Spring 5-2013

THE USE OF SIGN LANGUAGE TO REDUCE NEGATIVE INTERACTIONS AND INCREASE POSITIVE INTERACTIONS BETWEEN INFANTS AND CAREGIVERS

Christine M. Little Mrs.
clittle10142000@yahoo.com

THE USE OF SIGN LANGUAGE TO REDUCE NEGATIVE INTERACTIONS AND INCREASE POSITIVE INTERACTIOSN BETWEEN INFANTS AND CAREGIVERS

By

Christine M. Little

BA, Southern Illinois University, 2004

A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
Master of Science Degree

Department of Behavior Analysis and Therapy
in the Graduate School
Southern Illinois University Carbondale
May 2013

RESEARCH PAPER APPROVAL

THE USE OF SIGN LANGUAGE TO REDUCE NEGATIVE INTERACTIONS AND INCREASE POSITIVE INTERACTIOSN BETWEEN INFANTS AND CAREGIVERS

By

Christine Little

A Research Paper Submitted in Partial

Fulfillment of the Requirements

for the Degree of

Master of Science

In the field of Behavior Analysis and Therapy

Approved by:

Dr. Brandon F. Greene, Chair

Graduate School
Southern Illinois University Carbondale
May 2013

AN ABSTRACT OF THE RESEARCH PAPER OF

CHRISTINE LITTLE, for the Master of Science degree in BEHAVIOR ANALYSIS AND THERAPY, presented on May 2013, at Southern Illinois University Carbondale.

TITLE: THE USE OF SIGN LANGUAGE TO REDUCE NEGATIVE INTERACTIONS AND INCREASE POSITIVE INTERACTIOSN BETWEEN INFANTS AND CAREGIVERS

MAJOR PROFESSOR: Dr. Brandon Greene

Many studies have been conducted in the last several years, investigating the many benefits of the use of infant sign language as a child management tool, to improve language and cognitive skills, and to enhance the communication between parent and infant. Although many studies state that infant sign language increases the bond between parent and infant, few researchers have engaged in studies to prove or disprove this theory. The purpose of the current study is to investigate how infant sign language can be used to increase or decrease bonding between parent and infant, as measured through the quality and quantity of parent-infant interactions. Three parent and infant pairs participated in this study. The infants ranged in ages from 11 months to 14 months. Positive and negative interactions were measured through the use of partial interval recording of target interactions (positive and negative verbalizations, positive and negative affect, positive and negative touch, look, gestures, and manual signs). Partial interval recording of the interactions between the parent and infant pairs was implemented, before (baseline) and after (sign training phase) the introduction of infant sign. The pairs were observed in various locations and at various times of day. The results indicated a slight increase in positive interactions and a slight decrease in negative interactions following the introduction of infant sign language.

DEDICATION

This paper is dedicated to my mother and my two sons. I hope that I have accomplished everything she wished for me and everything she wanted for herself but did not have the time to accomplish. I hope to be an example of determination and an inspiration to my sons to continue to aspire to achieve throughout their lives.

ACKNOWLEDGMENTS

I would like to thank my faculty advisor, Dr. Brandon Greene for his patience and direction. I offer my thanks Melissa Starks, for reviewing hours and hours of video tape, and sharing the exhausting experience of observation and scoring of data with me. I would also like to thank my husband Brian and my two sons, Brody and Gunner, for their patience and support, as well as sacrificing their time with me so that I could conduct the research and composition of this paper.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The human infant's primary method of communicating with the world is through crying. The infant's primary goal is to be comfortable and the cry is a "reflexive response to discomfort" (White, 1995, p.52). The cry is a benefit with regard to ensuring the infant's survival through shaping the caregiver responses, along with the infant's obvious helplessness, that brings out the nurturing instinct in the adults around them (White, 1995). For some caregivers the cry can become intolerable and will evoke avoidance behaviors that could result in aggressive or neglectful acts.

In order to address and prevent the occurrence of aggressive or neglectful acts and increase positive interactions, alternative strategies and child management techniques continue to be identified. For example, Acredolo and Goodwyn (2000) stated that training the caregiver how to teach the infant sign language may result in an increased bond between the caregiver and infant, perhaps due to the initiation of reciprocal communication and facilitation of joint attention. In addition, increased communication results in a more accurate assessment of the child's needs, thus reducing the frequency of crying or other aversive behaviors exhibited by the infant (Acredolo and Goodwyn, 2000). Many studies examining the use of infant sign training have also touted other benefits to child development such as increased cognitive abilities, earlier and increased verbal communication, as well as a decrease in crying and whining. "Most of the programs, books, and videos, claim that using gestural signs to communicate with prelingual infants prompts language acquisition, reduces frustration, increases cognitive

functioning, and improves early communication" (Johnston, Durieux-Smith, and Bloom, 2003, p.4).

Almost form birth the infant can use various methods of communication. As cited in Thompson et al. (2007) infants begin to communicate "through facial expressions, gazes, and vocalizations such as cooing" (p.16). However, they rely more heavily on crying to communicate wants and needs (Thompson et al., 2007). Crying is an effective way to gain the attention of the caregiver, unfortunately the caregiver "must rely on contextual cues to determine" (p.16), the function of the behaviors. "For example, when an infant cries immediately following a meal, parents may be less likely to feed the child and more likely to put the child to sleep" (p.16). The parent's reliance on contextual cues (i.e. infant crying and raising his feet as if he has gas or the infant crying and chewing on objects as if he is teething) is unreliable due to the occasional absence of these cues or the child's unresponsiveness to the parents attempts at appeasement. On these occasions the caregiver may require trial and error to determine the communication intent of the crying. In addition, the crying behavior persists longer than if the contextual cues had obviously indicated the function of the crying behavior. The aversiveness of the crying behavior results in a prompt response from the caregiver; however, produces an unpleasant experience for both parent and infant (Thompson et al., 2007).

It is during the period between the emergence of deictic gestures (i.e. the emergence of the use of simple gestures), at around 10 months, and when the infant begins to increase his engagement in verbal communication, at around 24 months, that the infants and the parent, "become frustrated by the slowness with which verbal language develops" (Goodwyn, Acredolo, and Brown, 2000, p.82). As the children begin

to exhibit an increase in the use deictic gesturing and begin to exhibit an increase in whining, they become more "motivated to communicate about specific things, but may be months away from the fine motor coordination necessary to say relevant words"(p.82).

It is also believed that a meaningful experience is produced through daily interactions of the parent and child during the learning process (Meier and Newport, 1990). "The sustained joint attention held by the mother and infant, coupled with the training of symbolic gestures for communication, is thought to advance language development before speech" (p. 2). A social benefit of "early signing may advance language development, based on evidence that the frequency of caregiver-infant interaction predicts vocabulary and cognitive growth" (p.2).

It is believed that due to earlier development of gross motor skills compared to fine motor skills, manual communication is more practical and desirable. As Bonvillian, Orlansky, and Novack (1983) stated infants learn the concept of communication long before they can verbalize. In fact, this communication develops before the child has "developed the control necessary to coordinate the numerous muscle movements required to produce oral speech" (Bonvillian, Orlansky, and Novack, 1983, p. 1435). During the first year gross motor skills develop at a startling rate when compared with the development of the fine motor skills needed to produce speech (Bonvillian, Orlansky, and Novack, 1983).

Due to the differences in the development of gross motor skills compared to fine motor skills, infants and toddlers will generally begin engagement in a form of sign language, such as pointing, long before they begin to use words in order to communicate their needs and wants (Sperling 1978, As cited by Bonvillian, Orlansky, and Novack,

1983). Goodwyn, Acredolo, and Brown (2000) stated that "the onset of intentional communication is signaled by a small set of gestures which essentially launch the child into purposefully communicating with others" (p.83). This small set of gestures includes such acts as directing adult attention to objects by holding them up or raising their arms to be picked up. These gestures are known as "preformatives" or "deictic" gestures and begin around 10 months of age (Bates, Beniigi, Bretherton, Camaioni and Volterra, 1979, Messinger and Fogel, 1998, as cited in Goodwyn, Acredolo, and Brown , 2000). "These types of interactions also facilitate joint attention, a critical component to the development of language" (Goodwyn, Acredolo, and Brown, 2000, p. 82). In addition, children exposed to sign language spontaneously use their first signs earlier than children expressing themselves verbally (Meier and Newport, 1990). Signing children reach vocabulary milestones earlier than speaking children (Meier and Newport, 1990).

Goodwyn, Acredolo, and Brown (2000) support the claim that the use of sign language has a positive impact on the development of language in the typically developing infant. Goodwyn, Acrdolo, and Brown (2000) conducted a longitudinal study to examine the impact of purposefully encouraging infants to use sign language on verbal development. During baseline the experimenters administered standardized tests of receptive and expressive language development and again at 11, 15, 19, 24, 30, and 36 months, to two primary groups of infants. These tests included the MacArthur Communicative Development Inventory (CDI), the Sequenced Inventory of Communicative Development (SICD), the Receptive- and Expressive-One-Word-Picture-Vocabulary Tests (ROWPVT), the Mean Length of Utterance (MLU) and Longest Utterance, and the Phonemic Discrimination Task. The two primary groups included the

experimental group, or the Sign Training group (ST), and a control group, or the Non-intervention Control group (NC). A third group, or the control group, was also developed, titled the Verbal Training group (VT).

At the beginning of the study all the groups were compared on a variety of demographic variables (sex, birth order, maternal and paternal education, and family income) and language measures. The language measures were assessed through a maternal report of verbal vocabulary and a measure of vocalization frequency during 15-min play sessions (Goodwyn, Acredolo, and Brown, 2000). "No significant differences were found between groups during baseline" (p.87).

They divided 103 infants into the three groups; an experimental group, a non-intervention control group, and a control group. The parents of the infants in the experimental group were "instructed in ways to promote symbolic gesturing by modeling simple gestures themselves, always sure to pair the gesture with the verbal word" (Goodwyn, Acredolo, and Brown, 2000, p.86). The parents were told to use any physical motion that made sense to them. Video-taped examples of other parents and infants using gestures were used for training as well. The NC group did not know about the ST and did not know the true purpose of the study, while VT group was asked to model verbal labels (Goodwyn, Acredolo, and Brown, 2000). The two control groups were used to control for training effects (the use of the NC group compared to the VT group), while the VT group was used to detect if the ST group exhibited any verbal language advantages following the training.

The experimenters believed that the parents would be more motivated to continue with the intervention once they observed effects of their efforts. For this reason the target

words to be trained were chosen based on the familiarity of the words "because they were known to be among the easiest to learn…" (Goodwyn, Acredolo, and Brown, 2000, p.86). The target gestures chosen for the ST group to be trained included the following, fish, flower, bird, airplane, frog, where is it, more, and all gone; while the target words for the VT group included the following, word, kitty doggy, ball, shoe, boat, bye-bye, more, and all gone.

Parents were sent home following the initial training and were given toys representing new words and instructions on how to use the new word in daily activities. Each family was given a picture book with the target words in it. Mothers were interviewed over the phone at two week intervals starting after the first week. The calls were audiotaped and lasted between 30 and 90 minutes. One interviewer asked questions and took notes by hand. They used a speaker phone to allow a second observer to listen and enter the answers to the questions into a computer. Frequency data and the nature of the use of words were gathered by the interviews through the calls (Goodwyn, Acredolo, and Brown, 2000).

The children were tested in lab at 11, 15,19,24,30 and, 36 months. The sessions were videotaped, and a variety of standardized measures were taken for receptive and expressive language, as well as time sampling data (Goodwyn, Acredolo, and Brown, 2000). "For each 5-sec interval of the 11-month free-play sessions between mother and infant, coders indicated whether or not the baby had vocalized" (p. 88). The data was calculated as a percentage of time vocalizing.

MANOVA scores were calculated to compare the performances of the different groups for all age groups and both expressive and language forms. The ST and the NC

groups were first compared on a composite receptive language score averaging each child's z-score on standardized tests. "This score was obtained from averaging the z-scores for RCA at 15 and 19 mos; the ROWPVT at 24, 30, and 36 mos; and the Phonemic Discrimination Task at 30 mos" (Goodwyn, Acredolo, and Brown, 2000, p. 94). The results of the MANOVA were M= .21, SD = .73 for the ST group compared to M = -.10, SD = .72 for the NC group, with $F(1,69) = 3.24$, p =.04 (Goodwyn, Acredolo, and Brown, 2000). The two groups were also compared at individual ages using "2 (Group: ST vs. NC) X 2 (Sex) ANOVA's" (p. 94). Sex differences were not found, "however, the groups comparisons yielded a difference that approached significance at 15 mos on the SICD/RCA, $F(1, 69) = 2.14$, $p = .07$) and then emerged as a significant ST advantage at both 19 mos on the SICD/RCA, $F(1, 68) = 5.25$, $p = .01$, and at 24 mos on the ROWPVT, $F[1, 66] = 3.22$, $p = .04$)" (p. 94) . The researchers went on to state that differences "continued to favor the ST group over the NC group at 30 and 36 mos," (p. 94); however, the differences were not significant.

With regards to expressive language, again there was a composite score for expressive language by averaging the z-scores for each infant's performance on the standardized tests. "These measures included the SICD/ECA at 15 mos: the EOWPVT at 24, 30, and 36 mos; the CDI at 15, 19, 24, and 30 mos; and MLU and Longest Utterance measures at 24 mos" (Goodwyn, Acredolo, and Brown, 2000, p. 96). The scores were higher for the infants in the ST group compared to the NC group, (ST group: M = .17, SD = .7; NC group: M = -.17, SD = .69; $F[1, 69] = 4.12$, $p = .02$). Significant differences were also found favoring the ST group over the NC group "at 15 and 24 mos in MANOVA analyses using composite expressive language z-scores from individual ages"

(p. 96). At 15 months the score "for the ST group was .19 (*SD* = .68) compared to -.26 (*SD* = .79) for the NC group, a significant difference, $F(1, 59) = -.26$, $p < .01$" (p. 96). While at 24 months "the mean composite score for the ST group was .33 (*SD* = .84) compared to a mean composite score of -.20 (*SD* = .81) for the NC group, once again a significant advantage for the ST infants, $F(1, 59) = 5.92$, $p < .009$" (p. 96). Group differences were also found at 19, 30, and 36 months favoring the ST group. "At 30 mos the mean composite z-score for the ST groups was .25 (*SD* = .82) compared to a mean composite z-score of -.08 (*SD* = .83) for the NC group, $F(1, 59) = 2.30$, $p = .067$" (p.96). During the 36 month assessment the only measure of expressive language was the EOWPVT, on which the mean z-score for the ST group was .17 (*SD* = 1.05) compared to -.16 (*SD* = .82) for the NC group, $F(1, 59) = 1.93$, $p = .08$" (p. 96). The infants were also scored on the MLU and the Longest Utterance measures, "the ST group were significantly ahead of the children in the NC group in MLU, $F(1, 62) = 3.16$, $p = .04$, and very nearly so in the case of the Longest utterance, $F(1,66) = 2.74$, $p = .05$" (p. 97), which is evidence that the sign language appeared to "have a facilitative rather than delaying effect on early syntactical development" (p. 97).

The researchers went on to calculate a composite score for both receptive and expressive language. The comparisons of the ST and the NC groups again favored the ST groups across all ages. "MANOVA analyses indicated that the ST group advantage was significant at 15 mos, $F(1, 60) = 7.46$, p = .004; at 19 mos, $F(1, 60) = 3.17$, $p = .04$; and at 24 mos, $F(1, 60) = 5.99$, $p = .008$; and approached significance at 30 mos, $F(1,60) = 1.76$, $p < .09$" (Goodwyn, Acredolo, and Brown, 2000, p. 98). The number of measures favoring the ST group was higher than the NC groups; of the 17 measures applied, 16

favored the ST group. The scores of the VT groups and the NC groups were also compared "to see if merely having parents involved in a language intervention program would facilitate development" (Goodwyn, Acredolo, and Brown, 2000, p.92). It was determined that training effects were not a concern; however, there were also no differences between VT and the NC groups for training effects.

Overall, they found that there was a greater increase in language development for the sign training group. One reason to why this happens is that through signing the infant encourages interactions from the parent; "Birdie? That's right! That is a birdie! Oh, there it goes flying away. Bye-Bye birdie!" (Goodwyn, Acredolo, and Brown, 2000, p.99). "The more things an infant can and does talk about the more vocal language the infant will hear in return" (p.99). During interactions, the infants and parents experienced an increase in social interactions, increased attention to language development, and feelings of pride for prompting development (Goodwyn, Acredolo, and Brown, 2000).

In addition to the many benefits of using sign language with infants, several studies have demonstrated that training is simple and the acquisition of signs is prompt. Thompson, McKerchar, and Dancho (2004) found that three infants acquired one sign after less than 4 hours of training and through the use of delayed physical prompts and reinforcement. The participants consisted of three typically developing infants that participated in a "full-day infant and toddler program," (p.379) ranging in ages from 13 months to 6 months. "Sessions were constructed to teach children to request items or activities that the infants' parents or teacher identified as preferred" (p.379).

In baseline the reinforcer (a toy or food), "was presented according to a time-based schedule, independent of the participant's behavior" (Thompson, McKerchar, and

Dancho, 2004, p. 381). For the 13 month olds,(Alice and Anna) the reinforcers (an assortment of toys such as baby dolls and musical toys) were presented every 1 minute for 30 seconds and for the 6 month old, the reinforcer (a bite of food), was presented 20 seconds after he swallowed the previous bite of food (Thompson, McKerchar, and Dancho, 2004). Lyle was presented with attention as well, starting in session 9. Alice and Anna were trained the sign for the word "please" while Lyle was trained the sign for the word "more."

During the sign training phase, the "participants were physically prompted to perform the target signs after a 5-second delay" (Thompson, McKerchar, and Dancho, 2004, p. 381). Once the sign was physically prompted the participant was presented with the reinforcer. It is not clear if a verbal prompt was presented concurrently or prior to the physical prompt, the article did not describe if anything preceded the physical prompts. If the infant performed an approximation to the sign, they were physically prompted to use the correct sign, then presented with the designated reinforcer. In addition, if the participants signed for the reinforcer independently "the reinforcer was presented immediately" (p.381). All subsequent prompts were presented 5 seconds following the removal or consumption of the reinforcer. "The delay to the physical prompt was gradually increased from 5 s to 4 min, or until high levels of independent signing were maintained" (p.381). In the reversal to baseline phase the "procedures were similar to the previous baseline phase, except that the schedule of reinforcer delivery was based on the mean interresponse time (IRT) from the last five sessions of the sign training condition" (Thompson, McKerchar, and Dancho, 2004, p.381).

The results indicated that although Alice did not exhibit independent signing in the baseline phase, she exhibited high levels of independent signing at the 1 minute delay to the physical prompt following the sign training phase. In addition, high levels of independent signing were maintained at the 3 minute delay. The signing decreased during the return to baseline phase. Again, Alice exhibited independent signing at the 1 minute delay, once sign training was re-implemented and maintained at the 3 to 4 minute delay.

Anna did not exhibit signing during the baseline phase. She exhibited independent signing at the 4 minute delay to the physical prompt. Independent signing decreased during the return to baseline phase. Anna again exhibited independent signing at the 15 second delay to the physical prompt during the re-implementation of the sign training phase.

Lyle did not sign during the initial baseline phase. During the 30 second delay to the physical prompt Lyle exhibited an increase in crying behavior. Due to this the 15 second delay was re-implemented for nine sessions. Once he exhibited high rates of physical prompts, the 30 second delay was re-implemented. Lyle was unable to exhibit independent signing at the 1 minute delay and again the 15 second delay was re-implemented. Lyle was unable to increase the delay past 15 seconds.

The researchers found that although none of the participants used signing in the baseline phase, they acquired the skill through the use of delayed physical prompts and reinforcement. The infants were able to independently use signs for requests after less than 4 hours of training with the 6-month old and 2 hours with the 13 months olds (Thompson, McKerchar, and Dancho, 2004).

Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho (2007) went on to demonstrate in a later study that not only can signs be learned quickly but the signs could be learned in more natural conditions and be used as a replacement behavior for crying and whining. The procedures in experiment 1 were similar to the procedures in the Thompson McKerchar, and Dancho (2004) study, except a model prompt was used as well as a physical prompts (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007).

Once the children acquired the trained signs, the experimenters "sought to determine whether signs acquired under controlled experimental conditions would occur in more natural settings, in the presence of multiple listeners, and under the control of multiple reinforcers" (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007, p.16). The children were trained to request items that their parents and teachers had identified as preferred, such as an assortment of toys, experimental attention, or a bite of food. The participants included 10-month old Heather (who has Down syndrome), 6-month old Betty. Betty's identified reinforcers were food items such as rice cereal, pureed fruit, and pureed vegetables. Heather was trained to sign the word "please," while Betty was trained the sign for the word "more." The intervention was first conducted in a therapy room and later moved to the home and school settings (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007).

During the baseline phase, the participants received reinforcement according to a time base schedule. Heather received toys and experimenter attention every 1 minute for 30 seconds. Betty received a bite of food "at the beginning of the sessions and 10 seconds

after she swallowed the previous bite of food" (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007, p.17).

During the sign training phase, "the experimenter delivered a model prompt immediately at the start of each session and after the termination of each subsequent reinforcer delivery" (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007, p.17). A physical prompt was implemented if the participant did not exhibit the target sign 5 seconds after the model prompt of the target sign. If the participant exhibited an approximation to the sign she was physically prompted by experimenter. Once the sign was prompted or the infant independently signed the target sign, the reinforcer was delivered. The experimenters gradually increased the time from 0 seconds to 80 seconds before providing the model prompt, "or until high levels of independent signing occurred for several sessions" (p.17). The experimenters delivered a physical prompts 5 seconds after the model. During the initial sign training phase, each participant was "exposed to five consecutive sessions at each level of delay (e.g., 0 s, 5 s, 10 s)" (p.17). Following the initial five sign training sessions, Betty was exposed to three consecutive sessions at each level of delay, while Heather was exposed to five consecutive sessions at each level of delay.

Following training, a reversal to baseline phase was implemented which was identical to the initial baseline "except that schedules of reinforcer delivery were designed to match the rate of reinforcer delivery during sign training. The schedule of reinforcer deliver was based on the mean interresponse time from the last five sessions of the sign-training condition" (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and

Dancho, 2007, p.17). Heather received the reinforcer 60 seconds after the removal of the reinforcer and 5 seconds after the consumption of the food item for Betty.

A sign training extension phase was conducted to evaluate if the participants would engage in the signs taught in the experimental conditions in the natural environment. The sessions were similar to the previous sign training condition with the exception of the use of new experimenters conducting the training, in different settings, and with new reinforcers such as gold fish crackers and a riding toy for Heather. For Betty the sessions were similar to the previous sign training condition with the exception of new experimenters (her father and a classroom teacher) and in new environments.

The researchers evaluated the results by comparing baseline and sign-training conditions in a reversal design. Heather did not exhibit independent signing in the baseline phase. However, she began to engage in a gradual increase in the exhibition of independent signing by session 57. The delay to the model prompt remained at 35 seconds before she began to exhibit independent signing. She continued to exhibit independent signing at the 40 second delay to the model prompt. By session 99 new researchers and settings were implemented. She continued to engage in independent signs. Although Betty did not exhibit independent signing in the baseline phase, she first exhibited independent signing at the 10 second delay to the model prompt and continued at the 35 second delay during the sign training phase. Independent signing remained high once different experimenters and settings were introduced.

In experiment 2 the experimenters “attempted to replace infant crying and whining with signing” (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007, p.19). The subjects did not vocally communicate their needs. The participants

consisted of 10-month old Geoffrey and 9-month old Lyle. The baseline condition was designed "to replicate naturally occurring conditions" (p.18) in which the participants typically engaged in crying. Sign training was conducted to replace the crying with a sign to request the preferred item or activity. Geoffrey's target sign trained was "please," while Lyle's target sign trained was "up." "Sessions were 5 min in length and were conducted 1 to 4 times per day, 5 days per week" (p.19).

In the baseline condition the participants were presented with the reinforcer if they engaged in crying or whining. Geoffrey received experimenter attention and toys "for 30 seconds on a fixed ration (FR) 1 schedule for crying or whining" ((Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007, p. 20). Lyle received attention from his mother "for 15 seconds on an FR 1 schedule for crying or whining" (p. 20).

During sign training the subject no longer received the reinforcer if they engaged in the crying or whining. (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007). Sign training procedures were the same as those conducted in Experiment 1 for Geoffrey only. While for Lyle, the sign training procedures were similar as those in Experiment 1, "except that only physical prompts were delivered (i.e., no model prompts were used during initial training sessions" (p. 20). The model prompt was used with Lyle beginning with session 45, at a 5 second delay. Following session 45, the procedures used with Lyle were the same as those used with all the other participants (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007).

In Experiment 2, neither participant exhibited independent signing; however, Geoffrey exhibited independent signs at the 2 minute delay, following sign training. "A decrease in crying and whining occurred throughout the condition, with no crying and

whining when independent signing was established at high rates (session 80 to 88)" (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007, p. 20). In the return to baseline phase, Geoffrey exhibited a decline in independent signing and an increase in crying and whining. Once sign training was reinstated, independent signing returned to high levels while whining and crying again decreased. Lyle exhibited independent signing at the 30 second delay and remained high at the 1 minute delay. Crying and whining declined as independent signing "emerged." In the return to baseline phase independent signing declined while crying and whining increased. Once sign training was reinstated at the 3 second delay to the model prompt, independent signing increased to high levels. It remained high at a 15 second delay to the model prompts, while whining and crying decreased.

Results of Experiment 2 showed that, when sign training was combined with extinction, a decrease in crying and whining was observed. "It seems most appropriate to extinguish crying and whining only when an alternative form of communication is taught, and is likely that potential negative side effects of extinction were minimized through this combined approach" (Thompson, Cotnoir-Bichelman, McKerchar, Tate, and Dancho, 2007, p.22). This study demonstrated that delayed model prompts, physical prompts, and reinforcement of signing "produced independent signing in 4 infants, including 1 with Down syndrome (Heather) and 1 infant who was just 6 months old (Betty)" (p.21). The results of the study showed "that it is possible to teach an infant to perform a simple sign using delayed prompting and reinforcement" (p.21), in addition to using infant sign language as a replacement behavior for crying and whining.

Although many studies address the strategies to train sign language and the impact of sign language on communication, cognitive abilities, and the impact sign language has on crying and whining, few studies address the theory that sign language increases bonding between parent and infant. The concept of bonding can be subjective. However, one could study the impact of the use of sign language on the quantity and quality of interactions between parent and child.

Sroufre 2000, stated that the bond between parent and child could be determined by the quality of interactions between the two as well the responsiveness of the caregiver to the child's interactions (As cited by Gongora and Farakas, 2009). "The more frequently the child's signals generate an appropriate response and become coordinated (or synchronized in exchanges with a caregiver the more likely it is that both emotional regulation and a positive bond will be established" (Gongora and Farakas, 2009, p.218). In the 2009 article by Gorgon and Farakas, this is considered synchrony (Gongora and Farakas, 2009).

One of the few studies to investigate the relationship between interactions and infant sign language was conducted by Gongora and Farakas (2009). Gongora and Farakas attempted to study the impact that infant sign language has on the parent-infant bond. Gongora and Farakas (2009) studied the effects of infant sign language on the frequency and duration of the synchronic interactions. They specifically studied the modes of visual, vocal, tactile, and affective interactions (Gongora and Farakas, 2009).

They used a quasi-experimental, longitudinal, descriptive and comparative design. The participants consisted of 14 mother-infant pairs, who ranged in ages between 5 and 9 months at the beginning of the study. The experimenters observed 15 minutes of free play

sessions. The participants were provided with a toy and were video-taped to be later analyzed using an AIT grid (Early Interactions Analysis). They repeated the process after the infants had been exposed to infant sign language by their months, when the infants were 12-14 months and a third time when they were 18-20 months (Gongora and Farakas, 2009).

Following the first free play observation (baseline) the baby sign language program was implemented with the experimental group (Gongora and Farakas, 2009). The experimenters based their infant sign program on a program developed by Professors Linda Acredolo and Susan Goodwyn, titled the Infant Signs Program (Gongora and Farakas, 2009). "The program instructs mothers to encourage the use of symbolic gestures by their preverbal children by consistently modeling them, accomplanied by the corresponding words, during daily interactions" (p.220). The program consisted of two phases. The first phase included an educational workshop and the second phase included observations of the participants at home every 15 days by a researcher, until the infant was 18 months old. The control group participated in two educational talks about language with no mention of communication through sign language.

The experimenters used the AIT grid to assess interactions. "The goal of the grid is to provide a fine-grained analysis of dyadic interactions by identifying individual modes of interactions (i.e., visual, vocal, tactile, holding and affective behaviors) and by differentiating among interactive behaviors of the infant, the mother and synchronic interactions involving both" (Gongora and Farakas, 2009, p.221). Frequency data was obtained during a free play setting. They assessed the frequency and duration of synchronic interactions involving both the mother and the infant. One member initiated

the interaction while the other reciprocated the interaction. The researchers scored the participants for frequency, which was "considered on seven categories from "never" to "always" and later they were rated on a scale of one to seven. The other scale used was for duration, which was considered on five categories from "less than 5 seconds" to "more than 20 seconds," and later they were translated to scores of 1 to 5" (p. 221). The baseline analysis indicated no difference between the control group and the experimental group for the visual, vocal, and affective modes of interaction; however, there was a greater frequency and duration of tactile interaction scores for the control group compared to the experimental group.

Following the implementation of sign training, there were no significant differences found between the experimental group and the control group at 5-9 months and 12-14 months, "in visual synchronic interactions" (Gongora and Farakas, 2009, p.221); however, a significant difference was observed at 18-20 months "in both frequency GE mean: 2.9, CG 2.1; *U*-Mann-Whitney (Z =-1.752; p = .097) and duration, GE mean: 2.4, CG mean: 1.1; *U*-Mann-Whitney (Z= -2.433; $p < .05$)" (p. 221). As for the tactile interactions, there was no significant difference found between the two groups at second observation (12-14 months of age). However, a significant difference was found on the "third observation (18-20 months of age) for frequency (GE mean: 2.1, CG mean: 1.6; U-Mann-Whitney, Z = -2.965; p < .05) and duration (GE mean: 1.8, CG mean: 2.3; U-Mann-Whitney, Z = -2.377; p < .05) on tactile behaviors" (p. 222). There were no significant differences found between the two groups "in the duration of the interactions" (p.222). "However, the frequency of these interaction behaviors in the experimental group tended to increase during the third period (18-20 months of age)," (p.222) with a

GE mean: 3.9, CG mean: 2.6, which was not statistically significant. With regards to affective synchronic interactions, a significant difference was not found between the two groups for frequency or duration “at either of the two older ages” (p. 223). In addition, it was determined from maternal reports that the infants in the “experimental group learned and average of 10.3 signs at 18 months of age, with a range variation of 2-18 signs” (p. 221). Overall, the researchers determined that interactions increase following infant sign training.

Although the Gongora and Farakas, (2009) study is important to the limited research regarding the impact of infant sign language on bonding between parent and infant, the study is limited in that only three observations were made lasting only 15 minutes. In addition, these observations were the only direct observations conducted. The measurement tool used does not appear to be as accurate as a time sampling method, directly observing the interactions and measuring the percent of intervals in which the behaviors occur.

The current study employs a more thorough measurement tool and observation strategies. The primary method of data collection is direct observation and time sampling. The purpose of the current study is to investigate how infant sign language can be used to increase or decrease bonding between parent and child, as measured through the quality and quantity of parent-infant interactions.

CHAPTER 2

METHOD

General Method

Participants and Settings

The participants of this study included three typically developing infants and their parents. The participants were already known to the primary researcher as friends and acquaintances, or were referred by friends and acquaintances. The primary researcher personally approached the participants, informed them of the basic nature of the study, and asked them if they wanted to participate. Once they agreed an appointment was made to discuss the procedures and sign the consent form.

Each participant was assigned a pseudonym based on letters and numbers. The first parent-infant pair included a male infant (X1) aged 12 months and his mother (A1), who was employed as a certified occupational therapist assistant. The second pair included a female infant (N2) aged 11 months and her mother (N1), who was employed as a paraprofessional in the healthcare field. The third pair included a male infant (J3), aged 14 months and his mother (S3), who was also employed as a paraprofessional in the healthcare field. In order to be considered for participation the infants were not able to consistently communicate through vocal or manual communication at the beginning of the study. All observations and training took place in the participants' homes or locations that were commonly attended by the infant and parent such as the park. Initial observations were approximately forty minutes in length and occurred during times when

the observer expected to see the greatest amount of activity such as meal times and play times.

Measurement System

The infants were taught signs to request items, end demands, or ask for assistance. Prior to the sign training phase the researcher developed laminated picture cards depicting the signs and the name of the signs and presented them to the parent. The signs trained were identified through interviews with parents and naturalistic observations. The signs used were identified by the parents as signs that they believed would be most useful in communicating with their infant. The following table lists and defines the six signs that were considered the most useful to the parents.

Table 1

Definitions and Descriptions of the ASL Signs Trained:

Signs	
Eat:	child raises hand with fingers cupped in a paddle formation; child raises hand to mouth so that fingers touch lips, moving the hand toward and away from mouth for two seconds
Drink:	child forms a “C” with hand and raises hand to mouth moving toward and away from mouth for two seconds
All done:	Child raises both hand with the elbows directed to the floor and the hands up, child turns hand back and forth as if shaking the hands
More:	Child raises hands, hand cupped in a paddle formation, moves hands together towards midline till fingers touch each other, child taps fingers together for two seconds
Help:	child hold one hand flat, palm up, child takes second hand makes a fist, place fist on palm of first hand so that the meat of the hand touches palm and the thumb is extended and pointed up, child moves fist up and down for 2 seconds.

Table 1 continued

Definitions and Descriptions of the ASL Signs Trained:

Up:	child makes a fist with index finger out and up, child moves arm towards the ceiling for two seconds

The target behaviors measured in order to determine the quality and quantity of interactions consisted of positive verbalizations (+v), negative verbalizations (V-), positive affect (+A), negative affect (A-), positive touch (+T), negative touch (T-), and look (L) for the parents, and positive verbalizations (+V), negative verbalizations (V-), positive affect (+V), negative affect (A-), look (L), positive touch (+T), negative touch (T-), negative motors (-M), and gestures (definitions for these behaviors are listed below), for the infants.

Table 2

Definition of the Target Behavior Measured for the Parents:

Interactions	
Positive verbalizations	any positive statement made to the parent or sound made that is not presented in threatening manner, any questions, songs or humming
Negative verbalizations:	any negative statement or sound made by the parent verbal threats, cussing, yelling, whining, or screaming directed toward the infant
Positive affect:	a tone of voice that can be described as expressing a positive emotion
Negative affect:	a tone of voice that can be described as expressing a negative emotion
Positive touch:	any intended on unintended contact made by the parent by their physical body or an extension of their physical body to the infant made in a positive or affectionate manner
Negative touch:	any intended on unintended contact made by the parent by their physical body or an extension of their physical body to the infant made in a negative or punishing manner or that causes some amount of pain

Table 2 continued

Definition of the Target Behavior Measured for the Parents:

Look:	any movement of the eyes or head in the direction of the infant
Manual sign	Any approximation of an ASL sign used to communication a want or need

Table 3

Definitions of the Target Behaviors to be Measured for the Infants:

Interactions	
Positive verbalizations:	any sound by the infant that is not presented in threatening manner, cooing, songs, or humming
Negative verbalizations:	any sound made by the infant that is presented in a n0065gative manner, yelling, whining, or screaming directed toward the parent
Positive affect:	a tone of voice the can be described as expressing a positive emotion
Negative affect:	a tone of voice that can be described as expressing a negative emotion
Look:	any movement of the eyes or head in the direction of the parent
Positive touch:	any intended on unintended contact made by the infant by their physical body or an extension of their physical body to the parent made in a positive or affectionate manner
Negative touch:	any intended on unintended contact made by the infant by their physical body or an extension of their physical body to the parent made in a negative or punishing manner
Negative motors:	any instance of the infant using and object in a manner in which it is not intended or hitting an object repeatedly on another surface, any instance of the infant hitting an inanimate object
Gesture	Any movement or use of the body to signal a want such as pointing or raising the arms up to be picked up
Manual sign	Any approximation of an ASL sign used to communication a want or need

The researcher recorded interactions using ten second continuous intervals for approximately thirty minutes at a time. The target behaviors were scored if they occurred at any time in a ten second interval. The researcher scored the target behaviors by marking the coded behavior with a slash on the data collections sheets. The target behaviors were only scored one time in a 10 second interval no matter how many times they occurred. The interactions were measured through the use of data collection sheets that were coded with abbreviations for the interactions. The percent of intervals in which the targeted interactions occurred were calculated for each behavior (except affect) by dividing the number of occurrences by the total number of intervals recorded then multiplying by one hundred. The percentage of affect was calculated by dividing the total number of positive affect by the sum of positive and negative affect then multiplying the score by one hundred.

Interobserver Agreement

Reliability was calculated on 33% of the recorded sessions for the target behaviors consisting of +V, -V, +A, -A, L, +T, -T, for parents and +V, -V, +A, -A, L, +T, -T, -M, G, for infants in Baseline. The primary researcher scored all twelve sessions as they happened in order to determine trend and when to implement phase changes. A second observer was acquired once all videotaping was completed. At that time the primary researcher viewed the videotaped session and again collected data on the sessions selected through random draw as described below with the second observer. The data used for the graphs and as an assessment of the effect on interactions reflects the data collected with the second observer present and the primary researcher present. The primary researcher and second observer collected data at the same time due to the use of

an audio taped recording of timed intervals in order to ensure that the intervals observed were identical.

During the Sign Training phase the target behaviors, +V, -V, +A, -A, L, +T, -T, MS, for parents and +V, -V, +A, -A, L, +T, -T, G, MS, for infants were scored. A second observer collected data on the recorded sessions at the same time as the primary researcher. The second observer was a colleague of the primary researcher. The second observer had some experience prior to this study observing and scoring behavior as behavior therapist for a local brain injury rehabilitation center. She was given the definitions of the target behaviors and reviewed these definitions with the primary researcher. In addition, she was instructed through verbal instruction and trial runs with family videos provided by the primary researcher. While observing the family videos both researchers collected interaction data, the primary researcher verbalized when a target behavior occurred. For example, when a positive verbal occurred the primary researcher would say, “That was a positive verbal.” Those training sessions were scored for agreements and disagreements to determine skill acquisition. Once it appeared that the second observer was accurately scoring the target behaviors without the need for prompts, both observers began viewing the research videos.

The sessions scored for reliability were selected by random draw. Each parent and infant pair as well as each targeted behavior were scored. Due to the differences in the number of baselines sessions versus sign training sessions observed for each family, varying numbers of baseline to sign training sessions were scored for reliability, for each parent-infant pair. Parent and infant A1-X1 had one baseline and three sign training phases selected, N2-N3 had two baseline phases and two sign training phases selected,

while S3-J3 had three baseline phases and one sign training phase session. Each session for each parent-infant pair was assigned an alpha-numeric code. For example, sessions for A1 were assigned the following codes; A1-1B, A1-B2, A1-B3, A1-T4, A1-T5, A1-T6, A1-T7, A1-T8, A1-T9, A1-T10, A1-T11, A1-T12. The letter B designated the baseline phase and the letter T designated the sign training phase for each parent-infant pair, while the number identified the session number. These codes were written on a piece of paper for each pair of participants and placed in a hat. Scoring consisted of totaling the sum of all agreements by both observers for each behavior then dividing that sum by the instances of agreements plus all the instances of disagreements. The total was then multiplied by 100 in order to determine the percent of reliability. Mean percent of IOA for interactions in the baseline phase was 85.31% for positive verbalizations with a range of 75.00%-90.63%, 86.25% for positive affect with a range of 75.34%-90.48%, 92.67% for negative verbalizations with a range of 75.00%-100.00%, 91.15% for negative affect with a range of 75.00%-100.00%, 88.54% for look with a range of 79.93%-90.93%, and 83.34% for touch with a range of 75.35%-94.10%. During the training phase the mean percent of IOA for interactions was 84.27% for positive verbalizations with a range of 72.09%-93.68%, 85.62% for positive affect with a range of73.33%-93.68%, 95.44% for negative verbalizations with a range of 75.00%-100.00%, 98.40% for negative affect with a range of 87.50%-100.00%, 84.30% for look with a range of 70.00%-96.23% , 84.54% for positive touch with a range of 78.57%-97.89% , 100.00% for negative touch (in both the baseline and training phase) with a range of 100.00%-100.00%, and 91.42%for manual sign with a range of 76.92%-100.00% .

Table 4

Mean Reliability of observed interactions

	Positive Verbals	Positive Affect	Negative Verbals	Negative Affect	Look	Positive Touch	Negative Touch	Manual Sign
Mean Baseline percent	85.31	86.25	92.67	91.15	88.54	83.34	100.00	-----
Range Baseline percent	75.00-90.63	75.34-90.48	75.00-100.00	75.00-100.00	79.93-90.99	75.35-94.10	100.00-100.00	-----
Mean Training Percent	84.27	85.62	95.44	98.40	84.30	84.54	100.00	91.42
Range Training Percent	72.09-93.68	73.33-93.68	75.00-100.00	87.50-100.00	70.00-96.23	78.57-97.89	100.00-100.00	76.92-100.00

Experimental Procedures

Baseline Phase. Data for participant A1-X1 was collected in their home during evening/dinnertime hours. The pair was observed during dinner prep, dinner, and playtime in their home. Participants N2-N2 participated in data collection initially at noon during play time. The pair was observed at the park due to the parent's discomfort with the experimenter observing them in their home. In addition, due to scheduling conflicts, data for the sign training phase was collected in the evenings during play time. Data for participant S3-J3 was collected during play time in late evenings around 7:30 PM and 8:00 PM. The first few observations for all participants were conducted for approximately 40 minutes at a time. However, due to the need for compliance to participation and adherence to appointment times, times were reduced to approximately 30 minutes and were conducted two to three times a week for all three pairs. Parents were

more likely to keep appointments and participate for the duration of the appointment time once the session times were reduced to 30 minutes. There were some sessions that lasted less than 30 minutes due to a parent having to leave the session early to assist a family member or to attend another appointment. The sessions that were used for scoring purposes were no shorter than 20 minutes in length.

During the initial baseline session the researcher introduced herself by name and affiliation with the university. In addition, the experimenter briefly explained the basic purpose of the experiment the parent with the infant present, through the use of the following verbal script.

> "My name is Christine Little and I am a student in the Behavior Analysis and Therapy program at Southern Illinois University at Carbondale. I am conducting a research project regarding the training of American Sign Language to infants and caregivers in their personal residence."
>
> "I do not anticipate any risk of harm to you or your infant. Identifying information, such as names, will be protected through use of a separate code list which will be kept in a locked cabinet in my office. Locations will not be recorded in any paperwork. I will take all possible measures to protect your identity. Any recorded materials will be destroyed unless you request to be given those materials."
>
> "You will be asked to allow me into your home to observe you and your child engaging in daily activities, as well as the collection of the occurrences of non-occurrences of American Sign Language used during these activities. You will be taught how to train your infant sign language and be given laminated pictures of

the signs. You will then train the infant the signs following your participation in training conducted by me."

"This project will take approximately eight weeks of one hour evening and weekend sessions. The only criteria for participation in this study are to be a caretaker of an infant between the ages of 9-14 months of age and to be an infant between the ages of 9-14 months."

"Participation is completely voluntary and you may withdraw at any point in the research without prejudice. Questions or concerns about this study are to be directed to Christine Little, BA/BCaBA, clittle10142000@yahoo.com or 618-521-7177, or her adviser Brandon F. Greene, PhD/BCBA, Behavior Analysis and Therapy Program, 618-453-2434 or bfgreene@siu.edu."

"Thanks for participating and sacrificing your time."

Once the parent had signed the consent form and it was confirmed that they did not have any concerns or questions, the primary researcher began video-taping the interactions between the parent and infant, while they engaged in their everyday activities. The family was instructed to go about their usual routine without any additional expectations from the experimenter. The researcher recorded the sessions with a Sony Digital HandyCam, using Sony Hi8 video tapes.

Sign Training Phase. The researcher met with the family at the regular session site (home for A1-X1 and S3-J3, the park for N3-N3) and time as described in the description of the baseline phase. In order to ensure that each parent could train the infant sign language, the researcher first observed each parent attempting to train the infant a neutral sign such as dog. These observations took place during each parent's initial sign training

phase. The researcher told the parent that she wanted to see how the parent would teach her infant sign language without being trained. The researcher explained to the parent that she wanted to observe her attempting to teach the infant the sign for dog in order to determine her current ability to train sign language. The parent was asked to engage in three different attempts at sign training. The parent was scored for three consecutive trials. Each trial began with some sort of verbal prompt by the parent directed at the infant; such as "what is it," "dog," "show me dog,"etc, followed by the parent's attempts to train the manual sign. The trial ended when the parent began the next verbal prompt. Once the baseline phase was complete the parent was instructed on how to train the infant sign language beginning with one sign at a time, the first sign trained was more and then progress to all the signs listed in Table #1. Some parents were more consistent than others at using each sign. However, all parents were consistent with using the sign for more. The training was completed in one session that was not recorded due to the difficulty of training and taping concurrently.

The parent was taught to teach manual sign through a task analysis using verbal instruction accompanied by hand over hand assistance. The researcher introduced the training session by explaining the steps to the task analysis, and the rationale for the steps, and by providing recommendations regarding strategies to assist with successful acquisition of skills for the infant. For example, parents were encouraged to make the training fun. "We are going to start sign training now. When training signs to your infant it is important to make the experience fun in order for the child to want to participate without getting fussy."

During the training of the task analysis, the researcher first modeled the steps with the infant while playing with the infant. For example, the researcher modeled teaching the sign for the word dog to X1, while petting the family dog. The infant sat with the researcher and petted the dog. The researcher then verbally prompted and modeled the steps for the parent, again using the infant to model the steps. Each trial begin with the verbal prompt, "what is it," then the researcher waited approximately 5 seconds for a response. If the infant did not respond the researcher verbally prompted the sign and used hand over hand assistance with the infant. Following hand over hand assistance the infant was praised for signing dog. The researcher repeated modeling the steps for the parent until the parent verbally expressed that she was comfortable with the steps and was ready to conduct the training herself.

All trials began with the verbal prompt, "what is it," followed by the parent's attempts to train the manual sign. The trial ended with the parent waiting approximately 5 seconds (as counted using a stop watch application on a smartphone carried by the experimenter) for a response from the child or the infant's response itself. Finally, the parent was assessed on how she performed the steps independently.

Skill acquisition was determined once the parent was able to perform all the steps of the task analysis on four out of five trials. During this time the researcher provided recommendations for the parent to start with one sign initially and to use items to be requested that could be reinforced immediately and that were highly reinforcing for the infant, such as "more bubbles," "eat cookie," and "more milk." Specifically the researcher stated, "I also recommend that you use items that the infant really likes so that once she/he requests the item and receives it and is immediately reinforced." The

researcher asked the parent to identify these items prior to sign training. The participant A1 chose to start with the sign for “eat,” since sessions were conducted during meals. N2 and S3, both chose the sign for “more,” since their sessions were conducted during play times; more was used to ask for more drink, food, play, slide, swing, etc. All parents later, independently expanded the infant’s repertoire of signs to varying degrees. Parent A1 introduced music, airplane, car, play, milk, juice, just to name a few. While parents N2 and S3 expanded to include the signs previously defined; eat, drink, up, help, and all done. The training was completed in one session that was not recorded due to the difficulty of training and taping concurrently.

In this first training session the researcher discussed the signs that would be used and presented the parent with laminated picture cards depicting the sign and the name of the sign. The researcher modeled these signs for the parent. Following the discussion data collection commenced regarding quality and quantity of interactions.

Experimental Design

The design used was a multiple baseline design, across participants. The baseline phase for each participant pair was conducted until the pair exhibited a steady state in the percent of interactions made during the observation period. Once a steady state was established the sign training phase was implemented for one pair, with each pair to follow remaining in baseline until the pervious pair again exhibited a steady state of percent of interactions in the training phase. The experiment did not conclude until the last pair exhibited a steady state for percent of interactions. Once it was determined that the first participant A1-X1 was exhibiting a steady state in the occurrence of interactions, the sign

training phase began. The remaining two participant pairs continued to be observed and scored for baseline data.

CHAPTER 3

RESULTS

As shown in Table 5, the percent of occurrences of positive interactions, calculated from the number of occurrences divided by the number of intervals in which the interactions occurred, for parent A1 increased slightly for all positive interactions except for positive touch, which declined in the sign training phase compared to baseline. Positive verbalization and look increased to an average of 65.85% and 83.91%, compared to 60.73% and 65.50% in the baseline phase. A1 also exhibited the greatest percent of occurrences for manual sign, exhibiting an average of 22.94% of occurrences compared to the other two parents. With regards to negative interactions (Table 6), A1 exhibited a slight decrease in the percent of occurrences of negative verbalizations, exhibiting an average of 2.36% in the baseline phase and 1.44% in the sign training phase. There was no change for negative affect and negative touch, at an average of .00% of occurrences for both, during the baseline and the sign training phases.

Table 5

Summary of A1 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Baseline				
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch
1	46.33	100.00	42.58	20.33
2	66.67	100.00	78.32	41.35
3	69.20	100.00	75.61	49.79
Mean	60.73	100.00	65.50	37.16

Table 5 continued

Summary of A1 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Training					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	Manual Sign
4	50.00	100.00	72.64	14.15	32.08
5	58.29	100.00	56.91	14.97	19.25
6	68.32	100.00	91.93	34.16	34.16
7	65.29	100.00	91.25	30.00	22.35
8	77.06	100.00	88.17	23.53	26.47
9	71.05	100.00	88.16	25.00	23.03
10	63.09	100.00	89.80	24.16	23.49
11	70.00	100.00	84.18	40.00	21.25
12	69.57	100.00	92.17	50.43	27.83
Mean	65.85	100.00	83.91	28.49	22.94

Table 6

Summary of A1 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Baseline			
Session Number	Negative Verbalizations	Negative Affect	Negative Touch
1	1.13	.00	0.0
2	2.14	.00	.00
3	3.80	.00	.00
Mean	2.36	.00	.00

Table 6 continued

Summary of A1 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Training Session Number	Negative Verbalizations	Negative Affect	Negative Touch
4	.94	.00	.00
5	1.60	.00	.00
6	1.24	.00	.00
7	0.56	.00	.00
8	2.35	.00	.00
9	1.32	.00	.00
10	1.34	.00	.00
11	1.88	.00	.00
12	1.73	.00	.00
Mean	1.44	0	0

Parent N2 also exhibited an increase in the percent of occurrences of positive verbalizations, averaging approximately 34.86% in the baseline phase compared to 44.87% in the sign training phase, as shown in Table 7 below. In both phases the parent did exhibit a sharp increase, exhibiting 46.23% of occurrences in the baseline phase during the second observation and 73.95% of occurrences in the sign training phase for Session 8, slightly skewing the data 3-4 percent; however, the parent would have still exhibited a slight increase between the two phases. As for positive affect, look, and positive touch the parent did not exhibit an increase in percent of occurrences. Positive affect and look remained the same at 100.00% for positive affect and approximately 81% for look, in both the baseline and sign training phase. The data appears erratic for touch; however, the baseline phase was slightly more stable. The parent exhibited a low of

35.91% in the baseline phase and a high of 56.52% and 67.09%, with an average of 56.44%. While in the sign training phase she exhibited a low of 36.78% and 46.58% and a high of 77.19% and 81.21%, with an average of 59.78%. The parent exhibited an increase in the percent of occurrences for positive touch on average.

Parent N2 exhibited an average of 5.12% of occurrences of manual signs which is less than A1; however, as shown Table 7, it is greater than the percent of occurrences for S3. Parent N2 also exhibited a decrease in the exhibition of negative verbalizations in the sign training phase compared to the baseline phase, exhibiting an average of 5.93% of occurrences compared to 7.98% in the baseline phase, which can be seen in Table 8 below. Again the percent of occurrences for negative affect and negative touch remained at 0% throughout data collection.

Table 7

Summary of N2 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Baseline				
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch
1	33.48	100.00	61.67	56.52
2	46.23	100.00	89.62	35.91
3	33.11	100.00	79.45	65.54
4	30.48	100.00	87.50	57.14
5	31.01	100.00	89.87	67.09
Mean	34.86	100.00	81.62	56.44

Table 7 continued

Summary of N2 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Training					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	Manual Sign
6	40.61	100.00	82.42	81.21	8.48
7	35.63	100.00	79.49	36.78	1.15
8	73.95	100.00	96.61	61.34	6.72
9	49.32	100.00	91.78	46.58	4.11
10	35.96	100.00	71.05	77.19	3.51
11	47.13	100.00	71.16	58.05	4.02
12	31.46	100.00	76.40	57.30	7.87
Mean	44.87	100.00	81.27	59.78	5.12

Table 8

Summary of N2 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Baseline			
Session Number	Negative Verbalizations	Negative Affect	Negative Verbalizations
1	6.96	.00	.00
2	10.38	.00	.00
3	6.08	.00	.00
4	8.87	.00	.00
5	7.59	.00	.00
Mean	7.98	.00	.00

Table 8 continued

Summary of N2 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Training Session Number	Negative Verbalizations	Negative Affect	Touch
6	1.21	.00	.00
7	4.60	.00	.00
8	15.97	.00	.00
9	6.84	.00	.00
10	2.63	.00	.00
11	5.74	.00	.00
12	4.49	.00	.00
Mean	5.93	.00	.00

As shown in Table 9, S3 exhibited the most noticeable change in interactions from the baseline phase to the sign training phase. S3 exhibited an average of 10.29% of occurrences for positive verbalizations in the baseline phase compared to 26.85% in the sign training phase. Look and positive touch also increased in the sign training phase compared to the baseline phase. The parent exhibited 84.49% for look in sign training phase, compared to 59.04% in baseline. As for positive touch she exhibited an average of 8.32% in baseline (an outlier of 48.04% exhibited in session 4) compared to 13.20% in the sign training phase. As can be seen in Table 10, S3 exhibited an increase in the percent of occurrences for negative verbalizations, exhibited 1.81% of occurrences in the baseline phase compared to 2.86% in the sign training phase. She did not exhibit a change in negative affect and negative touch exhibiting 0% of occurrences for both phases.

Table 9

Summary of S3 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Baseline					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	
1	20.87	100.00	85.00	3.40	
2	16.91	100.00	60.91	.97	
3	11.43	100.00	59.93	7.43	
4	6.70	100.00	60.89	48.04	
5	7.43	100.00	47.30	1.35	
6	6.15	100.00	49.72	1.68	
7	6.45	100.00	30.32	1.94	
8	6.40	100.00	78.26	1.74	
Mean	10.29	100.00	59.04	8.32	
Training					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	Manual Sign
9	21.59	100.00	80.11	9.66	4.55
10	25.41	100.00	92.62	4.10	.82
11	33.80	100.00	78.26	25.35	.00
12	26.61	100.00	86.98	13.67	5.76
Mean	26.85	100.00	84.49	13.20	2.78

Table 10

Summary of S3 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Baseline			
Session Number	Negative Verbalizations	Negative Affect	Negative Touch
1	3.88	.00	.00
2	.97	.00	.00
3	.57	.00	.00

Table 10 continued

Summary of S3 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

4	.00	.00	.00
5	1.35	.00	.00
6	4.47	.00	.00
7	3.23	.00	.00
8	.00	.00	.00
Mean	1.81	.00	.00
Training			
Session Number	Negative Verbalizations	Negative Affect	Negative Touch
9	2.27	.00	.00
10	.00	.00	.00
11	7.75	.00	.00
12	1.44	.00	.00
Mean	2.86	.00	.00

As for the children, there was no evidence of a great change between their baselines to sign training phases for all interactions. X1 did exhibit an increase in the average of percent of occurrences for positive verbalizations, with an average of 37.85% compared to 32.81% in the baseline phase (Table 11). He exhibited a significant increase in percent of occurrences for look, exhibiting 36.91% of occurrences in the sign training phase compared to 12.22% of occurrences in the baseline phase. In addition, X1 consistently exhibited manual sign, at an average of 10.39% in the sign training phase. As shown in table 12 below, negative affect and negative verbalizations increased slighting in trend early in sign training; however, the means between the two phases did not change. X1 exhibited .00% occurrences of negative motors and negative touch for both the baseline phase and the sign training phase.

Table 11

Summary of X1 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Baseline					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	
1	31.07	75.34	6.78	16.38	
2	20.94	90.74	10.89	23.07	
3	46.41	78.57	18.99	37.55	
Mean	32.81	81.55	12.22	25.67	
Training					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	Manual Sign
4	35.38	81.52	25.94	4.25	8.49
5	33.69	65.63	50.55	20.86	14.97
6	24.06	72.72	23.66	27.07	9.02
7	34.86	71.76	38.29	32.57	14.29
8	47.37	94.19	21.64	21.64	10.53
9	38.10	91.80	42.07	19.05	4.76
10	26.11	78.85	49.68	12.10	7.01
11	43.75	87.50	33.13	29.38	11.25
12	51.65	90.38	47.25	49.45	13.19
Mean percent	37.22	81.59	36.91	24.04	10.39

Table 12

Summary of X1 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Baseline				
Session Number	Negative Verbalizations	Negative Affect	Negative Touch	Negative Motorizations
1	10.17	24.66	.00	.00
2	2.14	9.26	.00	.00

3	12.66	21.43	.00	.00
Mean	8.32	18.45	.00	.00

Table 12

Summary of X1 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Training Session Number	Negative Verbalizations	Negative Affect	Touch	
4	8.02	18.48	.00	.00
5	17.65	34.38	.00	.00
6	8.27	25.58	.00	.00
7	13.71	27.91	.00	.00
8	2.92	5.81	.00	.00
9	3.40	8.20	.00	.00
10	7.00	21.15	.00	.00
11	6.25	12.50	.00	.00
12	5.49	9.62	.00	.00
Mean	8.08	18.18	.00	.00

As for N2, Table 13 shows she was inconsistent in the percent of occurrences for positive touch. She exhibited a mean of 44.61% in the baseline phase, exhibiting a low of 24.02% and a high of 62.53%. During the sign training phase she exhibited an increase with a mean of 49%, with a low of 29% and a high of 77%. Her mean scores for touch were 44.61%% in baseline and 49.36% in the sign training phase, exhibiting an increase. She exhibited a slight increase for a baseline average of 81.85%, to a sign training average of 83.18%, for percent of occurrences for positive affect. In addition, she exhibited a small increase in the percent of occurrences of positive verbalizations. She exhibited a mean of 19.29%, in the baseline phase compared to 22.40%, in the sign training phase. She exhibited the second highest average for the percent of occurrences of

manual sign at an average of 2.69%. Again, N2 exhibited inconsistency in the percent of occurrences of negative verbalizations and negative affect, as can be seen in Table 14 below. She exhibited an average of 5.72% occurrences in the baseline phase for negative verbalizations, with a low of .00% and 2.18% and a high of 12.24% and 14.19%. Her average for the sign training phase was slightly lower at an average of 5.17%, with a low of .00% and .84%, to a high of 13.94%. She exhibited 18.14% of occurrences for negative affect during the baseline phase compared to 16.82% in the sign training phase, exhibiting a slight increase. Negative touch and negative motorizations continued at an average of .00% throughout both phases.

Table 13

Summary of N2 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Baseline				
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch
1	24.01	91.67	15.28	24.02
2	13.74	100.00	18.10	62.56
3	20.94	59.62	21.25	52.70
4	16.88	57.97	31.60	29.96
5	20.89	100.00	29.87	53.80
Mean	19.29	81.85	23.22	44.61

Table 13 continued

Summary of N2 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Training					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	Manual Sign
6	13.94	50.00	55.38	72.12	3.03
7	13.83	92.86	24.73	29.79	1.06
8	50.42	98.36	52.14	41.18	1.68
9	9.64	57.14	13.25	77.11	9.64
10	27.03	100.00	30.14	31.08	.00
11	15.66	100.00	23.48	65.22	1.74
12	26.26	83.93	33.52	29.05	1.68
Mean	22.40	83.18	33.23	49.36	2.69

Table 14

Summary of N2 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Baseline				
Session Number	Negative Verbalizations	Negative Affect	Negative Verbalizations	Negative Motors
1	2.18	8.33	.00	.00
2	.00	.00	.00	.00
3	14.19	40.38	.00	.00
4	12.24	42.03	.00	.00
5	.00	.00	.00	.00
Mean	5.72	18.14	.00	.00

Table 14 continued

Summary of N2 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Training Session Number	Negative Verbalizations	Negative Affect	Touch	Negative Motorizations
6	13.94	50.00	.00	.00
7	1.06	7.14	.00	.00
8	.84	1.64	.00	.00
9	7.23	42.86	.00	.00
10	8.11	.00	.00	.00
11	.00	.00	.00	.00
12	5.03	16.07	.00	.00
Mean	5.17	16.82	.00	.00

J3 exhibited a steady increase in the occurrences of positive verbalizations (please see table 15 below). He exhibited a mean of 34.81% in the baseline phase compared to 40.41% in the sign training phase; however, he exhibited an outlier in the baseline phase of 5.59%. He also exhibited an increase in the percent of occurrences for look. He averaged 17.52% of occurrences during the baseline phase compared to 30.66% in the sign training phase. He exhibited a significant increase in the average of percent of occurrences for touch, exhibiting an average of 9.24% in the sign training phase compared to 5.64% in the baseline phase. He did not exhibit an increase in the percent of occurrences of positive affect. In fact he exhibited a decline from 89.51% in the baseline phase to 87.34% in the sign training phase.

Table 16 presents data for negative interactions exhibited by J3. He exhibited an average of 2.16% for negative verbalizations during baseline and 6.35% during the sign training phase. During the sign training phase, initially he exhibited negative interactions

at a higher level than the baseline phase however, he then exhibited a steady decline. J3 exhibited 10.49% for the baseline phase for negative affect compared to 12.66% for the training phase. He exhibited an outlier of 54.17% in the baseline phase and an outlier of 33.90% for the sign training phase. J3 exhibited the lowest of occurrences of manual sign of all three infants.

Table 15

Summary of J3 Interaction Data, including percentage of occurrences of positive interactions for observed intervals during all phases, and means for the positive interactions during all phases:

Baseline					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	
1	17.48	90.00	21.36	4.37	
2	47.34	98.99	18.84	.97	
3	61.14	99.07	24.57	.57	
4	5.59	45.83	24.02	37.43	
5	19.59	93.55	21.62	.00	
6	45.81	96.51	22.35	.56	
7	54.19	100.00	4.52	1.29	
8	27.33	92.16	2.91	.00	
Mean	34.81	89.51	17.52	5.64	
Training					
Session Number	Positive Verbalizations	Positive Affect	Look	Positive Touch	Manual Sign
9	22.16	66.10	41.48	5.68	3.35
10	35.25	100.00	.00	.00	.00
11	57.75	89.13	40.85	16.90	.00
12	46.04	94.12	40.29	14.39	1.44
Mean	40.41	87.34	30.66	9.24	1.20

Table 16

Summary of J3 Interaction Data, including percentage of occurrences of negative interactions for observed intervals during all phases, and means for the negative interactions during all phases:

Baseline				
Session Number	Negative Verbalizations	Negative Affect	Negative Touch	Negative Motorizations
1	1.94	10.00	.00	.03
2	.48	1.01	.00	.48
3	.57	.93	.00	.00
4	8.94	54.17	.00	.00
5	1.35	6.45	.00	.00
6	1.68	3.49	.00	3.35
7	.00	.00	.00	.00
8	2.33	7.84	.00	.00
Mean	2.16	10.49	.00	.48
Training				
Session Number	Negative Verbalizations	Negative Affect	Touch	Negative Motorizations
9	11.36	33.90	.00	.00
10	4.10	.00	.00	.00
11	7.04	10.87	.00	.00
12	2.88	5.88	.00	.72
Mean	6.35	12.66	.00	.18

CHAPTER 4

GENERAL DISCUSSION

This study investigated the quality and quantity of interactions between parent and infant pairs following the introduction of infant sign language, through the use of partial interval recording of positive and negative interactions. While all parents exhibited an increase in positive verbalizations, S3 exhibited a significant increase. In addition, S3 exhibited an increase for all positive interactions. A1exhibited an increase for look and a decrease for touch, while N2 exhibited an increase for touch and a slight decrease for look.

Furthermore, all three parents acquired manual signs; however, A1 exhibited the greatest percent of intervals using manual sign at 23%, while N2 exhibited 5% and S3 exhibited only 3%. S3 did not consistently use manual sign during observation periods; however, she did state that the infant was using the sign for “more” outside of observations during their daily routines. In addition, while training the parent the steps to sign training, the researcher modeled the steps with the infant. During this training he exhibited the sign for “more,” with only a partial physical prompts, within five trials.

Most of the parents exhibited a decline in the exhibition of negative interactions. A1 and N2 exhibited a decline in the exhibition of negative verbalizations, while S3 exhibited a slight increase in the exhibition of negative verbalizations. None of the parents exhibited negative affect or negative touch throughout the observation period.

As for the children, all three of them exhibited an overall increase in positive interactions. All of the children exhibited an increase in positive verbalizations, look, and

positive touch. N2 exhibited an increase in positive affect, while X1 exhibited no change, and J3 exhibited a decline in positive affect. All of the children exhibited independent manual signs. X1exhibited 10% of manual sign, N2 exhibited 3% of manual signs, while J3 exhibited 1% of manual signs.

The majority of the children did not exhibit an increase in negative interactions. The only exception was J3, who exhibited an increase in negative verbalizations and negative affect. While N2 exhibited a slight decrease in negative verbalizations and negative affect. X1 exhibited no change from baseline to sign training in the exhibition of negative verbalizations, negative affect, negative motors, and negative touch. Like X1, N2 and J3 exhibited no change in the exhibition of negative touch and negative motors.

Most families exhibited an increase in some positive interactions and a decrease in some negative interactions. The exception being S3 and J3, who exhibited an increase in negative verbalization, which was likely due to the overall increase in direct interactions between the two. In addition, all three parents stated that their child had acquired at least one sign within the first week of sign training. In fact, as stated previously, J3 exhibited his first sign during the parent training portion of the experiment. In addition, X1 began to more consistently communicate verbally during the sign training phase, saying he words ‘ball’ and ‘cracker’ for the first time.

Although the majority of change in interactions during this study favored an increase in positive interactions and a decrease in negative interactions, the changes were very slight. This slight change could be due to the shortened research period. If more sessions were observed and the project was extended by four to six more weeks, greater change could have been observed. However, later in the study it became difficult to

arrange and maintain appointments with the parents. Either the parent would be reluctant to make an appointment or they would cancel at the last minute. In addition, another limitation of this project is the absence of a follow-up to determine if the families continued to use manual sign and the continued impact on interactions. Future studies should include a follow up phase to extend this research.

In addition, observations of S3/J3 at times only included either S3 or J3 alone. S3 was the only parent that did not engage with her infant in the same room throughout most of the baseline phase. During most of the observation periods she engaged with him while observing him from an attached room. The door way to this room was wide enabling her to easily observe the infant; however, this made it difficult for the researcher to observe both at the same time; which could have impacted the collection of interaction data. Again, with an increase in the number of observation sessions the researcher may have seen changes in this behavior. The parent could have been reacting to the presence of the researcher, resulting in avoidance of being videotaped or directly observed interacting with her infant by a stranger.

S3 did exhibit some change in her interactions following the implementation of sign training. After implementation of sign training, the parent increased the time spent interacting with the infant. She would sit in the same room with the infant and attempt to verbally interact with him.

Another limitation of this study included the small number of participants observed. Greater change could have been observed with the inclusion of more parent and infant pairs. The data would also been more reliable with the inclusion of more pairs. The use of video-taped sessions was another limitation. Data collection from a television

screen was sometimes compromised due to the difficulty in seeing and hearing all of the interactions. Direct observations are better at capturing all interactions, while the video-taped sessions could not always accurately capture all the interactions. However, strength of the video-taped sessions included the possibility of reviewing video for interactions that were initially missed.

Past studies investigated the strategies to teach manual signs such as model prompts and physical prompts. In addition, past studies also investigated if the signs could be trained by different people, in different settings, and to address and decrease crying and whining. These studies measured the number of signs used per minute and the length of crying and whining per second exhibited by the infants. A benefit of these studies was the introduction of natural environments and the use of direct observation; however, these studies did not prove or disprove the impact of use of infant sign language on the quality of interactions between parent and infant.

Prior studies also used parent reports to measure the change. Earlier studies investigated whether or not it was possible to teach signs to infants and the impact the use of signs had on the development of the infant. The limitation of these studies was the limited or complete absence of direct observations of the infants engaging in manual signs. Most of these studies measured the number of signs used through parent reports and cognitive ability through standardized tests. These studies also claimed that the use of infant signs could improve the bond between infant and child; however, they did not propose methods to prove or disprove this theory. The current study attempted to at least investigate the impact of infant signs on the quality and quantity of interactions. This study measured interactions through the use of partial interval recording while most

studies measured the time it took for the infant to learn signs and the number of signs taught.

This study measured interactions through the use of direct observations and partial interval recording. The only other study measuring interactions used only three direct observations and parent reports. Resulting in data that was not as reliable and accurate as the data collected in this study.

This study is one of the few to study the impact of infant sign on the quality and quantity of infant and child interactions. More research is needed to include follow up studies and larger numbers of participant pairs to demonstrate greater change in the interactions. This research would be important to a positive impact on child management strategies and intervention strategies to address neglect and abuse of infants due to the stress of caring for the crying infant who cannot communicate their needs verbally.

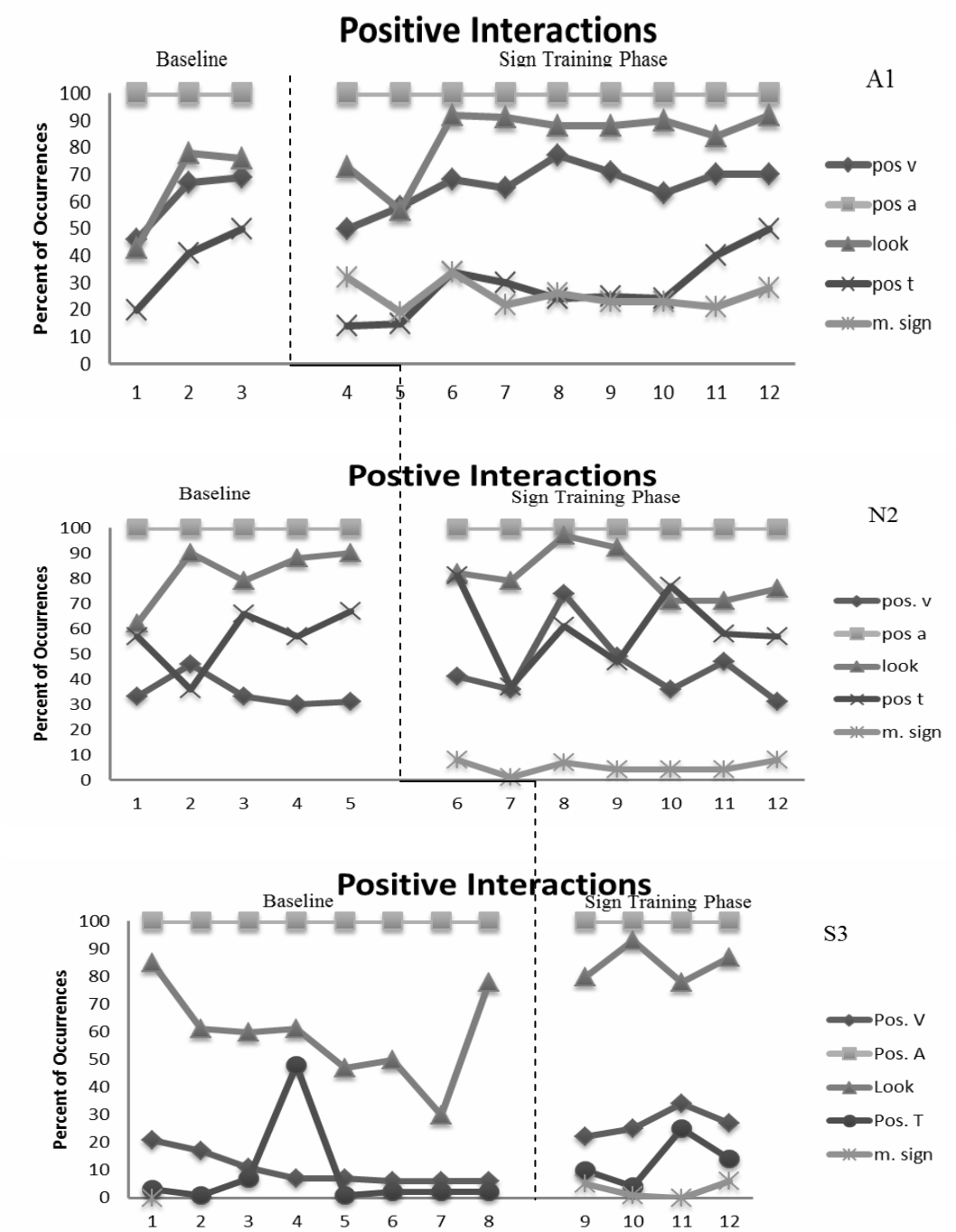

Figure 1: the graphs above represent the data collected from observation of parents A1, N2, and S3, for the target behaviors positive verbalizations, positive affect, look, positive touch, and manual sign, in the baseline and training phases.

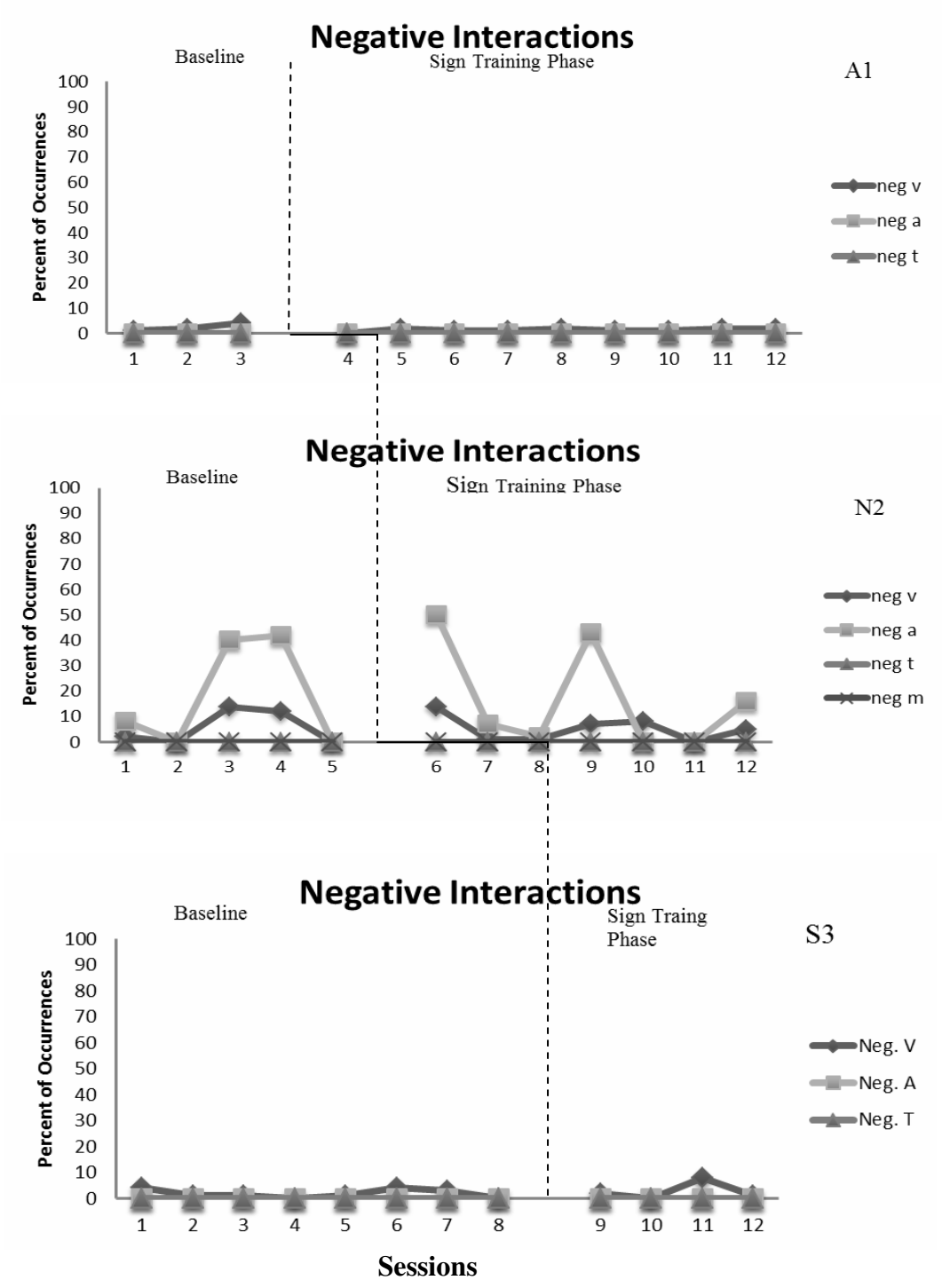

Figure 2: the graphs above represent the data collected from observation of parents A1, N2, and S3, for the target behaviors negative verbalizations, negative affect, and negative touch, in the baseline and training phases.

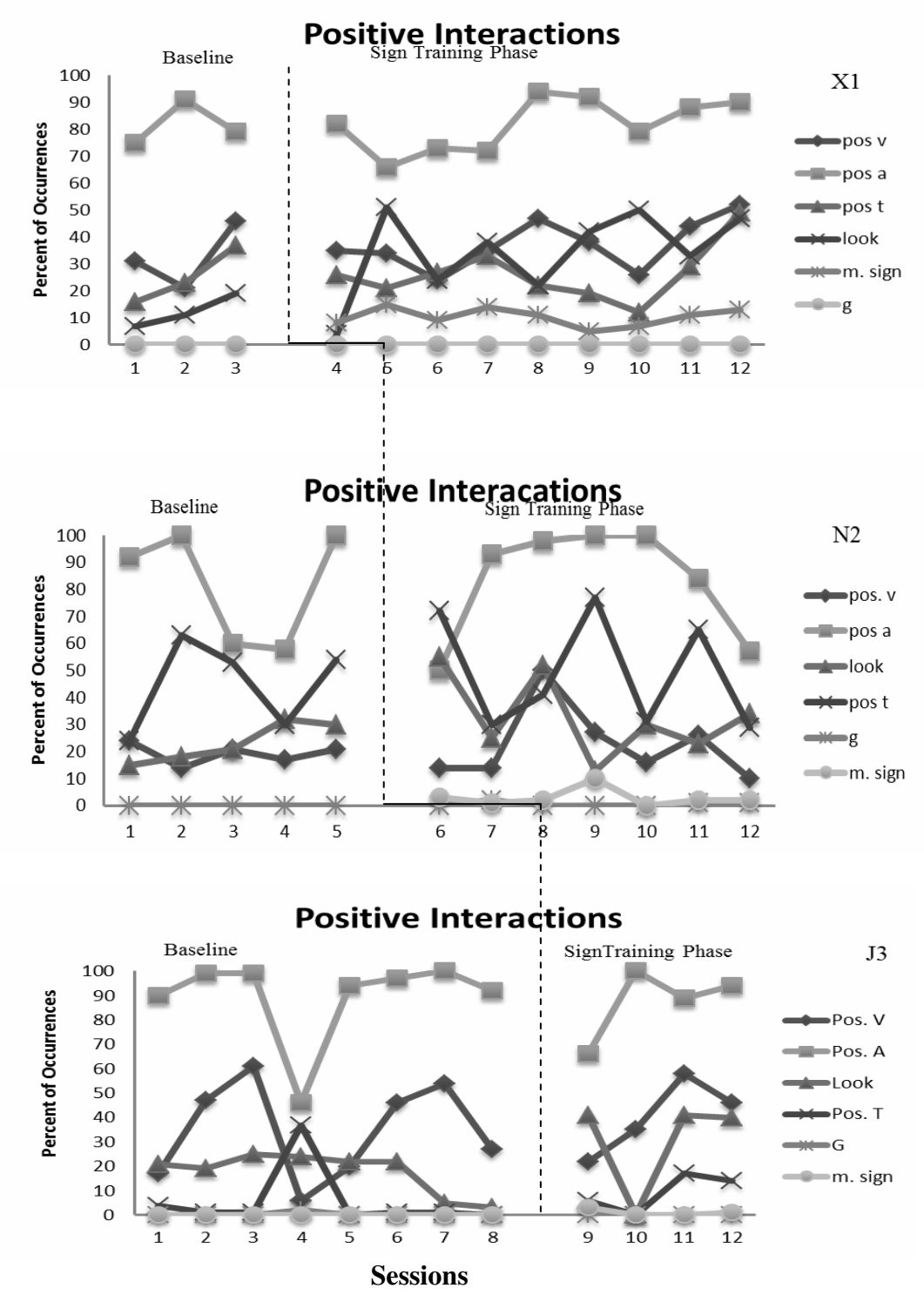

Figure 3: the graphs above represent the data collected from observation of infants X1, N2, and J3, for the target behaviors positive verbalizations, positive affect, look, positive touch, gestures, and manual sign, in the baseline and training phases.

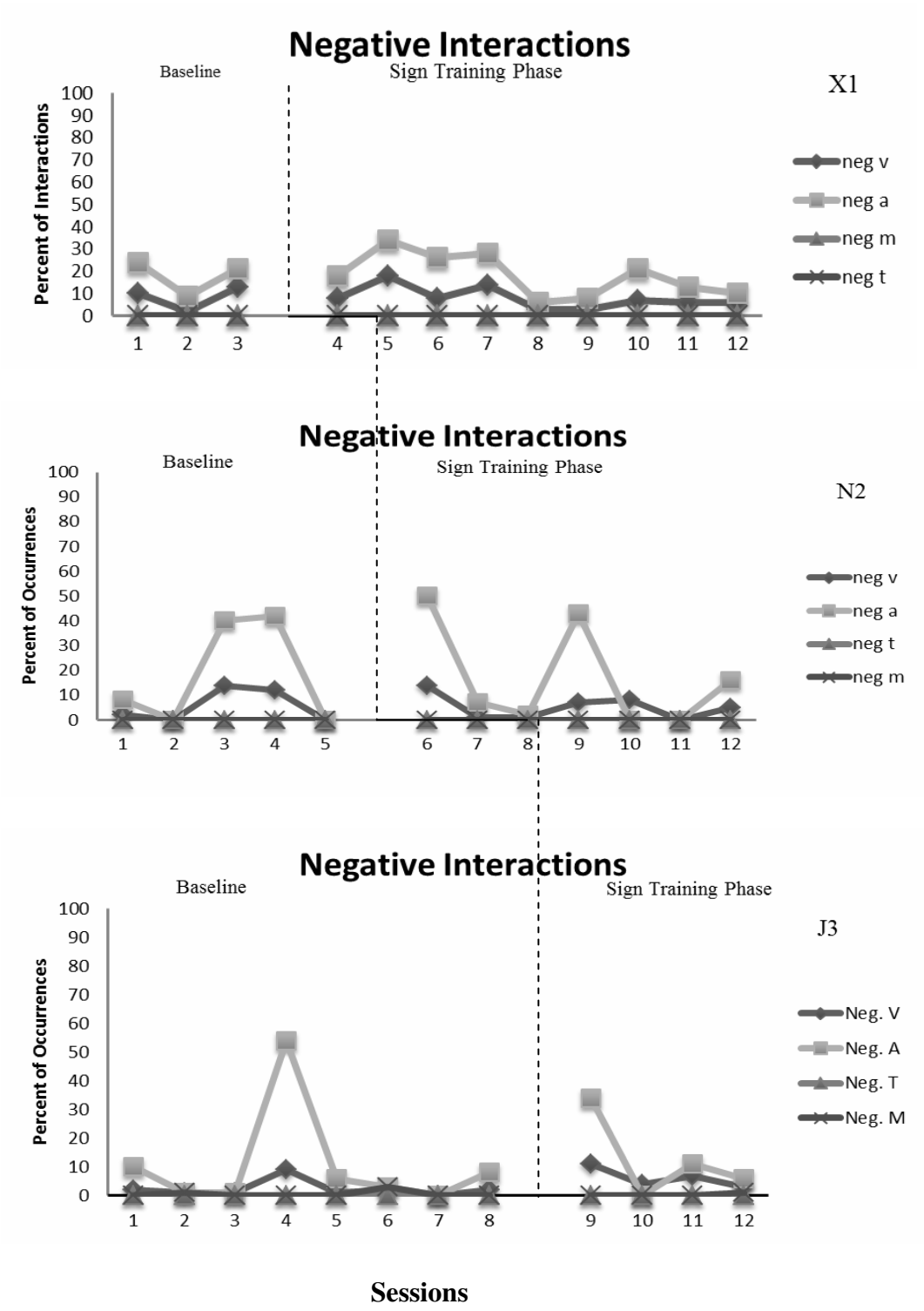

Figure 4: the graphs above represent the data collected from observation of infants X1, N2, and J3, for the target behaviors negative verbalizations, negative affect, negative touch, and negative motors, in the baseline and training phases.

REFERENCES

Goodwyn, Susan W., Acredolo, Linda P., and Brown, Cathrine A (2000). Impact of symbolic getsturing on early language development, *Journal of Nonverbal Behavior, 24*(2), 81-103. Retrieve 3-10-08.

Belsky, Jay (1984). The determinants of parenting: A process model, *Child Development, 55*(1), 83-96. retrieved 3-10-08.

Bonvillian, John D., Orlnasky, Michael D., and Novack, Lesley Lazin (1983). Developmental Milestones: Sing language Acquisition and Motor Development, *Child Development, 54*(6), 1435-1445. retrieved 3-08-08.

Gongora, Ximena, and Farkas, Chamarrritta (2009). Infant sign language program effects on synchromic mother-infant interactions. *Infant Behavior and Development,* (32), 216-225.

Goodwyn, Susan W., Acredolo, Linda P., and Brown, Catherine A. (2000). Impact of symbolic gestures on early language development, *Journal of Nonverbal Behavior, 24*(2), 81-103. Retrieved 9/2/12.

Johnston, J. Cyne Topshee, Durieux-Smith, Andree, and Bloom, Kathleen (2003). Baby Talk! ACanadian Language and Literacy Research Network Program Catalogue, and Review Evidence. Training Hearing infants to use sing language, 1-23. retrieved 3-09-08

Meier, Richard P., and Newport, Elissa L. (1990). Out of the hands of babes: On a possible sign advantage in language acquisition. *Language, 66*(1), 1-23. Retrieved 3-8-08

Stokoe, William c. (1978) Sing language versus spoken language. *Sign Language Studies, 18*, 69-90.

Thompson, Rachel H., McKerchar, Paige M., and Dancho, Kelly A. (2004). The effects of delayed physical prompts and reinforcement on infant sign language acquisition. *Journal of Behavior Analysis, 37*(3), 379-383.

Thompson Rachel H. Cotnoir-Bichelman, Nicole M., McKerchar, Tate, Trista L., and Dancho, Kelly A. (2007). Enhancing early communication through infant sign training. *Journal of Applied Behavior Analysis, 40*(1), 15-23.

White, Burton L. (1995). *Raising a happy, unspoiled child*. New York: Simon and Schuster.

Appendix A

Definitions:

Parent

Positive verbalizations: any positive statement made to the infant or sound made that is not presented in threatening manner, any questions, songs or humming

Negative verbalizations: any negative statement or sound made to the infant that is presented in a negative manner, verbal threats, cussing, yelling, whining, or screaming directed toward the infant

Positive affect: a tone of voice that can be described as expressing a positive emotion

Negative affect: a tone of voice that can be described as expressing a negative emotion

Positive touch: any intended on unintended contact made by the parent by their physical body or an extension of their physical body to the infant made in a positive or affectionate manner

Negative touch: any intended on unintended contact made by the parent by their physical body or an extension of their physical body to the infant made in a negative or punishing manner or that causes some amount of pain

Look: any movement of the eyes or head in the direction of the infant

Infant

Positive verbalizations: any sound by the infant that is not presented in threatening manner, cooing, songs, or humming

Negative verbalizations: any sound made by the infant that is presented in a negative manner, yelling, whining, or screaming directed toward the parent

Positive affect: a tone of voice the can be described as expressing a positive emotion

Negative affect: a tone of voice that can be described as expressing a negative emotion

Look: any movement of the eyes or head in the direction of the parent

Positive touch: any intended on unintended contact made by the infant by their physical body or an extension of their physical body to the parent made in a positive or affectionate manner

Negative touch: any intended on unintended contact made by the infant by their physical body or an extension of their physical body to the parent made in a negative or punishing manner

Negative motors: any instance of the infant using and object in a manner in which it is not intended or hitting an object repeatedly on another surface, any instance of the infant hitting an inanimate object

Gesture: the use of the hands and/or arms with a communicative intent, to obtain a want, end a demand, or request assistance

Signs

Eat: child raises hand with fingers cupped in a paddle formation; child raises hand to mouth so that fingers touch lips, moving the hand toward and away from mouth for two seconds

Drink: child forms a “C” with hand and raises hand to mouth moving toward and away from mouth for two seconds

All done: Child raises both hand with the elbows directed to the floor and the hands up, child turns hand back and forth as if shaking the hands
More: Child raises hands, hand cupped in a paddle formation, moves hands together towards midline till fingers touch each other, child taps fingers together for two seconds
Help: child hold one hand flat, palm up, child takes second hand makes a fist, place fist on palm of first hand so that the meat of the hand touches palm and the thumb is extended and pointed up, child moves fist up and down for 2 seconds.
Up: child makes a fist with index finger out and up, child moves arm towards the ceiling for two seconds

Appendix B

American Sign Language

Client: _____

Phase:	B	Tx	Mx			
Date						
Caregiver/staff						
Observer						
Activity						
1. Parent supplies the discriminative stimulus for the sign (what is it, what do you want…)						
2. Parent verbally prompts the sign						
3. Parent waits five seconds for response						
4. If infant responds parent reinforces correct responses immediately following SD or prompts Good signing “name of sign”						
5. If infant responds infant is reinforced immediately						
6. If no response parent verbally prompts and models sign						
7. Parent waits five second for infant to respond						
8. If no response in five seconds parent verbally prompts and full physical prompt						
9. If no response in five seconds parent verbally prompts and full physical prompt						
10. Parent reinforces compliance immediately following prompt						
11. Good signing “name of sign”						

Appendix C

Date: _____ Time:_____ Phase: _____

Participant:_____ Routine:_____

	CAREGIVER	INFANT
1.	+ V - + A - L + T -	+ V - + A - L + T - -M
2.	+ V - + A - L + T -	+ V - + A - L + T - -M
3.	+ V - + A - L + T -	+ V - + A - L + T - -M
4.	+ V - + A - L + T -	+ V - + A - L + T - -M
5.	+ V - + A - L + T -	+ V - + A - L + T - -M
6.	+ V - + A - L + T -	+ V - + A - L + T - -M
7.	+ V - + A - L + T -	+ V - + A - L + T - -M
8.	+ V - + A - L + T -	+ V - + A - L + T - -M
9.	+ V - + A - L + T -	+ V - + A - L + T - -M
10.	+ V - + A - L + T -	+ V - + A - L + T - -M
11.	+ V - + A - L + T -	+ V - + A - L + T - -M
12.	+ V - + A - L + T -	+ V - + A - L + T - -M
13.	+ V - + A - L + T -	+ V - + A - L + T - -M
14.	+ V - + A - L + T -	+ V - + A - L + T - -M
15.	+ V - + A - L + T -	+ V - + A - L + T - -M
16.	+ V - + A - L + T -	+ V - + A - L + T - -M
17.	+ V - + A - L + T -	+ V - + A - L + T - -M
18.	+ V - + A - L + T -	+ V - + A - L + T - -M
19.	+ V - + A - L + T -	+ V - + A - L + T - -M
20.	+ V - + A - L + T -	+ V - + A - L + T - -M
21.	+ V - + A - L + T -	+ V - + A - L + T - -M
22.	+ V - + A - L + T -	+ V - + A - L + T - -M

Appendix D

Date: _____ Time:_____ Phase: _____

Participant:_____ Routine:_____

	CAREGIVER			INFANT		
23.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
24.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
25.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
26.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
27.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
28.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
29.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
30.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
31.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
32.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
33.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
34.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
35.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
36.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
37.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
38.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
39.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
40.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
41.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
42.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
43.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
44.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6
45.	+V- +A- L +T-	MS	1 2 3 4 5 6	+V- +A- L +T- -M	MS	1 2 3 4 5 6

VITA

Graduate School
Southern Illinois University

Christine M. Little

clittle10142000@yahoo.com

Southern Illinois University Carbondale
Bachelor of Arts, Psychology, May 2004

Research Paper Title:
The Use of Sign Language to Reduce Negative Interactions and Increase Positive Interactions Between Infants and Caregivers

Major Professor: Dr. Brandon Greene