The Effect of the Use of a Service Dog on Pragmatic

Language in a Child with Autism

A Report of a Senior Study

by

Andrew Salpas

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Maryville College

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ABSTRACT

This senior study is an evaluation of the effect of a service dog upon the pragmatic language skills of a child with autism. This is a quantitative and qualitative analysis of data collected by means of two parent-reported psychological tests and film footage of the child. The participating child was filmed prior to the introduction to the service animal and then seven days later, as well as immediately after introduction to the dog and then seven days later. The parents of the participating child scored their child in two standardized psychological measures prior to the introduction to the service animal and after a six month period follow-up. Changes in behavioral skills and communication capabilities specific to the use of pragmatic language were analyzed by comparing the prior and post sets of data. It is hypothesized that the placement of a service dog with the autistic child will result in improvements in the child's ability to use pragmatic language, and thus benefit the child in the areas of communication and socialization.

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CHAPTER I

AUTISTIC DISORDER AND CONSEQUENT AREAS OF DEFICIENCIES

Autistic Disorder

Autistic disorder, otherwise known as autism, is a neuro-developmental disorder resulting in impaired cognitive abilities, communication, social interaction, and restricted reoccurring behaviors (American Psychiatric Association, 2000). Autistic disorder results in such deficiencies without necessarily impacting the individual's IQ (Baron-Cohen, Leslie, & Firth, 1985). Initially attributed by psychoanalysts as a regression to an earlier autistic phase, the disorder was first depicted in 1943 by Leo Kanner as a collection of symptoms differing from childhood schizophrenia and including, but not limited to, an inability to relate with others, a lack of conveyance of meaning, and restricted interests (Kasher & Meilijson, 1996).The disorder was first included in psychiatric classification in 1980 (Harris & Glasberg, 1996). Autistic disorder is multifaceted in nature, comprising of a permutation of related developmental deficiencies and thus the cause of the disorder is not believed to be singular but instead to be an unclearly delineated brain abnormality.

Research suggests a genetic component to the disorder as evidenced by an increased risk of autism among siblings of 5% (APA, 2000; Kasher &

Meilijson, 1996; Tager-Flusberg, 2007). The disorder is heterogeneous in nature in that the symptoms vary widely in form and intensity within the diagnosis. While developmental gains may occur in some subset of the population, the course of the disorder is continuous, with some evidence of improvements in other cognitive areas to mitigate deficits in affected areas over time (APA, 2000; Tager-Flusberg, 2007). By diagnostic definition the condition of autism must begin before three years of age, but research has shown that associated symptoms such as deficits in response to joint attention—the capacity to recognize another person's attention upon events or objects—can be accurate indicators of autistic disorder in individuals as young as 14 months of age (APA, 2000; Sullivan et al., 2007).

According to the APA, the rate of prevalence in 2000 was 1 in 2,000, but recent researchers note a growing increase in the number of diagnosed cases with current estimates as high as 1 in 166 (National Institute of Mental Health, 2007; Sams, Fortney, & Willebring, 2006). There is a much greater rate of prevalence among males as compared to females, with estimates of five times the number of males as females (Kasher & Meilijson, 1996).

Autistic disorder is part of a broader family of pervasive developmental disorders (PDDs), as classified by the American Psychiatric Association (2000).This diagnostic category includes five related developmental disorders all categorized by continuous and marked impairment in areas of development including socialization and restricted behaviors (APA, 2000; Harris & Glasberg,

1996). Comorbidity with intellectual disabilities is prominent (Matson & Wilkins, 2006).

<u>Theory-of-Mind</u>

Specific impairments of cognitive abilities have been identified in the processing of mental-state information including attribution of mental-states to others and intentionality of others (Kasher & Meilijson, 1996; Tager-Flusberg, 2007).The ability to recognize mind-states in others and create meta-representations has been termed theory-of-mind (Premack & Woodruff, as cited in Baron-Cohen, Leslie, & Frith, 1985). Impairments in autistic individuals' abilities in communication and socialization are purported to be best explained by deficiencies in this ability. However, behavioral abnormalities such as restriction or repetition cannot be accounted for by such deficiencies (Tager-Flusberg, 2007). Impairments in communication and socialization result in excessive reliance upon executive-function in social contexts (Tager-Flusberg, 2007). In normal development, the ability to represent mental-states in others is developed between the ages of three and six, while the framework for such understanding—termed second-order representations—is founded around the age of two (Baron-Cohen et al., 1985; Kasher & Meilijson, 1996).

Deficits in theory-of-mind may be moderated in older autistic children by the use of logical reasoning and mastery of the pragmatics of communication verbs and syntax through development of a "linguistically mediated theory of mind" (Tager-Flusberg, 2007, p. 313). This contention is supported by functional neuroimaging which shows activation areas differing for an autistic sample as

compared to a non-autistic sample; activation is present in areas associated with executive control and the social-cognitive neural network in non-autistic participants while activation is limited to brain regions associated with general problem-solving in autistic participants (Frith & Frith, as cited in Tager-Flusberg, 2007).

Joint attention is an integral component of theory-of-mind and can be regarded in two specific forms, response to joint attention and initiation of joint attention (Sullivan et al., 2007). Response to joint attention is defined as the recognition of direction of attention in another individual as can be observed when a child follows the eye gaze of an adult to the adult's object of attention. Initiation of joint attention can be identified as the capacity to recognize that one may influence the direction of attention of another individual and act upon it as can be seen when a child points towards an object to direct an adult's attention towards it. Sullivan et al. (2007) believe that deficits in response to joint attention result in delays in early social learning, thus leading to delayed or impaired socialization skills.

Language

Specific impairments in language skills have been identified in pragmatic language as well as in "nonliteral intentional language" (Kasher & Meilijson, 1996, p. 2). Pragmatic language is defined as the use of language in social contexts which communicates intentions and references (Philofsky, Fidler, & Hepburn, 2007). Language deficits in autistic children can be divided into two categories, nonverbal children being classified as deviant and verbal children as

delayed (Rice, Warren, & Betz, 2005; Tager-Flusberg, 2007). Language

capabilities vary broadly within the diagnosis with some individuals completely

lacking speech, some limited to echolalia (the repeated imitation of words or

vocalizations) and others expressing abnormal patterns of speech such as

pronoun reversal, excessive use of utterances, self-created words, or socially

inappropriate or irrelevant language (Harris & Glasberg, 1996; Kasher &

Meilijson, 1996). Narrative abilities are also deficient in this population; however,

research suggests strengths in the local level and deficiencies in the global level

(Philofsky et al., 2007; Rice et al., 2005).

<u>Socialization</u>

Specific deficits in social interaction include impairments in the use of

directed eye-gaze in communication, empathetic awareness, interpretation of

gestures, ability to form intimate relationships such as friendships, and a lack of

or inappropriate use of gestural communication (Kasher & Meilijson, 1996).

Autistic individuals show impairments in the comprehension of social

environments and the sharing of valuable social experiences such as enjoyment

or interests (Baron-Cohen et al., 1985; Sullivan et al., 2007). Deficiencies in eye-

gaze recognition and eye contact result from a lack of cognitive integration of

language channels with gazing motor channels (Kasher & Meilijson, 1996). In

normal development, pretend-play begins to occur around the age of two. With

autistic children, this form of play may be entirely lacking regardless of IQs

(Baron-Cohen et al., 1985). The ability to create statements in request form also

normally develops around the age of two and this skill is characteristically late to

develop in autistic children (Kasher & Meilijson, 1996). These children may also exhibit difficulty in turn-taking (Matson et al., 2007).

<u>Restricted Behaviors</u>

Autistic individuals display a wide range of atypical and stereotypical patterns of behaviors, often including repetitive and/or restricted movements (APA, 2000). The individual's interests may be limited and may appear unsuitably intense in emotional relation or frequency, such as in ritualistic behaviors. Autistic children may display repetitive body movements such as clapping, rocking, and self-injurious behaviors (APA, 2000; Levy, Kim, & Olive, 2006). Disruptive or aggressive behavior has also been noted in this population (Levy et al., 2006). Self-stimulatory behaviors such as rubbing, slapping, and noisemaking may also be present.

Atypical behaviors may result, in part, from over- and under- responsiveness to sensory information and deficits in skilled motor functioning (Sams et al., 2006). Deficits in the ability to plan and initiate sequences of complex motor movement have been identified in this population and may result in limitations in operations of physical interaction such as motor imitation. This, combined with an overload of sensory information, may help explain autistic children's difficulties in executing organized behavior (Sams et al., 2006).

<u>Pragmatic Language</u>

While language impairments in the autistic population vary from a lack of speech to abnormal speech patterns, research has shown deficiencies in pragmatic language to be a general feature of the disorder. Pragmatic language

encompasses a wide variety of interactive communication, including appropriate connotation, semantics, organization of interaction, and conveyance of intentionality and emotion (Kasher & Meilijson, 1996; Philofsky et al., 2007). Research has shown autistic children to exhibit impairment in all areas of pragmatic social capabilities as measured by the Children's Checklist of Communication 2(CCC-2) (Philofsky et al., 2007). Kasher & Meilijson (1996) divide pragmatic language into five different types: core pragmatics, amplified core pragmatics, talk-in interaction pragmatics, central pragmatics, and interface pragmatics. They contend that the following manifestations of deficiencies in their types in autistic individuals are representative of core deficiencies put forth in the DSM-IV.

Core pragmatics is defined as the knowledge of fundamental speech acts, and deficiencies in this area result in difficulties constructing appropriate and contextually relevant acts of speech. Similarly, deficiencies in amplified core pragmatics lead to a lack of understanding of rules governing nonliteral and semantic use of language. Deficits in talk-in interaction pragmatics, or the organization aspects of communication, may cause problems in turn-taking, recognition of change, and differentiation of prior subject matters. Deficiencies in the knowledge of language use such as indirect acts of speech, or central pragmatics, may result in inappropriate attribution of attention to irrelevant aspects of conversation or overly literally interpretations. Interface pragmatics is defined as the integration of verbal with nonverbal communication and

deficiencies in this area may result in ignorance of intentionality (Kasher & Meilijson, 1996).

Deficiencies in any of the areas of pragmatic language result in difficulties in social relatedness and interest in performing social interactions (Philofsky et al., 2007). Autistic individuals may find such interaction to be confusing or frustrating. This may be due to ignorance of or misinterpretation of nonverbal or contextual cues, resulting in the aforementioned lack of interest in interaction. Autistic individuals are not limited just in their abilities to comprehend others' pragmatic use of language, but also in their own ability to express pragmatically. Deficits and embellishments have both been observed; gesturing or contextually relevant expression as well as reciprocity in communication may be lacking or absent while stereotyped expressions or the insertion of inappropriate use of language or subject matter may be present (Philofsky et al., 2007).

Interventions for Autistic Children

Interventions

Interventions for children diagnosed with autistic disorder vary in their setting, targeted deficits, and theoretical framework. Common interventions for autistic children often involve behavioral interventions which assist in teaching various skills such as communication and social behaviors by means of reinforcement schedules, modeling, or imitation (Kronenberger & Meyer, 2001). Other interventions may involve speech or language therapy or the use of psychotropic medications. A review of measurements in intervention research conducted by Wolery and Garfinkle (2002) found that interventions take place

nearly equally in clinical and special education classes, with a smaller percentage taking place in other types of classes and at home. The interventions in their review focused on seven different areas of deficit. Most common were interventions targeting deficits in social skills, followed by those targeting communication. The least common were those involving imitation (Wolery & Garfinkle, 2002). In occupational therapy, treatments involving sensory integration are found to be most prevalent (Sams et al., 2006).

Interventions for the population of autistic children are nearly as widely varied as the symptoms of the disorder. However, across the spectrum of interventions, certain key components have been shown to be most effective. In a review of the literature published between 1975 and 2001, Levy et al. (2006) found five distinct intervention characteristics leading to significant positives effects in treatment. They reviewed 24 studies of interventions involving children, predominately between the ages of three and eight, of whom at least 50% were diagnosed with autism (as opposed to other PDDs). Of the areas determined to result in positive effects in their review, foremost is the involvement of parents in the intervention program. They found that this involvement generalized positive effects across their review. Large effects are also associated with the diversity of focus (e.g., communication, socialization, and behavior management) and the intensity and duration, with intensive and long lasting interventions producing the most positive effects. Positive effects on treatment are found to be significant when the treatments are involving early interventions incorporating multiple components, treatments of speech and language, imitative interactions, and

intensive behavioral interventions. The authors also found significant, but lesser positive changes in effect size for interventions involving involvement of non-autistic children versus the involvement of other autistic children, with no significant difference in effect size found for the involvement of non-autistic children as compared to no other children. Despite the finding of positive changes involving non-autistic children, a broader range of improvements was found in children involved in home-based interventions as opposed to integrated settings (Levy et al., 2006).

Interventions Using Animals

Documentation of the inclusion of animals in therapeutic services dates back to 1792 to the York Retreat of England, in which mentally ill residents were given the opportunity to care for small animals (Mallon, 1992). Since then, much research has been conducted to support the therapeutic benefits of animals upon humans. Research suggests that pets may aid in the reduction of blood pressure and in coronary health and research specific to elderly residents of hospitals and nursing homes have found benefits in mental alertness, processes of socialization, and increasing responsiveness (Heimlich, 2001). Studies of the effects of dogs upon institutionalized children have reported benefits in physical, emotional, and social areas such as socially appropriate and nurturing behaviors (Heimlich, 2001). Further research suggests additional social and emotional benefits associated with companion animals, such as reduced isolation and increased responsible independent behavior (McCulloch, 1984; Mallon, 1991; as cited in Mallon, 1992). It is purported that the development of a relationship

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between a child and a pet which ensues from the care taking of the animal may act as a bridge to the development of meaningful human relationships, and this notion has direct implications for the treatment of autistic children (Levinson, 1970; as cited in Mallon, 1992). Levinson believes that this is due in part to the non-threatening nature of the relationship between the child and the companion animal and the priming nature of the animal in social situations (Levinson, 1978; as cited in Mallon, 1992).

Animal Assisted Therapy and Autistic Disorder

Research on the involvement of animals in the treatment of autistic children dates back to 1989, yet little research has been conducted in the succeeding years and that which has followed has been limited by its anecdotal nature or methodological constraints. Research involving animal interventions with autistic children can be divided into three categories: socialization with an animal, in which a dog lacking training specific to the diagnostic population is observed with an autistic child; Animal Assisted Therapy (AAT), in which an animal is included in integrated therapy sessions with the autistic child; and interventions involving service animals, in which an animal trained specifically to aid in the management of an autistic child is permanently placed with the family of the child. In this review, only AAT and service animals will be discussed as they provide greater consistency due to specific training or settings.

As early as 1962, Levinson was observing the benefits of the use of AAT in the pediatric population, and in 1964 he suggested that the use of an animal in therapy was especially beneficial for autistic children, resulting in a strengthening

of their connection with reality (as cited in Mallon, 1992). Yet, it was not until 1989 that experimentation took place to measure the effects of AAT on this population. In 1989 Redefer and Goodman measured several markers of changes in social interactions and isolation in autistic children considered severely impaired between the ages of five and ten. These children were involved in therapy sessions with and without the presence of a dog. The authors conducted four phases of treatment including three baseline sessions without the animal and 18 with the animal. The authors found initial increases in social interaction, or prosocial behavior, of 6.5 standard deviations accompanied by decreases in isolation, or self-absorption, of 5 standard deviations; changes in both categories regressed partially after one month, resulting in follow-up changes of 3 standard deviations in social interactions and 2.5 standard deviations in isolation.

Redefer and Goodman (1989) suggest that these changes may be due to several factors of the animal's involvement. They believe that the dogs offered a multisensory experience that overcame the children's inhibited sensory arousal levels and that the actions of the dog, both simplistic and repetitive, were easy nonverbal acts for the children to decipher. They further suggest that the children were better prepared to be involved in social interactions due to the priming effects of the dog. While this research offers evidence of positive effects upon social interactions in the study's participants, the research was limited in its ability to be generalized due to several constraints of the methodology and flaws in

research design such as the dual role of a contributing therapist as a coder and limited time (Redefer & Goodman, 1989).

Subsequent to the Redefer and Goodman study, little research was published on the involvement of dogs with autistic children, nor those with any PDD population, until 2002; however, research was conducted in other pediatric populations which give insight into the nature of the gains in social interactions found by Redefer and Goodman. In 1989 Mader, Hart, and Bergin conducted an experiment in which five physically, though not developmentally, disabled children were observed while unaware in both a school and a shopping mall setting with and without a service dog present. Four measures of social acknowledgment expressed by passerbys were assessed and analyzed for comparison. The researchers found that in the school setting, children with a service dog present were proportionately more likely to attract looks from passerbys, to elicit conversations more often and in greater length, and to elicit touching by passerbys. In the public mall setting, children with a service dog experienced similar increases in each area, accompanied by increases in an additional measure not assessed in the school setting, frequency of smiling by passerbys. The authors conclude that increases in each measure of social acknowledgment were associated with the presence of the dog, noting that in the public setting smiles directed towards the children were nearly absent whereas one quarter of the passerbys smiled at the participants when the dog was present (Mader et al., 1989). Suggestions from this research may be relevant to the use of service dogs with autistic children. As deficits in socialization skills in

this population can contribute to a lack of desire to engage in social interaction on the part of the autistic individual, by increasing the positive social acknowledgment of the individuals such inhibitions may be moderated.

In 2001 Heimlich sought to evaluate the effect of AAT on the behavior of children suffering from moderate to severe mental retardation accompanied by other diagnoses in a residential care setting. Using four scales of behavioral observation the children were monitored in structured therapy sessions involving a dog with specific factors of interest including communication, attention span, body movement, and compliance. The author found a positive increase in behavioral ratings for most participants; however, the study was not generalizable due to several confounding factors including a small sample size, low inter-rater reliability, and incomplete data sets due to the absence of a sick animal.

In 2002 Martin and Farnum conducted a quantitative assessment of the effects of a dog incorporated into therapy sessions involving children with PDDs. The study was focused on the effects of animal-assisted therapy, but its results may offer insight into the use of service animals as well. Ten children between the ages of 2.5 and 6.5 were observed for changes in prosocial behavior in two experimental therapy sessions, one involving a live dog and the other a stuffed dog similar in appearance to the live animal, and compared to control sessions without additional stimuli. The authors found a positive effect on behaviors associated with the interaction with the dogs but that the findings may not be generalized to a wider population due to the small sample size. Although they

note that their study offers provisional support for the effectiveness of ATT in the pediatric PDD population, such as increases in compliance and decreases in ignoring of questions followed by irrelevant comments. Several measures of their study show changes which challenge this contention, such as increases in hand flapping and decreases in detailed explanations. The authors suggest that these contradictory findings are due to the novelty of the situation and not to inefficiency of the intervention (Martin & Farnum, 2002).

Service Dogs and Autistic Disorder

Far more limited than the research on AAT is that concerning the use of service dogs with the autistic pediatric population. In 2005 Burrows conducted a qualitative study to assess the benefits and challenges associated with the placement of service dogs with autistic children. Burrows conducted semi-structured interviews with the parents of ten children, between the ages of four and 14, diagnosed as either autistic or displaying autistic characteristics. All families were interviewed during the week in which they received the service animal and followed up in three month intervals. Four families were interviewed for a total of six months while the other six families were interviewed for a total of twelve months. Parents reported positive results for themselves including decreases in stress levels, in part resulting from the added safeguard that the service dogs provided such as alerting the parents when the autistic children were in unsafe situations (e.g., leaving the bedroom during the night or running away from the parents). The parents reported that their children experienced improvements in fine motor functions as evidenced by developing the ability to

control the pace of their movements while petting the service dog, to throw a ball, and to groom the animal. Parents reported decreases in the number of meltdowns (in which case the animal would deter the child's tantrum by moving itself close to the child's face), levels of anger, and increases in compliance and overall happiness. Parents also reported that their children's ability to focus their attention on the dog had improved and that this resulted in less time spent being distracted by outside stimuli. Burrows found that parents initially reported avoiding social situations due to feelings of embarrassment and exclusion but that, consequent to the placement of the service dog, they reported feeling a more positive reception from the public. Furthermore, they reported an increase in social acknowledgement of the siblings of the autistic children following the placement of the service animal with the family. Burrows deduced that the dogs act as a social catalyst for the families resulting in greater ease of integration in social settings, and this contention corresponds to the findings of Mader et al. (2005).

Burrows (2005) suggests several means by which the interaction with the service dogs may be connected to improvements in the children's autistic symptoms. She purports that, for children with high levels of arousal or anxiety, the pressure of the animal upon the child—e.g., while in the bed at night—may lead to a calming effect. This finding is supported by the parent's report that their children were more quickly able to settle down at bedtime with the animal lying next to them. She concludes that the service animals offer benefits in several

areas of interest, including safety, socialization, behavioral management, and decreases in stress and anxiety.

Application to Research Objectives

Given the limited amount of research available pertaining to the benefits of the placement of service dogs with autistic children it is the purpose of this study to provide further analysis. Because current research suggests that deficits in pragmatic language are a unifying feature of autistic disorder this study will focus on the effect that the placement of the service animal has upon the pragmatic language abilities of the participating children. Due to the difficulties associated with the care of an autistic family member and the increasing rate of prevalence of the disorder in the pediatric population, it is necessary to explore treatments to establish an association between the interventions used and the benefits gained by the affected children and their families so as to give direction to future researchers who may conduct experiments in order to test causation of these benefits. This study seeks to support such future directions in research.

CHAPTER II

METHODS

Participants

The participant in this study was a female age 3 years and 11 months at the time of the study and will herein be referred to as 'Jane' (a pseudonym). Jane's parents obtained their service dog from Wilderwood Service Dogs in Tennessee. Wilderwood Service Dogs train their service animals specifically for neurological impairments, including PDDs. The dogs are trained explicitly for the individual they are to be placed with such that, in the case of placement with children with autism, the animals may be trained to disrupt the child's specific autistic behaviors. Jane was selected from the Wilderwood Service Dogs program for this research by means of the time of her participation in the graduation and public safety testing with the service dogs; she was the child of a family who received their 'graduate' service dog between May and September of 2008.

Jane lives with both of her biological parents in a metropolitan area of Texas and was described by them as Caucasian and as their second born child. She had previously been diagnosed with autism. Her parents note that problems with tantrums, head banging, and delayed language were first noted at 18

months of age and that she never experienced a significant loss of previously obtained skills. They note that she has 'good' overall health, no problems with

hearing, sight, or motor skills, has had 'normal' results in a hearing test, and has no neurological impairments beyond her diagnosis of autism. They report that she takes no medications. They describe no history of or current medical, psychiatric, learning, or language problems in the immediate or extended family. The child's parents signed informed consent forms and the design of this study was approved by the IRB at Maryville College. All participants were treated in accordance with the "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 2002).

Materials

The caregivers of the participant completed two paper and pencil standardized psychological instruments regarding their participating child prior to the child's introduction to the service dog and again after a period of six months. The instruments were the Children's Communication Checklist 2 (CCC-2) (Bishop, 2003) and the Pervasive Developmental Disorder Behavioral Inventory (PDDBI) (Cohen & Sudhalter, 1999). Video footage was transferred to computer for transcription using Transana 2.21 (Woods, 2007) video transcription software.

The CCC-2 is an instrument designed to measure children's communication skills in 5 areas: pragmatics, speech, syntax, semantics, and morphology; in order to identify general speech and language impairments,

pragmatic language impairments, and the need for additional assessment for ASD (Bishop 2003). It is designed for children between the ages of 4 and 17 who speak in sentences with English as a primary language. It has been standardized across a range of geographic and ethnic backgrounds. The instrument consists of 10 scales each made up of 7 items. The scales are: speech, syntax, semantics, coherence, initiation, scripted language, context, nonverbal communication, social relations, and interests (Bishop 2003). From the raw scores obtained from these scales, several different measures may be obtained. For the purpose of this study only the scaled scores and percentile ranks will be discussed.

The PDDBI is an instrument designed to provide an age standardized score for autism assessment which measures relevant behavior problems and social communication skills and has been verified to be useful in measuring changes and response to intervention in the assessed areas (Cohen & Sudhalter, 1999). The test was designed for use with children indentified with a PDD between the ages of 1 year 6 months and 12 years 5 months. It has been standardized across a range of geographic and ethnic backgrounds. The instrument consists of 10 domains: sensory/perceptual approach behaviors (SENSORY), ritualisms/resistance to change (RITUAL), social pragmatic problems (SOCPP), semantic/pragmatic problems (SEMPP), arousal regulation problems (AROUSE), specific fears (FEARS), aggressiveness (AGG), social approach behaviors (SOCAPP), expressive language (EXPRESS), and learning, memory, and receptive language (LMRL). Each of these domains consists of a

number of behavioral clusters of which percentile ranges may be derived (PDDBI; Cohen & Sudhalter, 1999). Other data derived from the raw scores includes several composite scores and discrepancy scores. For the purpose of this study, only the composite scores will be discussed.

Design and Procedure

A baseline evaluation of the child was created prior to the introduction of the child to the service dog by means of the initial parent-reported psychological tests (CCC-2 and PDDBI) and a 15 minute segment of video footage of the child indoors filmed by the researcher. The child was accompanied by her parents, the researcher, the service dog trainer, and one additional participant and caregivers; at this point the child had not been introduced to the service dog and the animal was not present. Following the initial filming, the child was introduced to her individual service dog at which point she became continuously tethered to the animal during waking hours. The child was filmed by the researcher 7 days later at the same indoor location with the same accompanying individuals with the addition of the tethered service dogs. This video footage was subsequently compared to the initial video footage for an analysis of changes in the pragmatic language skills of the participant. A second round of filming was conducted in a public setting. The initial filming session took place in a retail store and consisted of the child's first public exposure tethered to the service dog. At a follow up period of seven days the child was again filmed tethered to the dog in a retail store. This film footage was also compared to the initial public setting film footage for analysis of changes in the pragmatic language skills of the child. At a follow

up period of six months, the parents of the participant completed the CCC-2 and

the PDDBI again for comparison to the baseline evaluation.

CHAPTER III

RESULTS AND DISCUSSION

Comparison of the baseline video footage with the seven day follow-up footage revealed several changes of interest. The baseline video footage consisted of Jane and her father in a room with the researcher in which the child continuously engaged in self-stimulatory behaviors and spoke mostly in echolalic utterances. The child was observed repeatedly to hop around the room like a bunny, attempt to stand on her head, and rub her hands against her clothing. These behaviors were confirmed by her father to be part of Jane's range of self-stimulatory behaviors. Jane's echolalic utterances included repeatedly blowing against her finger in a "shushing" motion, repeating the phrase "he's sleeping" when not contextually appropriate, and repeatedly telling her father to "sit down" when he was already seated. Jane's behaviors in the baseline video footage reflect deficits in several of the pragmatic language types put forth by Kasher and Meilijson (1996), such as core pragmatics, talk-in interaction pragmatics, and interface pragmatics.

In the seven day follow-up footage, subsequent to the placement of the service animal, self-stimulatory behaviors appeared sharply reduced. The child

remained seated throughout the filming period, coloring in a book. In the initial footage Jane only sat briefly when instructed repeatedly to do so by her father.

The only behavior observed in the follow-up footage that could be interpreted as self-stimulatory was a brief period of the child drawing upon her hand. This, however, was not confirmed by either parent to be part of Jane's range of self-stimulatory behaviors. Jane's echolalic utterances appeared to be reduced as well, however not as prominently as her reduction in self-stimulatory behaviors. Jane was observed on several occasions to sing a single line of a song repeatedly.

Comparison of the initial public setting video footage with the seven day follow-up footage also revealed several changes of interest. Foremost was the reduction in meltdowns. Initial public footage consisted of a series of tantrums including screaming, crying, and limb flailing, in which the child continuously attempted to break free of her tether to the service dog by attempting to "bolt" in the opposite direction. These bolting behaviors had been described by Jane's parents prior to the placement of the service dog as one of the key safety concerns that led them to the service dog intervention. Follow-up footage contained no meltdown periods and no instances of the child attempting to break free from the animal. Furthermore, the child was observed to interact with the service dog in a contextual appropriate fashion in the follow-up video footage, as evidenced by giving commands to the dog such as "stop."

Direct observation of improvements in pragmatic language skills were limited in the analysis of film footage, yet this was likely due to limited time span

between video segments. Such rapid changes as a result of any intervention would be unusual, yet while immediate pragmatic language changes were lacking, immediate changes were observed in Jane's behavior. It may be suggested that these behavioral changes are representative of a reduction in the child's level of anxiety and that this reduction in anxiety lays the foundation for the child to begin building upon deficit pragmatic skills. This reduction in anxiety is evidenced by the reduction in meltdowns, which are a behavioral response to anxiety in PDDs (Myles, Adreon, & Stella, 2001). The reduction is further evidenced by the decrease in the child's self-stimulatory behaviors, behaviors which tend to increase as autistic individual's anxiety increase (Turner, 1999). It is possible that as the child's attention and energy is diverted from these behaviors more is available to commit to interactions with others, including with the service dog. While testing this contention was beyond the scope of this research, a mechanism of change is evident as increases in the child's pragmatic language skills were supported by comparison of the baseline psychological instruments to the six month follow-up instruments.

Analysis of differences in the baseline and six month follow-up of the standardized psychological instruments revealed notable changes. Evaluation of the CCC-2 revealed substantial increases in the participant's percentile ranks in several categories pertinent to pragmatic language. Scales in which a percentile increase of 3% or more was observed include: Initiation (2% to 5%), Scripted Language (1% to 5%), Semantics (1% to 16%), Nonverbal Communication (2%

to 25%) and Interests (5% to 37%). Specific areas of these scales in which the greatest amount of improvement was reported are listed in Table 1.1.

Evaluation of the PDDBI also revealed substantial increases in several categories pertinent to pragmatic language. Children with autism have been show to have domain scores ranging between 40 and 60 in the 10 domains of the PDDBI; For the domains SENSORY, RITUAL, SOCPP, SEMPP, AROUSE, FEARS, and AGG an increase in the level of severity of autism corresponds to an increase in the domain scores (Cohen & Sudhalter, 2005). Jane scored within the typical autism range in each domain on her baseline test. The follow-up test showed decreases in domain scores for all seven of the aforementioned domains, revealing a decreasing trend of autistic severity. Jane showed marked improvement in areas of pragmatic language, such as in the SOCPP and SEMPP domains, as well as in the domain FEARS, which includes items relevant to anxiety. As such, the reduction in anxiety related behaviors observed in the video analysis is supported by the results of this psychological instrument.

For the domains SOCAPP, EXPRESS, and LMRL, increases in domain scores are indicative of increased competency in those areas (Cohen & Sudhalter, 2005). Jane's baseline scores for these domains fell within the typical range for autism and changes in domain scores for these domains in the follow-up test were negligible. A complete list of the changes in domain scores can be found in Table 2.

Both instruments have been standardized for age and tested for stability. The PDDBI professional manual reports high test-retest correlations over a 12

month period ranging from .38 to .91, while the CCC-2 manual reports a test-retest coefficient range of .86 to .96 over a 28 day period (CCC-2; Bishop, 2003; PDDBI; Cohen & Sudhalter, 1999). Standardized results over a six month period for both instruments should be stable, yet these results reveal trends of improvement in the several key areas noted above.

While it is clear that a reduction of anxiety has occurred in this case, both in the immediate and over an interval of six months, it is unclear, however, by what means the placement of the service dog with the child results in or relates to this reduction. Studies of other populations have shown that pet ownership is linked to a reduction in blood pressure and coronary health, both related to anxiety (Heimlich, 2001). While these findings are consistant with the findings of this study, they nevertheless leave the means of reduction unclear. Future research should seek to establish the means by which this reduction in anxiety occurs in order to establish a foundation upon which further questions may be approached.

Once a means of anxiety reduction is understood, the relationship between this reduction and increases in pragmatic language abilities must be identified. A means by which the two may be related is attentional capacity. A study conducted by Murray, Creaghead, Manning-Courtney, Shear, Bean, and Prendeville (2008) found a positive correlation between joint attention responsiveness and receptive language scores. They suggest that joint attention may be related to the development of more complex pragmatic skills. In future studies, further psychological testing could be implemented in order to test the

hypothesis that the child's reduction in anxiety results in an increase in attentional resources. If this is found to be the case, it is likely that more of these attentional resources may be devoted to social interactions in the autistic child just as they are with a normally developing child.

This prediction elaborates upon the findings of Levinson (1970; as cited in Mallon, 1992), who suggested that the relationship between the child and pet acts to create a bridge to the development of meaningful human relationships. Furthermore, this prediction gives a means by which the priming effect of the dog upon the child with autism, as suggested by Redefer and Goodman (1989), may occur; the child may be primed by the increase in attentional resources.

This study was limited by a number of factors. The study was initially conceptualized as a quantitative study of a group of children with autism involved in the service dog intervention. It became clear, however, that due to the exploratory nature of the study and the initially limited number of participants that the research would be better approached as a case study. Unfortunately, this change in design occurred before more detailed information could be obtained from Jane's parents. The result of this was a lack of awareness of core deficits in the child prior to filming and film analysis. Future research would benefit from having a clear understanding of targeted deficit behaviors in order to better organize filming and better focus analysis.

Another limitation of the study was inter-rater reliability. The baseline psychological instruments were completed by the child's father while the follow-up instruments were completed by the child's mother. While this could certainly

explain a small amount of variation in the domain scores and percentile ranks, it is extremely doubtful that differences in observations provided by parents, whom had both lived with the child for her lifetime, would account for such large differences as found in this study.

CONCLUSION

This study suggests that the changes over a six month period revealed in

the psychological instruments were consistent with the short-term changes,

particularly the decreases in acting-out behaviors, such as meltdowns and

bolting, and self-stimulatory behaviors. Initial decreases in bolting behaviors were

clearly attributable to the child's continuous tethering to the service animal,

however, the mechanisms by which the dog helped reduce the meltdowns—e.g.

uncontrolled crying and refusal to comply with parental commands—and self-

stimulatory behaviors are less clear. The most plausible explanation for these

changes is that the training the dogs receive in disrupting such behaviors is

effective. Possible mechanisms include the dog acting as a highly consistent,

positive reinforcer for appropriate behaviors—for instance when giving positive

displays of attention such as proximity or licking—and as a punishing stimulus

for inappropriate behaviors—such as decreasing proximity or disengaging in

play. Furthermore, the dog may be acting as a secondary source of stimulation,

whereas the child's involvement with the animal in activities such as petting

displaces the child's tendency for self-stimulation.

The reduction in anxiety-related behaviors, such as acting-out and self-

stimulation, observed in the video analysis is supported by the results of the

PDDBI in the scales AROUSE and FEARS (decreases in domain scores are

presented in Table 2). Decreases in these areas may free up the child's attention

for processing simple communication cues from her service dog—e.g. consistent responses to commands as well as body posture and gaze—, cues which once utilized in communication with the animal ideally may be transferred to more complex communication with other humans. Conversely, it is possible that immediate changes in communication skills are the first step in this model of change, with improved communication resulting in the observed decreases in anxiety-related behaviors. Initial improvements in communication may be present in the interactions between the child and the dog and may differ from improvements one might expect to see in communication between humans, such as in increased verbal responses. These communication improvements may be in part motivated by the novel role the child finds herself in, that of a constant companion or even care-taker. Such improvements, accompanied by the child's decrease in anxiety-related behaviors, may lay the foundation for improved communication with other humans. It is possible that the child not only receives positive reinforcement from her communication with the dog, but also actively transfers these communication improvements to humans based upon her noted success with the animal. Because the service dog may provide simpler communication cues than the complex cues offered by other humans, the dog may act as a stepping stone in communication in which the child can recognize her own improvements in communication and begin to apply them in more complex interactions. This is an important area for future exploration, as improvements in many previous interventions have shown to be situation specific, highlighting the children's difficulty in employing their newly learned

skills in different ways. Furthermore, as the improvements in communication are transferred from the animal to other humans, it would be expected that reductions in self-stimulatory and acting-out behaviors would decrease in a linear fashion (follow-up data received at later intervals should clarify this contention).

This study presents evidence that interventions for autism involving service dogs should be an important avenue for future research. While this type of intervention has been providing interesting anecdotal evidence for some time, this exploratory study hopefully will lay the groundwork for further empirical evidence to be established. Furthermore, developing an understanding of the mechanism of change by which the service dog intervention affects the pragmatic language abilities of the child may lead to further specificity of current interventions.

TABLES

Table 1

CCC-2 Specific Areas of Improvement in Domains of Greatest Percentile

Improvement

Semantics	Scripted Language	Nonverbal Communication	Interests
Makes false starts, and seems to search for the right words (3-0)	When answering questions provides enough information without being over-precise (0-2)	Looks blank in a situation where most children would show a clear facial expression (2-0)	Talks about lists of things he/she has memorized (3-0)
Mixes up words that sound familiar (2-0)		Ignores conversational overtures from others (3-1)	Shows flexibility in adapting to unexpected situations (0-2)

Note. "Rating Key: 0 = less than once a week (or never); 1 = at least once a week, but not everyday (or

occasionally); 2 = once or twice a day (or frequently); 3 = several times (more than twice) a day (or always)"

(Bishop, 2003, p. 8).

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Table 2

PDDBI Changes in Domain Scores

	SENSORY	RITUAL	SOCPP	SEMPP	AROUSE	FEARS	AGG	SOCAPP	EXPRESS	LMRL
05/13/08	47	61	57	76	64	47	57	57	60	59
11/17/08	39	63	50	68	48	38	47	56	58	61

Note. For the domains SENSORY, RITUAL, SOCPP, SEMPP, AROUSE, FEARS, and AGG increases in the domain scores are indicative of an increase in the level of severity of autism; for the domains SOCAPP, EXPRESS, and LMRL, increases in domain scores are indicative of increased competency in those areas (Cohen & Sudhalter, 2005).

REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed. Text Revision). Washington, DC: Author.

Baron-Cohen, S., Leslie, A.M., & Firth, U. (1985). Does the autistic child have a "theory of mind"? *Cognition, 21,* 37-46.

Bishop, D.V.M. (2003). *Children's Communication Checklist-2*. San Antonio, TX: Harcourt Assessment, Inc.

Burrows, K.E. (2005). *Service dogs for children with autism spectrum disorder: Benefits, challenges and welfare implications.* Unpublished master's thesis, University of Guelph, Guelph, Ontario, Canada.

Cohen, I.L., & Sudhalter, V. (2005). *PDD Behavior Inventory*. Lutz, FL: Psychological Assessment Resources, Inc.

Davis, B.W., Nattrass, K., O'Brien, S., Patronek, G., & MacCollin, M. (2004). Assistance dog placement in the pediatric population: Benefits, risks, and recommendations for future application. *Anthrozoös, 17,* 130-145.

Harris, S., & Glasberg, B. (1996). Pervasive developmental disorders: Distinguishing among subtypes. *School Psychology Review, 25,* 308-315.

Heimlich, K. (2001). Animal-assisted therapy and the severely disable child: A quantitative study. *Journal of Rehabilitation, 67,* 48-54.*

Kasher, A., & Meilijson, S. (1996). Autism and pragmatics of language. *Incontri Cita Aperta, 4,* 37-54. Retrieved on January 16, 2008, from http:www.math.tau.ac.il/Autism_English.pdf.

Kronenberger, W.G., & Meyer, R.G. (2001). *The child clinician's handbook* (2nd ed.). Needham Heights, MA: Allyn & Bacon.

Levy, S., Kim, A., & Olive, M.L. (2006). Interventions for young children with autism: A synthesis of the literature. *Focus on Autism and Other Developmental Disabilities, 21,* 55-62.

Mader, B., Hart, L.A., & Bergin, B. (1989). Social acknowledgements for children with disabilities: Effects of service dogs. *Child Development, 60,* 1529-1534.

Mallon, G.P. (1992). Utilization of animals as therapeutic adjuncts with children and youth: A review of the literature. *Child and Youth Care Forum, 21,* 53-67.

Martin, F., & Farnum, J. (2002). Animal-assisted therapy for children with pervasive developmental disorders. *Western Journal of Nursing Research, 24,* 657-670.

Matson, J.L., & Wilkins, J. (2006). A critical review of assessment targets and methods for social skills excesses and deficits for children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 1,* 28-37.

Murray, D.S., Creaghead, N.A., Manning-Courtney, P., Shear, P.K., Bean, J., & Prendeville, J. (2008). The relationship between joint attention and

language in children with autism spectrum disorders. *Focus on Autism and Other Developmental Disorders, 23,* 5-14.

Myles, B.S., Adreon, D., & Stella, J. (2001). *Asperger syndrome and adolescence: Practical solutions for school success.* Shawnee Mission, KS: Autism Asperger Publishing Company.

National Institute of Mental Health. (2007). *Autism spectrum disorders: Pervasive developmental disorders, with addendum January 2007.* Bethesda, MD: Author.

Philofsky, A., Fidler, D.J., & Hepburn, S. (2007). Pragmatic language profiles of school-age children with autism spectrum disorders and Williams syndrome. *American Journal of Speech-Language Pathology, 16,* 368-380.

Redefer, L.A., & Goodman, J.F. (1989). Brief report: Pet-facilitated therapy with autistic children. *Journal of Autism and Developmental Disorders, 19,* 461-467.

Rice, M.L., Warren, S.F., & Betz, S.K. (2005). Language symptoms of developmental language disorders: An overview of autism, Down syndrome, fragile X, specific language impairment, and Williams syndrome. *Applied Psycholinguistics, 26,* 7-27.

Sams, M.J., Fortney, E.V., & Willenbring, S. (2006). Occupational therapy incorporating animals for children with autism: A pilot investigation. *The American Journal of Occupational Therapy, 60,* 268-274.

Sullivan, M., Finelli, J., Marvin, A., Garrett-Mayer, E., Bauman, M., & Landa, R. (2007). Response to joint attention in toddlers at risk for autism spectrum disorder: A prospective study. *Journal of Autism and Developmental Disorders, 37,* 37-48.

Tager-Flusberg, H. (2007). Evaluating the theory-of-mind hypothesis of autism. *Current Directions in Psychological Science, 16,* 311-315.

Turner, M. (1999). Annotation: Repetitive behaviour in autism: A review of psychological research. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 40,* 839-849.

Wilson, C.C., & Barker, S.B. (2003). Challenges in designing human-animal interaction research. *American Behavioral Scientist, 47,* 16-28.

Wolery, M., & Garfinkle, A.N. (2002). Measures in intervention research with young children who have autism. *Journal of Autism and Developmental Disorders, 32,* 463-478.

Woods, D.K. (2007). Transana [Computer Software]. Madison, WI: Wisconsin Center for Education Research.