



## *Using Animal-Assisted Therapy to Facilitate Social Communication: A Pilot Study*



## *L'utilisation de la zoothérapie pour faciliter la communication sociale : une étude préliminaire*

### KEY WORDS

ANIMAL-ASSISTED  
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### Abstract

Promoting social communication is a challenging but important component of working with children with language impairments (LI). The purpose of this clinical investigation was to determine if animal-assisted therapy (AAT) was effective in promoting social communication between children with LI and typically-developing peers by comparing the use of a live cat to a toy cat and a preferred activity. Three female children, ages 4-8 years, were observed in interactions with a matched peer over twelve weeks to monitor social interactions during play-based speech-language therapy sessions. Two of the three participants demonstrated more sustained interaction in the live animal condition. The results of this pilot study suggest the potential benefits of AAT in speech therapy with children and continued expansion of the project is recommended to increase generalization.

### Abrégé

La promotion de communication sociale est un important défi lorsqu'on travaille avec des enfants ayant des troubles de langage. Le but de cette étude clinique était de déterminer si la zoothérapie est efficace pour promouvoir la communication entre les enfants ayant des troubles de langage et leurs pairs ayant un développement typique en comparant leur utilisation d'un chat vivant à un chat jouet et une activité préférée. Les interactions sociales de trois filles ayant des TL de quatre à huit ans ont été observées avec un pair pendant 12 semaines de thérapies en orthophonie qui se sont déroulées sous forme de jeux. Deux des trois participantes ont démontré une communication plus soutenue avec l'animal vivant. Les résultats de cette étude suggèrent de potentiels bénéfices de la zoothérapie en intervention orthophonique avec des enfants et nous recommandons la poursuite de ce projet afin de vérifier la généralisation des résultats obtenus auprès de cette population.

Appropriate, efficient communication that facilitates relationships is an important skill for all children to learn. For children with language impairments (LI) who are receiving speech-language therapy, a functional approach to intervention focuses on the development of meaningful communication skills in order to establish relationships with peers (Owens, 2010). Promoting social communication between peers can be challenging work for speech-language pathologists (S-LPs) but animal-assisted therapy (AAT) has shown promise as a helpful mechanism to promote social interactions and encourage language use with children with LI including impairments attributed to autism spectrum disorders (ASD), Down syndrome, and developmental disabilities (Esteves & Stokes, 2008; Limond, Bradshaw, & Cormack, 1997; Martin & Farnum, 2002; Nathanson, deCastro, Friend, & McMahon, 1997; Nimer & Lundahl, 2007; Redeker & Goodman, 1989; Solomon, 2010). The purpose of this pilot project was to compare the use of a live animal with a toy animal and a preferred activity to determine if the live animal promoted social communication between a child with a language impairment and a typically developing peer.

## Social Communication

In order to facilitate language development, a functional approach embeds all aspects of language in the context of language use, referred to as pragmatics or social communication (Owens, 2010). When pragmatic use of language is the primary focus of therapy, clinicians and educators do well to promote interactions between children with language impairments and typically developing peers. Inclusion, or the education of students with disabilities in an environment with peers without disabilities, can promote language development and social communication (Rafferty, Piscitelli, & Boettcher, 2003; Vaughn & Bos, 2012), but the establishment of such a setting is not sufficient to increase communication between children with language impairments and those without language impairments. Fujiki, Brinton, Isaacson, and Summers (2001) for example, reported that children with language impairments spent significantly less time in peer interactions and more time in withdrawal behavior during playground sessions. Hadley and Rice (1991) also reported that preschool children with LI responded to peers at lower rates when compared with typically-developing peers, and in fact were more likely to engage in verbal interactions with a teacher in the classroom than with a peer. Hence, simply placing children in an environment that enables increased interactions will not in itself promote functional communication between peers. The challenge is to identify effective tools to promote social communication.

Social communication includes social interaction, social cognition, verbal communication, and nonverbal communication (ASHA, 2013). Social communication enables an individual to establish and maintain social interactions. When social communication deficits are present, individuals may have difficulties taking turns in conversation, knowing how to use verbal and nonverbal signals to regulate interactions, and sharing information (ASHA, 2013). Interventions focused on pragmatic language to facilitate social communications have been described as being in their “infancy” (Gerber, Brice, Capone, Fujiki, & Timler, 2012).

Gerber and colleagues (2012) examined the literature to find pragmatic interventions for school-age children with language impairment. Originally, Gerber et al. identified 11 possible research questions based on different intervention methods, but they found only eight qualifying empirical investigations related to three of the research questions. The eight studies focused on conversation and discourse treatment, pragmatic treatment, and narrative and discourse treatment. Specific techniques included modeling, role play, practice, caregiver training, and meta-pragmatics. The authors noted that other methods such as those from applied behavior analysis might have been identified if they had expanded their definition of language impairment to include children with autism spectrum disorder or intellectual disability. However, the authors noted their own surprise at the limited empirical data related to pragmatic interventions. Gerber et al. (2012) concluded that feasibility was demonstrated by the literature, but that they could not recommend specific practices to target pragmatic language based on the current evidence.

Adams and colleagues (2012) applied a rigorous randomized control design to compare traditional speech therapy to application of a scripted social communication intervention package. The scripted package was individualized for children between the ages of six and eleven with social communication deficits. Participants in the social communication intervention group received 16-20 hours of individualized therapy but exact techniques were not described. Results indicated that compared with traditional practices children in the experimental group improved their overall quality of conversation but not in structural language use. Adams et al. (2012) described the challenges in obtaining universal benefit using a treatment package and the need to individualize interventions for social communication.

Fujiki, Brinton, McCleave, Anderson, and Chamberlain (2013) applied a case study design with four participants

with language impairment using a treatment approach focused on increasing access to peers and cooperative play with peers in part by increasing validating comments. Validating comments were described as comments by the child with LI that promoted ongoing social interaction including compliments, comments, and encouragement. Participants completed a 10-week intervention program with sessions focused on role play, modeling, and the opportunity to practice with typically developing peers. Fujiki et al. (2013) documented increased validating comments for three of the four participants. The authors noted differences across participants and described the need for further investigation into techniques to promote peer relationships.

Social communication interventions often involve practice opportunities with supports from a clinician. However, there is consistency among researchers in the need to individualize intervention programs focused on pragmatics and social communication. Animal-assisted therapy might be a viable mechanism for promoting social communication between peers for some with LI.

### Animal-Assisted Therapy

The use of animals in a formalized way in intervention/treatment is referred to as animal-assisted therapy, defined by Gammonley et al. (1991) as the “utilization of the human/animal bond in goal directed interventions as an integral part of the treatment practice...” (p.1). AAT is an increasingly popular treatment approach in both rehabilitation and education settings (Jalongo, Astorino, & Bomboy, 2004). AAT is goal-directed so that the animal is utilized specifically to assist the individual in accomplishing specific, therapeutic goals. In contrast, animal-assisted activities (AAA) involve animals in activities that are often structured, but activities are for the purpose of recreation and enjoyment (Gammonley et al., 1991). AAT is the focus of this investigation, because a live animal was introduced to therapy sessions to facilitate language goals for each participant. Interventions involving animals have been documented in therapy between clinician and child in classrooms, and in non-traditional settings such as water tanks (Esteves & Stokes, 2008; Martin & Farnum, 2002; Nathanson et al., 1997). Documented gains in both quality and quantity of social interactions provide promise that animals can be a tool in promoting verbal, social interactions in an educational setting.

A variety of animals have been utilized in AAT in diverse settings such as hospitals, residential facilities, and schools. For example, Green Chimneys is a residential treatment

facility specializing in care of children with emotional and behavioral disorders utilizing farm animals and domestic animals in the therapeutic process (Mallon, Ross, Klee, & Ross, 2010). Horses have been utilized to promote physical improvements, in a process referred to as hippotherapy, and also to promote social behavior (Macauley & Guitierrez, 2004). Nathanson et al. (1997) utilized dolphins to facilitate improved communication. While a variety of animals have been incorporated in AAT, dogs continue to be the most common animal utilized (Nimer & Lundahl, 2007).

Animal use for therapeutic intervention, such as social communication, is based on the idea that animals can be agents to reduce stress and promote social engagement, including language interactions. Beetz et al. (2011) compared use of a real dog, toy dog, and friendly human to mediate stress responses in a group of 31 boys age seven to 12 with insecure or disorganized attachment. Each participant was assigned to a treatment condition and allowed to interact with a live dog, toy dog, or friendly human before and after a stressful task. The stressful task first required each participant to construct and present an oral story to a two-person panel followed by completion of a math test. The researchers used salivary cortisol levels to assess stress responses as well as self-report. While self-report did not differ across conditions, salivary cortisol levels decreased in the real dog condition both during and after the stressful task. In addition, when participants increased body contact with the dog, cortisol levels decreased. Beetz and colleagues (2011) concluded that live animals appeared to decrease stress response in the participants.

Nimer and Lundahl (2007) examined 49 different quantitative investigations in a meta-analysis of AAT. The criterion used by Nimer and Lundahl for inclusion were that the investigations involved a minimum of five participants in the experimental group, were written in English, AAT rather than AAA, and had sufficient data to calculate an effect size. The authors organized dependent variables across studies into four different groups: behavioral outcomes related to autism spectrum disorder, medical outcomes such as blood pressure, emotional wellbeing including stress, and observable behaviors such as aggression. Using treatment effect sizes, Nimer and Lundahl (2007) described moderate to high treatment effect size for promotion of social interaction among children with ASD, moderate effect size for both medical benefits and behavioral outcomes, and low to moderate effect sizes for well-being. Dogs appeared to be more beneficial than other animals, although the authors noted none of the included investigations utilized cats.

Nielson and Delude (1989) compared social responses of preschool and kindergarten children with a variety of animals including a dog, bird, rabbit, and tarantula. Using videotaped observations, the researchers described responses to the animals and concluded that all animals promoted social engagement, but engagement differed across animals. The dog and rabbit promoted more intimate interactions including touching and hugging. The bird and tarantula appeared to promote talking from the children including talking to the animal in the case of the bird or about the animal in the case of the tarantula. The authors did note that verbal interactions seemed particularly influenced by the presence of live animals (Nielson & Delude, 1989). Results from Nielson and Delude support the presence of live animals as facilitators of social engagement, potentially making animals a therapeutic tool in promoting social, verbal communication.

Improvements in verbalizations, compliance with requests, and other social interactions have been documented when using animals with children with ASD (Martin & Farnum, 2002; Redefier & Goodman, 1989). Solomon (2010) reported that after only three weeks of working with a dog, a child with autism initiated a social interaction with two of his peers in the presence of the animal. Use of an animal to promote interactions in a classroom was described by Esteves and Stokes (2008). The authors reported increased initiations by children towards their teacher as a result of interventions using a dog, and suggested the need for further documentation of interaction between peers when using an animal to promote social interactions (Esteves & Stokes, 2008). Friesen (2010) suggests that dogs possess a non-judgmental nature that is thought to provide social and emotional support to children with disabilities. Because the basis for this nonjudgmental nature is that dogs are “outside the complications and expectations of human relationships”, cats and other animals that meet the same criteria should be expected to provide similar types of emotional and social support (Friesen, 2010, p. 261).

AAT has been compared with more traditional speech therapy as well as with the use of a toy animal to determine if a live animal is a necessary component to effectiveness. Macauley and Guitierrez (2004) reported that both parents and three participants in a hippotherapy program reported high motivation for attending hippotherapy sessions (i.e., sessions involving horses) as opposed to traditional speech therapy sessions. No significant performance differences were documented between the two types of treatment approaches. Limond et al. (1997) documented qualitative differences in verbalizations, specifically more on-subject

initiations, when comparing use of a live animal with a toy animal with children with Down syndrome.

The live animal utilized in this investigation was a three-legged domestic cat. While cats are not as commonly utilized as dogs, cats have been described in AAT literature as viable therapeutic adjuncts (Hart, 2000). The cat's disability did not contribute to selection which is consistent with warnings regarding selection of animals based on perceived metaphors between the animal's disability and the challenges of the participant (Fredrickson-MacNamara & Butler, 2010). A cat was utilized in this investigation in order to extend the literature on AAT to a less frequently utilized animal, to accommodate practical considerations regarding size and speed of movement in a small therapy room, and because all the participants had cats at home.

## Current Study

The body of evidence that animals facilitate language suggests the possibility that an animal might also facilitate sustained social communication between a child with LI and a typically developing peer. In this study, a domestic cat was introduced to speech-language therapy sessions that were focused on promoting social interactions between a child with LI and a peer who was in the same classroom. Improved social communication was defined as the presence of verbal continuations, verbal productions past the initiation/response sequence. In order to determine the relative effectiveness of a live cat in promoting social communication, an alternating treatment design was implemented that compared a live cat with the use of a toy cat, and also with preferred play activities that included a sensory table or dolls. Abby, the live cat, was not a licensed pet partner for AAT, but was selected based on her age and demeanor. She was 5 years, 9 months at the onset of the program and had been socialized to several different environments that included interactions with children. She was frequently handled and enjoyed people, meeting the recommendations that an ideal cat for AAT enjoy, being petted and human attention (Granger & Kogan, 2000). The research addressed two specific questions: 1) Does AAT result in improved verbal, social communication between a child with LI and a peer? and 2) Do peers in an AAT condition participate in longer communication exchanges than in alternative treatment conditions?

## Methods

### Participants and Setting

Three participants with language impairments participated in the study. All participants were female,

Caucasian, and attended either preschool or an after-school program at the same nonprofit, developmental preschool and therapy center. The center adhered to an inclusion-based philosophy, and placed children with disabilities in the same classrooms as typically developing peers. Each of the participants met the criterion for diagnosis of language impairment based on scoring at least 1 standard deviation below the mean on either the Preschool Language Scale-3 (PLS-3; Zimmerman, Steiner, & Pond, 1992) or the Clinical Evaluation of Language Fundamentals (CELF-4; Semel, Wiig, & Secord, 2003). One participant, Jasmine<sup>1</sup>, scored between 1 and 1.5 standard deviations below the mean on the PLS-3 with greater deficits in expressive language than in auditory comprehension. The remaining two participants presented with more significant language impairments with both receptive and expressive language skills more than 2 standard deviations from the mean on the CELF-4. All participants had documented difficulties with peer interactions in the classroom based on teacher report and clinician observation. Participants varied in co-morbid conditions, but all participants were receiving S-LP intervention and had therapy goals that focused on increasing verbal interactions with peers. Each participant was matched with a peer from the same classroom, and each matched peer was recommended by the facility director based on demonstration of the ability to engage in play activities with peers and to use language during play activities.

Jasmine was a 4 year, 4 month old child with mild expressive language impairment who had attended the preschool five days per week. She had also received regular speech-language therapy for more than one year to address areas of expressive language including semantics and pragmatics. Joy was an 8 year, 5 month old child with mixed receptive and expressive language impairment as well as Down syndrome and a bilateral mild-moderate hearing loss. She attended a specialized school during the day, was integrated into a classroom with typically-developing five-year-olds at the developmental center after school, and had been receiving speech-language therapy for several years. June was a 7 year, 3 month old child with mixed receptive and expressive language impairment and a history of developmental delay. She attended her neighborhood school in a special education classroom for much of the day, and had been receiving speech-language therapy for several years. Both Joy and June attended after-school programming at the developmental center five days per week in the same classroom, and received speech-language therapy both at the center and in a public school. All the participants had cats in the home and parents reported the children enjoyed interacting with the cats.

Before AAT began, several challenges to facilitating social communication were reported by the clinician. For example, when attempting to support interactions between the participants and their peers, the S-LP reported that she often felt like an interpreter. Instead of Joy, June, or Jasmine speaking directly to a peer, they would often speak with the SLP. The S-LP encouraged the typically-developing peers to play with the child with the language impairment, but the interactions that did occur were often very brief initiation/response sequences. During observations when the S-LP was not directly involved in the interaction, June, Joy, and Jasmine were often playing in isolation in the classrooms, and finally, preschool staff documented behavioral problems including biting (Jasmine), attempting to flee (Joy), and hitting (June).

For the present study, all speech-language therapy sessions lasted 15 minutes, were conducted outside the classroom in a therapy room at the preschool, and were videotaped using a Sony digital handy cam video recorder. This setting was chosen in order to eliminate background noise, and to determine if dyad interactions increased without the presence of other peers.

Materials differed for each condition. Ellie, the toy cat, closely resembled Abby in appearance. Abby was 5 years, 8 months at the onset of the investigation. Materials used during both the live and toy animal conditions included grooming items, food items, various cat toys, cat clothes, a camera to take pictures of the animals, a wagon, and a cat carrier. Materials provided for the preferred activity condition included Barbie dolls, a sensory table, a kitchen set, and other items related to these various activities.

## Design and Data Collection

Single subject design was utilized in this investigation with the purpose of observing effects of specific stimuli on observable behavior. The use of single subject design enabled the flexibility of comparing each participant only with her own progress allowing for differences between the participants. The individualized nature of single subject design is consistent with social communication literature recommending individualized strategies for intervention (Adams et al., 2012). Specifically, we utilized an alternating treatment design (Cooper, Heron, & Heward, 2007) to compare the influence of a live animal, a toy animal, and more traditional play-based treatment condition on a measure of verbal continuations of social interaction within dyads composed of a student with language impairment and a matched peer. The alternating treatment does not require baseline prior to the onset of treatment conditions

(Richards, Taylor, Ramasamy, & Richards, 1999). This design benefit enabled the introduction of treatment conditions into an ongoing, active treatment schedule. The conditions were alternated across days and each treatment condition was presented once per week. A block form of counterbalancing was used to present treatment conditions, and each block was used twice during the 12-week study. Counterbalancing is critical in an alternating treatment design to prevent the order of presentation of the treatment from impacting results (Bloom, Fischer, & Orme, 2003). Each dyad participated in three sessions per week, and each session lasted 15 minutes. Twelve weeks of intervention is consistent with literature documenting changes in behavior with AAT, and is adequate for measuring progress exhibited in speech therapy.

Although the teachers were blind to the purpose of the investigation, they were given a five-point, Likert-type scale to rate the child's use of response behaviors and verbal interaction opportunities in the classroom in order to examine social validity of the target behaviors outside the therapy room. The teachers completed the rating scale four times: prior to the start of the study, at the midpoint of the study, at the end of the study, and one month later. The scale asked teachers to rate the child's use of initiations with peers, responses to initiations from peers, responses to questions during interactions, asking questions of peers during interactions, and rating the amount of classroom time devoted to encouraging play between peers. The Likert-type scale ratings were the following: 1) the behavior never occurred; 2) the behavior rarely occurred; 3) the behavior sometimes occurred; 4) the behavior frequently occurred; and 5) the behavior always occurred.

### Data Analysis

Each videotaped recording of the treatment session was coded for social interaction sequences by a data coder who had been trained using written explanations of the behavior and videotaped scenarios. The coder obtained a 90% accuracy level during training. Coded social interactions consisted of verbal continuations produced by either member of the dyad. A verbal continuation was defined as a word, phrase, or sentence produced by either member of the dyad following an initial initiation/response sequence. The presence of a verbal continuation indicated a more sustained verbal, social interaction beyond a simple verbal initiation and verbal response sequence which was the goal of therapy. The data coder also tracked who produced a continuation in each interval to determine the balance in maintaining ongoing verbal interactions. The data were collected using a partial interval recording method in which

10 seconds of observation are followed by five seconds to record the data, and an audiotape was used to cue the observation and record intervals for the data coder. Partial interval recording is utilized in single subject design as an estimate of frequency (Richards et al., 1999).

The percentage of intervals that contained continuations for each treatment session were charted using Microsoft Excel software (see Figures 1, 2, and 3). A visual analysis of the data was conducted to determine if changes in percentages of intervals containing continuations occurred over the course of treatment in the live animal condition and if there were differences between the three treatment conditions for each participant (O'Neil, McDonnell, Billingsley, & Jenson, 2011). Visual analysis is used in single subject design to analyze study outcomes by examining level or performance on the dependent variable and trend of the data paths (Richards et al., 1999). For this investigation, level and trend will be compared across the three treatment conditions for each participant enabling each participant to be compared to their own performance weekly and over the course of the 12 weeks. The differences in the range of values can be seen as a degree of separation between the intervention data paths, and thus a measure of comparative effectiveness for each treatment condition is revealed.

In order to assess inter-rater agreement, 33% of all observations were simultaneously but independently coded by two observers. After each session the data sheets were compared to determine the percentage of agreement between observers using the traditional agreements/ agreements + disagreements  $\times 100$  for each behavior code (O'Neil et al., 2011). Inter-rater agreement for continuations was 95%.

### Intervention

**Preference Assessment.** Prior to beginning data collection, a preference assessment was conducted in order to identify the toy to be used in the third treatment condition for each of the three participants with language impairment. Because communication is assumed to be more difficult for these participants, identifying a motivating play activity was important for encouraging continued participation in the interaction. Items presented in the preference assessment were all identified as a preferred toy of the child by either the classroom teacher or the speech pathologist. A three-item panel was presented to the child on three different occasions during a single week. On each occasion, the child was asked to show the clinician the toy the child most wanted to play with, and the toy with

the highest average rating across the three trials was the toy selected for treatment condition C. One participant selected Barbie dolls, one participant selected a sensory table (i.e., container of tangible objects such as beans, rice, or sand that stimulate a sensory response), and one participant selected a kitchen set.

**Condition A.** The toy animal condition consisted of activities that focused on play and caretaking with a toy cat. The specific activities included grooming, handling, playing with, feeding, and dressing the toy cat, all of which are suggested for animal-assisted therapy by the Delta Society, a recognized leader in the field of AAT. The toy cat was given the name Ellie, and the name was used consistently to provide that cat with an individual identity.

**Condition B.** This condition was identical to condition A with the exception that a live cat, Abby, was used. The live cat and toy cat resembled each other in appearance; their names were both female, and identical in syllable structure. All participants had a cat at home and had either talked about their cat in therapy, or the child's family had indicated that the child enjoyed interacting with the family cat. The live cat used in this investigation was over a year old and had a history of interacting with both adults and children in a variety of settings.

**Condition C.** The preferred toy or activity identified by the participants with LI during the preference assessment was used to provide a comparison between the use of animal conditions with a play-based treatment condition. The toy selected by each of the three participants (i.e., Barbie dolls, sensory table, kitchen set) was used throughout the study, and new related components were incorporated weekly just as different related items were incorporated into conditions A and B.

**Procedures.** The S-LP provided the structure of the therapy session, including starting and ending times for activities, prompting during the interactions, and monitoring behavior during sessions. At the onset of the 15-minute sessions, the S-LP introduced the children to the activity of the day. The first time meeting both the live and toy cat, the children were instructed to be gentle, petting her softly and holding her with two hands. As well, they were provided with guidance on not poking or pulling her hair to prevent from scaring her. Activities with the animals included taking the cats on wagon rides, taking pictures with them, dressing them, brushing them, and playing with them with toys.

If the children did not interact with each other within a minute following the introduction, the clinician would provide a prompt to facilitate interaction. A least-to-most

prompting hierarchy was used across the treatment conditions that progressed from verbal prompts, to visual prompts in the form of gestures or manual signs, and finally to a verbal model. A verbal prompt example included the clinician saying "The two of you can decide what Abby should wear today and get her dressed." A visual prompt would include the previous verbal prompt plus the clinician pointing to a specific clothing item for the cat. Finally a verbal model would model specifically a verbalization to initiate interactions such as "I want Abby to wear shoes". A fading procedure was used to decrease the likelihood of dependency upon clinician prompts during interactions, with a model faded after week four and the visual prompt faded after week seven. The S-LP monitored the time of the session and concluded each session at 15 minutes at which time the children returned to their classrooms.

## Results

Data are presented in the figures below for the three participants. Clear benefit of AAT should be visible in the graph as a data line increasing throughout the intervention period. Comparative benefit is demonstrated by an AAT data point above the remaining two conditions, and trend is demonstrated when successive data points yield separation from the comparison treatment conditions. Both Joy and her peer partner experienced illnesses during the treatment phase resulting in absences. Joy's peer partner also had a death in the family requiring absence to travel for the funeral. Because 30% of treatment condition sessions were missed due to absence by either Joy or her peer partner, a comprehensive visual analysis of her data was not possible. Each of the remaining participants missed five sessions or fewer.

### Did Social Communication Increase with AAT?

The first hypothesis focused on determining if using AAT would improve verbal, social communication. When examining overall continuations, both the Jasmine and June dyads produced continuations in a greater percentage of intervals in the final week than at the onset of therapy in the live animal condition. For both participants, these interval increases were greater than 10% increase in intervals containing continuations between the first and final sessions.

Each dyad also showed wide fluctuations within the study's timeframe. Jasmine and her peer produced continuations in 65% of the intervals at the onset of the intervention, for example, but in 10% of the intervals during week seven. Nonetheless, Jasmine and her peer partner concluded with continuations in 77% of intervals in the final week, a 12% increase from week one. June and her

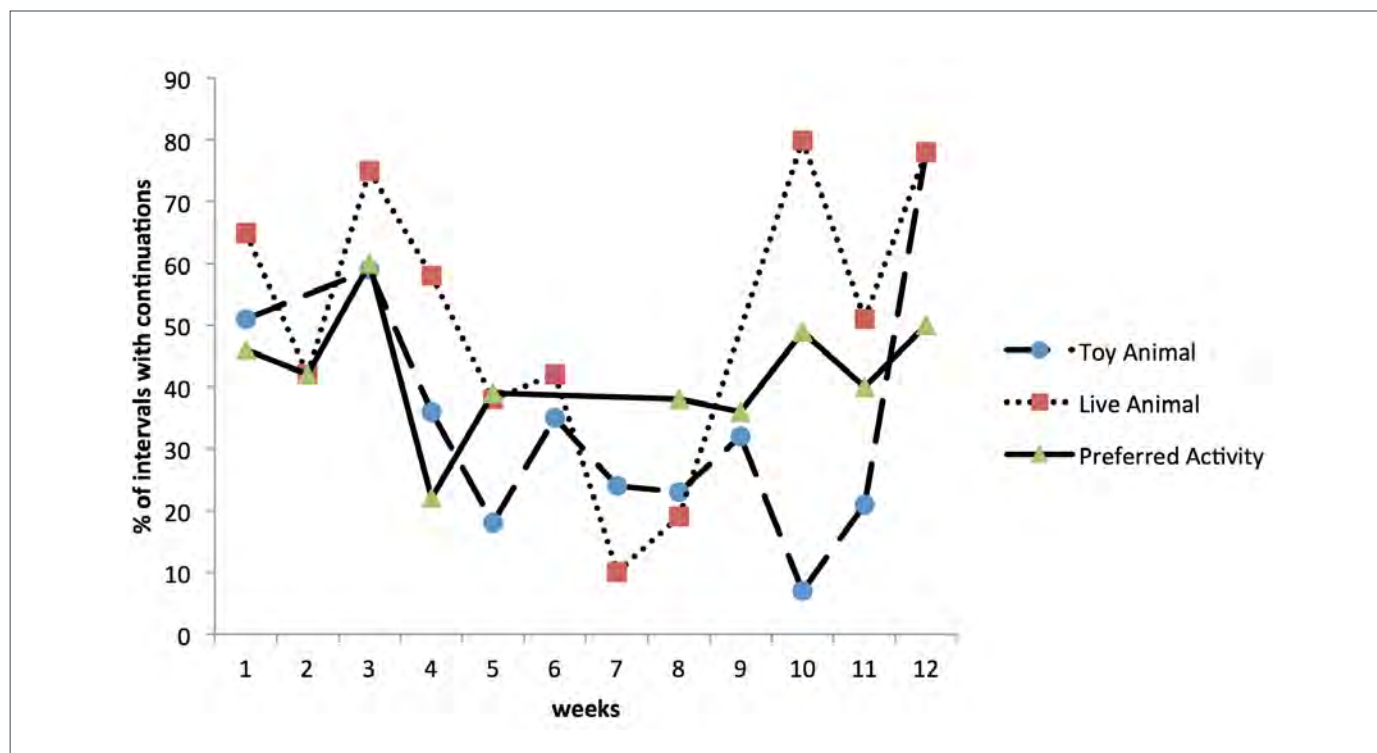


Figure 1. Continuations between Jasmine and a Peer

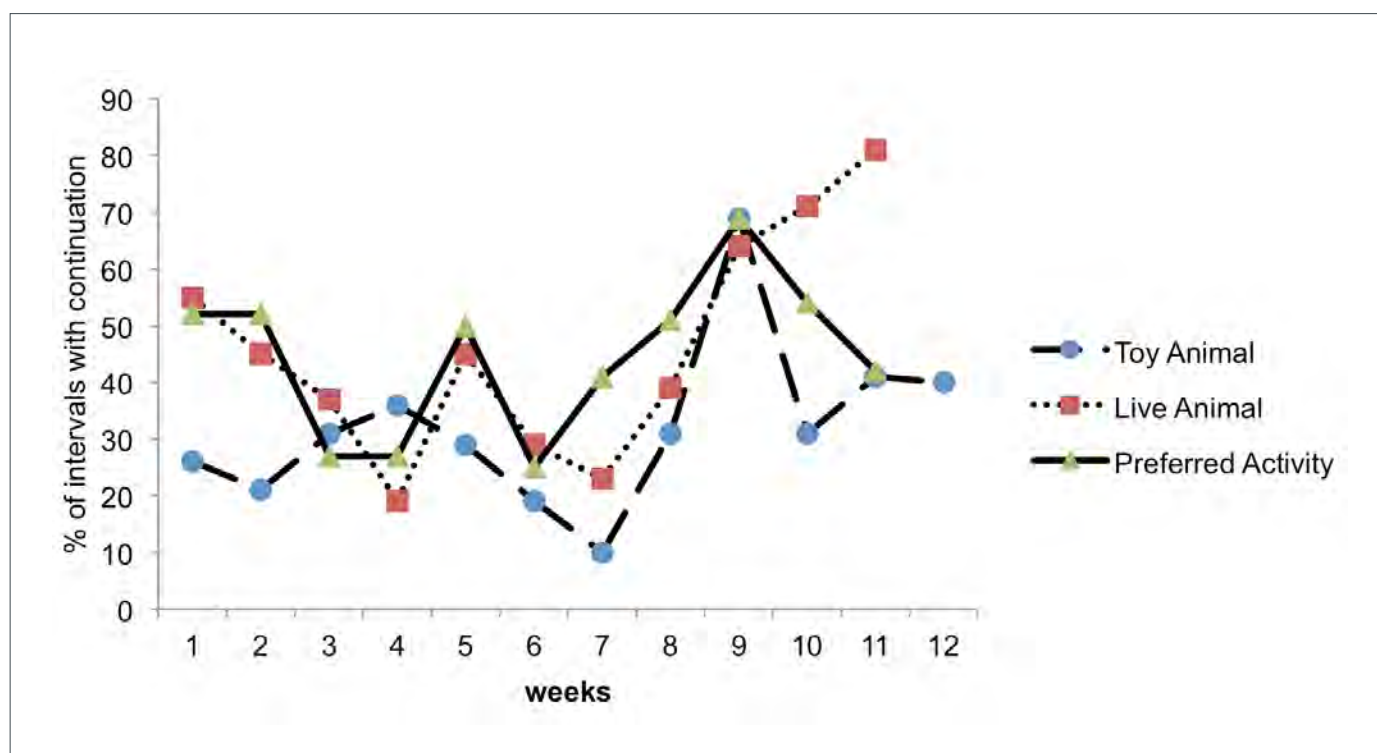


Figure 2. Continuations between June and a Peer

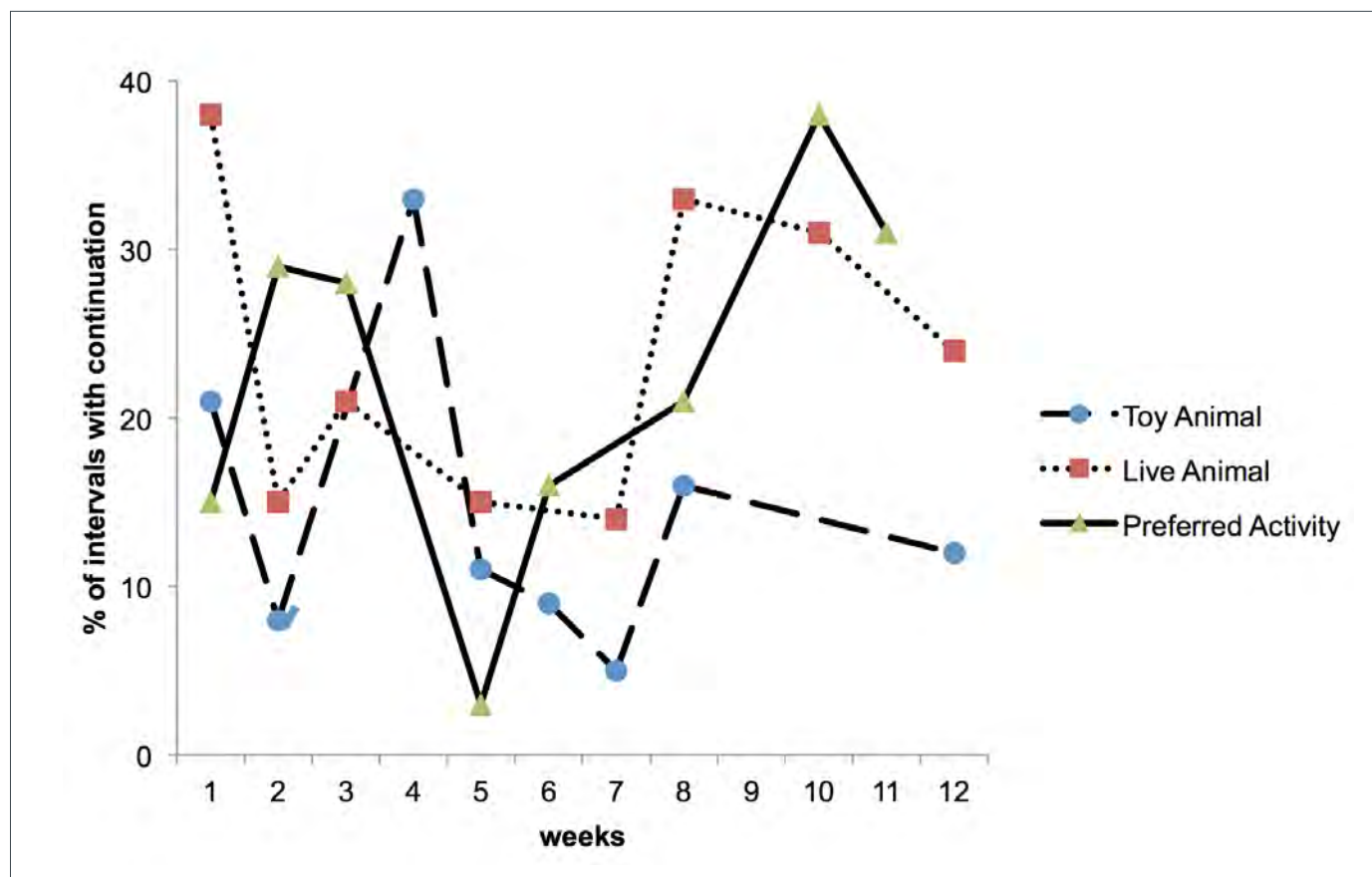


Figure 3. Continuations between Joy and a Peer

peer began week one with 55% of the intervals containing a continuation, and dropped to their lowest in week four, 18% of intervals. June and her peer reached 82% of intervals in week 11, an increase of 27% from week one. Due to the absence of the peer partner, week 11 was the final week of June's AAT.

Joy's dyad did not show overall increase in continuations in the AAT treatment condition over the course of the investigation. Joy's initial week included a high of 38% of intervals containing a continuation. There are likely multiple factors involved including the novelty of the animal present, the clinician's use of maximum prompts, and also the lack of consistency in attendance.

To determine if generalization of socialization behavior occurred in the classroom setting, a teacher rating scale was used as a gross estimate of social interactions that occurred in the inclusive classroom. Teachers were asked to rate Jasmine, June, and Joy on the following five areas: (1) The child initiates interactions with peers; (2) The child responds to initiations from peers to participate in play

activities; (3) The child responds to questions including what, who, and where questions; (4) The child asks questions when necessary rather than simply guessing at what he/she should do next; and (5) There is classroom time devoted to encouraging interactive play between peers. A five-point rating scale was used with the following values: 1 = never, 2 = rarely, 3 = sometimes, 4 = frequently, 5 = always. Results are listed in Table 1 and indicate changes reported between the onset and the final week of therapy for both Jasmine and June. The teacher's report indicates that Jasmine progressed from "sometimes continuing interactions" (Q3, Q4) at the onset of the investigation to "always continuing interactions" (Q3, Q4) during the final week. June's classroom teacher did not report progress for continuing social interactions with peers during the investigation, but did report that June increased verbal initiations with peers. Joy's classroom teacher reported only maintenance of ratings during the intervention but reported Joy frequently responded to questions and asked questions at one-month post intervention.

Table 1. Teacher Rating Scales for Social Skills

Date	Child	Initiation	Response	Asking WH ?'s	Answering WH ?'s	Time in Class
Week One	Jasmine	4	4	3	3	4
Week Eight	Jasmine	4	4	3	4	5
Final Week	Jasmine	5	5	5	5	5
One month post	Jasmine	5	5	4	4	5
Week One	June	3	4	4	3	5
Week Eight	June	4	5	4	3	5
Final Week	June	5	4	4	3	5
One month post	June	4	5	4	3	5
Week One	Joy	4	4	3	2	5
Week Eight	Joy	4	3	3	2	5
Final Week	Joy	4	4	3	2	5
One month post	Joy	2	4	4	4	5

1 =behavior never occurred; 2 =behavior rarely occurred; 3 =behavior sometimes occurred; 4 = behavior frequently occurred; and 5 =behavior always occurred.

### How does AAT compare?

The second hypothesis examined the comparative benefit of AAT. Visual analysis of the continuation data shows Jasmine and her peer partner demonstrated some separation between treatment conditions. Figure 1 shows that in seven of the ten weeks in which Jasmine was present for both the live animal and toy animal treatment conditions, the live animal condition resulted in a greater percentage of intervals with continuations than did the toy animal condition. The AAT treatment condition recorded an increase of 10% over the toy animal condition in six of the ten weeks compared. During six of the nine weeks in which AAT could be directly compared with a preferred activity, continuation percentages in the AAT treatment condition were larger than the preferred activity condition.

An improvement of more than 10% in the AAT treatment condition compared with the preferred activity condition was recorded during all six weeks. In sum, the data indicated that in the majority of therapy sessions, the AAT condition produced more social, verbal continuations between Jasmine and her peer than the other two conditions.

Visual analysis for June demonstrated separation for the live animal condition and the remaining two conditions in weeks 10 and 11, the final two weeks in the investigation because of her absence in week 12. When comparing the live animal and toy animal conditions as shown in Figure 2, June and her peer demonstrated more frequent continuations in nine weeks in the AAT treatment condition, with separation greater than 10% in seven of those nine

weeks. The separation between the live animal condition and the preferred activity condition began in week 10 with a greater percentage of continuations produced in the live animal condition.

### Discussion

Recall the aims of the study were to assess if social communication improved between a child with language impairment and a typical peer when a live animal was present, and to compare the benefits of AAT with other modalities. Two participants increased use of social communication in the form of longer, social interactions with a peer. Jasmine and June both produced gains over the course of the treatment in the live animal condition. Jasmine improved her social interactions in all treatment conditions. June also demonstrated gains in social communication in multiple treatment conditions. Purposeful opportunities to participate in play-based interactions including those with an animal resulted in gains in social interaction which is critical for children with language impairments to use language effectively. The fact that both participants made gains in each of the treatment conditions is consistent with research demonstrating gains in both AAT and compared treatment conditions (Curtright & Turner, 2002; Limond et al., 1997; Macauley, 2006).

Comparative benefit is important in determining when AAT can be more efficient and effective than traditional speech therapy. Using a live animal requires additional resources and logistical planning, so it is important that we document comparative benefit. Jasmine and her peer demonstrated a greater percentage of intervals containing continuations in the AAT treatment condition, although there were inconsistencies during weeks seven and eight when data points for AAT drop below the toy animal and preferred activity treatment conditions. Jasmine's four absences across the 36 sessions also complicated direct comparisons between all treatment conditions every week, but the data do suggest comparative benefit for Jasmine and her peer when participating in AAT. Independent communication is the goal, and Jasmine's dyad demonstrates the value of the live cat in achieving ongoing spontaneous communication between peers.

June and her peer demonstrated more separation between the live animal and toy animal conditions which is consistent with benefits reported by other investigators using AAT to facilitate language (Limond et al., 1997; Martin & Farnum, 2002). Limond and colleagues (1997) observed benefits in quality but not quantity of verbal productions in the live animal treatment condition, but June and her peer demonstrated increased quantity of verbal continuations

as well. The results of this investigation suggest that children do respond more to a live animal when compared with an inanimate representation.

The benefit of AAT was less apparent when compared with the preferred activity condition for June and her peer, as they demonstrated significant benefits with a live animal only in the final two weeks of treatment. This may indicate that other treatment modalities lose effectiveness in promoting social interaction over time, but that the presence of a live animal is dynamic enough to maintain motivation to interact. Increasing the length of the treatment conditions in future research would help to determine if motivation is maintained more effectively in the live animal treatment condition. Past reports from Macauley and Gutierrez (2004) that participants report sustained, high motivation for AAT indicate that motivation might be an advantage to this form of therapy.

### Future Directions

There was both variability within each participant's data and individual differences in response to the treatment conditions. AAT seemed most beneficial for Jasmine and less beneficial for June and Joy. Jasmine had language impairment without co-morbidity and therapy was largely focused on pragmatics, perhaps making her more responsive to intervention. Prior success of AAT with individuals with developmental delay and Down syndrome may not be an indication that AAT will always yield comparative benefit for similar individuals. It also may be necessary to sustain intervention longer with individuals with co-morbidity as June's data seemed to indicate separation between treatment conditions during the final two weeks. Individual differences in response to AAT should be explored further, and clinicians using AAT should continue monitoring changes in response to AAT.

The preferences of Jasmine, June, and Joy determined the preferred activity, as we did not incorporate the preferences of the typically-developing peer. These benefits were reported to be related to a sense of well-being and to behavioral changes, and were consistent with anecdotal observations of preference during the current investigation. During the live cat treatment condition days with Abby, the matched peer was excited about participation and was quick to leave the classroom to participate. While the peers' verbal productions to continue an interaction were included in the data, their preferences for a toy were not, and those preferences might be an area of future research in the comparative benefit of AAT when trying to promote social interactions in an inclusive environment.

The animal utilized in this investigation was a domesticated female cat with a strong affinity for interacting with others. She attracted the attention and interest of others due to her disability -an amputated rear leg. It also helped that Joy, June, and Jasmine had a cat as a family pet. Nimer and Lundahl (2007) reported more consistent treatment effect sizes using dogs in AAT than other animal groups, specifically horses and aquatic animals, but both horses and aquatic animals have been documented as beneficial adjuncts in AAT. Macauley (2006) recommended exploring whether or not the type of animal incorporated into the therapy sessions matters. One method to address this question would be to alternate sessions with different live animals, including dogs and cats, to determine if there is comparative benefit with either.

For June and Jasmine, the presence of a cat was clearly beneficial to promote conversation. To further examine the linguistic benefit of animals, language sampling procedures could be utilized to determine if the complexity of language is improved and enable qualitative analysis of language utilized. For the SLP, increasing verbal communication by a child with language impairment is a crucial goal of therapy, so future studies should describe if the child with the language impairment was maintaining the interaction equally with the typically developing peer and not simply that the interaction was maintained. In addition, transitioning the setting of intervention into a classroom would also be useful in examining linguistic interactions in a group larger than a dyad. Finally, absences impeded analysis for Joy and her peer, and both June and Jasmine missed treatment sessions which also made direct comparisons between treatment conditions more difficult. Increasing the length of intervention beyond 12 weeks would enable a greater analysis of the comparative benefit of the animal and might also assist in compensating for absences that are inevitably going to occur.

### Conclusion

Results of this investigation indicated modest overall benefit in using AAT in speech-language therapy focused on social interactions. Both Jasmine and June were participating in more frequent social interactions at the end of the investigation than at the onset for two of the treatment conditions. The AAT treatment condition resulted initially in the most frequent intervals with continuations for both participants, which might be due to the novelty of having a live animal present, as intermittent declines indicate that the novelty effect faded. The fact that both participants were able to achieve even higher levels of continuations at the conclusion of the treatment

is testament to the impact of AAT on encouraging social communication. Finding methods of encouraging lengthier exchanges between typically developing children and children with language impairments provides S-LPs with functional means of promoting generalization of communication to natural interactions. Using AAT appears to have some potential for promoting those natural interactions which would be especially useful in an inclusive classroom situation where social interaction between children with language impairments and typically developing peers is crucial.

Reports documenting the use of AAT will enable this treatment modality to be further refined and expanded so that it is used in a more meaningful and beneficial way. In the end, therapy is about efficiency and functional outcomes. For AAT to become a more widely accepted therapy modality it is important to determine how and when the use of an animal is a more efficient treatment modality that will result in functional benefit for the clients we serve. This investigation took some important steps in the right direction.

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## End Notes

<sup>1</sup>All names have been changed to protect identity of participants.

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