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Communication in Routines between Caregivers and Children with Down Syndrome

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THE FLORIDA STATE UNIVERSITY

COLLEGE OF COMMUNICATION AND INFORMATION

Communication in Routines between Caregivers and Children with

Down Syndrome

By

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A Thesis Prospectus submitted to the School of Communication
Science and Disorders in partial fulfillment of the requirements for
graduation with Honors in the Major

Degree Awarded:
Spring, 2013

Abstract

The purpose of this study was to describe the communication of toddlers with Down syndrome in everyday routines with their caregivers within four intervention time points. Archival video data of caregiver-implemented language intervention from the KidTalk Tactics Project were used to describe the communication of three children, ages 12 to 20 months, measured at four time periods across caregiving, pre-academic, and play routines. Increases in the frequency of single words and multiple word phrases were evident for all children. Variability in the frequency of communication acts in different routines were also noted. The results of this study contribute to the expanding literature on caregiver-implemented intervention in natural environments by examining the unique profiles of toddlers with Down syndrome and the context in which they participated with their caregivers.

The members of the Defense Committee approve the thesis of Kelsey Hendershott defended on October 25, 2012.

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Chapter 4

Introduction

Parents welcome smiles, vocalizations, gestures and the arrival of first words as they track their children's early communication development. In fact, a child's first three years of life are the most important years for language development (Warren et al., 2006). We now know that children are born communicating and during these first three years they learn to use communication to interact with others, participate in social exchanges, to learn about the world surrounding them and to gain new information (Owens, 2011). While the study of communication and language has been the focus of developmental research for decades, recent findings have added to our knowledge base about what children learn, when, and importantly how interactions with caregivers support their growth and development (Mahoney, Robinson & Powell, 1992; Woods, Kashinath & Goldstein, 2004).

Knowing what and how children communicate facilitates interaction with caregivers that can support children's communication development, functional use, and enjoyment over time. For example, prior to development of words, it is particularly important for caregivers to communicate and respond frequently and consistently with their children. As children develop, early vocalizations sound more word-like and intentional, gestures become more precise and joint attention is used for requesting, protesting, greeting and commenting (Brady et al., 2008). Finally, communication becomes symbolic language as children acquire words and begin to combine them into functional and meaningful units of speech.

Not all children however develop communication and language at the same rate. Children with developmental delays and disabilities, such as Down syndrome, may develop communication skills at a slower rate as compared to their typically developing peers. Evidence-based language interventions can be used to effectively increase the communication skills of

young children with significant communication delays and impairments. One such intervention is prelinguistic milieu teaching (PMT), which uses child-centered play to teach intentional vocal and gestural communication for requesting and commenting purposes (Yoder & Warren, 2002). Another example of a language-based intervention strategy is enhanced milieu teaching (EMT), which is used to enhance early word use in young children (Hancock & Kaiser, 2006; Hemmeter & Kaiser, 1994; Peterson, Carta, & Greenwood, 2005). While studies of the development of specific forms and functions of young children abound, the effects of different activity contexts within a child's natural environment and everyday routines have not been examined in the research literature. The present study examined the communication skills of toddlers with Down syndrome in different types of daily routines with their caregivers in order to examine frequency of communication acts across routine types to explore differential effects within various settings.

Language Development in Down Syndrome

Down syndrome is a chromosomal abnormality caused by the presence of trisomy on chromosome 21 (Patterson & Lott, 2008). Due to this abnormality, particular developmental characteristics are present in children with Down syndrome. Children with Down syndrome vary in their development and may have only moderate delays in language development or may not speak at all by three years of age (Sterling & Warren, 2008). Overall communication development is slower in children with Down syndrome as compared to their typically developing peers. In correspondence, developmental delays in other areas such as social, play, physical and cognitive development may also be present in children with Down syndrome.

Children with Down syndrome typically demonstrate relative strengths in the ability to vocalize and use gestures to communicate. Although vocalizations and gestures may be strong, the ability to use spoken language for communication is typically delayed in children with Down

syndrome due to low intelligibility (Roberts, Stoel-Gammon, & Barnes, 2008). There are several specific conditions that may impact the ability to produce language and learn communication skills. It is common for a child with Down syndrome to have facial hypotonicity (low muscle tone), oral structural impairments, reduced nasal resonance, recurrent otitis media, and possible hearing loss in addition to motor planning difficulties. These physical and medical challenges may inhibit their ability to produce speech sounds, fine tune their own speech production, and comprehend the phoneme and speech production of their adult models (Roberts et al., 2008). Expressive language development may also be affected by limited vocabulary. A child with Down syndrome will generally develop expressive language skills at a slower rate and with fewer vocabulary words than that of a typically developing child (Patterson & Lott, 2008). Children with Down syndrome have difficulty using vocabulary, combining that vocabulary into multiple word utterances and using those utterances to construct intelligible sentences (Sterling & Warren, 2008). As with typically developing children, children with Down syndrome will generally comprehend more language than he or she will be able to produce (Adamson et al., 2009).

Early Intervention for Children with Down Syndrome

Within the first three years of life, it is imperative that caregivers' surround their child with as many communication opportunities as possible, in order for children to reach their full communicative potential (Warren et al., 2006; Hancock & Kaiser, 2006). Children with communication delays and impairments need more communication opportunities earlier in their development in order to support the development of effective communication skills and later academic success (Berger, 1990). Early intervention can help children to improve speech and language outcomes using typical language development as a reference (ASHA, 2008). The aim

of early intervention is to provide children with developmental disabilities specific supports and strategies to increase the number of opportunities to participate in meaningful communication exchanges throughout the day (Bailey et al., 1986; Berger, 1990; Cole et al., 2006). Surrounding an infant with many communication opportunities in daily routines will enable the child to learn through interactions with caregivers (Cole et al., 2006).

Caregivers' engagement and responsivity to their children's communication contributes to their child's communication development (Dunst et al., 2000; Mahoney & Powell, 1988). By following their child's lead, frequently sharing conversational turns with their child, and commenting on their child's focus of attention, parents can support communication skills that their child can use in everyday life, both now and in the future when their child reaches school age (Sterling & Warren, 2008). For children with Down syndrome, environmental factors, attention, response to communication attempts, and the use of intentional intervention in functional activities are extremely important, and can result in increased communication outcomes if implemented consistently (Mahoney & Neville-Smith, 1996).

Early intervention for children with developmental disabilities including children with Down syndrome can result in increased caregiver use of intervention strategies in daily routines, which in turn then increases opportunities for children to practice intervention targets (Raab, 2005; Roberts, Kaiser, & Wright, 2010). Incorporating communication opportunities into daily routines, particularly in a child's natural environment, provides a predictable, meaningful framework to embed communication intervention, and increases opportunities to participate in a given daily activity with caregivers (Raab et al., 2006; Woods & Kashinath, 2007; Woods, Kashinath & Goldstein, 2004). These communication intervention strategies can be implemented in daily activities such as caregiving routines, pre-academic routines, such as shared book

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reading between caregivers and children and play routines (Buckley & Johnson-Glenberg, 2008; Dunst et al., 2001; Ricci, 2011).

Children learn communication through a variety of sources. In order to expand communication in children with Down syndrome, caregivers are encouraged to provide numerous communication opportunities for their children. One important aspect of those communicative opportunities and experiences is the context, or activity setting in which they are practiced. Activity settings consist of everyday experiences rather than a deliberate curriculum, in which children's social interaction and behavior occurs in their typical daily settings and routines (Dunst et al., 2001). Communicating with children in a variety of activity settings can encourage the use of more sophisticated communication, specifically through consistent practice and repetition (Dunst et al., 2001).

Enhanced Milieu Teaching

EMT is a caregiver-implemented evidence-based intervention used with young children to increase communication skills with a focus on communicative initiations. (Hancock & Kaiser, 2006; Hemmeter & Kaiser, 1994; Peterson, Carta, & Greenwood, 2005). It includes teaching caregivers how to arrange the child's environment, increase responsive interaction, and use milieu teaching, or prompting (Hancock & Kaiser, 2006; Mahoney et al., 2006). These components are used to support children's language development with a focus on communicative initiations. EMT is beneficial with children in the early stages of communication development who have developmental or communication delays including intellectual disability, autism, specific language impairment and severe impairments to increase overall rates of communication (Hancock & Kaiser, 2006). EMT is a parent-implemented intervention in which children and caregivers participate in 24-36 intervention sessions (Hancock & Kaiser, 2006). This set of

intervention strategies can result in higher rates of communication in children with disabilities (Hancock & Kaiser, 2006; Kaiser, Hancock, & Nietfeld, 2000). The focus of the current study is on the use of EMT strategies within the family's preferred routines and activities to increase the expressive communication skills of children with Down syndrome.

KidTalk Tactics Project

The KidTalk Tactics Project (KTTP) is a research study at Florida State University and Vanderbilt University investigating parent-implemented early communication interventions for young children age birth to three with communication delays and disorders. In KTTP, parents participate in 24 intervention sessions with a communication coach to learn how to support their child's communication in daily routines and activities. The present study examined how EMT strategies embedded in the child and family's preferred routines impacted the communication skills of children with Down syndrome. Previous studies have identified EMT as an effective intervention for young children when delivered in a clinical setting (Kaiser et al., 2000) with limited research on the use of these strategies by caregivers in natural environments using daily routines as the context for intervention. In addition, previous studies measured child communication outcomes using standardized tests (e.g., Peterson et al., 2005), which may not provide detailed information of children's communication. The present study measured child communication by gestures, vocalizations, single words/signs and multiple word utterances/signs in typically occurring daily activities with caregivers. Archival video data from KTTP was used to answer the following questions**:**

1) What was the frequency of total communication acts in caregiving, pre-academic, and play routines for children with Down syndrome?

2) What was the change over time in the types of communication acts (gestures, vocalizations, words/signs, and multiword utterances/signs) across routines used by children participating in KTTP?

3) What was the frequency of communication initiations and responses to communication in these routines?

Method

Participants

Parent-child dyads were identified through KTTP archival records according to the following inclusionary criteria: (1) consent for participation in KTTP was obtained following the child's first birthday and before the child produced word combinations, (2) caregivers consented to standardized assessments and videotaping for data collection, and (3) caregiver-child dyads completed a minimum of 24 intervention sessions to ensure sufficient data to analyze across time points. All child participants were diagnosed with Down syndrome prior to participation in KTTP. Three dyads met the inclusion criteria and are described in the following table.

Table 1: Child and Caregiver Characteristics

Pre-Intervention Child Characteristics	Kelly	Elizabeth	Jasmine
Age in months	18	20	12
Gender	Female	Female	Female
Race	Caucasian	Caucasian	Caucasian
Primary Language	English	English	English
CSBS Standard Score	102	74	90
MSEL-ELC	97	70	73
PLS-4-AC	75	68	71
PLS-4-EC	73	79	77
PLS-4:Total Language Score	71	71	71
Mother's Age	36	36	35
Mother's Highest Level of Education and Family Income	Bachelor's Degree ($50,000+)	Bachelor's Degree ($50,000+)	Graduate Degree ($50,000+)

Note. CSBS= Communication and Symbolic Behavior Scales (Wetherby & Prizant, 2002), MSEL-ELC= Mullen Scales of Early Learning – Early Learning Composite (Mullen, 1995). PLS-4= Preschool Language Scale, 4th ed. (EC=Expressive Communication subscale, AC=Auditory Comprehension subscale) (Zimmerman, Steiner, & Pond, 2002). MacArthur-Bates Communicative Development Inventories - Words and Gestures, NCS (Fenson et al.,2007).
*Kelly's MSEL score was at 24 months.

Each caregiver-child dyad agreed to participate in a research study on caregiver-implemented intervention for children with language delays and disorders.

Setting

All KTTP intervention sessions took place in the child's home with the caregiver present and were video recorded. Daily routines were identified by each family specifically as the context for their child's intervention. Three routine types, caregiving, pre-academic, and play routines, were selected and targeted for measurement in each family. Caregivers learned to use specific embedded intervention strategies to facilitate the child's language use throughout the 24 KTTP sessions mentioned previously.

Research Design

The present study was a posthoc descriptive study of the communication of three children with Down syndrome in the context of daily routines. A sample of each child's communication was coded in three different family routines; caregiving, pre-academic and play with their caregiver, prior to participating in KTTP, at the beginning, middle, and end of intervention. This approach allowed the researcher to describe communication in different types of routines as well as at different time points during the intervention.

Routine and Child Communication Coding

In order to establish a baseline (pre-intervention) measurement of each child's communication in each of the three routine types, three-minute video clips were identified from the baseline period of KTTP. The caregiver-child interactions in the routines all occurred prior to the initiation of the intervention. Three, three-minute samples of child communication, in the beginning of intervention (sessions seven, eight, nine), in the middle of intervention (sessions 15, 16, 17) and at the end of intervention (sessions 23, 24 and 25) were selected and coded using the

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child communication coding system to identify frequency of each communication act and change over time in communication across the routines for each child. This procedure enabled the researcher to determine the frequency of communication acts in caregiving, pre-academic, and play routines by initiations and responses, as well as change over time in types of communication acts. Three-minute segments were identified as reasonable for two reasons. First, the very young age of the children influenced the length of the parent-child routines, especially caregiving routines. Second, previous research on communication interventions, had successfully used three-minute segments (Kashinath, Woods, & Goldstein, 2006; Woods, Kashinath & Goldstein, 2004). The researcher served as the primary video identifier and data coder in this study.

Upon watching each video clip, the routine was identified as caregiving, pre-academic, or play. Caregiving routines included bath/hygiene related, medical/comfort related, dressing related and eating related. Pre-academic routines described activities such as reading books, songs and rhymes and writing or drawing. Play routines included play with objects, physical play, pretend play and social games.

Each child's communication in the identified family routines was coded according to the Child Communication Coding Protocol (see Appendix A), which was adapted from the Communication and Symbolic Behavior Scales (Wetherby & Prizant, 2002) and characterized communication acts as gestures, vocalizations, words/signs, or multiple utterances/sign combinations. A communicative act is an interactive behavior that consists of a gesture, vocalization, or verbalization that is directed toward another person and that serves a communicative function. All communicative acts were coded as mutually exclusive events and categorized according to gestures, vocalizations, single words/signs, or multiple utterances/signs. Each communication act was then coded as either an initiation or response to adult

communication. A full description of the child communication coding protocol and definitions are included in Appendix A.

Data Analysis

Child communication codes were entered into a spreadsheet using Microsoft Excel. Data were graphed using Microsoft Excel to display the frequency of total communication acts, and types of communication acts (gestures, vocalizations, single utterances/signs, and multiple utterances/signs) in each of the three routines for each child, allowing for visual inspection of the data to answer the first and second research questions. To address the third research question, the researcher used child communication codes to make a table of the frequency of communicative initiations and responses for each child, by routine type.

Inter-rater Reliability

An undergraduate coder and the researcher viewed and coded 25 percent of the video clips from the baseline, beginning, middle and end periods of intervention. Training for coding reliability occurred using video footage that was not included in the study. Both coders achieved initial reliability of at least 80% on five sample segments for coding of both routine-type and communication acts. Inter-rater reliability was conducted on 25 percent of the data. Percentage of agreement was calculated by dividing the number of agreements by the total number of opportunities, and total inter-rater reliability was 85%.

Results
Question 1

What was the frequency of total communication acts in caregiving, pre-academic, and play routines for children with Down syndrome?

In order to determine the frequency of each child's communication in varying contexts, to answer the primary research question, child communication data for each child's frequency of total communication acts was graphed by intervention stage (baseline, beginning, middle, and end of the 24-session intervention period) using Microsoft Excel. Figures 1-3 display total communication across routines for all three participants.

As displayed in Figure 1, Kelly's average frequency of total communication ranged from zero to 5.7 in the baseline period, from zero to 18 at the beginning of intervention, from 0.3 to 18.7 in the middle of intervention, and from 1.3 to 19.3 at the end of intervention across all three routines. Kelly's frequency of total communication was highest in play routines before the start of intervention and highest in pre-academic and caregiving at the end of intervention.

Figure 2 shows Elizabeth's average frequency of total communication acts across routines. Elizabeth's average total communication ranged from zero to 9.7 in the baseline period, from zero to 21 at the beginning of intervention, from zero to 24.3 at the middle of intervention, and from zero to 12.3 at the end of intervention across all three routines. Elizabeth's frequency of total communication was highest in play routines before the start of intervention and highest in pre-academic at the end of intervention.

Figure 3 shows Jasmine's average frequency of total communication acts across routines. Jasmine's average total communication ranged from zero to four in the baseline period, from zero to seven at the beginning of intervention, from zero to 5.3 at the middle of intervention, and from zero to 16 at the end of intervention across all three routines. Jasmine's frequency of total

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communication was highest in play routines before the start of intervention and highest in play at the end of intervention.

Question 2

What is the change over time in the types of communication acts (gestures, vocalizations, words/signs, and multiword utterances/signs) across routines used by children participating in KTTP?

Figures 1-3 were used to answer the second research question and determine any change over time in the type of communication acts (gestures, vocalizations, words/signs, and multiple utterances/signs) from baseline through the end of the 24-session intervention period.

Figure 1

Figure 1 shows Kelly's communication acts from baseline through the third intervention time point in caregiving, pre-academic and play routines, respectively. Within the caregiving routine category, there is an increase in the use of single words from baseline to the beginning, to the middle, and finally to the end of intervention. Multiple words are initially seen in the middle of intervention in caregiving routines, and increase from the middle to the end of intervention. Kelly demonstrated increases in single words and in multiple word utterances in pre-academic and play routines as well. For pre-academic routines, single words are not evident in baseline and are observed in the second and third intervention time points. Play routines also show increases in single words (especially from baseline to the beginning of intervention), and multiple words which are first observed at the beginning of intervention and increase from the beginning to the middle of intervention, demonstrating the use of more complex language skills. Kelly showed gains in total communication from the baseline to the end of intervention in all routines. In caregiving routines, Kelly demonstrated increases from baseline to the beginning, then to the

middle, and finally to the end of intervention. This sequence of progress was less clear in pre-academic and play routines. In pre-academic routines, Kelly demonstrated increases from baseline to the beginning, to the middle, and finally to the end of intervention.
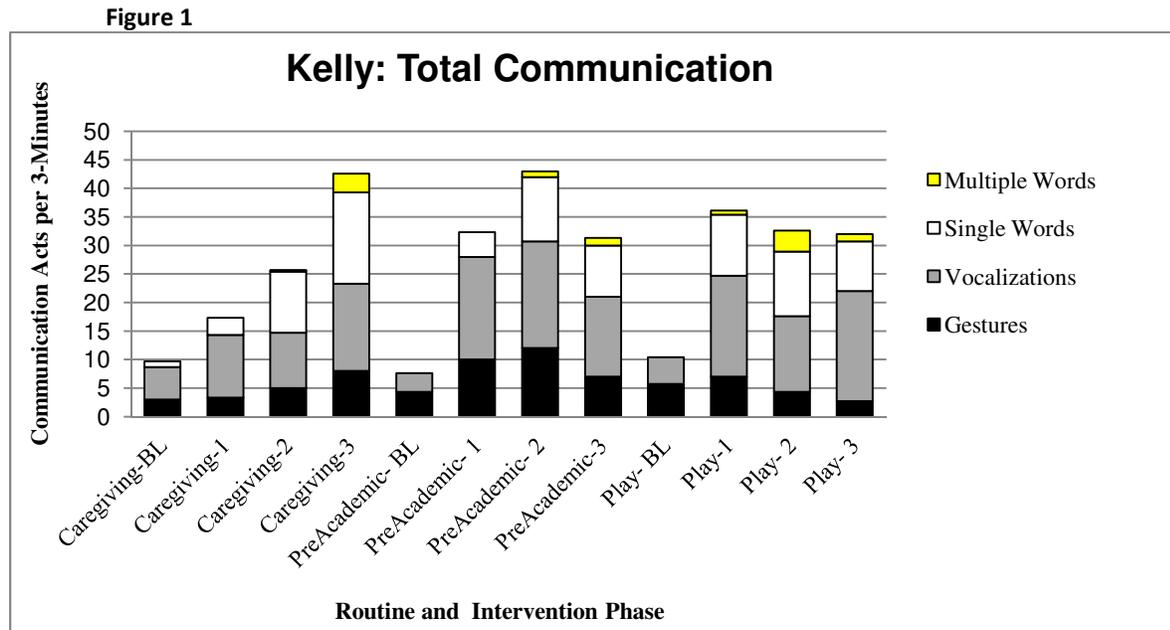
Figure 1

Figure 2

Figure 2 illustrates communication type from baseline through the third intervention time point for Elizabeth, in caregiving, pre-academic and play routines, respectively. As can be seen throughout caregiving routines, there are no specific increases between intervention time points, but rather a relative plateau of total communication acts among all time points for that routine. Throughout pre-academic routines, an increase can be seen between baseline and the first intervention time point. However, again a slight plateau and an eventual decrease in total communication acts are presented within intervention time points two and three. Play routines for Elizabeth, also exhibit a relative plateau of communication acts across intervention time points. In correspondence to this communicative plateau however, there is an increase in the use

of single words, insinuating the use of more complex communication over time. Elizabeth showed gains in total communication from baseline to the end of intervention in pre-academic routines, a decrease in caregiving routines, and slight increase in play routines.
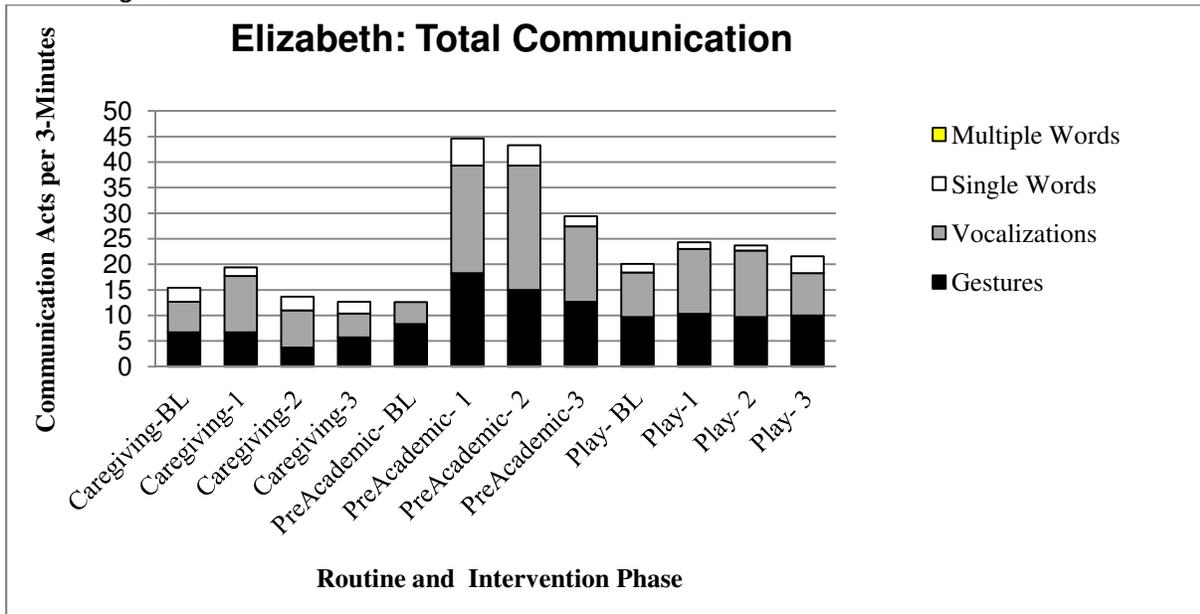
Figure 3

Jasmine's communication, displayed in Figure 3, illustrates a wide variety of types of communication acts across caregiving, pre-academic and play routines, respectively. There is a variation of communication acts within caregiving routines from baseline through the third intervention time point. Baseline for caregiving illustrates the use of gestures, vocalizations and single words, while the first intervention time point only presents the use of gestures. Following the first intervention time point, there are increases in the use of overall communication acts during intervention time points two and three with single and multiple words used in the middle of intervention but not at the end. Pre-academic routines show an increase in vocalizations and words, from baseline through the middle of intervention. Jasmine's play routine intervention sessions show an increase of communication acts in the third intervention time point (end of

intervention), but with variations between baseline and intervention time points one and two. Jasmine showed gains in total communication from the baseline to the end of intervention in all routines.

Figure 3

Jasmine: Total Communication
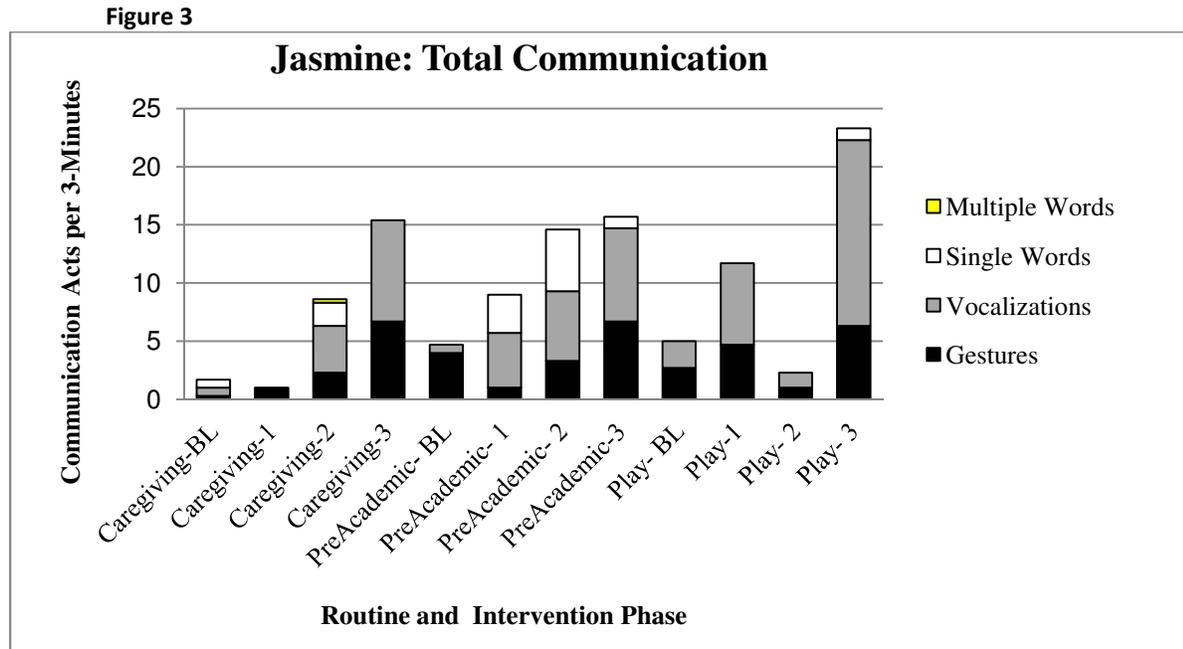
Question 3

What is the frequency of communication initiations and responses to communication in these routines?

In the baseline period for Kelly, an average between 4.4 and 6.4 communicative *initiations* were coded in each 3-minute play, caregiving and pre-academic routine sample (see Table 2). Averages between 11.3 and 22.4 *initiations* were coded at the end of intervention in those same routines. Kelly's average frequency of *initiations* for baseline as compared to her average *initiations* at the end of intervention, show *increases* across all three routines (play, caregiving and pre-academic). The largest *increase* in *initiations* was seen in caregiving routines in which Kelly *initiated* an average of over four times more at the end of intervention as compared to baseline. In correspondence, Kelly's data represents *increases* in average

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communication *responses* as well. During the baseline period, Kelly presented averages between

3.4 and 4.3, and averages between 16 and 21 at the end of intervention for communication

responses. The largest increase in *responses* was seen in caregiving routines in which Kelly

responded an average of over four times more at the end of intervention as compared to baseline.

Table 2: Child Communication Kelly

Routine Category (Frequency of Communication Acts)		Communication Acts in Baseline (Average of 3 sessions)	Communication Acts at the End of Intervention (Average of 3 sessions)	Change in Communication Acts From Baseline to End of Intervention
Play	Initiations	6.4	15.9	9.5 increase
	Responses	4.3	16	11.7 increase
Caregiving	Initiations	5.3	22.4	17.1 increase
	Responses	4.3	21	16.7 increase
Pre-Academic	Initiations	4.4	11.3	6.9 increase
	Responses	3.4	20	16.6 increase

In the baseline period for Elizabeth, an average between 5.3 and 9.3 communicative

initiations were coded in each 3-minute play, caregiving and pre-academic routine sample (see

Table 3). Averages between 5.3 and 12.4 *initiations* were coded at the end of intervention in

those same routines. Elizabeth's average frequency of *initiations* for baseline as compared to her

average *initiations* at the end of intervention, show overall *increase* in play and pre-academic

routine types, while the caregiving routine remained constant throughout. The largest *increase* in

initiations was seen in pre-academic routines in which Elizabeth *initiated* over two times more at

the end of intervention as compared to baseline. In comparison to *initiations*, Elizabeth's

increases in *responsive* communication were not as obvious. During the baseline period,

Elizabeth presented averages between 5.3 and 10.6, and averages between 7.3 and 13.9 at the end

of intervention for communication *responses*. The largest *increase* in *responses* was seen in pre-

academic routines in which Elizabeth *responded* an average of nearly two times more at the end

of intervention as compared to baseline.

Table 3: Child Communication Elizabeth

Routine Category (Frequency of Communication Acts)		Communication Acts in Baseline (Average of 3 sessions)	Communication Acts at the End of Intervention (Average of 3 sessions)	Change in Communication Acts From Baseline to End of Intervention
Play	Initiations	9.3	12.4	3.1 increase
	Responses	10.6	9.3	1.3 decrease
Caregiving	Initiations	5.3	5.3	no change
	Responses	9.9	7.3	2.6 decrease
Pre-Academic	Initiations	5.3	12	6.7 increase
	Responses	7.3	13.9	6.6 increase

In the baseline period for Jasmine, an average between 1 and 3.4 communicative

initiations were coded in each 3-minute play, caregiving and pre-academic routine sample,

respectively (see Table 4). Averages between 9 and 16.6 *initiations* were coded at the end of

intervention in those same routines. Jasmine's average frequency of *initiations* for baseline as

compared to her average *initiations* at the end of intervention, show *increases* across all three

routines (play, caregiving and pre-academic). The largest increase in *initiations* was seen in play

routines in which Jasmine *initiated* an average of almost ten times more at the end of

intervention as compared to baseline. In correspondence, Jasmine's data illustrates *increases* in

average communication *responses* as well. During the baseline period, Jasmine presented

averages between 0.6 and 3.3, and averages between 3.7 and 6.7 at the end of intervention for

communication *responses*. The largest increase in *responses* was seen in caregiving routines in

which Jasmine *responded* an average of eight times more at the end of intervention as compared

to baseline.

Table 4: Child Communication Jasmine

Routine Category (Frequency of Communication Acts)		Communication Acts in Baseline (Average of 3 sessions)	Communication Acts at the End of Intervention (Average of 3 sessions)	Change in Communication Acts From Baseline to End of Intervention
Play	Initiations	1.7	16.6	14.9 increase
	Responses	3.3	3.7	0.4 increase
Caregiving	Initiations	1	10.3	9.3 increase
	Responses	0.6	5	4.4 increase
Pre-Academic	Initiations	3.4	9	5.6 increase
	Responses	1.3	6.7	5.4 increase

Discussion

The previous figures and tables illustrate the changes in overall communication between baseline and the end of intervention for the three child participants. Two of the three children had increasing trends across all three routines, while the third child had increases across only two routines types. Overall, increases were seen in the use of single and multiple word utterances, demonstrating a growth in the use of more complex language skills over time for each child, as would be expected developmentally (Owens, 2011).

Routine Types

Across the three child-caregiver dyads, there was no one routine category in which frequency of total communication was consistently higher than the other routine types. It was interesting to note that before the start of intervention, all three children had the highest frequency of communication acts in play routines, as compared to caregiving and pre-academic. By the end of intervention, the highest frequency of communication acts were in pre-academic routines for Kelly and Elizabeth, and in play routines for Jasmine. For each participant, overall communicative acts across routines showed distinct variance. These findings are similar to the findings of previous research, which reported that caregivers often had individual preferences for types of routines useful for intervention with their child rather than using the same routine such as play for intervention (Woods & Kashinath, 2007). By diversifying the types of routines used, children in the study had more opportunities throughout the day to interact with their caregivers.

Frequency and Type of Communication Acts in Routines

Kelly's communication during caregiving routines illustrated gradual increases from baseline to the third intervention time point, while pre-academic and play routines were variable in comparison. For Elizabeth, communicative increases were seen throughout pre-academic

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routines from baseline through the second intervention time point, while some decrease in communicative acts occurred in the third intervention time point. Even with some decrease in overall communication acts, Elizabeth showed an increase in higher-level communication acts (i.e., increased frequency of single words) within all routine types across the four time points. Jasmine's gradual but steady increase of communication acts throughout pre-academic intervention time points differed from the variable increases evidenced within caregiving and play routines. The child's variability in communication may be related to the caregiver's variability in providing opportunities for interaction.

It is important to consider maturation and the impact of each child's developmental and chronological age on the results. Kelly increased in both rate as well as use of single and multiple word utterances across the 24 sessions. Her increases could be related to her general developmental progression and the timing may have corresponded to the typical "vocabulary burst" seen in young children learning language (Owens, 2011). In like manner, since Elizabeth used signs rather than verbal words at the beginning of intervention, the changes in her responsive communication could be related to her increase in independent sign use and decreased use of imitation of her caregiver's signs. The signs identified as words in her baseline and earliest intervention sessions could be over-representations of her symbolic language use and may have been more accurately coded as gestures or motor imitations.

Initiations and Responses

Each child's communication acts varied in relation to the amount of change in *initiations* and *responses* with Kelly and Jasmine showing increases overall for both. Kelly's frequency of both *initiations* and *responses* greatly increased in all routines from baseline to the end of intervention, with greater increases in *initiations* in caregiving and greater increases in *responses*

in pre-academic and play routines. Elizabeth and Jasmine's data shows more variation in communication increases among routines. Eliabeth's data illustrated increases in *initiations* in play and pre-academic routines and a decrease in *responses* in play and caregiving routines. Like Kelly, Jasmine's data showed increased frequency of communicative initiations and responses across all routine types, however Jasmine demonstrated greater increases in *initiations* in all routines as compared to increases in *responses*. Each child's data demonstrate a large variety of differences between *initiations* and *responses* for each routine type, caregiving, pre-academic and play, suggesting a need for further research in order to determine the relationship between initiations and responses.

Limitations

The current research analyzed three individual children with Down syndrome, using a single case design. In this manner, each child was analyzed individually. In doing so, each child was only compared to herself as opposed to comparing to other children or groups of children. There are certain limitations inherent to single case research. One in particular, is the inability to generalize results to the overall population.

The purpose of the KTTP project at FSU was to support caregiver-implemented intervention with coaching from an interventionist. While this project yielded a large amount of useful data, it was not designed for a child communication system specifically. In this way, data had to be extrapolated to form useful video clips to be coded for child communication, resulting in a less than perfect data analysis for this study. Having a reliable source of data to choose from is an important part of any research project. The intricate process of selection (i.e., selection of three-minute clips for data coding were limited to segments where the interventionist was not part of the interaction in order for natural caregiver-child interactions to be coded) may have

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impacted the results of the study. Having a larger amount of video footage to randomly select from may have allowed for a more accurate representation of each child's communication acts and may have also allowed for use of longer video clips for coding.

Like any individual, some days are particularly good and others are not. This statement was true for the children who participated in the KTTP study as well. A variety of factors may have contributed to a less than perfect communication day for these children such as fatigue, sickness, frustration, etc. The opposite may also be true. Some days included very productive, frequent communication, affecting the results as well. As in all human communication exchanges, many factors could have affected the communication for either the child or adult throughout the intervention sessions.

The purpose of this study was to look for trends in the frequency of overall communication acts, either initiated or responded. Unfortunately, the data did not include post-intervention communication frequency. Having this information could possibly illustrate changes in communication in comparison to communication at the start of each child's KTTP intervention process, thus expanding the usefulness of this data.

Future Directions

By analyzing the presented data, there are a number of important factors that could be expanded upon for future studies and research. For example, the use of longer video samples, as opposed to brief, three-minute samples may result in a difference in the number of and frequency of communication acts. Perhaps a longer sample may allow a greater understanding of communication change over time. Measures of communication opportunities provided by the caregiver would also be important to examine in various routines. It may be that caregivers simply offer more opportunities in play routines compared to caregiving routines because of the

nature of the routine or the role of the caregivers may be more structured in pre-academic and provide more support for providing opportunities. Responses may increase as children are directed to answer questions about pictures in story books. Questions that would compare children with Down syndrome to other children with communication disorders would also be of interest.

Summary

This study examined communication rates for toddlers with Down syndrome in their daily routines with caregivers to gain additional insight to potential differential patterns of communication in various routines. Additionally, change-over-time in the rate and types of communication as the caregiver-child dyad progressed in a manualized treatment were examined for toddlers with Down syndrome. While communication rates and types increased over time for two of the three participants, there was variability in the communication production in the various routine types for the participants. Two of the three participants also increased both their use of initiations and responses within the routines over time as their communication types expanded. Further study to examine if there is an impact on the length of routines coded and the child's communication rate and level would be useful.

References

American Speech-Language-Hearing Association. (2008). Roles and Responsibilities of Speech-Language Pathologists in Early Intervention: Position Statement [Position statement]. Available from www.asha.org/policy.

Adamson, L.B., Bakeman, R., Peckner, D.F., & Romski, M. (2009). Joint engagement and the emergence of language in children with autism and down syndrome. *Journal of Autism and Developmental Disorders*. *39*, 84-96. doi: 10.1007/s10803-008-0601-7

Bailey, D.B.Jr., Simeonsson, R.J., Winton, P.J., Huntington, G.S., Comfort, M., Isbell, P., O'Donnell, K.J., & Helm, J.M. (1986). Family-focused intervention: A functional model for planning, implementing, and evaluating individualized family services in early intervention. *Journal of Early Intervention*. *10*(2), 156-173. doi: 10.1177/105381518601000207

Berger, J. (1990). Interactions between parents and their infants with down syndrome. D. Cicchetti & M. Beeghly (Eds.), Children with down syndrome: A developmental perspective, (pp.101-146). Cambridge: Cambridge University Press.

Brady, N.C., Bredin-Oja, S.L., & Warren, S.F. (2008). Prelinguistic and early language interventions for children with down syndrome or fragile x syndrome. J.E. Roberts, R.S. Chapman, & S.F. Warren. Speech & language development & intervention in down syndrome & fragile x syndrome, (173-192). Baltimore, Maryland: Paul, H. Brookes Publishing Co., Inc.

Buckley, S. & Johnson-Glenberg, M.C. (2008). Increasing literacy learning for individuals with down syndrome and fragile x syndrome. J.E. Roberts, R.S. Chapman, & S.F. Warren.

Speech & language development & intervention in down syndrome & fragile x

   syndrome, (233-254). Baltimore, Maryland: Paul, H. Brookes Publishing Co., Inc.

Cole, K.N., Maddox, M., & Lim, Y.S. (2006). Language is the key: Constructive interactions

   around books and play. R.J. McCauley & M.E. Fey (Eds.), *Treatment of language*

   disorders in children, (149-171). Baltimore, Maryland: Paul. H. Brookes Publishing Co.,

   Inc.

Dunst, C.J., Bruder, M.B., Trivette, C.M., Hamby, D., Raab, M., & McLean, M. (2001).

   Characteristics and consequences of everyday natural learning opportunities. *Topics in*

   Early Childhood Special Education. *21*(2), 68-92. doi: 10.1177/027112140102100202

Dunst, C.J., Hamby, D., Trivette, C.M., Raab, M., & Bruder, M.B. (2000). Everyday family and

   community life and children's naturally occurring learning opportunities. *Journal of*

   Early Intervention. 23(3), 151-164. doi: 10.1177/10538151000230030501.

Fenson, L., Marchman, V.A., Thal, D.J., Dale, P.S., Reznick, J.S. & Bates, E. (2007).

   MacArthur-bates communicative development inventories: User's guide and technical

   manual (2nd ed.). Baltimore, Maryland: Paul. H. Brookes Publishing Co., Inc.

Hancock, T.B., & Kaiser, A.P. (2006). Enhanced milieu teaching. R.J. McCauley & M.E. Fey

   (Eds.), Treatment of language disorders in children, (203-234). Baltimore, Maryland:

   Paul, H. Brookes Publishing Co., Inc.

Hemmeter, M.L., & Kaiser, A.P. (1994). Enhanced milieu teaching: Effects of parent-

   implemented language intervention. *Journal of Early Intervention. 18*(3), 269-289.

   doi: 10.1177/105381519401800303

Kaiser, A. P., Hancock, T. B., & Nietfeld, J. P. (2000). The effects of parent-implemented

> enhanced milieu teaching on the social communication of children who have autism.

> *Journal of Early Education and Development, 4*, 423-446.

Kashinath, S., Woods, J., & Goldstein, H. (2006). Enhancing generalized teaching strategy use in

> daily routines by parents of children with autism. *Journal of Speech, Language, and*

> *Hearing Research, 49*, 466-485.

Mahoney, G., & Powell, A. (1988). Modifying parent-child interaction: Enhancing the

> development of handicapped children. *The Journal of Special Education*. *22*(1).

Mahoney, G., Robinson, C., & Powell, A. (1992). Focusing on parent-child interaction: The

> bridge to developmentally appropriate practices. *Topics in Early Childhood Special*

> *Education*. *12*(1), 105-120.

Mahoney, G., & Neville-Smith, A. (1996). The effects of directive communications on children's

> interactive engagement: Implications for language intervention. *Topics in Early*

> *Childhood Special Education*. *16*(2), 236-250.

Mahoney, G., Perales, F., Wiggers, B., & Herman, B. (2006). Responsive teaching: Early

> intervention for children with down syndrome and other disabilities. *Down Syndrome*

> *Research and Practice*. *11*(1), 18-28.

Mullen, E.M. (1995). Mullen scales of early learning manual. Circle Pines, MN: American

> Guidance Service.

Owens, R.E., (2011). Language development: An introduction (8th ed.). Upper Saddle River, NJ:

> Pearson Education, Inc.

Patterson, D., & Lott, I. (2008). Etiology, diagnosis, and development in down syndrome. J.E.

> Roberts, R.S. Chapman, & S.F. Warren. Speech & language development & intervention

in down syndrome & fragile x syndrome, (3-25). Baltimore, Maryland: Paul, H. Brookes Publishing Co., Inc.

Peterson, P., Carta, J.J., & Greenwood, C. (2005). Teaching enhanced milieu language teaching skills to parents in multiple risk families. *Journal of Early Intervention. 27*(2), 94-109. doi: 10.1177/105381510502700205

Raab, M. (2005). Interest-based child participation in everyday learning activities. *Insights into Early Childhood and Family Support Practices. 1(*2).

Raab, M., Swanson, J., Roper, N., & Dunst, C.J. (2006). Promoting parent and practitioner identification   of interest-based everyday child learning opportunities. *Instruments and Procedures for Implementing Early Childhood and Family Support Practices. 2*(6).

Ricci, L.(2011). Home literacy environments, interest in reading and emergent literacy skills of children with down syndrome versus typical children. *Journal of Intellectual Disability Research. 55*(6), 596-609. doi: 10.1111/j.1365-2788.2011.01415.x

Roberts, M., Kaiser, A.P., & Wright, C. (2010). Parent training: Specific strategies beyond "try this at home". KIDTalk Powerpoint.

Roberts, J.E., Stoel-Gammon, C., & Barnes, E.F. (2008). Phonological characteristics of children with down syndrome or fragile x syndrome. J.E. Roberts, R.S. Chapman, & S.F. Warren. Speech & language development & intervention in down syndrome & fragile x syndrome, (143-170). Baltimore, Maryland: Paul, H. Brookes Publishing Co., Inc.

Sterling, A., & Warren, S.F. (2008). Communication and language development in infants and toddlers with down syndrome or fragile x syndrome. J.E. Roberts, R.S. Chapman, & S.F. Warren. Speech & language development & intervention in down syndrome & fragile x syndrome, (53-76). Baltimore, Maryland: Paul, H. Brookes Publishing Co., Inc.

Warren, S.F., Bredin Oja, S.L., Fairchild, M., Finestack, L.H., Fey, M.E., & Brady, N.C. (2006). Responsivity Education/Prelinguistic Milieu Teaching. R.J. McCauley & M.E. Fey (Eds.), *Treatment of language disorders in children*, (47-73). Baltimore, Maryland: Paul. H. Brookes Publishing Co., Inc.

Wetherby, A.M. & Prizant, B.M. (2002). CSBS DP manual: Communication and symbolic behavior scales developmental profile (1st ed.). Baltimore: Maryland: Paul. H. Brookes Publishing Co., Inc.

Woods, J., Kashinath, S. & Goldstein, H. (2004), Effects of embedding caregiver implemented teaching strategies in daily routines on children's communication outcomes. Journal of Early Intervention, 26, p.175-193.

Woods, J., & Kashinath, S. (2007). Expanding opportunities for social communication into daily routines. Journal of Early Childhood Services. 1(2), 137-154.

Yoder, P.J. & Warren, S.F. (2002). Effects of prelinguistic milieu teaching and parent responsivity education on dyads involving children with intellectual disabilities. *Journal of Speech, Language, and Hearing Research, 45*, 1158-1174.

Zimmerman, I. L., Steiner, V. G., & Pond, R. V. (2012). Preschool Language Scales (4th ed.). San Antonio, TX: The Psychological Corporation.

Appendix A

CHILD COMMUNICATION CODING PROTOCOL

Follow the general guidelines listed below when coding child behaviors.

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General Guidelines for Coding

- **Do not code any vocalization/utterance if child's face is not in view if you are unsure of how many children are in the segment or are unsure of whether the child spoke or not.** *For example, if the camera is behind a child in a group setting and you hear the child say a word, then **do not** code.* However, if you can see a side profile of the child and can clearly tell that s/he is communicating, then you may code the vocalization or utterance
- **Code only vocalizations or gestures that the child is directing towards the interventionist or caregiver.**
- **You can code any communication that the child directs towards another caregiver or child in the room as long as you can see the child's face, even if the child/caregiver she is talking to is not completely visible.**
- **Do not code gestures if they are not directed towards another child or caregiver and you are not sure of the purpose of the behavior**. *For example, if child is sitting by him/herself and is waving or pointing in the air.*
- **If a gesture continues for a long period of time** (*for example, the child may point to a picture for 10 seconds or more*) **code as two gestures only if the gesture is interrupted by the child moving hand or body and then the gesture is repeated** (*for example, the child may be pointing to a picture, may retract her hand and then point to the picture again. This counts as two gestures. If child doesn't move her hand at all, it counts as 1 gesture*).
- **Code as vocalization if child uses transcribable sounds with clear function (request, protest, comment) even if there is some emotion (like excitement or happiness). Do not code if child is clearly upset or if the vocalization is just the child's excited or happy sounds.**
- **Code all times that caregiver and child are not engaged as Non-Engaged (NE).**

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Use the following guidelines to identify gestures, vocalizations, words, signs, and multiword utterances.

Gestures: Gestures are defined as physical movements in attempt to communicate with another person (communication partners).
Gestures INCLUDE:
      a. Giving or handing objects to partners
      b. Pushing away or rejecting an object
      c. Reaching toward a partner or object the partner is holding
      d. Pointing toward an object or partner
      e. Nodding or shaking the head or shrugging shoulders to indicate "yes" or "no"
      f. Showing an object

g. Manipulating a partner's hand to request object or action
h. Waving
i. Clapping
j. Depictive gestures such as raising hands in air to say "yeah" or gestures to familiar songs
k. Touching partner to get attention

Gestures are NOT coded when the child:

l. Reaching toward toys or objects that the partner is not holding
m. Moving toys or objects in a way that does not involve interaction with the partner
n. Making a physical movement that shows excitement or pleasure that is not in direct communication with the partner (e.g., waving arms)

Vocalizations: Vocalizations are non-word or unintelligible verbal utterances voiced by the child to a partner. Utterances that are coded as vocalizations are those that cannot be understood as single or multiple words. If a vocalization co-occurs in utterances in which single or multiple words are understood, the vocalization(s) should not be coded. An utterance ends when there has been a breath or a clear break of at least 1 second without vocalizations.

Vocalizations INCLUDE:

a. Speech sounds such as /ba/, /k/, /do/, /gr/, /m/, etc.
b. Laughing out loud
c. Animal sounds (e.g., "moo")
d. Motor sounds (e.g., "vroommm")

Do NOT code the following as vocalizations:

a. Crying/whining/screaming
b. Abnormal vocalizations (like screeching)
c. Sigh
d. Lip smacks
e. Tongue clicks
f. Grunts
g. Involuntary noises such as hiccups

Single Word: A single word utterance is a single word voiced by the child that is understood as a single word and not a vocalization. Recognizable single word that may not be articulated perfectly but is understandable to the viewer as a conventional word. *At least 50% of the adult word should be included to be coded as a single word.* Write down the word in the space provided on the coding sheet.

Multiword Utterance: Includes utterances with 2 or more words. The utterance may not be clearly articulated but must be intelligible to an unfamiliar adult other than caregiver. Write down the utterance in the space provided on the coding sheet.

Multi-sign Communication: Includes 2 or more recognizable signs. Write down the sign in the space provided on the coding sheet.

Child Communication Coding

Communication Act Coding Instructions
Watch the 3-minute routine and use the following 3 steps to code the child's communication by 1-minute segments:

Step 1
Us the Communication Coding Definitions to identify the mode of communicative act as either
- Gesture
- Vocalization
- Single Word
- Sign
- Multiple Word Utterance
- Multiple Sign Communication

Step 2
Code each communicative act as either
- I (communicative initiation); or
- R (response to a communication partner)

Step 3
Tally the number of codes in each category for the total number of communicative acts that the child demonstrated in the 3-minute routine.