td>
</tr>
<tr>
<td>Number and gender</td>
</tr>
<tr>
<td>Relationship to child</td>
</tr>
<tr>
<td>Education</td>
</tr>
</tbody>
</table>
Materials

For the B phase of the study, social storybooks were written and produced by the experimenter according to each participant's individual needs and abilities. Each book had computer-printed text in black, 20 point Times New Roman font. Picture Communication Symbols (PCS; Johnson, 1994) related to the text were produced using the Boardmaker software (Mayer-Johnson Co.) and appeared on each page of the story. When an appropriate PCS symbol could not be found, pictures (e.g., cartoon characters) were downloaded from the internet. All of the social stories were three-hole punched and placed in 8 x 10 inch binders. For the two younger children (Andrew and Henry), the social stories were quite short and simple; each page contained one idea/concept, to avoid confusing or bombarding the participants with too much information at once. For the oldest child in the study (Neil), the social story was more lengthy and complex; more than one concept was presented on a single page and the story was more detailed. The text of the social stories for each child is contained in Appendices A-C. For the C phase (i.e., non-social story with reminder), children's storybooks that were similar in complexity and length to the social stories were chosen for each child. Table 7 summarizes the stories utilized during the B and C phases for each participant.
Table 7

Title and Authors of Stories Read in the Study

<table>
<thead>
<tr>
<th>Phase</th>
<th>Participant</th>
<th>Andrew</th>
<th>Henry</th>
<th>Neil</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (social story)</td>
<td></td>
<td>Sharing Toys</td>
<td>Mealtime</td>
<td>Playing Games</td>
</tr>
<tr>
<td>C (non-social story</td>
<td></td>
<td>The Very Hungry</td>
<td>Train Songs</td>
<td>Barry's Big Bread</td>
</tr>
</tbody>
</table>

**Research Design**

Two treatment conditions (social story versus non-social story with reminder) were compared in the study. Initially, a multiple baseline design with an embedded reversal (A-B-A-C-A-B) across two participants was planned for the experiment. The third subject was scheduled to run independently in the context of a simple A-C-A-B-A-B reversal design, receiving the interventions in reverse order of the other two participants to control for possible order effects. However, because the study was conducted over the summer months, it was difficult to solicit many eligible candidates for the experiment. From the participants that were selected, conflicting summer schedules prevented the ability to implement a multiple baseline design. As a result, the multiple baseline was dropped from the design, while the reversals remained intact. The scientific rigor of the investigation was not believed to be compromised, as Barlow and Hersen (1984) assert that withdrawal designs are more convincing than multiple baseline designs for demonstrating the "controlling effects of the treatment" (p. 227). In a multiple baseline design, the effectiveness of a treatment relies on
performance of untreated behaviors/participants/settings. In reversal designs, the
intervention can be evaluated more directly by comparing performance when treatment is
introduced versus removed.

In the end, the investigation involved a series of three single-subject reversal designs
comparing two interventions (social story versus non-social story with reminder). The study
also included three children in attempt to demonstrate direct replication across participants.
Direct replication is important because attaining similar performance across participants
allow the experimenter to be more confident about the effectiveness of the treatment (Barlow
& Hersen, 1984). An A-B-A-C-A-B design was carried out with two of the participants
(Andrew and Henry). The design was counterbalanced for Neil, who received an A-C-A-B-
A-B design. As discussed previously, counterbalancing is used to avoid the potential
confound of order effects. The order of treatment presentation was not randomly assigned to
participants. Rather, the participants who exhibited more severe problem behaviors were
given what was hypothesized as the more effective treatment first (social story). Clearly,
aggression towards others and throwing up food are more severe in nature than cheating to
win games. Thus, Andrew and Henry received the social story intervention earlier in the
course of the experiment than did Neil.

The following section describes the procedures for each phase of the study.

Phase A (Baseline)

Since Barlow and Hersen (1984) recommend “relatively equal number of data points
for each phase” (p. 96), each baseline consisted of between 5-8 data points. Eight data points
were pre-established a priori as the ceiling, since this is considered the minimum number
necessary to perform statistical analyses (if necessary) (Barlow & Hersen, 1984).
Phase B (Social Story)

A social story written specifically for each child was introduced during this phase. Reading of the social story occurred directly prior to the situation in which the target problem behavior(s) typically occurred. For instance, a social story written to address problem behaviors at mealtime was read immediately before this activity commenced. Each intervention session took between 3-4 minutes, during which the interventionist read the social story and commented on the pictures/text.

Phase C (Non-Social Story with Reminder)

During the C phase, the interventionist was directed to provide one-to-one attention while reading a non-social story book to the child, and to then remind the child of the appropriate behaviors in the target situation upon completion of the story. The purpose of this phase was to determine whether or not simple extra adult attention paired with a verbal reminder would have an impact on the target behavior.

Procedure

A pilot study with one child was conducted prior to the experiment, to explore some of the key issues related to the intervention. Based on the results of the pilot, the procedures were finalized. Appendix D contains details of the pilot study.

Identifying a Target Behavior

Together, the interventionist and experimenter identified 3-4 problem behaviors for each participant and operationally defined them in measurable and observable terms. Table 8 summarizes the behaviors targeted for each child and their corresponding definitions.
Table 8

Target Problem Behaviors and Operational Definitions

<table>
<thead>
<tr>
<th>Participant</th>
<th>Target Problem Behaviors</th>
</tr>
</thead>
</table>
| Andrew      | Aggression – attempts to or makes contact with another's body with intent to harm (i.e., contact appears to be purposeful, as opposed to accidental)  
Yelling – talks in a voice louder than he usually does in a conversation  
Crying – tears coming from his eyes, down his face |
| Henry       | Hands in pants – puts one or both hands inside his pants or on genital area  
Sounds – screams, squeals, or cries  
Throwing up – removes chewed food from his mouth |
| Neil        | Cheating – verbally changes a rule/makes up a new one  
Moving – moves another player’s piece/card  
Touching – makes contact with another player’s hand/arm  
Negative comments – verbalizes a negative comment about losing to self/other |

Developing a Social Story

The investigator wrote a social story related to the target behavior for each child. For Andrew, the social story addressed his reluctance to share toys in the home setting. For Henry, a social story was written to encourage him to eat appropriately during mealtime at summer school. For Neil, the social story was aimed at promoting appropriate peer play at summer school. All of the stories followed Gray and Garand’s (1993) guidelines regarding the types and ratio of sentences to be used. Gray and Garand (1993) suggested that the most effective stories maintain a proportion of 2 to 5 descriptive and perspective sentences for
every 0 to 1 directive sentence. Table 9 summarizes the composition of the social stories for each participant.

Table 9
Composition of Social Stories

<table>
<thead>
<tr>
<th>Sentence Type</th>
<th>Andrew</th>
<th>Henry</th>
<th>Neil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptive</td>
<td>16</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>Perspective</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Directive</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

Drafts of the social story were presented to interventionists for feedback and modifications. The developmental appropriateness of the social stories was determined by examining books written for children of similar chronological ages and eliciting input from the participant’s preschool/daycare worker. Further, each child’s parent was asked to confirm that the social story was within the child’s comprehension level prior to the intervention.

Implementing the Interventions

The experimenter trained each interventionist to introduce the social story (phase B) and book reading (phase C) interventions and to collect accurate data in the targeted situation. The implementation procedures were based on the guidelines provided by Gray and Garand (1993). The interventionist sat at the child’s side and slightly behind while reading the story to him/her. To ensure that the social story intervention was comparable across the children, interventionists were instructed to read the story and provide
social stories over a 3-4 minute period each time. This resulted in the story being read more slowly for a less able child, while a faster pace was used with a more able child.

The following are sample scripts of how the interventionists were instructed to interact with the child during Phases B and C. Model comments such as those that were inserted while reading the stories are included in parentheses.

**Phase B (social story):**

"(Let's read a story together.) Riding in the Car, by Lisa Verbrugge. Sometimes, I ride in the car. (Look at the car. It looks just like the one your mommy drives.) I get in and put on my seat belt. (See, he's putting on his seat belt. Click! It's on now.) Mom likes it when I sit quietly when she drives. (Wow, look, mom has such a big smile. She's very happy because you're sitting so nicely!) I can look outside the window. (See, there's a big tree, a man walking his dog and a parked car.) Riding in the car can be a lot of fun. (It's so much fun going for a car ride.) I wait until I am told to get out of the car. (Look, you're waiting so nicely in the car.) Mom feels great when I am good in the car. (Oh, mom has a happy face because you were so quiet and such a good listener in the car.)"

The following is a sample script for Phase C (non-social story with reminder):

"(It's story time. Let's read this book together). Spot in the Garden, by Eric Hill. Every morning Spot goes into the garden (See, he's opening the fence). Spot watches the birds having breakfast (Look at the birds. They are eating). Spot sits by the fishpond and talks to the frog (There's the frog. He says 'ribbit'). Sometimes Spot helps his dad in the garden (Spot is watering the tree). Spot picks some flowers for his mom. (Four yellow flowers. One, two, three, four!). And digs up carrots for dinner (Carrots. Mmmm, I like to eat carrots). Then Spot goes inside to water his
very own window box. He likes doing that best of all (Look, he's watering the flowers). The End.

Hey, your mom's coming to take you home. Remember, you need to put on your seat belt and sit quietly. If you do that, you will be safe and have a good car ride.”

Responding to Desired and Targeted Behaviors

The interventionists were instructed to respond to occurrences of the targeted behaviors as they would naturally. In all cases, the interventionists intervened when one of the targeted behaviors occurred, and provided the appropriate verbal feedback (i.e. "no cheating" or "don't hit your brother"). This procedure was used consistently throughout the entire experiment, regardless of the treatment condition.

Data Collection

The interventionists were provided training (by the experimenter) in the data collection procedures during training sessions in which the procedural and data collection protocols were simulated. After each interventionist achieved two training sessions with 90% or better accuracy, the study commenced for that child. The data collection sheets that were used both during training and during the experiment are included in Appendices E-G.

A large digital clock with a display of large (1 5/8" X 3/4") numbers and a tally sheet were used to measure the frequency of the target behaviors. The interventionists were instructed to mark the time on the digital clock (i.e., the exact hour and minute) of each occurrence of a target behavior(s) and to note which behavior(s) occurred on the tally sheet. Data were collected 1-2 times each day of the study, for all of the participants. Most days, 2 sessions were recorded, but on certain days (i.e. field trips), data were collected once. For one child (Henry), data collection and intervention ceased for a one-week period following the second A phase, due to funding cuts at his summer school, which resulted in him
remaining at home. Following this break (which occurred at the end of an A phase), the experiment continued where it had left off. Although the amount of time the interventionists spent collecting data varied, the total frequency of the behaviors was converted to rate per minute so that the data could be compared.

Reliability Data

**Inter-rater reliability.** To ensure that the data collection was performed accurately by the interventionists, the experimenter collected data during a mean of 23.5% of the intervention sessions (range = 20% - 27.9%). Reliability checks occurred randomly during both baseline and intervention conditions. To verify that the same incidences of the targeted behavior were recorded by both the interventionist and the experimenter during reliability probes, both documented the time of each occurrence of a behavior (i.e., the exact hour and minute) from the digital clock, as well as the topography of each behavior that occurred. Inter-rater reliability was calculated employing Tawney and Gast's (1984) formula: agreements divided by agreements plus disagreements, multiplied by 100. The inter-rater agreement ranged from 86.9% - 100%, with a mean of 97.9%. Table 10 shows a summary of the reliability data for each participant.
Table 10

Inter-Rater Reliability Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Andrew</th>
<th>Henry</th>
<th>Neil</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of total sessions used</td>
<td>22.6%</td>
<td>20%</td>
<td>27.9%</td>
</tr>
<tr>
<td>Reliability range</td>
<td>100%</td>
<td>90-100%</td>
<td>86.9-100%</td>
</tr>
<tr>
<td>Mean reliability</td>
<td>100%</td>
<td>98%</td>
<td>96.4%</td>
</tr>
</tbody>
</table>

Procedural reliability. Procedural reliability data were gathered to ensure that the interventionist followed the procedures prescribed for intervention or baseline. Table 11 summarizes the checklist used to assess procedural reliability. Any deviations from the prescribed procedures were brought to the interventionist’s attention, followed by a review of the procedural protocol.
Table 11
Checklist for Procedural Reliability

1. Interventionist locates the social story/book in adequate time prior to the target situation
2. Interventionist finds child participant
3. Interventionist finds a quiet, distraction-free location to read the social story/book
4. Interventionist reads the social story (B phase) or book (C phase)
5. Interventionist comments on the pictures/text in the social story/book, as instructed
6. Interventionist takes 3-4 minutes to complete the reading of the social story/book
7. C phase: Interventionist reminds the child of the desired behavior after the book is read
8. Interventionist remains with the child for the above procedures without interruption
9. Interventionist puts the social story/book back in its proper location
10. Interventionist ready to record data (i.e. digital clock, pen, data recording sheet)
11. Interventionist observes child’s behavior during the target situation and records data, as instructed (i.e. indicates when the time in hours and minutes that the data collection starts and ends)

The investigator collected procedural reliability data during a mean of 23.5% of all sessions across the three participants (range = 20% - 27.9%). Procedural reliability was calculated using the formula: number of correct steps divided by the number of correct plus incorrect steps multiplied by 100. Procedural reliability probes were collected during the same sessions as inter-rater reliability probes. For all participants, the procedural reliability range was 91% - 100%, with a mean of 98.4%. For Andrew, on one occasion, reading of
social story took less than 3 minutes. For Henry, another child interrupted reading of the social story on two occasions. For Neil, on two occasions he did not want to read the social story with the interventionist. In the first instance, the interventionist read it to Neil and three others in a group; on the second, the child and others took turns reading it out loud to each other. Table 12 summarizes the procedural reliability data across participants.

Table 12
Procedural Reliability Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Andrew</td>
</tr>
<tr>
<td>% of sessions used</td>
<td>22.6%</td>
</tr>
<tr>
<td>Reliability range</td>
<td>91%-100%</td>
</tr>
<tr>
<td>Mean reliability</td>
<td>98.7%</td>
</tr>
</tbody>
</table>

Data Analysis

Visual inspection was used to assess the impact of the intervention. Kazdin (1982) asserted that the “magnitude of the changes across phases and the rate of these changes” (p. 233) are important considerations. Magnitude was measured by changes in mean (i.e., shifts in the average rate of performance), median, and level (i.e., shifts in performance from the end of one phase to the start of the following phase). In terms of rate of changes, trend and latency were analyzed. Changes in trend refer to the data showing either an upward or downward slope over time, while changes in latency refer to the “period between the onset or termination of one condition (e.g., intervention, return to baseline) and changes in performance” (p. 237).
CHAPTER 4

Results

Overview

This goals of this study were twofold: first, to examine the effectiveness of social story interventions across three children with autism spectrum disorders; and second, to compare the relative effectiveness of social stories versus non-social stories + verbal reminders. The data were analyzed using visual analysis and descriptive statistics for each participant individually, as is typical in single-subject experiments. From these analyses, it appears that the social story intervention was correlated with decreases in problem behaviors for two of the three participants. However, due to a failure to demonstrate a return to baseline when the social story intervention was removed, it is not possible to draw firm conclusions about the effectiveness of this intervention. When the two treatments were compared, the performance of one participant indicated that the social story had a greater impact on the problem behaviors than the non-social story treatment. For the other two participants, the relative impact of the two treatments could not be readily assessed.

In the sections that follow, the results will be presented for each of the participants according to the two research questions posed by the study.
Andrew

Figure 1 displays the results for Andrew.

![Graph showing Andrew's rate of responding per minute during baseline, intervention and follow-up.]

**Figure 1.** Andrew's rate of responding per minute during baseline, intervention and follow-up.

**Question #1:** Is there a functional relationship between a social story intervention and changes in specific target behaviors?

During baseline (A phase), there was an ascending trend in the opposite direction from that which would be expected during intervention. When the social story was introduced (B phase), there was an immediate decrease in the rate of problem behaviors. The data also became less variable and the mean level in this phase was lower than that during baseline. When the social story intervention was withdrawn (second A phase), the rate of problem behavior remained low and did not return to the baseline rate that was expected. During the final B phase, Andrew did not display any instances of problem behavior.
The effectiveness of the social story intervention was not demonstrated for this participant because when the treatment was withdrawn (second A phase), the problem behaviors did not return to the level observed during the initial baseline phase. Thus, the controlling effects of the social story could not be isolated. However, there appeared to be a correlation between the social story intervention and changes in the behaviors of interest, as evidenced by the comparison between the initial A phase and the subsequent B phase. The irreversibility of the intervention suggests that learning may have occurred during the first B phase and that this learning was maintained throughout the remainder of the experiment and during the follow-up phase, during which the social story was not read at all to the participant. The follow-up data suggest that the gains were maintained at 1, 2 and 4 weeks following the completion of the study.

Question #2: Is a social story intervention more effective than a non-social story + verbal reminder intervention in decreasing rates of problem behavior?

When the mean rates of problem behavior associated with the two treatments were compared, the non-social story condition (C phase) appeared to produce a slightly lower rate of problem behavior (0.03 behaviors/minute) than did the social story intervention (B phase, 0.07 behaviors/minute). However, as noted previously, a reversal was not achieved during the second A phase; because of this, it is not possible to accurately assess the impact of the non-social story + reminder condition (C phase).

Table 13 summarizes the data in terms of means, medians and ranges for each of the experimental phases.
Table 13

Descriptive Statistics for Andrew

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Phase A</th>
<th>Phase B</th>
<th>Phase A</th>
<th>Phase C</th>
<th>Phase A</th>
<th>Phase B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.3</td>
<td>0.07</td>
<td>0.04</td>
<td>0.03</td>
<td>0.04</td>
<td>0</td>
</tr>
<tr>
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<td>0.05</td>
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<tr>
<td>Range</td>
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<td>0-0.13</td>
<td>0-0.17</td>
<td>0-0.08</td>
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</table>

Henry

Figure 2 displays the results for Henry.

![Graph](image)

Figure 2. Henry's rate of responses per minute during baseline and interventions.

Question #1: Is there a functional relationship between a social story intervention and changes in specific target behaviors?
During the initial A phase, Henry’s data showed high variability, a decreasing trend, and a mean level of 0.77 behaviors/minute. When the social story was implemented (B phase), there was an immediate decrease in the rate of problem behavior. The data also became less variable and the mean level was 0.09 behaviors/minute. However, when the social story was removed during the subsequent A phase, Henry’s rate of responding did not return to the initial baseline level; rather, the rate was maintained at 0.08 behaviors/minute.

The impact of the social story intervention for Henry is difficult to assess for three reasons. First, there was a decreasing trend (in the same direction as that expected during treatment) during the initial baseline phase. A split-middle technique was utilized to compare the trend lines across the first two phases. According to Hersen and Barlow (1984), “the split-middle technique describes the rate of behavior change over time...The technique permits examination of the trend or slope within phases and comparison of slopes across phases.” (pp. 312-313). The results (see Figure 2) show the trend lines in phases A and B intersecting, indicating that Henry’s performance in the B phase was likely to have occurred, even in the absence of treatment. In fact, the slope of the trend line during the B phase suggests that the intervention resulted in a slight increase in his problem behaviors, compared to baseline. Given the combination of these two factors, the decrease in Henry’s problem behaviors during the B phase cannot be directly attributed to the intervention.

In addition, the return to baseline conditions during the second A phase did not produce the predicted reversal and the anticipated return to a higher rate of problem behavior. Coupled with the afore-mentioned problem with regard to the unstable baseline, this failure to demonstrate experimental control of the social story for Henry makes it impossible to attribute the decrease in his problem behavior to the social story intervention alone.
Question #2: Is a social story intervention more effective than a non-social story + verbal reminder intervention in decreasing rates of problem behavior?

Henry received the social story intervention (B phase) prior to the non-social story + reminder intervention (C phase). Because of the problem described previously with regard to Question #1, the impact of the non-social story + reminder intervention could not be assessed fairly. Thus, Henry's data do not allow for a clear determination regarding which of the two treatments was more effective in reducing the problem behaviors.

Table 14 summarizes the mean, median, and range for Henry's data.

Table 14

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Phase</th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
<td>C</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Mean</td>
<td>0.77</td>
<td>0.09</td>
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<tr>
<td>Median</td>
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<td>0-0.31</td>
<td>0-0.06</td>
<td>0-0.45</td>
<td>0-0.04</td>
</tr>
</tbody>
</table>

Note. A one-week break occurred during the second and third A phases.
Question #1: Is there a functional relationship between a social story intervention and changes in specific target behaviors?

In order to answer this question, it is appropriate to compare the second A phase and the first B phase in Neil’s graphed data. During the second A phase, Neil’s problem behaviors ranged from 0.56-2.0 behaviors/minute, with a mean of 0.93 behaviors/minute. When the social story was introduced (B phase), there was a marked decrease in both the variability of his performance (0.08-0.67 behaviors/minute) and the mean rate (0.34 behaviors/minute). However, as was the case with Andrew and Neil, when the intervention was withdrawn during the subsequent A phase, Neil’s problem behaviors did not revert to the higher rates recorded during the second A phase. When the social story was re-introduced
(second B phase), the problem behaviors showed a further reduction in terms of mean level and variability.

These data suggest that a reduction in Neil’s rate of problem behavior was associated with the social story intervention, although this treatment cannot be isolated as the sole variable responsible for changes in his rate of target behaviors because of the failure to achieve a reversal when the treatment was withdrawn. It is important to note, however, that 4 weeks after the end of the study, one follow-up session was conducted in his summer school, and the results of this session indicated that the reduction in his problem behaviors were maintained during this time without additional intervention. This supports the suggestion that irreversible learning may have occurred during the social story intervention.

**Question #2:** Is a social story intervention more effective than a non-social story + verbal reminder intervention in decreasing rates of problem behavior?

Of all the participants, Neil’s experimental design allowed for the clearest evaluation of the relative impact of the two treatments. Recall that Neil received the interventions in reverse order from the other two participants (i.e., C phase, non social-story + reminder, prior to B phase, social story) in order to counterbalance the order of treatment. Initial baseline measures (first A phase) indicated a mean level of 1.14 behaviors/minute. The mean level in the C phase was also 1.14 behaviors/minute, suggesting the non-social story + reminder condition was not effective in reducing the targeted behaviors. The mean level for the second A phase was 0.93 behaviors/minutes, suggesting the rate of problem behaviors were similar to those recorded at initial baseline. Finally, it was not until the social story was introduced during the first B phase that the mean rate dropped to 0.34 behaviors/minute. Moreover, the data became more stable (i.e. less variable) during the social story intervention, compared to the first three phases of the study.
From visual inspection, the impact of the social story appeared to be greater than the non-social story + reminder intervention for Neil. The critical factor that permitted the evaluation of both treatments was the second A phase, which showed a rate of responding similar to that of the initial baseline. This was important because, if the mean rate during the second A phase had changed substantially, the effects of the second treatment (B phase) could not have been assessed as readily.

Table 15 summarizes the descriptive statistics data collected for Neil.

Table 15

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Phase</th>
<th>A</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>A</th>
<th>B</th>
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<tbody>
<tr>
<td>Mean</td>
<td></td>
<td>1.14</td>
<td>1.14</td>
<td>0.93</td>
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<tr>
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<td>0.5-1.9</td>
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<td>0.08-0.67</td>
<td>0.18-0.55</td>
<td>0.1-0.23</td>
</tr>
</tbody>
</table>

Summary of Results

Visual inspection of the data indicated that, for all three participants, there was an immediate and substantial reduction in the rate of problem behaviors when the social story was implemented. Other patterns that emerged from visual analysis included less variability in the data as the experiment continued and an inability to revert to baseline measures once the social story had been introduced.

The first research question examined whether a social story intervention was effective in decreasing problem behaviors. For all of the participants, there was an absence of a reversal when the social story treatment was withdrawn. As a result, experimental control
was not demonstrated in this investigation. The social story appeared to be correlated with reduced rates of problem behavior (for Andrew and Neil), but this intervention cannot be isolated as the sole variable that produced the changes.

The second research question addressed in the study was a comparison between two treatments: social stories versus non-social stories + verbal reminder. It was anticipated that the social story condition would be more effective in reducing problem behaviors. The results indicated that, for Andrew and Henry, the treatments could not be compared due to the failure to return to baseline measures after the social story treatment. However, for Neil, the data suggested that the social story treatment had a greater impact on the targeted behaviors than did the non-social story + reminder condition. It was hypothesized that learning had occurred during reading of the social story with all three participants, which contributed to the inability to assess the impact of the second treatment for Andrew and Henry. Although Neil's results suggest that the social story intervention was more effective that the comparison treatment, statements attesting to the merit of one treatment over the other (across participants) are not warranted at this time.
CHAPTER 5

Discussion

Impairment in the area of social development is a core deficit in individuals with autism (Kanner, 1943). Some theorists suggest that their social problems stem from an inability to understand mental states and to take the perspective of other people (Baron-Cohen et al., 1985; Leekam & Perner, 1991; Leslie, 1987). Regardless of whether or not this is the primary reason that people with autism are often unsuccessful in social settings, it is important that they are provided with effective social supports. Social stories, created by Carol Gray (1993) are designed to help people with autism negotiate the intricacies of social exchanges by providing accurate social information about the perspectives of other people.

The present study examined the effectiveness of a social story intervention with three young children diagnosed with autism spectrum disorders. The single-subject design compared two treatment conditions and measured changes in the child participants' targeted problem behavior. In the social story condition, the interventionist read the child a social story that described a problem situation, provided insights into the perspectives of others, and offered desired responses. In the non-social story + reminder condition, the interventionist read a regular storybook to the child and then provided a verbal reminder of the appropriate behavior in the targeted situation. It was expected that a comparison of these two conditions would determine whether any changes in behavior were the result of the content of the social story or the extra adult attention with verbal reminder. In the sections that follow, the results for each of the three participants will be discussed separately.
Results for Each Participant

Andrew

Introduction of the social story to Andrew was associated with a reduction in his problem behavior; however, during the return-to-baseline condition, a reversal in this improvement did not occur. Thus, experimental control of the change during the social story intervention was not evidenced. When phases B and C were compared visually, it appeared that phase C was slightly more effective in reducing his target behaviors. However, this may have been somewhat misleading, given the experimental design that was implemented. The social story intervention was introduced as the first treatment (B), followed by the non-social story condition (C). It appears that the effects of the social story intervention “carried over” and thus influenced performance in subsequent treatment phases. For this to happen, there must have been some form of learning involved during the B phase, which could not be unlearned, despite withdrawal of the treatment and return to the baseline condition. This hypothesis is consistent with Andrew’s data, which showed similar rates of responding during the initial intervention (B) phase and the following baseline (A) phase. For the remainder of the study, the data showed little change in trend, level, and slope, providing further support for the learning hypothesis and carryover effects in interpreting the data.

Thus, the results for Andrew are problematic for two reasons. First, the failure to return to baseline levels of performance did not demonstrate experimental control of the intervention. Second, this irreversibility (presumably, as a result of learning) prevented assessment of the impact of the second intervention (non-social story).

Three follow-up probes were taken at 1, 2, and 4 weeks after the completion of the study. The data indicated that Andrew maintained the gains from the intervention, displaying no episodes of the problem behaviors. These findings were particularly interesting, given
that the social story was not read to the participant at follow-up. This further suggests that learning during the initial B phase did, indeed, take place, and that Andrew no longer needed to review the social story to respond appropriately in the context of sharing toys with others.

Anecdotal data from Andrew’s mother also indicated that generalization of sharing behavior had occurred after the completion of the study. Andrew reportedly shared food and toys with his family and home workers more often, and he no longer displayed aggression toward his older brother when asked to share.

**Henry**

For Henry, the results also were ambiguous and difficult to interpret. At baseline, there was a decreasing trend in the rate of the problem behaviors. This was problematic in that the slope was in the same direction of what was expected during treatment. Thus, it is not possible to state that the social story treatment for Henry had any effect at all on his target behaviors. In addition, as was the case with Andrew, Henry received the social story treatment prior to the non-social story condition and the data show that reversal during withdrawal (A phase) did not occur. Thus, caution should be taken in comparing the impact of phase B versus phase C for Henry.

Despite these shortcomings, the social story intervention with Henry may have contributed to the decrease in his problem behaviors, as evident from the changes in level following initial baseline measures. The mean for phase A was 0.77, dropping to 0.09 when the social story was introduced. For the reminder of the study, means across phases were quite steady and showed little variability at 0.06, 0.02, 0.17 and 0.01. In addition, the range of data points for Henry became less variable as the study progressed, suggesting that the intervention may have contributed to less erratic rates of responding. At baseline, Henry's
behaviors (calculated in rates/minute) ranged from 0.29 - 1.33, while the final phase showed a much smaller range of 0 - 0.04.

Unfortunately, the experimenter was unable to collect any follow-up data for Henry. Anecdotal reports from Henry’s mother suggest that eating difficulties continue to be a problem in the home setting. Recall that a special needs worker implemented the study at his summer school. Henry’s inability to generalize appropriate eating behaviors at home may be due to the different setting and different dynamics he has with his parents.

Neil

Neil’s data were the least ambiguous of all three participants. Neil was the only participant who received the non-social story intervention prior to the social story condition. His data show evidence that the social story intervention had a greater impact than the non-social story + reminder condition in decreasing the rate of his targeted problem behaviors. Visual inspection of the range, slope, and trend of the data showed no marked differences between initial baseline measures and the non-social story condition. It was not until the social story was introduced that substantial decline in the problem behaviors were demonstrated.

One follow-up probe was collected a month after the study’s completion, which indicated that Neil maintained the treatment gains. The social story was not read to him during the follow-up session, suggesting that he no longer required review of the social story to respond appropriately in playing games with peers.

Interventionists working with Neil offered anecdotal reports that playing competitive games (where there is only one winner) had always been problematic at home and school. He would often become upset and display tantrum behaviors when he lost. Following the
Social Stories 84

study, his mother and people working with him at home reported that losing was no longer a contentious issue.

Summary

Across participants, the results did not fully support the hypotheses that social story interventions are effective in reducing rates of problem behaviors and that social stories have a greater impact than non-social stories + verbal reminders. However, the results for two participants did suggest an association between social story implementation and decreases in problem behaviors. For Andrew and Neil, there was direct A-B replication: when the social story intervention was initiated, decreases in problem behaviors were noted immediately for both participants. Although an A-B design is vulnerable to a host of uncontrolled variables, Barlow and Hersen (1984) noted that, if the same pattern is found through direct replication, it provides more evidence for a treatment’s effectiveness.

Comparison with Previous Research

As discussed in Chapter 3, past social story studies suffered from numerous methodological shortcomings that hindered their ability to assess the effectiveness of this intervention. The present study was designed to eliminate the major internal validity concerns of past research. Recall that some of the concerns included the choice of experimental design, changing more than one variable at a time, lack of an attention-placebo control phase, varying Gray's guidelines for writing social stories, measurement issues, and reactivity effects. Due to various combinations of these problems, the findings from past research are vulnerable to alternative explanations other than the effects of the social story intervention.

These concerns were important in designing the current investigation. Whereas past studies mostly utilized a simple A-B design, this experiment included multiple reversals in an
attempt to demonstrate the controlling effects of the treatment. While other studies changed two or more variables concurrently, this study altered only one variable at a time. None of the previous research controlled for the effects of "attention" on behavior, while this experiment evaluated the effects of extra adult attention (through the reading of a non-social story + verbal reminder). Past studies did not adhere to Gray and Garland’s (1993) prescribed procedure for writing and implementing social stories; this study followed the recommended procedures very closely. Finally, reactivity effects were speculated to have influenced the participant’s responses in one previous study. No reactivity was believed to have occurred in the present study.

On the other hand, unstable baselines before the introduction of treatment were noted in both previous studies as well as in current study, especially with one participant (Henry). Hersen and Barlow (1984) asserted that stability during baseline is advantageous because it provides a “standard by which subsequent efficacy of an experimental intervention may be evaluated” (p. 74). The present study established (prior to the onset of the experiment) that each phase would have a minimum of 5 data points. The next phase was to be introduced if the data were stable (i.e., 3 points in the same direction). However, if this did not occur, 8 data points were sought because this was the minimum number needed to perform statistical analyses. Because of practical and time constraints faced by the participants, an a priori decision was made to introduce a new phase after 8 baseline data points, even if the data were not stable. In retrospect, this decision was problematic in that it prevented demonstration of the effect of treatment for one participant (Henry).

Table 16 summarizes the methodological concerns of past studies, and provides a comparison with the current investigation.
## Table 16

### Comparison of Current and Past Social Story Research

<table>
<thead>
<tr>
<th>Internal Validity Issues</th>
<th>Research on Social Stories</th>
<th>Norris &amp; Kuoch</th>
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<td>Research on Social Stories</td>
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<tr>
<td>Changing more than one variable at a time</td>
<td>Physical redirection, verbal prompts, &amp; response cost</td>
<td>Changes in the home &amp; behavior</td>
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<tr>
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<td>review social story &amp; unlimited access to social story</td>
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<td>Did not control for this</td>
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<td>Unstable baseline</td>
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<tr>
<td></td>
<td>Unstable baseline</td>
<td>Unstable baseline</td>
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</table>
Limitations of the Study

Experimental Control

As the data show, none of the participants returned to baseline rates of problem behaviors following the introduction of the social story condition. This finding is not consistent with that of Kuttler and her colleagues (1998), who successfully demonstrated experimental control in their A-B-A-B experimental design. As discussed previously, the impact of the social story may have been robust and produced lasting changes in the targeted behaviors. Alternatively, the lack of experimental control may be attributed to the internal validity threat of maturation effects. That is, it is possible that the behaviors of interest would have decreased on their own, regardless of whether an intervention was implemented or not.

Choice of experimental design. A single-subject reversal design comparing two interventions was incorporated in the present study. Andrew and Henry received an A-B-A-C-A-B design, while Neil’s design consisted of an A-C-A-B-A-B design. The difference between the two designs involved the order in which the treatments were presented. This counterbalancing of treatment presentation was incorporated to determine whether order of presentation affected the results. As noted earlier, it was not possible to conduct the originally planned multiple baseline with embedded reversal design. The design for each participant was not randomly assigned due to ethical considerations. A decision was made to implement what was believed to be the more effective treatment (i.e. social story) to the participants exhibiting more extreme problem behaviors. Andrew engaged in acts of physical aggression towards others, while Henry threw up his food during mealtime. These problem behaviors were considered more severe in nature than were Neil’s, who cheated
during games with peers. As a result, Andrew and Henry received the social story condition prior to the non-social story treatment and Neil received treatment in the reversed order.

Examining the methodology of past social stories research also influenced the choice of design. Kuttler and her colleagues (1998) were the only researchers to include a withdrawal of the social story treatment in their design. Their A-B-A-B design successfully demonstrated experimental control for a child exhibiting precursor tantrum behaviors. Baseline measures (A) indicated an average of 15.6 incidences of tantrum behaviors during morning work time and mean of 11.6 behaviors at lunchtime. When the social stories were implemented (B), the problem behaviors decreased to a mean of 0 during work time and 2.0 during lunchtime. When the social story intervention was withdrawn (A), the behaviors increased to rates similar to baseline, with a mean of 15.3 during work time and 18.0 during lunchtime. Finally, when the social stories were reintroduced (B), there was an average of 0 tantrum behaviors during work time and 1.0 during lunchtime. The results from the Kuttler et al. (1998), served as a model design for the present study. Given these findings, there was no reason to suspect that the social story intervention would produce irreversible effects (i.e. learning). A design involving reversals seemed appropriate for the current investigation, in light of the existing study.

On the other hand, the research on theory of mind, upon which the social story intervention was based, would suggest that the failure to return to baseline after treatment withdrawal could have been predicted. Essentially, the therapeutic instruction (i.e. social story) would be anticipated to remain intact because of learning, even after treatment is terminated. This is supported by research that shows the natural course of acquiring theory of mind abilities develops as early as 18 months and becomes increasingly sophisticated as the child ages. These skills remain intact once they are acquired. A similar rationale would
apply for participants in the current investigation, for whom learning appeared to be irreversible even when the treatment was withdrawn. Thus, the finding that participants did not revert to baselines measures after withdrawal of the social story would not be surprising to theory of mind researchers. In fact, it is consistent with this perspective. For example, Carol Gray, the creator of social stories, has used an "eyeglasses" analogy to explain the variable effects of implementing social stories (C. Gray, personal communication, 1998). Gray asserts that different individuals respond differently to social stories, just as people use eyeglasses in unique ways, depending on their vision. Some people must wear glasses all the time in order to see, while others wear glasses only to read, or only to see distances. Similarly, she suggests that some people will need social stories read to them quite frequently, while others will only require a few exposures in order for behavior change to occur. The latter appeared to be the case with the three participants in this study.

External Validity

The participants in the study had all received 1.5 - 3.5 years of one-to-one discrete trial teaching, using the methods of applied behavioral analysis (ABA). Part of their programming included "learning to learn" skills such as sitting, listening, looking, and following directions. Having these skills would have been beneficial and may have allowed the children to grasp the content of the social story more readily. For children who have not had ABA therapy, the impact of social stories may take longer and may be less pronounced.

Recall that each social story was designed to address problem behaviors which were contextually based (i.e. gym class). It is unclear how effective a social story intervention would be for behaviors that were more diffuse (i.e. all day long).
Future Research

Story Composition

Decelerating versus accelerating behaviors. The social stories written for Andrew and Henry involved stating the desired behaviors in a positive manner (i.e. “When Henry feels hungry, Henry needs to eat food.”). No attention was drawn to the negative, undesirable behaviors (i.e. problem behaviors). For Andrew, the problem behaviors included physical aggression towards others, yelling, and crying. As was the case for Henry, Andrew’s story did not include negative statements such as “It is not okay to hit others when you don’t want to share.” Rather, his story emphasized a rationale for sharing, such as making others feel happy. Likewise, Henry’s story did not address his throwing up food, making sounds, nor putting his hands in his pants during mealtime. Instead, the social story emphasized tasting the food in his lunchbox and provided reasons for this behavior. Thus, the social story compositions for these two participants included delivering the social information to “accelerate” appropriate behaviors. The approach that was taken also addressed the behavior problems more globally, in attempt to change responses in the pre-established contexts.

On the other hand, Neil’s story was written in a different manner. Specifically, his social story focused directly on “decelerating” the problem behavior (i.e. "I need to leave the other player's pieces alone"). This approach was taken for Neil because (1) he scored in the moderately high range on the PPVT-R, (2) he possessed an excellent command of receptive and expressive language, (3) he was older than the other children in the study, and (4) he appeared to respond to this approach in the past (i.e. pilot project).

The findings indicated that both types of social stories hold promise for reducing problem behaviors. Perhaps, an individual’s language and cognitive profile can be used to
predict the type of story composition that will be most beneficial. Future research could
examine this issue further by comparing these two conditions using a multiple baseline
design and counterbalancing the treatments across participants to clarify this issue.

**Special interests.** Each child's specific interests were incorporated into their social
stories. Andrew's social story included people important in his life, such as family members
and home workers. Henry was fascinated with trains, so his social story provided Thomas
the Tank Engine as a model for the appropriate behaviors. Neil enjoyed Pokemons (cartoon
characters) and so his social story included them to promote the desired responses.

Past studies have not included the child's special interests in the composition of the
social stories. It is unclear, to what extent, if any, this has on changes in behavior. Future
studies could examine this by contrasting conditions that include and exclude special
interests in social stories.

**Comparing a Social Story Versus a Non-Social Story**

The present study compared two treatments: social story versus a regular storybook
with reminder. The results did not clearly demonstrate the superiority of one condition
across all participants. For Neil, the social story appeared to be have a greater impact, but for
Andrew and Neil, the second intervention was difficult to assess, given that the first
treatment produced lasting changes in the problem behaviors.

To confirm and extend the finding that the social story condition produced greater
impact, the non-social story condition should be introduced prior to the social story treatment
in future research of this type. If changes in response rate occur only when the child is read
the social story, then the efficacy of this intervention would be more convincing.
Multiple Baseline

Originally, a multiple baseline design with embedded reversal was to be included in the study. Due to the experiment being conducted during the summer months, participants had conflicting summer schedules that did not allow the researcher to coordinate the introduction of baseline and intervention phases across participants.

Recall that when the social story was applied, the participants appeared to demonstrate learning, as response rates were maintained despite withdrawing treatment. This is problematic, as the social story intervention could not be isolated as being effective. According to Hersen and Barlow (1976), irreversible procedures can be overcome by incorporating multiple baseline designs. In such designs, baseline measures are taken for two or more participants concurrently. After a stable baseline is established, one participant is introduced to the treatment, while the other participant(s) continue at baseline. Soon after, the intervention is extended to subsequent participants until all individuals have been exposed to treatment. This technique shows the treatment's efficacy when response rates remain stable before treatment and change in the expected direction only after treatment has been applied. Thus, future research can implement such a design to avoid the problem of irreversibility found in the present study.

Generalization

Although a few follow up data were collected for the participants, only anecdotal data were available in other settings. Future studies can extend data collection to other environments to determine if gains in the initial environment are generalized across settings, people, and time.
Educational Implications

The results from the present study provided some support for the potential of social story interventions for reducing problem behaviors in young children with autism. The findings indicated that even very young children (ages 3-6) might benefit from this type of intervention, suggesting that educators, particularly at the preschool level, should not rule out this intervention based on the age of the child.

Aside from age, scores on the PPVT-R (measuring receptive, single-word vocabulary acquisition) did not appear to be a factor in deciding who would be most suited for social stories. The PPVT-R produced varied results across participants: Andrew scored in the low average range, Henry received an extremely low score, and Neil performed in the moderately high range. Regardless of the level of functioning on this standardized test, a reduction in problem behaviors was noted for both Andrew and Neil. This finding was inconsistent with Gray and Garand's (1993) suggestion that children with higher intellectual functioning were the best candidates for social story interventions.

The results also suggested that social stories can be implemented successfully in a variety of settings and by various adults. Regardless of whether the experiment was conducted in the home or school, by a caregiver or parent, the child participants appeared to be responsive to the intervention. This study is the first to empirically evaluate changes in behavior in a home setting, as previous social stories research were all conducted in the school settings and implemented by staff members (Hagiwara & Myles, 1999; Kuttler et al., 1998; Norris & Dattilo, 1999; Swaggart et al., 1995). These findings are encouraging for parents who wish to use social stories in the home environment.

In sum, the use of social stories is appealing for a number of reasons. First, preschool-aged children may benefit from this intervention. Second, social stories are low-
Social Stories

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tech and inexpensive to produce. Third, the process of writing a story is not overly time consuming and no extensive training is required. Fourth, they can be used across settings, with different adults and to address a variety of problem behaviors. Finally, the results of this study suggest that changes in behavior may occur quite quickly and may be robust.

Summary

This study examined two questions: (a) Is there a functional relationship between a social story intervention and changes in specific target behaviors? and (b) Is a social story intervention more effective than a non-social story + verbal reminder intervention in decreasing rates of problem behavior? The results indicate that the social story could not be isolated as the variable that affected changes in the participants' problem behaviors. However, across two participants, there was direct A-B replication, indicating that when the social story was read, decreases in problem behavior soon followed. This occurrence provides correlational support for the hypothesis that the social story intervention contributed the reduction of problem behaviors.

Comparisons between the two treatment conditions produced mixed results. For Andrew and Henry, failure to return to baseline measures during the reversal resulted in the inability to assess the second intervention (non-social story). For Neil, the social story appeared to have a greater impact on the problem behaviors than the non-social story condition.

This experiment contributes to the existing empirical data on social studies and extends previous findings in a number of ways. First, the methodological design was more stringent, controlling for a number of threats to internal validity. Second, the study was conducted with much younger participants than past studies and found that young children of preschool age may benefit from social stories. Third, follow-up data for two of the
participants suggest that gains were maintained up to 4 weeks after intervention, despite the fact that the social story was not read during that time and no verbal reminders were provided to the children. This suggests that learning of appropriate social behaviors occurred during the course of the intervention.

For educators and parents, the findings of the present investigation should be viewed as promising. Social story interventions appear to hold promise for assisting individuals with autism to handle social situations, by providing accurate social information they may be lacking. Further research is necessary to extend these findings within the context of a multiple baseline design, as well as to extend the current knowledge base regarding factors that influence the success of this intervention.
References


Appendix A

Sharing: Andrew's Social Story

Sometimes Andrew plays alone.

Sometimes Andrew plays with other people.

Playing with other people can be fun.

When people play together, they can share.

Sharing is good.

Lots of people share.

Mommy and Papa share.

(Name) and (name) share.

(Name) and (name) share too.

Sharing makes lots of people feel happy.

Sometimes Andrew doesn't feel like sharing.

Sometimes Andrew hurts people when they touch his toys.

This is not o.k.

It makes people very sad when Andrew doesn't share.

Andrew can still play with the toys if he shares.

Sharing means taking turns with a toy.

Sharing also means giving half of something to the other person.

Andrew will try to take turns.

Andrew will try to give half to another person.

The other person will feel very happy.
Appendix B

Time to Eat: Henry’s Social Story

Everyone gets hungry sometimes.

Thomas the Tank Engine gets hungry.

When Thomas is hungry, he gets his lunch box.

The lunch box has food inside.

Thomas eats all the food.

Eating the food makes Thomas big and strong.

Thomas can go fast along the tracks after he eats.

Henry also gets hungry.

When Henry feels hungry, Henry needs to eat food.

Eating food will make Henry big and strong like Thomas.

Henry usually eats lunch and snack at (summer school).

Everyone takes out their lunch boxes when it is time to eat.

Henry will take out his lunch box too.

Mom packs food in Henry’s lunch box.

Sometimes Henry likes the food in his lunch box.

Sometimes Henry doesn’t like the food in his lunch box.

This is ok.

Henry will try to eat the food.

Henry needs to take a bite, chew, and swallow his food.

Mom will be happy if Henry eats the food.

(Interventionist) will be happy too.

Eating lunch and snack can be fun.
Appendix C

Playing Games: Neil’s Social Story

Sometimes kids like to play games.

Playing games can be lots of fun.

During the game, we all take turns.

Sometimes it is my turn.

When it is my turn, I can move my game piece.

Sometimes it is another player’s turn.

He or she will move their game piece.

It is not my turn when someone else is moving their game piece.

I need to leave the other player’s pieces alone.

The other players will like this a lot.

During the game, it is ok to give gentle reminders about the game rules.

It is not ok to change the rules during the game.

It is not ok to make up new rules either.

This will confuse the other players.

I will try my best to play by the rules of the game.

Sometimes I am ahead in the game.

Sometimes I am behind the other players.

If I am behind, I can tell myself to keep trying my best.

If another player is behind, I can tell him/her to keep trying too.

This is a very nice thing to do.

It is called being a good sport.

Most of the time, there will be one winner at the end of the game.
Sometimes I will win.

Sometimes someone else will win.

This is ok.

No one wins all the time.

Even Pokemons lose sometimes.

Pikachu loses, Ash loses, and Jigglypuff loses sometimes.

I may feel sad about not winning.

This is ok.

I will try to remember winning is not the most important thing.

What is important is having fun during the game.

(His interventionists) will be very happy to see everyone playing games and having fun.
Appendix D

Pilot Study

Objectives

A pilot project was implemented to answer the following questions:

(a) Is the use of illustrations in the social story distracting for the child participant?

(b) Does the effects of a social story generalize to another setting?

(c) Are parents as effective as daycare staff in implementing and collecting data related to the social story?

(d) What is the optimal amount of time needed to read a social story?

Participant

A 5-year-old boy with autism participated in this study. Prior to his third birthday, he received a diagnosis of PDD-NOS by an independent agency. During the study, he was attending kindergarten in the morning for 3 hours and after school-care for the remainder of the day. He is able to speak in full sentences and has no receptive nor expressive language delay. For three years prior to the pilot, he had received discrete trial teaching on a one-to-one basis in the home setting. Because of his excellent receptive language understanding, his interest in letters and books, and the presence of a number of problem behaviors, he was selected for this pilot project.

Target Behavior

The target problem behavior that was addressed in the social story related to the use of use of “bad words”; the participant would say “I’ll kill you” or some variation of this phrase whenever he became upset. A discussion with his parents and after-school workers indicated that this behavior would be appropriate for a social story intervention. A social
story was written by the investigator to describe why the behavior was not allowed and what would happen if it occurred.

Procedure and Data Collection

The social story was read every day at school for one month, by one of the after-school care workers. The story was read in a quiet room away from distractions after lunch. This was deemed an appropriate time because baseline observations indicated that the target behavior occurred in the early afternoon. The participant’s child-care workers were primarily responsible for the collection of data. Inter-rater reliability probes were conducted by the experimenter on 10.8% of the observations at school. There was 100% agreement between the child care workers and the experimenter regarding the occurrences of the targeted behavior. In addition, the procedural reliability was 100%.

When the story was implemented in the home, one of the parents read it every morning. The parents collected data in a similar manner as the child care workers. No reliability checks were assessed in the home setting. The social story, along with the illustrations, are included in Figure 5.
Sometimes, when people feel sad or unhappy, they want to say bad words.

But saying bad words will make other people feel unhappy and sad too.

Bad words are not funny. I will try NOT to say bad words.

"Kill" is a bad word. Saying it will make people feel very unhappy.

If I say bad words, I will have to go to the office or go home.
Figure 4. Social story for pilot project.

Results

The X-axis indicates the days that the data were collected. The Y-axis is number of times the child said the inappropriate word, “kill.” The first graph shows data collected in the after-school care setting, while the second graph shows data collected at home. The results indicate that the inappropriate speech was eliminated at the school setting, once the social story was introduced. At home, the changes in the targeted behavior were not as notable.

The pilot project was useful in answering the questions posed previously. It appeared that the use of a data collection sheet was helpful in that it provided the interventionist guidelines as to how to record data. Furthermore, if two or more interventionists shared the role of recording information related to the targeted behavior, the collection sheet allowed for gathering of consistent information across data collectors. However, a decision was made to modify the data collection sheet for the actual study because it appeared cumbersome to use for high frequency behaviors. Simple black and white line drawings did not appear to hinder the child’s capacity to comprehend the story, nor did they appear to be distracting.
After analyzing the data visually, it seemed that the social story was far more effective in decreasing the target behavior in the daycare setting compared to the home setting. The effects in the daycare setting did not appear to generalize to the child's home. Thus, in the proposed study, only one setting for each participant was targeted. Similarly, training with regard to implementation of the intervention and data collection seemed to be more effective with the daycare staff, compared to the parents. For instance, when the ongoing data were requested by the experimenter, the daycare staff provided it in a timely manner, while the parents needed reminding on a number of occasions. In addition, the daycare workers asked many questions about implementing the social story, while the parents did not contact the investigator with questions or ask for clarification.

Finally, the interventionists reported that the social story took an average of 2-3 minutes to read. Thus, for the proposed study, interventionists were instructed to extend each reading to 3-4 minutes by making comments about the text and pictures in the social story.

In conclusion, the following information derived from the pilot project was incorporated into the proposed study: (a) the use of simple black and white illustrations accompanying the text, (b) data collection confined to one environment, (c) daycare staff as preferred implementers and data collectors over parents, and (d) interventionists instructed to take 3-4 minutes to complete each reading of the social story.
Appendix E

Andrew's Data Collection Sheet

A = Aggression – attempts to or makes contact with another’s body with intent to hurt him/her

Y = Yelling – talking in a voice louder than he usually does in a conversation

C = Crying – tears coming from his eyes, down his face

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Appendix F

Henry's Data Collection Sheet

H = Hands in pants – puts 1 or both hands inside his pants or on genital area

S = Sounds – screaming, squealing, or crying

T = Throwing up – removing chewed food from his mouth

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Appendix G

Neil's Data Collection Sheet

C = Cheating – verbally changes a rule/makes up a new one

M = Moving – moving another player's piece/card

T = Touching – making contact with another player's hand/arm {when it is not part of the game}

N = Negative comments – verbalizes a negative comment to self/other around losing

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