INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI

A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor MI 48106-1346 USA
313/761-4700 800/521-0600

THE USE OF FUNCTIONAL ASSESSMENT AND ANALYSIS TO ACCELERATE THE SOCIAL COMMUNICATION TARGETS OF CHILDREN WITH SEVERE MULTIPLE DISABILITIES AT HOME AND SCHOOL

by
Mark James Larson

A Dissertation to be submitted in partial fulfillment
of the requirements for the degree of

Doctor of Philosophy
University of Washington

1998

Approved by Jack F. Billingsley
(Chairperson of Supervisory Committee)

Program Authorized
to Offer Degree Education

Date 8/14/98

Doctoral Dissertation

In presenting this dissertation in partial fulfillment of the requirements for the doctoral degree at the University of Washington, I agree that the library shall make its copies freely available for inspection. I further agree that extensive copying of this dissertation is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for copying or reproduction of this dissertation may be referred to University Microfilms, 1490 Eisenhower Place, P.O. Box 975, Ann Arbor, MI 48106, to whom the author has granted "the right to reproduce and sell (a) copies of the manuscript in microfilm and/or (b) printed copies of the manuscript made from microfilm."

Signature Mark James Lauer

Date 8/14/98

University of Washington

Abstract

THE USE OF FUNCTIONAL ASSESSMENT AND ANALYSIS TO ACCELERATE THE SOCIAL COMMUNICATION TARGETS OF CHILDREN WITH SEVERE MULTIPLE DISABILITIES AT HOME AND SCHOOL

by Mark James Larson

Chairperson of Supervisory Committee: Professor Felix F. Billingsley
College of Education

A hypothesis-driven functional assessment and analysis procedure was used to examine target communication behaviors of four preschool-age children with severe and multiple disabilities within the contexts of their homes. Parent reports and subsequent observations indicated that the children communicated more in their home than in their school during similar activities. Both parents and school personnel were unable to explain this discrepancy in the children's communication behaviors. The functional assessment activities included structured interviews, event-recording observations of six communication forms, and tape recorded transcriptions of sustained communication exchanges between children and parents during daily activities in the home. Examination of long versus short exchanges were used to develop hypotheses with relevant condition variables and values of adult language and context associated with occurrences of their child's communication behaviors. Two hypotheses were developed with parents: One predicted increases and the other decreases of their child's communication behaviors during activities in the home. Functional analysis analog test procedures simulated daily activities with a single-case withdrawal design in order to evaluate the validity of each hypothesis. Adult communication partners during analog tests included family members for two children; and the same non-family member was a partner for three children. Interview and observation results indicated that parents were usually able to predict their child's general communication responding during daily activities in the home. The analog test results indicated in that for three of the children their parents were able to identify relevant condition variables and values associated with increases and decreases in their child's

general communication responding. However, hypotheses developed with the parents of one child resulted in opposite rates of child communication behaviors than predicted.

Family members shared results with their child's classroom teacher. Individual interviews with teachers and family members were completed to assess the usefulness of the functional assessment and analysis results to inform the design of interventions aimed to accelerate the child's social communication behaviors in the school and in the home. Parents reported that the functional assessment and analysis procedures and results helped them to explain and describe their child's general communication abilities in exchanges for others to replicate. Teachers reported that the procedures and results needed to be more clearly connected with socially valued intervention outcomes. Specifically, results were desired that describe functional relationships between condition variables and values and specific child communication forms such as speech or those from an augmentative or alternative communication system.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

The author wishes to express sincere appreciation to Professors Felix Billingsley and Owen White and Dr. Nola Marriner for their assistance in the preparation of this manuscript. In addition, special thanks for the assistance and support from the members of the Supervisory Committee: Dr. Felix Billingsley (Chairperson), Dr. Owen White, Dr. Nola Marriner, Dr. Eugene Edgar, and Dr. Paul Burstein. This study was only possible through the collaboration with the teachers, families, children, and administration associated with the Experimental Education Unit at the University of Washington.

This study is dedicated to my wife, Jeannie, my children, Charles and Teri, and the children and their families with whom I have learned much through the years sharing some of life's struggles and joys working together.

CHAPTER I

Introduction

A critical education outcome for children with moderate to severe and multiple disabilities is the development of a communication repertoire that provides increased control of daily activities and personal relationships (Guess, Sailor, & Baer, 1974; Haring, 1991a, 1991b; Kangas & Lloyd, 1988; Mirenda, Iacono, & Williams, 1990; Neel & Billingsley, 1989). Essential to this repertoire is the ability to generalize communication skills across communication partners and settings (Bricker, 1993; Bryen & Joyce, 1985; Guess, Keogh, & Sailor, 1978; Haring, 1988; Reichle & Sigafoos, 1991).

In some cases, skills and abilities a child learns at school are not generalized to the home. In other instances, a child's abilities used in the home are not generalized to settings in the school. An example of this is when parents report more communication with their child in the home than they observe their child using during activities in the school. In such a case, assessment of the child's communication abilities within the daily social contexts of the home and school can provide necessary ecological or ecobehavioral information for designing interventions to facilitate generalization of communication abilities to the school (e.g., Buekelman & Mirenda, 1992; Rogers-Warren & Warren, 1977; Warren & Reichle, 1992).

The present study examined children's communication exchanges with their parents in the home through the use of hypothesis-driven functional assessment and analysis procedures. In collaboration with parents, study activities were designed to identify and examine environmental conditions associated with each child's communication behaviors during activities in the home, and then, with parents and teachers, discuss the extent to which results may be used in designing interventions aimed at accelerating the child's communication behaviors in the school and in the home.

Communication Assessment Issues

Research on the social uses of communication as it relates to children with severe disabilities have included three assessment issues: (a) the identification of context variables associated with child communication abilities across natural settings; (b) observation procedures employed in recording child communication abilities within and across natural social settings; and, (c) interpretation of non-conventional, nonsymbolic communication behaviors (Beukelman & Mirenda, 1992; Notari-Syverson & Losardo, 1996; Pena, 1996; Wetherby & Prizant, 1992). These issues converge when a child's idiosyncratic communication forms and functions developed within the contexts of parent/child activities are not generalized by the child from the home to the school setting.

Over the past 20 years, assessment and intervention practices across all curriculum areas for children with moderate to severe and multiple disabilities have undergone major changes in development, implementation, and evaluation of outcomes (Baumgart et al., 1982; Brown, et al., 1979; Ford, Schnorr, Meyer, Davern, Black, & Dempsey, 1989; Guralnick, 1978; Neel & Billingsley, 1989). These changes have been characterized by a shift away from norm-referenced assessment towards identification of context variables associated with functional skills required by the child across natural social settings. The focus for implementation and evaluation of interventions has moved from adult centered clinical settings towards child-centered daily activities with adults and peers. Moreover, child language and communication development research findings have identified the importance of reciprocal nonverbal behavior exchanges (e.g., gestures, facial expressions, turn-taking) to subsequent child communication development (e.g., Bates, Camaiono, & Volterra, 1975; Bruner, 1977). Thus, assessment and intervention target behaviors include nonverbal behaviors for a child with severe communication disorders when communicating with other persons in the flow of daily activities (Beukelman & Mirenda, 1992; Kaiser, 1993; Linder, 1993; Neel & Billingsley, 1989). This type of observation assessment

centers the communication analysis on the child within a social context, incorporating variables that affect the child's generalization of communication behaviors across social settings (Haring, 1988; Haring 1991b; Stokes & Osner, 1988) .

Too often, communication assessment target behaviors have been based on sequenced skills and prerequisite abilities derived from norm-referenced developmental inventories. This approach often acts as a barrier to understanding the child's communication abilities in daily social settings (Brown et al., 1979; Cole & Fey, 1996; Kangas & Lloyd, 1988; Reichle & Karlan, 1988). For example, the child may have failed to learn the functional and pragmatic communication skills to meet age-appropriate expectations of peers who have no disabilities (Brown et al., 1979; Kangas & Lloyd, 1988; Rice, 1993), yet have a number of pragmatic skills (e.g., social uses of communication such as initiating, maintaining, and terminating interactions) and communication functions (e.g., requesting, refusing, and commenting) signaled with nonverbal communication behaviors (Reichle, Halle, & Johnson, 1993; Seigel-Causey & Downy, 1987; Wetherby & Prizant, 1992). Identification of context variables from an analysis of communication exchanges during daily activities with adults and peers has become a focus in the development, implementation, and evaluation of communication interventions (Beukelman & Mirenda, 1992; Bricker & Cripe, 1992; Kaiser, 1993; Neel & Billingsley, 1989; Notari-Syverson & Losardo, 1996).

A second issue, observation of a child's communication abilities within natural social settings, centers around the definition of communication. Communication behaviors are those which are effective only through the mediation of other persons (Skinner, 1957). A child may reach out and extend her arm, but someone must see and interpret the reach, for example, as a "request" for communication to take place. This definition is consistent with assessment procedures that examine interactions between young children and their parents within the contexts of their daily activities and routines, and then design

interventions from the results (e.g., Bricker & Cripe, 1992; Kaiser, Hendrickson, & Alpert, 1991).

In such interactions, the child's target communication behaviors are assessed through verbal and nonverbal exchanges with others during shared activities (Bricker & Cripe, 1992; Hart & Risley, 1974; Higginbotham & Yoder, 1982; Kaiser, Alpert, & Warren, 1987). The functions of the child's target communication behaviors are identified within the communication exchanges of the shared activities. For example, an extended arm during bedtime might signal a request for a kiss from father; the same extended arm at breakfast might signal a request for more juice from older brother. Thus, the daily communication exchanges with others contain the environmental conditions associated with the social uses of the child's target behaviors that may or may not generalize across communication partners and settings (e.g., Haring 1991a; Hart & Risely, 1974, 1975; Hart & Rogers-Warren, 1978; Horner & Billingsley, 1988).

The child's failure to generalize communication abilities between home and school may result from undetected or altered contingencies within the context of the exchanges (e.g., Schreibman, 1975). For example, relevant stimuli controlling the target behaviors in one context may not be present in other contexts (e.g., the use of serving trays during meal times in the home with language models and yes/no questions to prompt the child requesting food items contain stimuli that occasion "requesting food" target behaviors; however, at school meals are provided without serving trays and yes/no questions with language models, thus, target behaviors fail to generalize across settings); or, task-irrelevant stimuli controlling the target behaviors in one setting may interfere with occurrences of target behaviors when these stimuli are absent in other contexts (e.g., music playing during meal times contain irrelevant stimuli controlling task target behaviors at meal times in the home, thus, target behaviors fail to generalize to the school setting because the music is absent).

These are examples of the child learning restricted stimulus control of target behaviors, thus limiting their ability to communicate beyond the context (Horner, Bellamy, & Colvin, 1984; Horner & Billingsley, 1988; Schreibman, 1975; Stokes & Baer, 1977). Other examples of restricted stimulus control include when the child's target communication behaviors may be limited to meal times that offer specific types of foods, or play times with specific toys and activities. The specific foods or toys contain the stimuli associated with occurrences of the child's target responses. The child may fail to generalize communication abilities here because the critical effects of these specific stimuli to occasion the child's target behaviors are not available across settings and partners (White, 1980). Thus, assessment procedures must include observations that record the child's sustained exchanges with others during daily activities in order to identify stimulus conditions that control or are associated with the child's target communication behaviors (Beukelman & Mirenda, 1992; Bricker, 1993; Neel & Billingsley, 1989; Reichle, 1991; Sigafoos & York, 1991).

A third issue is how to interpret the child's non-conventional, nonsymbolic communication behaviors. Non-conventional behaviors are those that are idiosyncratic to the "speaker", whereas conventional behaviors are recognized and responded to reliably across members of a verbal community (Mustonen, Locke, Reichle, Solbraack, & Lindgren, 1991; Rowland & Stremel-Campbell, 1987; Skinner, 1957). Conventional symbols in this case refer to the methods used for visual, auditory, and/or tactile representation of conventional concepts (e.g., gesture, photographs, manual sign-sets/systems, picto-ideographs, printed words, objects, spoken words, Braille) (ASHA, 1991). Nonsymbolic communication refers to the use of gesture, facial expression, body movement, eye gaze, vocalizations, that are not representative of conventional concepts within the broader verbal community (Beukelman & Mirenda, 1992; Seigel-Causey & Guess, 1989).

If a child's disabilities affect the use of conventional, symbolic communication behaviors, then non-conventional, nonsymbolic communication behaviors need to be assessed in order to design an intervention for an individualized augmentative or alternative communication system (AAC) (Beukelman & Mirenda, 1992; Rowland & Stremel-Campbell, 1987; Seigel-Causey & Guess, 1989). Nonconventional, nonsymbolic communication behaviors such as facial expressions, gestures, and vocalizations are present in the communication repertoires of children with and without disabilities (Bates, Benigini, & Bretherton, 1979; Light, Collier, & Parnes, 1985a, 1985b, 1985c). Moreover, we learn to express and interpret these behaviors through their use in daily activities within our families and communities. Thus, AAC assessment methods examine the use of non-conventional, nonsymbolic communication behaviors during daily activities and natural contents in order to describe their functional and pragmatic uses within communication exchanges (Beukelman & Mirenda, 1992; Pien & McKibbin-Klein, 1989; Seigel-Causey & Ernst, 1989).

Most individuals use different combinations of nonsymbolic communication behaviors in their daily exchanges with others (Seigel-Causey & Downing, 1987; Seigel-Causey & Ernst, 1989). It is likely that these communication behaviors were shaped into a repertoire through the exchanges and interactions among family members and others during daily activities (Bruner, 1977, 1981, 1983). Social interactions during daily activities that contain nonconventional, nonsymbolic communication behaviors develop into particular conventional, nonsymbolic behaviors that communicate critical information between the parent and child (Adamson, Bakeman, & Smith, 1988; Kaiser, 1993; Pien & McKibbin-Klein, 1989). For children with moderate to severe and multiple disabilities, this may lead to the development of idiosyncratic communication behaviors that may not be recognized across the child's various social contexts outside of the family, even though they may be

described as conventional within the verbal community of the family (Mirenda & Donnellan, 1986; Pien & McKibbin-Klein, 1989).

Use of unconventional forms of communication often compound the difficulties that occur when a person with severe disabilities participates in communication exchanges with other persons (Stillman & Siegel-Causey, 1989). Conventional speech and gestures convey salient messages that may be missed if similar messages are sent using vocalizations or facial expressions that are unfamiliar to communication partners (e.g., Drasgow & Halle, 1995). Thus, the communication abilities that a child demonstrates in one setting with specific communication partners may not generalize across settings or partners because the nonconventional communication behaviors are not recognized or because context variables such as nonconventional communication partner behaviors that set the occasion for the child's conventional communication behaviors are absent (Guess, Keogh, & Sailor, 1978; Mirenda & Donnellan, 1986; Romski, Sevcik, Reumann, & Pate, 1989).

Functional assessment and analysis procedures have been used to identify environmental conditions associated with occurrences of target behaviors (e.g., problem behaviors). Various methods have been used to identify and make a statement of the functional relationship among target behaviors or responses and environmental conditions or events. Such statements require a high degree of covariance of incidents that have been observed in a particular temporal sequence (e.g., when a specified event fails to follow a response, that response decreases in frequency). The results are summarized to describe the relationships among condition variables and target behaviors. These results can then be used to design interventions aimed at changing occurrences of target behaviors.

Functional Assessment and Analysis

Functional assessment refers to a range of strategies and procedures used to identify environmental conditions that appear associated with target behaviors. Functional analysis

refers to procedures used to manipulate and control the presentation of environmental conditions hypothesized to have a functional relationship with target behaviors, often in analog or simulated activities and clinical settings (Horner, 1994; Mace, 1994).

Results of functional assessment are obtained through an examination of environment-behavior interactions and corresponding temporal relationships of antecedents, consequences, and context variables associated with occurrences and non-occurrences of target behaviors. Procedures include: structured interviews, rating scales, record reviews, direct observations, and clinical intuition (Durand & Crimmins, 1991).

Results of functional analysis procedures are also obtained through examination of environment-behavior interactions and corresponding temporal relationships of antecedents, consequences, and context variables associated with occurrences and non-occurrences of target behaviors. However, a functional analysis empirically tests hypotheses regarding relevant variables with single-case research designs (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982; Kennedy & Itkonen, 1993; O`Neill, Horner, Albin, Storey, & Sprague, 1990).

A functional assessment and analysis of target communication behaviors examines the communication exchanges of a child and communication partner within a shared social context. This type of examination is critical for identifying context variables associated with conversational turn-taking and the events that precede and follow communication exchanges during daily activities.

Possible relevant context variables include biological states that appear to correspond with the child's communication behaviors (e.g., hunger or satiation; pain, discomfort or comfort; activity, attention or lethargy) and variables that characterize partner interaction styles (e.g., pace of turn-taking, eye contact) (Michael, 1988; Mirenda & Donnellan, 1986; Wetherby & Prizant, 1992). In addition within parent-child communication exchanges, context variables include the social uses of nonsymbolic,

nonconventional communication behaviors that can be interpreted by communication partners across social interactions and settings (Abbeduto & Rosenberg, 1987; McKirdy & Blank, 1982; Olswang, Bain, & Johnson, 1992; Peck, 1989).

Functional assessment and analysis methods have been used together to develop and test hypotheses that contain sets of variables (e.g., difficulty of task; choice) associated with occurrences of sets of target behaviors (e.g., on-task behaviors; problem behaviors) (Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991). In a hypothesis-driven model, functional assessment results (e.g., interview results) are used to develop hypotheses, and then functional analysis procedures (e.g., analog tests) are used to measure their validity (cf. Repp, Felce, & Barton, 1988). The usefulness of the hypothesis-driven functional assessment and functional analysis model has been demonstrated for developing intervention plans to decrease challenging behaviors of children with severe disabilities (e.g., Dunlap et al., 1991; North et al, 1991; Repp, Felce, & Barton, 1988).

Modified functional assessment and analysis procedures have been used to examine the communication behaviors of young children's who have severe disabilities (Brady & Halle, 1997; Drasgow & Halle, 1995). However, there has been limited demonstration of these procedures to examine the communication exchanges and corresponding social contexts of children with disabilities during daily activities. Also, previous research have predominately occurred in school settings with minimal descriptions of procedures and no inter-observer agreement assessment to evaluate results (e.g., Brady & Halle, 1997; Drasgow & Halle, 1995). Additionally, reported discrepancies between parent reports about child communication behaviors in the home and teacher reports about the child communication behaviors in the school suggest that variables associated with child communication behaviors in the home need further study (Brady & Halle, 1997).

Purpose of Study

Assessment and intervention practices for children with moderate to severe disabilities have moved away from the assessment of norm-referenced developmental skills towards identifying functional, age-appropriate skills necessary for participation in social contexts of daily life. The ultimate objective of assessment and intervention programs is to increase the child's social participation and membership across age-appropriate contexts in the community, with communication abilities that generalize to new situations and communication partners (Baumgart et al., 1982; Brown, et al. 1979, Haring, 1991a; Ford et al., 1989; Neel & Billingsley, 1989).

Functional assessment and analysis methods have been used to analyze context variables associated with target child communication behaviors. However, these methods have not been used with families to examine communication exchanges during daily activities in the home. Moreover, reports of functional assessment and analysis of child communication behaviors have been presented without sufficient details describing procedures or data to replicate the procedures or evaluate the results (e.g., Brady & Halle, 1997; Drasgow & Halle, 1995).

This study used a hypothesis-driven model that combined descriptive functional assessment and abbreviated experimental functional analysis methods in order to identify environmental conditions associated with child communication behaviors in the home. Study participants included four children with moderate to severe and multiple disabilities who communicated more at home with family members than at school with teachers and peers. The study was designed to answer the following three questions:

1. To what extent will a structured functional assessment interview lead to the identification of variables associated with occurrences of the child's communication behaviors?

2. To what extent does a combination of structured interview and direct observation functional assessment lead to hypotheses that predict functional relationships between condition variables and occurrences of the child's communication behaviors with adult communication partners during shared activities in the home?

3. When parents present results of functional assessment and analysis of child communication behaviors to personnel in the school, to what extent are these reports perceived as potentially useful in developing intervention programs that accelerate the child's communication behaviors at home and at school?

CHAPTER II

Review of Literature

Communication is a process of exchanging information as a means by which people affect each other's thoughts and actions (Skinner, 1957; Stillman & Siegel-Causey, 1989). Communication involves spoken and written language, speech, and a variety of behaviors such as facial expressions, vocalizations, gestures, movements, postures, and physical touches. Children have been studied within numerous models to describe the development of communication behaviors within social contexts (Bates, Comaioni, & Volterra, 1975; Brown, 1958; Bruner, 1977, 1983; Dale, 1976; McLean & Snyder-McLean, 1988; Wetherby & Prizant, 1992). That language and communication development is class-like, sequential, and novel has historically led researchers towards a study of the functional analysis of verbal behaviors, particularly in the area of teaching children who use nonverbal communication (Wetherby, 1978).

The linguistic structural models of language and communication development derived from syntactic, semantic, and cognitive studies of typical child development has lead to interventions with disappointing results for children with moderate or severe and multiple disabilities (Kangas & Lloyd, 1988; Reichle & Karlan, 1988). Too often these children fail to generalize new learning and abilities across settings and persons. This is particularly evident in regards to the generalization of communication abilities across social contexts (Bricker, 1992; Bryen & Joyce, 1985; cf. Guess, Keogh, Sailor, 1978; Miller, 1978). Bryen and Joyce (1985) identified major components of successful studies on language and communication interventions for children with severe disabilities. These components included: (a) conducting intervention in an ongoing, environmentally based context, (b) establishing attainable structural goals and functional goals that stress the importance of spontaneous communication for a variety of purposes, and (c) using methods of intervention that have been characterized as interactional (e.g., ongoing

modeling, play, commenting, waiting, being responsive to the communicative intent of the student's productions).

Many communication interventions for young children with disabilities have been designed with items from developmental sequences with little regard to the appropriateness of those skills for affecting a child's communication abilities within their current or future environments and relationships (Beukelman & Mirenda, 1992; Bricker, 1993; Bryen & Joyce, 1985). Explanations regarding why such intervention programs produced disappointing results for children with severe disabilities include: (a) the large discrepancy in learning acquisition rates between children with and without disabilities which may have resulted in what Neel and Billingsley (1989) term "learning only bits and pieces of the total picture"; (b) the emphasis on conventional, symbolic communication which may have prevented communication partners from recognizing, utilizing, and expanding the child's existing nonconventional, nonsymbolic communicative abilities such as gestures and facial expressions (Houghton, Bronicki, & Guess, 1987; Siegel-Causey & Guess, 1989); (c) inadequate emphasis on increasing spontaneous expressive communication skills for the child within motivating tasks and natural environments (Pien & McKibbin-Klein, 1989; Siegel-Causey & Ernst, 1989); and, (d) the use of contrived adult-centered environments which present environmental conditions with little generalization of stimuli to occasion the child's communication abilities across communication partners in natural settings (Bryen & Joyce, 1985; Kaiser, Alpert, & Warren, 1987, Neel & Billingsley, 1989).

Consequently, the target behaviors and contexts for assessment and intervention have changed in order to affect the functional abilities and pragmatic or social uses of language of children with their communication partners in the social contexts of their daily activities (Bricker & Cripe, 1992; Kaiser, 1993; Linder, 1993; Neel & Billingsley, 1989). These changes focus on functional assessments of the child's skills and abilities and identify ecological characteristics for designing intervention conditions and contexts, as

well as outcomes to evaluate treatment progress to improve the child's quality of life (Gaylord-Ross & Browder, 1991).

Assessment of Young Children's Communication

The contexts for assessment of children's communication abilities have moved away from isolated, adult-centered settings towards child-centered interactions within the environments of daily life (Bricker & Cripe, 1992; Kaiser, 1993; Neel and Billingsley, 1989; Olswang, Bain, & Johnson, 1992). Target behaviors include non-conventional and nonsymbolic communication behaviors such as facial expressions, vocalizations, and gestures. In addition, adult communication partner behaviors are used in strategies to facilitate target child communication behaviors (Kaiser, 1993; Olswang, Bain, & Johnson, 1992). These changes are based on findings from child development and communication theory and research indicating the importance of the pragmatic or social uses of language during daily interactions that facilitate child communication development (Adamson, Bakeman, & Smith, 1988; Bakeman & Adamson, 1986; Blank, 1983; Bretherton, McNew, & Beeghly-Smith, 1981; Bryen & Joyce, 1985; Cole, Dale, & Mills, 1991; Sugarman, 1983).

In addition, special education and speech, language, and communication research indicate the importance of functional outcomes or goals for the child with disabilities and communication partners during daily activities that meet immediate needs in order to facilitate communication development (Haring, Neetz, Lovinger, Peck, & Semmel, 1987; Kaiser, 1993; Kangas & Lloyd, 1988; Pien & McKibbin-Klein, 1989; Warren & Reichle, 1992; Yoder & Kraat, 1983). Parallel to these studies, AAC assessment models for persons with severe and multiple disabilities have evolved to include the social uses of nonconventional, nonsymbolic communication behaviors.

The American Speech-Language-Hearing Association (ASHA) defines augmentative or alternative communication (AAC) as: "... an area of clinical practice that

attempts to compensate (either temporarily or permanently) for the impairment and disability patterns of individuals with severe expressive communication disorders (i.e., the severely speech-language and writing impaired)" (ASHA, 1989, p.107). An ASHA position paper (ASHA, 1991) emphasizes that AAC interventions need to be multimodal and "utilize the individual's full communication capabilities, including residual speech or vocalizations, gestures, signs, and aided communication." Thus, for persons with severe and multiple disabilities the facial expressions, eye gaze, body postures, vocalizations, and other nonsymbolic communication forms and aids become target behaviors for assessments (Beukelman & Mirenda, 1992). The results are used in designing individualized AAC systems to affect independent living skills and quality of life (Beukelman & Mirenda, 1992; Reichle, Sigafoos, & Remington, 1991; Reichle, York, & Sigafoos, 1991; Romski & Sevcik, 1988; Stillman & Siegel-Causey, 1989).

These changes in forms provide guidelines for assessment and intervention practices aimed at accelerating the development of communication behaviors for children with moderate to severe and multiple disabilities.

1. Expand the use of nonsymbolic communication in order for the child to more effectively influence others and to become more active participants in their daily social interactions and communication exchanges (e.g., Bruner, 1981; Rowland & Stremel-Campbell, 1987). The use of nonsymbolic, nonconventional communication forms (e.g., gestures, vocals) by the child's communication partner helps them to convey information in a manner that is more readily detected and understood by the child (Baumgart, Johnson, & Helmstetter, 1990; Stillman & Siegel-Causey, 1989).

2. Use the range of the child's natural environments of everyday interactions as contexts in order to have a positive effect on the child's generalization of communication across settings and partners (e.g., Carlson, Hough, Lippert, & Young, 1988; Neel & Billingsley, 1989; Schreibman, 1988; Siegel-Causey & Guess, 1989). Using the naturally

occurring opportunities of daily life provides the child a logical framework for learning new communication behaviors.

3. Include the child's communication partners as participants in the communication assessment and intervention activities (e.g., Afflect, McGrade, McQueeney, & Allen, 1982; Bricker & Cripe, 1989; Kaiser, 1993; Linder, 1993; Reichle, Sigafoos, & Remington, 1991; Seigel-Causey & Guess, 1989; Walker & Kershman, 1981; Yoder & Kraat, 1983). The use of familiar communication partners enhances the intelligibility of communication exchanges for the child and the communication partners. In addition, when the assessment and intervention context is naturally occurring communication opportunities throughout the child's daily activities and routines the current communication repertoires of the parent and the child become the foundation for new learning.

4. Set the child's communication goals, objectives, and expectations to approximate the functional and pragmatic uses of same-age peers who have no identifiable disabilities with the existing forms in the child's repertoire (e.g., Beukelman & Mirenda, 1992; Kaiser, 1993; Neel & Billingsley, 1989; Reichle et al., 1991).

Assessment of child communication behaviors within an ecological or eco-behavioral learning environment describes characteristics of the child's behaviors, and the parent's behaviors, and of the physical contexts of daily activities and routines (Kaiser, 1993; Wahler, Berland, Coe, & Leske, 1977). These components of the child's learning environment contain the condition variables and values that facilitate communication behaviors.

Communication Partners and Social Context

Adult communication partners control many of the relevant variables that occasion child communication behaviors within a behavioral, social-interactionist model of language development (Kaiser, 1993). The naturally occurring interactions between parents and their young children provide a logical framework to learn the social uses of language (e.g.,

conversational turn-taking) during daily activities and routines (Kaiser, 1993; Snow, 1977). The communication partners of children who are experiencing severe communication disorders are often unaware that they often provide fewer opportunities for the child to initiate communication during exchanges or to participate in conversational turn-taking than the communication partners of children who have no disabilities (Afflect, McGrade, McQueeney, & Allen, 1982; Houghton, Bronicki, and Guess (1987); Walker & Kershman, 1981; Yoder & Kraat, 1983).

Houghton, Bronicki, and Guess (1987) reported that regardless of the age-level of the child with disabilities or type of setting (i.e., institution, school), classroom staff seldom responded to child-initiated expressions of choice and preferences. These communication partners also used different communication behaviors or forms than those that the children used in their turns (e.g., adult speech versus child gestures and vocalizations). Furthermore, Mittler and Barry (1977) noted that individuals with severe disabilities are generally functioning at a level below their capabilities, due in part to the failure of communication partners to provide appropriate opportunities for communication exchanges and conversational turn-taking to occur naturally during daily activities.

The parent- child or adult-child interactions are the social contexts used for parent-implemented interventions aimed to facilitate the language and communication development of young children with disabilities (Alpert & Kaiser, 1992; Bricker & Cripe, 1992; Linder, 1993). However, adaptations are often required of the social contexts and adult communication behaviors in order to fit a child's behavior and developmental characteristics (Kaiser, 1993; Linder, 1993). For example parents, may need to modify their communication behaviors to be more responsive and less directive (Cheseldine & McConkey, 1979), to follow the child's lead in conversations (Seitz, 1975), or to established balanced, less complex turn-taking to effect the child's communication abilities during exchanges (Cheseldine & McConkey, 1979).

The child's engagement in activities shared with the parent defines aspects of the social and physical environments that can be controlled to influence the child's communication abilities. The parent can act on multiple levels to facilitate child communication behaviors during shared activities. The parent's behaviors may act as a stimulus or set of stimuli to occasion child communication behaviors. For example, when the parent looking at the child and the act of looking with a type of facial expression (i.e., eyes opened wide, big smile with an open mouth) occasions child communication behaviors (e.g., an infant opening her mouth and reaching toward the parent). Parents may provide language models (e.g., expansion of child utterances) that occasion child communication behaviors. Parent's behaviors may act as a contingent responder during interactions. For example, specific parent's behaviors presented differentially in response to target child behaviors of a more general class or repertoire of behaviors may occasion higher frequencies of those target communication behaviors. Last, parent's control of the child's access to environments and materials may act to mediate the child's engagement and occasion child communication behaviors. Therefore, an analysis of both parent and child communication behaviors within natural environments and activities is necessary to assess and describe current abilities of child communication behaviors (Beukelman & Mirenda, 1992; Bricker & Cripe, 1992; Linder, 1993; Kaiser, 1993; Neel & Billingsley, 1989).

Relationships among condition variables and values of the physical environment, the social environment, and the child's behaviors affect a child's communication development and abilities. Within the field of applied behavior analysis, functional assessment and analysis procedures provide various methods to examine environment and behavior relationships in order to identify relevant condition variables and values and design interventions to change behaviors (Carr, 1994; Horner, 1994; Mace, 1994). A functional assessment and analysis of child communication behaviors within social contexts may identify relevant characteristics of condition variables and values associated with child

communication behaviors when the child fails to generalize communication behaviors between home and school.

Functional Assessment and Analysis

Wetherby (1978) points out that a functional analysis approach to language was first advocated by early American behaviorists (e.g., Kantor, 1929; Meyer, 1911; Watson, 1924; Weiss, 1929). To date, the study of linguistic systems to explain certain aspects of language learning (e.g., the novel characteristics of language) has guided research, along with the functional analysis of behavior model in the area of assessments and interventions for persons who have disabilities.

The power of a functional analysis of behavior is the predictability of occurrences and non-occurrences of behavior within contexts of specified environmental conditions (i.e., variables and values); according to White (1971) a functional analysis of behavior is "the identification and statement of the functional relationships obtain between an organism and its environment. Such statements require a high degree of covariance of incidents which has been observed in a particular temporal sequence (e.g., when a specified event fails to follow a response, that response decreases in frequency). A functional analysis need not be obtained experimentally, but the power of an experimental analysis is considerably greater."

In the last 10 years, numerous functional assessment and analysis methods have been used to identify condition variables and values associated with occurrences of problem behaviors such as self-injurious, aggressive, and excessive behaviors that served communicative functions for persons with severe disabilities (Carr & Durrand, 1985; Carr et al., 1994; Iwata et al., 1982; O'Neill et al., 1990). These methods are used to examine environmental conditions as antecedents, consequences, and context variables associated with target behaviors with results used in designing interventions to change target behaviors.

Functional assessments of problem behaviors include descriptive methods such as rating scales, structured interviews, and direct observations (e.g., Durand & Crimmins, 1988; Dunlap et al., 1991). A Functional analysis of problem behaviors consists of methods to isolate and control condition variables and values in order to observe corresponding effects on target behaviors within single-case research designs (e.g., Iwata et al., 1982). The methods provide opportunities for direct observations of within subject variation under different conditions in order to identify functional relationships between conditions and target behaviors.

A standard for functional analysis procedures is provided in a study by Iwata et al. (1982) on self-injurious problem behaviors. Participants ranged in age from 3 years, 7 months to 17 years, 2 months old with mild to moderate, severe or profound disabilities. Their self-injurious behaviors included self-biting, face slapping, head banging, eye-gouging, hand mouthing, and hair pulling. A multielement single-case design was used across four context conditions to identify high versus low covariance of target behaviors with context conditions. The dependent variables were observations of corresponding levels and types of self-injurious behaviors. The independent variables across four context conditions were "social," "alone," "academic," and "play." These conditions were presented as analog sessions in a clinical setting for 1-hour in the morning and 1-hour in the afternoon over several days. Results showed that specific context conditions affected self-injurious behaviors differently across participants. In general, relatively low levels of self-injury were observed during "play" conditions, and for several participants the levels of self-injury was observed to occur greatest during the "alone" conditions. The occurrence of self-injury varied considerably, both between and within individuals (Iwata, et al., 1982). These functional analysis procedures provide an evaluation of internal validity through the manipulations and replications of condition-behavior interactions (i.e.,

functional relationships). The analog tests demonstrate sources of variance that control observed occurrences of target behaviors over time intervals (Carr, 1994).

Functional analysis procedures have been reported effective in identifying environmental determinants of self-injurious behavior on an individual basis, guiding the design of intervention programs that changed target behaviors (e.g., Derby, Wacker, Sasso, Steege, Northup, Cigrand, & Asmus, 1992; Iwata, et al., 1994). For example, when results indicate that the function of a targeted behavior is communicative (e.g., to request), relevant condition variables and values are used to design an intervention to teach an alternative, more acceptable, communication behavior (i.e., form) that serves the same functional relationship to context variables (e.g., Carr & Durand, 1985; Drasgow & Halle, 1995).

One of the limitations of the Iwata et al. (1982) study is the use of numerous analog sessions conducted over several days. These procedures are difficult to replicate within natural settings and conditions (e.g., homes, out-patient clinics, schools). Therefore, functional assessment methods have been combined with abbreviated analysis procedures designed to fit the constraints of natural settings (e.g., Cooper, Wacker, Sasso, Reimers, & Donn, 1990; Northup et al., 1991; Repp, Felce, and Barton, 1988).

One combination is the hypothesis-driven model developed by Repp, Felce, and Barton (1988). First, direct observations of target behaviors are made in natural settings to record any correlation between target behaviors and possible relevant condition variables and values. Then, hypotheses are developed that describe functional relationships among these conditions and occurrences of target behaviors. Last, an intervention is designed based on those hypotheses to change target behaviors. The success of the intervention to change target behaviors is used as a quasi-experimental evaluation of the hypotheses.

In another example of the hypothesis-driven model, functional assessment and analysis procedures were combined to meet the restrictions of an outpatient clinic for

children who displayed challenging and self-injurious target behaviors (e.g., Derby, et al., 1992). Derby et al. (1992) provided a summary of 79 cases from a clinic that used brief functional assessment and analysis methods where outpatient evaluations were limited to 90-minutes. Prior to the clinic evaluation parents completed the Motivation Assessment Scale (MAS) (Durrand & Crimmins, 1988) to provide functional assessment data on possible relevant condition variables and values associated with target behaviors. This information was used to develop hypotheses. The hypotheses contained context conditions that predicted occurrences of target behaviors. Multielement and reversal single-case designs were used to develop and test hypotheses across conditions of "alone," "escape," "attention," "demand," or "tangible." The authors reported that the brief functional analysis methods were more effective for high-frequency rather than low-frequency behaviors observed in the clinic. They stated that brief analog procedures are preferable to indirect methods alone (i.e., functional assessment rating scales), but are not as accurate in identifying controlling variables as extended analog procedures (cf. Iwata et al., 1982).

Other hypothesis-driven model combinations of functional assessment and functional analysis analog procedures have been designed to meet the requirements of complex natural settings (e.g., Carr & Carlson, 1993; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Sasso et al., 1992). These methods included combinations of functional assessment interviews, direct observations, and functional analysis analog sessions, but with fewer analog sessions than the extended procedures of the Iwata et al. (1982) study (e.g., Northup et al., 1991; Sasso et al., 1992).

In one example, Dunlap et al. (1991) examined the effects of context variables on severely disruptive behaviors of a 12-year-old in school. Functional assessment data were collected though direct observations, interview and rating scale questions from 28 respondents who had regular contact with the student. The assessment results were used to develop hypotheses that predicted the disruptive behaviors or on-task behaviors required to

complete school work. Hypothesis variables included antecedent factors and specific stimulus conditions (e.g., fine versus gross motor activities, short versus long tasks, activity student choice versus no student choice). The functional analysis analog conditions presented the student opposing sets of context condition variables and values (e.g., fine versus gross motor activities). Four hypotheses were tested during analog sessions within a single-case reversal design of three to four replications over four school days. Levels of observed on-task and disruptive behaviors varied systematically with condition changes. For example, higher levels of on-task behaviors and lower levels of disruptive behaviors were observed during conditions of fine motor activities, shorter tasks, and when the student selected the task. Results were used to design curricular modifications that contained the conditions associated with low levels of disruptive behavior and high levels of on-task behavior. The curricular modifications produced substantial and durable reductions in the student's long-standing severe behavior problems (Dunlap et al., 1991).

The hypothesis-driven model of functional assessment and analysis has been used successfully in collaboration with parents whose children exhibited problem behaviors (Arndorfer, Miltenberger, Woster, Rortvedt, & Gaffaney, 1994). Parents have participated in the functional assessment and analysis activities, including the development of hypotheses from assessment results and subsequent functional analysis analog tests. For example, a single-case reversal design was used to examine possible controlling conditions (i.e., attention, escape, tangible) of child target behaviors (i.e., hitting, noncompliance, grabbing, throwing, head banging). Results were used to design a communication intervention for two of the children within natural contexts. The functional assessment and analysis hypothesis-driven model used with parent participation in natural settings effectively identified the controlling condition variables of their children's problem behaviors (Arndorfer et al., 1994). The use of functional assessment and analysis procedures on problem behaviors has more recently been applied to the analysis of other

forms of communication behaviors displayed by children with severe disabilities (Brady & Halle, 1997; Drasgow & Halle, 1995).

Functional Assessment and Analysis of Child Communication Behaviors

Brady and Halle (1997) and Drasgow and Halle (1995) reported their use of functional assessment and analysis procedures to study the communication behaviors of children and youth with severe disabilities during daily activities. Drasgow and Halle (1995) used descriptive assessment interviews with parents and teachers, direct observations, and environmental manipulations as analog tests to develop and test hypotheses that interpreted the idiosyncratic communication behaviors of a 4-year-old boy with moderate to severe disabilities. Direct observations were conducted to record occurrences of target behaviors across daily activities to identify high frequency periods of target behaviors across contexts and possible functions they served the child in school. The results were used to design an intervention aimed to replace the child's target behaviors with conventional communication behaviors. The replacement behaviors were to serve the communication functions of requesting or rejecting and replace the target behaviors of grabbing, leading an adult by the hand, and pushing away. Complete descriptions of the functional assessment and analysis procedures along with inter-observer agreement scores of observations were omitted in the report. These omissions limited the evaluation and replication of study procedures and results.

Brady and Halle (1997) reported two case-studies as illustrations of functional assessment and analysis analog procedures (i.e., interviews, direct observation, and analog probes). These procedures were used in combination to evaluate idiosyncratic communication behaviors of a 5-year-old and a 15-year-old, both with severe disabilities. In the case on the 15-year-old, the assessment interviews were completed with parents and teachers to describe the child's current communication behaviors and abilities during daily activities. There were discrepancies between parent and teacher reports of the child

communication abilities in the home and the school. Parents reported more varied child communication behaviors in the home than were reported by teachers in the school.

The interview results were used to schedule direct observations of child communication behaviors during school activities. Child communication behaviors were observed and recorded in an ABC (antecedent, behavior, consequence) format. However, no inter-observer agreement scores were reported to evaluate the reliability of the observation data. Functional analysis analog data were collected during an adult-directed, mass-trial format where the child was provided nine opportunities to respond to condition variables and values chosen to evoke different communication functions (e.g., to request, reject, comment on food or toys). Results were used as recommendations to teachers for communication intervention options in the school. In response to parents reporting more varied communication behaviors in the home than teachers reporting in the school, the authors suggested that functional assessment and analysis of child communication behaviors in the contexts of the home could indicate condition variables and values necessary to set to occasion for similar child communication behaviors in the school.

In the case involving the 5-year-old, assessment interviews were completed with the child's mother, teacher, and paraprofessional in the school. The interview results were used to schedule direct observations of the child communicating during daily activities in the school. Child communication behaviors were recorded in the ABC format in the gym, on the playground, and during a classroom snack time. Functional analysis analog probe observations were used to answer specific functional assessment questions, framed as hypotheses. For example, one probe was used to determine if the child followed the teacher's speech direction, "Get your coat" or whether the child relied on modeling, visual, and sequence cues within the classroom routine to successfully follow the direction. A second probe was used to test whether the child could interpret a visual discrimination cue within a daily routine. Teachers used results to design intervention programs to help the

child respond to teacher directions more successfully and to use photograph cues to request teacher assistance when walking the stairs at school.

Detailed descriptions of the functional assessment and analysis procedures, as well as inter-observer agreement scores of the direct observation data were omitted in both case studies (Brady & Halle, 1997). The paucity of procedural data reported in recent studies warrants further and more complete examination in this area, particularly to provide descriptions of data collection procedures with inter-observer agreement scores of observation data.

Of particular benefit for children with severe disabilities would be the functional assessment and analysis of their communication behaviors during daily activities in the home when the child communicates more in the home than in the school (cf. Brady & Halle, 1997). The results could be used to design communication interventions with similar communication opportunities in the school in order to accelerate the child's communication behaviors and abilities across natural settings.

Summary and Redirection

The physical environment, the social environment (e.g., parent) and the child are components of the child's language learning system used in designing communication interventions for children with disabilities (Kaiser, 1993). The child's engagement in shared activities coupled with the parent's behaviors functioning on multiple levels (e.g., stimulus, language model, contingent responder, mediator) facilitate child communication behaviors for assessment. Hypothesis-driven functional assessment and analysis procedures have proven effective in identifying environmental determinants of problem behaviors for persons with severe disabilities. More recently, these procedures have been used to assess other communication behaviors of children and youth with severe disabilities. The results have been used to develop communication intervention programs in school (e.g., modified incidental teaching). In addition, parents have actively

participated with their children in functional assessment and analysis activities, but to date, parents have not participated in functional assessment and analysis procedures to examine their own communication exchanges with their children during daily activities in the home.

The practical application of these results would particularly benefit parents who report that their child communicates more in the home than in the school during similar daily activities, but are unable to demonstrate their child's communication abilities in the school. The functional assessment and analysis procedures in this study were conducted with parents and their children in the home and included: (a) interviews with parents and teachers, (b) the transcription of direct observations of communication exchanges between the parent and the child that occurred naturally in the home to analyze conversational turn-taking, (c) development of hypotheses with relevant condition variables and values to predict occurrences of child communication behaviors during activities in the home, and (d) functional analysis analog tests to evaluate the validity of the hypotheses. Parents and the investigator shared the results with their children's teachers, and follow-up interviews of teachers and parents were used to determine to what extent results were viewed as potentially useful in designing interventions to accelerate the child's communication behaviors and abilities in the school and in the home.

CHAPTER III

Method

The first study objective was to determine whether results from an interview with parents (i.e., the functional assessment method) would identify condition variables and values associated with occurrences of their child's communication behaviors during daily activities in the home. The second objective was to determine the extent to which hypotheses developed regarding these condition variables and values predicted changes in occurrences of the child's communication behaviors in the home (i.e., the functional analysis analog tests). The final objective was to determine the extent to which family members and school personnel viewed the functional assessment and analysis results as potentially useful in designing interventions aimed to accelerate the child's communication behaviors at home and at school.

Subject Selection Criteria

The participants in this study were preschool-age children with moderate to severe and multiple disabilities, their parents, and classroom teachers. The speech and language pathologists (SLPs) that worked with the children in the school participated in study activities to a lesser extent due to their large case loads and scheduling conflicts.

There are three rationales that determined subject selection criteria. First, the focus of study was the functional and pragmatic child communication behaviors that a child used in the home, but not generalized by the child during similar activities in the school. Thus, teachers and SLPs reports of the child's communication repertoire in the school, discrepant with parent reports of the child's repertoire in the home, were necessary to identify children and family participants. Second, the development of a child's communication repertoire occurs within the contexts of daily activities and routines with parents and caregivers. Thus, it was necessary for parents willing to participate and collaborate with the investigator to examine their child's communication behaviors in the home. Third, the

social validity of the functional assessment and analysis procedures required the potential use of results by parents, teachers, and SLPs in designing interventions aimed to increase the child's communication behaviors in the school and in the home. In addition, children who displayed challenging behaviors were not included as participants because of the need to design interventions aimed to decelerate and extinguish these behaviors. Following are the criteria used to select child participants.

1. The child was enrolled in a preschool or kindergarten early childhood special education program.
2. The child's Individual Education Program (IEP) contained communication goals and objectives to increase communication within the contexts of daily activities, supervised by a speech language pathologist (SLP).
3. The child's IEP documented that the child had moderate to severe and multiple disabilities and/or multiple developmental delays with an indication of moderate to severe cognitive delays.
4. The child's IEP contained no goals or objectives targeted for the management of challenging behaviors (e.g., self-injurious, aggression towards others).
5. The child's teacher, SLP, and parents reported that the child's communication behaviors are difficult to predict, and the parents reported that the child's communication repertoire was more complete at home than what he or she demonstrated at school and performed during school based assessments. Thus, a discrepancy was reported in the child's communication behaviors during similar activities in the home and in the school.

Participants and Settings

Four preschool-age children with moderate to severe and/or multiple disabilities participated in the study with their parents, classroom teacher, and SLP. Two of the

families lived in Seattle and two families lived in suburban communities within 20 miles of Seattle. The children and their families were identified through a series of steps.

First, informed consent study information packets were sent to local early childhood special education school administrators in the Seattle area. Administrators who were interested in the study then shared the information packets with early childhood special education teachers and SLPs in their programs. Second, teachers and SLPs shared information packets with families who had children who met study criteria. Third, early childhood special educators, SLPs, and interested parents of children who met study criteria discussed the study with the investigator, and then signed individual informed consent agreements to participate in the study (see Appendix A, Human Subjects Informed Consent Information Packet).

All four children attended half-day, special education preschool or kindergarten programs where they were integrated in classrooms with typically developing peers. Lara, Kevin, and Cory attended university-based preschool classrooms with approximately a two to one ratio of children with disabilities to children without disabilities. Will attended suburban elementary school in a classroom of 12 children where he was the only child with a disability. The children were three boys and one girl, ranging in age from 4-years-old to 6-years 8-months old. A SLP provided therapies for the children in their schools as prescribed on their IEPs.

Lara was a 4-year-old girl diagnosed with a multiple metabolic disorder of unknown etiology associated with moderate to severe delays across all developmental areas (e.g., motor, speech, language, cognition, social). She used vocalizations and gestures to communicate. Her IEP communication goals and objectives included using picture-symbols and a communication board to make requests during daily classroom activities and routines.

Kevin was a 6-year 8-month old boy diagnosed with Down syndrome. Kevin used speech, vocalizations, and gestures to communicate. His IEP communication goals and objectives included using spontaneous three word utterances during daily activities in the classroom and the home.

Cory was a 4-year 11-month old boy diagnosed with a Pervasive Developmental Disorder (PDD). Cory used speech, vocalizations, and gestures to communicate. His IEP communication goals objectives included his imitation and spontaneous use of two and three word phrases during daily activities.

Kevin and Cory attended the same classroom and Lara attended a different classroom in the same school. They were half day early childhood special education preschool programs that emphasized age-appropriate functional and communication skills curriculum. Instruction was provided by a teacher, assistant teacher, and several graduate students participating in practica experiences.

Will was a 5-year 4-month old boy diagnosed with Down syndrome and Hyesnebsryer's Disease. Will used speech, vocalizations, and gestures to communicate. His IEP communication goals and objectives included using three word phrases and location words during classroom activities. Will attended a half-day kindergarten program at a general education elementary school in his home school district. Instruction was provided by a teacher, assistant teacher, and several parents who rotated as helpers in the class.

General Procedures and Timeline

Study activities were completed in stages and took place in each child's home and school (see Table I. Sequence of Stages and Study Activities). Stage One examined the parent-reported discrepancy in the child communication behaviors in the home and in the school during similar daily activities. Stages Two, Three, and Four activities followed if Stage One results indicated that the child communicate more in the home than in the school.

Table I. Sequence of Stages and Study Activities

In the Home	In the School
Stage One:	
1. Conduct parent interview and direct observations of the child to determine if a discrepancy exists in child communication behaviors between home and school	2. Conduct teacher and SLP interviews and direct observations of the child's to determine if a discrepancy exists in child communication behaviors between home and school
Stage Two:	
1. Conduct functional assessment interview with parents to describe child's communication repertoire and contexts; schedule observations of child communicating most often with parents during daily activities in the home	
2. Conduct observations of communication exchanges between child and parent; transcribe communication behaviors from audio-tape recording of exchanges with observation notes.	
3. Develop hypotheses with parents from analysis of observation transcripts; identify condition variables and values that predict increases and decreases in child communication behaviors	4. Conduct observation probe of child communication behaviors in the school to examine any changes in child communication behaviors from data recorded in Stage One observations.
Stage Three:	
1 Conduct functional analysis analog tests to evaluate hypotheses predicting occurrences of child communication behaviors	
Stage Four:	1. Conduct parent meeting with teacher and SLP to share results and discuss their potential usefulness in designing interventions to accelerate the child's communication behaviors in the school and in the home.
2. Conduct follow-up interviews with parents to determine potential usefulness of study activities and results in designing interventions to accelerate their child's communication behaviors in the school and in the home.	3. Conduct follow-up interviews with teachers and SLPs to determine potential usefulness of study results in designing interventions to accelerate their child's communication behaviors in the school and in the home.

Some of the activities in this study were similar to those reported by Drasgow and Halle (1995) and Brady and Halle (1997). However, this study added more activities in stages and collaborated more closely with parents completing the activities in the home than the previous studies.

The Stage One activities were used to identify target children for this study who communicated more at home than at school. The issue was generalization of a child's established communication repertoire across settings. This stage was not necessary in the previous studies because the research addressed problems within a child's existing repertoire of communication forms (cf. Brady & Halle, 1997; Drasgow & Halle, 1995). Thus, the focus was to change existing forms and replace them with functionally equivalent and more socially acceptable forms.

The Stage Two activities of functional assessment interviews with a child's adult communication partners and observations of the child communicating were similar to the previous studies (cf. Brady & Halle, 1997; Drasgow & Halle, 1995). However, this study was conducted in collaboration with parents, primarily in their homes to examine their child's communication exchanges during daily activities. The previous studies activities were conducted primarily in school or clinical settings with parents providing assessment interview data and opportunities for observations. The observation data in this study included extended language sample data of transcribed parent-child communication exchanges which were used to analyze both child and parent communication turns. The previous studies examined only the child's use of different communication forms and functions across settings.

The hypothesis development activities in this study were different in two ways from the previous studies (cf. Brady & Halle, 1997; Drasgow & Halle, 1995). First, the observation transcriptions of consecutive conversational turns were analyzed with the parents to develop hypotheses predicting child communication behaviors. In the previous

studies the authors developed the hypotheses from interview and observation results that predicted occurrences of specific communication forms and communication functions (e.g., requesting, rejecting).

Stage Three analog tests were also different in this study. The purpose of this study was to determine context conditions, controlled by adult communication partners, that occasioned child communication behaviors during daily activities. The unit of analysis was the communication exchange between an adult and the child. The previous studies tested hypotheses on form-function relationships within the child's communication repertoire either through observations during daily activities or during massed trial analog tests of communication functions (e.g., requesting, rejecting) and parents were not involved in these activities. The hypotheses of this study were developed with parents and were tested using systematic observation procedures and manipulations of conditions during daily activities in the home.

In addition, the Stage Four parent meetings with teachers to share results and the follow-up interviews to determine their potential usefulness to accelerate the child's communication behaviors in the school were omitted from the previous studies.

Stage One. The teacher, SLP, and parent reports of discrepancies in child communication behaviors between home and school were examined using event-recording observations and inter-observer agreement procedures. Separate interviews were completed with parents in their home and with teachers and SLPs in the school. The family interviews were audio-taped recorded and later transcribed onto the Communication Screening Interview protocol (see Appendix B, Functional Assessment and Analysis Protocols). A similar interview was completed with each child's teacher and/or SLP. The purpose of the interviews was to describe the child's communication repertoire and schedule observations of the child's when the child communicated most often in exchanges with others in the home and in the school. A 5-minute event-recording, observation system

was used to measure child communication behaviors during three sessions in the school and three sessions in the home. Two observers recorded child communication behaviors as events across six communication forms (e.g., speech, gesture, facial, AAC, physical, vocal), as they were observed across 10-second intervals of a 30-minute session. The 5-minute time frame was used because it approximated the duration of engagement with an activity expected of preschool-age children. If the child was observed to communicate more in the home than in the school, then the functional assessment and analysis activities were initiated with the child and parents in the home. All children who began Stage One activities demonstrated a discrepancy in their communication behaviors between the home and the school and completed all study activities.

Stage Two. The first activity of Stage Two was the functional assessment interview. The purpose of the interview was for parents to describe in detail their child's communication behaviors, the types of communication forms and functions used in exchanges with their child, and the contexts and types of activities when their child communicated most often with them. The Stage One and Stage Two parent interviews were collapsed into one interview for the last two children in the study. This eliminated redundancies of interview questions and used parents' time more efficiently. Interview data were used to identify and schedule observations of child and parent communication exchanges during daily activities.

The second activity involved observations of child and parent communication exchanges. The observations included audio-tape recording speech and vocalizations and written notes of non-verbal communication behaviors and context events during the activity. These data were combined and transcribed onto the Stage 2 - Observation Assessment protocol (see Appendix B, Functional Assessment and Analysis Protocols).

The third activity was the analysis of the transcriptions of the child and parent communication exchanges. The transcription contained consecutive communication turns

and exchanges. The turns were marked with cumulative minutes and seconds over the duration of the activity in order to identify communication exchanges. Longer versus shorter exchanges and corresponding adult language used in those exchanges were coded across categories such as: (a) forms of specific communication behaviors (e.g., speech, gesture), (b) types of pragmatic communication (e.g., giving or following directions), or (c) types of communication and social function (e.g., a adult request used to maintain the social interaction). Analyses were completed with parents from reading transcription, recalling activity events, and sometimes listening to the audio-tape recording of exchanges. The outcome was to develop two hypotheses that identified condition variables and values: One that predicted increases and a second that predicted decreases of child communication behaviors in the home.

The fourth activity of Stage Two was an observation of the child in the school. An observation probe was conducted of child communication behaviors in school administered commensurate to the observation system used in Stage One. The probe results were compared to the Stage One results and used to monitor any changes in the child's communication behaviors in the school.

Stage Three. The hypothesis evaluation process or functional analysis analog tests used a single-case ABAB withdrawal design (Barlow & Hayes, 1979). The conditions relevant to each hypothesis was assigned to a treatment condition: the hypothesized condition to increase child communication was Condition A and the hypothesized condition to decrease child communication was Condition B. Two activities were alternated across conditions in the procedures. These sessions were audio tape recorded with the event-sampling, direct observation system used to record child's communication behaviors over four 5-minute sessions structured as ABAB.

Stage Four. Parents and the investigator shared the functional assessment and analysis results with each child's teacher and/or SLP at a scheduled meeting in the school.

Within two weeks after the meeting, separate interviews were conducted with school personnel and family members to determine to what extent the study results were judged to be of potential use in the design of communication interventions to accelerate child communication at home and at school.

Timeline. The four children followed separate start dates and pacing of project activities. The purpose of the staggered starting dates was to provide consecutive opportunities for problem solving and reflection on study activities to improve procedures (e.g., combining Stage One and Two parent interviews). This process had a cumulative benefit of streamlining study activities and procedures to for the last two children to meet the time constraints of families and natural settings. Study activities for each child were completed within 12 weeks.

Data Collection and Measurement

Following are descriptions of the various procedures used to collect and analyze the functional assessment and analysis data.

Interview Data. The purpose of Stage One interviews was to identify the time of day, the activities and communication partners, and the communication behaviors and functions used by the child when he or she communicated most often with others. Interviews took 15 to 20 minutes to complete and the information was used to schedule observations of child communication behaviors in the school and in the home.

The purpose of the Stage Two parent interviews was to elaborate on information from the Stage One interview. This information regarded settings, partners, and communication behaviors used by the child and family members during their exchanges. Information included a general description of their exchanges in terms of duration and the variety of functions or outcomes they might serve the speaker. Stage Two interviews took 30 to 45 minutes to complete. Written notes were taken during the interviews and all interviews were audio-tape recorded. Parents identified any context or event factors that

might be associated with differences in their child's communication behaviors (e.g., how the child may communicate differently when hungry, tired, sleepy, and during play-time interactions).

In addition, parents identified any medications that the child took and possible side-effects that may interact with their child's abilities to communicate with others. Last, parents provided a brief developmental history of the child's social interaction and communication behaviors. The purpose was to describe differences and changes in their child's communication repertoire over time. As mentioned previously, the Stage One and Two parent interviews were combined into one interview format for the last two children. Thus, the Stage One interview was expanded to include Stage Two questions and elaboration of answers. The one interview took 30-45 minutes to complete and obviated the need for a second interview.

Direct Observation of Communication Forms. An event-counting observation system was used to record occurrences of the child's communication behaviors during Stage One observations and Stage Three analog tests. Child communication behaviors were recorded across six communication forms (described below) within 30, 10-second intervals, as partial interval events observed over a 5-minute observation session. Partial interval refers to an event needing to be observed for a portion of a 10-second interval in order to be recorded. The child communication behaviors were collapsed into the following six communication forms (e.g., Beukelman & Mirenda, 1992; Reichle, York, & Sigafoos, 1991).

1. Speech behaviors were any spoken word, word combinations, or word approximations. This included echolalia and imitated utterances that occurred within communication exchanges.

2. AAC behaviors were augmentative and alternative communication forms, including the use of manual sign language, picture symbols, line drawings, photographs,

written words, Braille, Bliss, or other conventional symbolic system to convey meaning to others.

3. Gestures were body movements such as reaching, extending or showing objects to others, pointing towards objects or individuals, waving, nodding, shaking head, shrugging shoulders, or mimicking other's behavior to convey meaning.

4. Facial behaviors were expressions defined as facial muscle movements such as smiling, frowning, and gazing with body orientation towards a communication partner.

5. Vocals were utterances such as cries, whining, cooing, gurgling, laughing, and other unintelligible sounds that were not word approximations.

6. Physical behaviors were forms of communication where the speaker's body movements contacted the listener's body such as touching, hugging, grabbing, pulling, pushing, kissing; or, physically moving to comply with directions, instructions, and requests of a communication partner (e.g., child's compliance to adult's directions).

These categories included both conventional, nonconventional, symbolic, and nonsymbolic communication behaviors. Children's and adults' uses of communication within social contexts contain this range of behaviors, thus their inclusion was necessary in order to assess their communication abilities (Beukelman & Mirenda, 1992; Siegel-Causey & Guess, 1989).

The observation rules required that observers record all observed communication forms expressed by the child within each 10-second interval. Events were recorded when the child expressed one or more of the six communication forms and was located within 3 feet of a communication partner. The 3-foot rule was an arbitrary standard to discriminate communication directed to others versus speaking to one's self. Exceptions to this distance rule were communication turns that identified a partner by name. For example, a father calling his daughter by name from across the room. The partial interval rule meant that a communication form was recorded as an event if observed within a 10-second interval,

even if its duration occurred only during a portion of the interval (e.g., 2 seconds). However, if the communication form extended across intervals it was only counted once in the interval where it was first initiated by the speaker. So if a child extended her arm in a gesture for 12 seconds, it would only be counted once.

Two or more different communication forms observed sequentially were recorded as separate events. To record two identical forms as two separate events, a 3-second interval between identical forms was the rule. For example, if the child (a) extended her arm, (b) smiled and opened her eyes and mouth, and (c) said, "aheee aheee aheee" almost simultaneously while standing less than 3 feet from her communication partner, it would be recorded as (a) "one gesture," (b) "one facial," and (c) "one vocal." The second and third vocal would not be counted because less than 3-seconds passed between each vocal event. However, if there were more than a 3-second pause between vocal events, then they would be counted separately as three discreet events (i.e., communication forms). Similarly, because her arm extension was sustained over several seconds it would be counted as a single discreet event (i.e., one gesture). However, if the child brought the arm back to her side, paused 3 or more seconds and then extended her arm again, it would be counted separately as two discreet events (i.e., two gestures). An audio cassette player with a prerecorded tape was used to cue 30, 10-second intervals, and a y-jack connecting two sets of earphones synchronized the concurrent observations procedures for two observers.

Observation Language Sample. When it was determined that the child communicated more in the home than in the school, the problem was how to sample the communication exchanges of daily activities to analyze conditions associated with the conversational turns of the child and parent. The method was to audio-tape record and then transcribe the communication turns and exchanges for the duration of a 30-45 minute daily activity for later analysis (Klee, 1992). This method of data collection was used during Stage Two observations and Stage Three analog tests. The data were transcribed as

consecutive conversational turns between the child and adult communication partner. Conversational turns were defined as the communication behaviors or continuous "talking" by a speaker followed by "talk" by a communication partner or by a definite pause or period of silence of 5 seconds or more (McKirdy & Blank, 1982). Both the Stage Two observations and Stage Three analog tests recorded the child's and communication partner's communication behaviors as a continuous language sample of a daily activity (Klee, 1992). A professional grade stereo cassette recorder (Sony Walkman Professional WM-D3) was used with an omni-directional microphone to record the speech and vocalizations during the activity.

The consecutive turns were marked with cumulative minutes and seconds over the duration of the activity to record communication exchange duration. Communication exchanges were successive parent and child conversational turns when the child and the communication partner were positioned less than 3 feet of each other and a change in turns occurred within 5 seconds. After each observation, family members reported whether the child demonstrated typical communication behaviors and interactions during the activity. If parents reported that the child's behaviors were not typical, then subsequent observations were rescheduled until typical behaviors were observed by the parent. Typical child communication behaviors were always reported by all parents during study activities.

Analysis of Language Sample Transcriptions. Sustained turn-taking between the child and the parent was analyzed within a transactional framework of communication exchanges (Kaiser, 1993; McLean & Snyder-McLean, 1978). In this framework, the speaker-listener communication behaviors contain the stimuli that set the occasion for occurrences or non-occurrences of each other's behaviors. The parent and the child are engaged within a daily activity or routine and interact contingent upon each other's behaviors. The parent, as the more able communicator, usually mediates the physical and

social interactions for the child, linking their communication behaviors into turn-taking conversational exchanges.

The parent communication behaviors may serve as a familiar event, conditioned reinforcer, instructional prompt, a general or specific language model, a general or specific contingent response, or as a mediator or interpreter engaging the child with environments and contingent events (Kaiser, 1993). Moreover, parent's communication behaviors during conversational turn-taking may provide topic maintenance, semantic matching, and expansions of the child's utterances are special cases of contingent responding (see Table III, Examples of Communication Turn Analysis). These types of adult communication behaviors and turn-taking characteristics, with specific reinforcement contingencies, may facilitate the child's communication behaviors (Hart 1985; Hart & Risely, 1982; Kaiser, 1993; Linder, 1993).

Characteristics of adult communication that appeared to correspond with child communication behaviors were used to develop hypotheses that predicted occurrences of child communication behaviors during activities. Following is an example of a hypothesis predicting increases in child communication behaviors: Child will use vocals, gestures, and speech to comment, request, initiate, and maintain communication exchanges with an adult partner when the partner follows the child's lead with comments and open-ended questions that have referents in the physical context and are logically linked to the sequence of their interactions. [specific example]

Transcription Analyses for Hypothesis Development. The development of plausible hypotheses predicting increases or decreases in the child's communication behaviors began at Stage Two interviews. The investigator introduced and explained terms to parents regarding the communication forms and functions and the social functions within their exchanges. The purpose of referencing technical terms was to provide the parents with a vocabulary to discuss the possible differences between longer versus shorter

communication exchanges. Longer communication exchanges were valued as better than shorter exchanges or no exchanges between the parent and the child.

Communication functions were divided into comment/tact, request/mand, and refusal/tact or mand (cf. Reichle, York, & Sigafoos, 1991; Skinner, 1957; Wetherby & Prizant, 1992). Referencing the transcriptions, these communication behaviors and functions became the focus of discussion and analysis within and across longer versus shorter parent-child exchanges (see Table II. Communication Function Terminology, and Table III. Examples of Communication Turn Analysis).

Social functions were defined as communication behaviors that conveyed information intended to affect the social interactions embedded within communication exchanges and corresponded to communication functions. Social functions were divided into behaviors intended to initiate, maintain, or terminate the social interactions with the communication partner (Reichle, York, & Sigafoos, 1991). These are just a sample of the social functions that may serve speakers and listeners (cf. Reichle, Halle, & Johnston, 1993). However, in discussions with parents, these general descriptors of social functions were sufficient for a pragmatic analysis of the communication exchanges.

Table II. Communication Function Terminology

Comment/Tact: speech, AAC, gestures, vocals, or physical proximity that acted as a statement to convey information or express an opinion to a communication partner; a communicative act in which there is a fixed or definitive relation between the antecedent stimulus and the form of the response; and where the response is maintained by a generalized reinforcer.

Type	Specific Stimulus →	Specific Response CHILD →	Generalized Reinforcer
Comment/Tact	(child drinks cold juice)	"Cold"	Parent smiles at child

Request/Mand: speech, AAC, gestures, vocals, or physical proximity that asked for something (e.g., access to materials, objects, sensory stimulation) from the communication partner; a communicative act in which there is a fixed or definitive relation between the response and the consequence or reinforcer (which is provided by the listener-responder); and the antecedent stimulus can be a specific or nonspecific to the response.

Type	Specific Stimulus →	Specific Response CHILD →	Specific Reinforcer
Request/Mand	(unobserved)	Child says, "Here me do it"	Parent says, "U" (child places piece in puzzle)

Refusals: speech, AAC, gestures, vocals, cries, physical contact, or physical behavior aimed to reject, protest, or show displeasure towards a communication partner, an object, material, or the content of the communication message. Refusals act as a **tact** when stated as a comment (e.g., "I don't want that"), but defined as a **mand** when a definitive consequence is provided by the listener-responder (e.g., "No, stop that!" Whereupon the listener-responder stops tickling the child).

Type	Specific Stimulus →	Specific Response CHILD →	Generalized Reinforcer
Refusal/Tact	(unobserved)	Child says, "No want"	Parent smiles and continues drinking milk
Refusal/Mand	Adult says, "Where does the star go?"	Child says, "No want star I need"	Specific Reinforcer: Adult says, "Okay, not ready"

Table III. Examples of Communication Turn Analysis

Type	Specific Stimulus →	Specific Response CHILD →	Generalized Reinforcer
Tact/Comment	(child drinks cold juice)	"Cold"	Parent smiles at child
Mand/Refusal	Adult says, "Where does the star go?"	Child says, "No want star I need"	Adult says, "Okay, not ready"
Mand/Request	(child knocks pins down)	Child says, "Mommy clap"	Mother looks at child and smiles
Type	**General Stimulus →**	**Specific Response CHILD →**	**Specific Reinforcer**
Tact/Comment	(a picture book)	"Bye"	Parent says, "Is it flying, flying?
Mand/Refusal	(parent lifts pitcher to pour juice for child)	"No juice"	Parent says, "Okay, no apple juice for you"
Mand/Request	(unobserved)	Child says, "Here me do it"	Parent says, "U" (child places piece in puzzle)
Type	**Specific Stimulus →**	**Specific Response ADULT →**	**Generalized Reinforcer**
Tact/Comment	Drinking cold juice	"Cold"	Child vocalizes
Mand/Refusal	Child goes to leave room	"No bye"	Child says, "Bye, bye"
Mand/Request	Child opens door	Adult says, "Come play"	Child stops and looks at parent
Type	**General Stimulus →**	**Specific Response ADULT →**	**Specific Reinforcer**
Tact/Comment	(a picture book)	Adult says, "Oouu, go birdie"	Child says, "Bye" (puts sticker into book)
Mand/Refusal	Child vocalizes for Barnie, "My turn"	Adult says, "Okay, not yet, not yet"	Child waits for adult to set up pins
Mand/Request	(unobserved)	Adult says, "It's your what?"	Child says, "It's soo so"

For example, a parent recalled his child vocalizing (e.g., "eaah, eaaah") while turning the page of a book that they were reading together. The social function was the "maintaining" of the shared activity because the child's vocalizing was responded to by the parent as a "comment" to continue the activity. At another time the parent recalled the child vocalizing in accented utterances (e.g., "eaah, eaaah") while holding a book towards the parent. The outcome for the child, contingent on the vocal and gesture, was to sit down and read the book with her father. The child's vocalization and gesture were responded to by the parent as a "request" (i.e., communication function) to "initiate" reading the book together (i.e., social function). Thus, discreet communication behaviors of the child's (i.e., vocalizations and gestures) can serve multiple functions (e.g., comment, request, maintain) when they correspond to different context variables.

Pragmatic abilities are the agreed upon communication behaviors defined by group members to control social interactions during communication exchanges (e.g., direct eye contact between individuals affects the social interaction differently within different social contexts). Other pragmatic terms used during Stage Two analyses included the concepts of restricted oblige and unrestricted oblige (McKirdy & Blank, 1982).

A restrictive oblige was defined as yes/no questions, instructions, commands, and directions initiated by the adult to the child. In such cases, the adult partner (i.e., speaker-initiator) presents the child (i.e., listener-responder) with a situation in which he or she must choose from a limited set of responses, or when in command form, must perform a particular action specified by the parent (i.e., speaker-initiator). For example, while playing with a wooden puzzle the mother asks, "Where does the star go?" The child responses as listener are restricted to locations on the form board where the star could fit. A restrictive oblige may also be defined as a mand because the communicative act has a fixed or definitive relation between the response (i.e., mother's request) and the consequence or reinforcer (e.g., child pointing to where the star goes).

An unrestrictive oblige was defined as adult initiated open-ended or divergent questions directed to the child that provided the child with the opportunity to add information and share the social control of the communication turns with the parent (McKirdy & Blank, 1982). The adult partner's (i.e., speaker-initiator) unrestrictive oblige presents the child (i.e., listener-responder) with a situation in which he or she has no restrictions upon type or number of possible responses (McKirdy & Blank, 1982). For example, while playing toys on the rug a father asks, "What do you wanna do?" The child's responses are unrestricted and she controls the choice of what to do or what not to do with her father. An unrestrictive oblige may also be defined as a mand as in the previous discussion, even when the child's response is a "no response," because this is a definitive consequence to the unrestricted oblige.

Communication terms were used to label adult conversational turns that appeared associated with increases or decreases in child communication behaviors. The adult communication behaviors and characteristics, viewed as condition variables and values were used as components to develop hypotheses.

Communication Hypotheses and Analog Tests. The third activity in Stage Two was to develop hypotheses predicting the child's communication behaviors from the transcribed observation language sample of a daily activity. The transcriptions were marked from beginning to end with cumulative time in minutes and seconds. The time intervals were used to identify consecutive conversational turns and exchanges. The investigator explained to parents how to identify long versus short communication exchanges using the time intervals and provided a few examples marked on the transcription. In each case, the conversational turns were defined as continuous "talking" by a speaker followed by "talk" by a communication partner or by a definite pause or period of silence of 5 seconds or more (McKirdy & Blank, 1982). Thus, exchanges were defined as consecutive turns between the parent and the child within a 5 second interval.

Longer versus shorter exchanges were different lengths and defined relative to the conversational turns of each parent and child.

During discussion of the exchanges, the investigator asked parents questions regarding why they thought specific exchanges were short or long. The focus of the discussion was to identify specific condition variables associated with their child's participation in longer and shorter exchanges. In addition, the investigator and parents read from the transcription, recalled the activity events, and sometimes listened to the audio-tape recording of exchanges. Condition variables needed to be characteristics of adult communication that could generalize across settings, activities, and partners. The outcome was to develop two hypotheses that identified condition variables and values: One that predicted increases and a second that predicted decreases of child communication behaviors in the home.

A communication hypothesis was a best guess prediction based on apparent correlation in the data of those conditions under which the child will demonstrate increases or decreases in communication behaviors during a daily activity in the home. In particular, a hypothesis referred to condition variables and values that the parent could control to set the occasion for increases or decreases in the child's communication behaviors. Condition variables included: (a) use of specific communication forms (e.g., speech, gesture), (b) use of specific pragmatic communication behaviors (e.g., restricted oblige, unrestricted oblige), or (c) use of specific communication functions to affect social interactions with the child (e.g., an adult request for the child to repeat a vocalization, which maintained the conversational turns and interactions).

Also, the type of support or assistance provided by the parent to engage the child's participation in a communication exchange was identified as a variable. For example, a condition to increase a child's communication behaviors included looking at the child at eye level (i.e., facial communication form) and after an adult communication turn pausing to

signal an expected child communication turn. The condition variables "level of gaze" and "pace of conversational turn-taking" had specific values that were determined through analysis of exchanges. In the case of the variable "level of eye gaze" the values included looking at the child versus looking away from the child. In the case of "pace of turn-taking" the values included pausing a few seconds for the child's turn versus the adult starting a new turn without a wait time for the child's turn. Parents relied on their learning history, communicating with their child, to recognized possible optimal values of variables.

Functional Analysis Analog Tests. The functional analysis analog tests evaluated each hypothesis. The activities for the analog tests were similar to the activities used for the functional assessment observations. Activities were simulated or analog because the parent or adult partner limited and controlled their communication behaviors to match the set of condition variables and values within each respective hypothesis, and because the child was encouraged to engage in two separate activities that alternated across four 5-minute observation sessions.

The child's communication behaviors were recorded using Stage One direct observation procedures and audio-tape recorded with adult communication behaviors for transcription. Direct observations were completed across two conditions using a single-case withdrawal design (Barlow & Hayes, 1979; Barlow & Hersen, 1984). Condition A was associated with the conditions hypothesized to increase the child's communication behaviors and Condition B was associated with the conditions hypothesized to decreases the child's communication behaviors. The single-case designs included four consecutive 5-minute direct observation sessions designated as ABAB. The experimental procedures controlled and alternated the presentation of each condition (i.e., independent variables) in order to observe differential occurrences of the child's communication behaviors (i.e., dependent variables).

Two activities were alternated across the A and B conditions so that each activity was presented with each condition. Activity one was the setting for the first Condition A and the second Condition B, and activity two was the setting for the first Condition B and the second presentation of Condition A. An example could be, Condition A presented with stickerbook at table, Condition B presented with toys on rug, Condition A presented with toys on rug, and Condition B presented with Stickerbook at table. This design provided three reversals and two replications of conditions for the child to discriminate conditions (i.e., A1-first reversal-B1-second reversal-A2-third reversal-B2). Dunlap et al. (1991) used three and four reversal conditions to test hypothesis conditions with analog procedures that predicted on-task behaviors for a student during classroom activities. In other studies when multielement single datum points were used to develop hypotheses (rather than a descriptive functional assessment), two reversal conditions were used to determined the functional relationships of maintaining conditions and the occurrence of target behaviors (e.g., Derby et al., 1992; Northup et al., 1991).

The analog test activities followed the natural flow of communication exchanges between the adult partner and the child rather than to control a specific number of opportunities for the child to communicate with the adult within each condition. The condition cue card was placed in view of the adult by one of the observers on an agreed upon surface near the play area. The cue cards were used as a visual prompt for the adult communication partner and assisted the adult partner to include only the variables and values of each condition most of the time when communicating with the child. Thus, adult partners needed to include condition variables and values in the majority of their conversational turns during the activity.

Functional Assessment and Analysis Results. Results of the functional assessment and analysis procedures were examined and summarized with each child's parents. Frequencies of child communication behaviors were compared across conditions and the

transcriptions of the communication exchanges were analyzed using Stage Three assessment procedures. The parents scheduled a meeting with their child's teacher and/or SLP, and with the investigator shared the functional assessment and analysis results. Study procedures were described leading to the hypotheses and analog tests. The assessment and analysis results were described and graphically displayed in order to suggest possible application to the design of interventions for the child in the school and in the home. Within two weeks after sharing this information, follow-up interviews were conducted with family members and school personnel to determine the extent that functional assessment and analysis results were viewed as useful to design interventions aimed to increase or accelerate the child's communication behaviors at home and at school (see Appendix B, Functional Assessment and Analysis Protocols).

Reliability and Analysis. Inter-observer agreement assessments were completed on most Stage One and all of the Stage Three direct observations. Two observers simultaneously observed and recorded the child's expressions of six communication forms. Two types of agreement were calculated: (a) observers recording the same communication form within the same 10-second interval and (b) observers recording any communication form within the same 10-second interval (i.e., agreement that one of the communication behaviors occurred). Agreement scores were computed by adding agreements to disagreements and then dividing the sum into total agreements and multiplying by 100. These scores were computed for agreement of communication form types recorded within 10-second intervals and agreement that a communication behavior or form occurred within 10-second intervals. Both calculations summed agreements and disagreements across the thirty intervals of each 5-minute session.

The functional assessment and analysis language samples were audio tape recorded and transcribed by the investigator and a subset was also completed by a professional transcriber. In addition, reliability was assessed on the coding of parent language from the

Stage Two observations and Stage Three analog tests transcriptions. A sub-set of these transcriptions was coded by two individuals in order to assess the agreement of assigning codes to parent language. A 5-page sub-set of Stage Two observation transcriptions were coded for each child (language sample transcriptions ranged 12-14 pages in total length for each child). A 4-page sub-set across all conditions and activities of Stage Three analog test transcripts were coded for each child (analog test transcriptions ranged 8-13 pages in length for each child). Agreement scores were also used to examine the extent to which parent's language corresponded to prescribed condition variables and values within the analog tests. Adult utterances within conversational turns were coded either as a restricted oblige, unrestricted oblige, or comment.

Four graduate students in special education, one practicing SLP who worked as a classroom teacher in an early childhood special education setting, and one communication disorder specialist (CDS) aide who worked in a public school were hired and trained to conduct the concurrent direct observations or the coding of parent language from observation transcripts. Individual training time ranged from 2 to 4 hours. Training for direct observation of the six communication behaviors was completed individually. Training included orientation to study materials and procedures, the six communication form definitions, and practice observation sessions. There were two types of practice observation sessions followed by feedback from the investigator: (a) observation of child communication behaviors from video-taped segments of preschool-age children with disabilities and teachers interacting at play activities, and (b) observations of live preschool-age children communicating during play activities. Training for coding parent language on transcripts included orientation to study materials and code definitions, and practice sessions followed by corrective feedback from the investigator. A Observers and coders were trained to a minimum of 80% agreement level of proficiency before collecting

study data. The 80% level represented an acceptable, much better than chance agreement recording communication forms during observations based on their written definitions.

CHAPTER IV

Results and Discussion

As previously indicated, data were collected in four stages. Stage One activities evaluated the extent to which each child communicated more in the home than in the school. The various activities in Stages Two through Four addressed the following three research questions.

1. To what extent will a structured functional assessment interview lead to the identification of variables associated with occurrences of the child's communication behaviors? A functional assessment parent interview and observation of parent and child communication exchanges were analyzed with parents to develop two hypotheses that predicted occurrences of their child's communication behaviors in the home.

2. To what extent does a combination of structured interview and direct observation functional assessment results lead to hypotheses that predict functional relationships between variables and occurrences of the child's communication behaviors with adult communication partners during shared activities in the home? A single-case withdrawal design was used to evaluate the validity of two hypotheses: One hypothesis that predicted increases and the other decreases in child communication behaviors.

3. When parents present results of functional assessment and analysis of their child's communication behaviors to school personnel, to what extent are results reported as useful to design intervention programs that target the acceleration of the child's communication behaviors at home and at school? Separate parent and teacher interviews were used to determine the extent to which results were of potential value in designing interventions to accelerate child communication behaviors during daily activities?

Stage One - Interviews and Observations

Separate interviews were conducted with parents in their home and with classroom teachers and SLPs at school. The purpose was to identify the times of day, types of

activities, communication partners, and the communication forms and functions used by the children when they communicated most often in exchanges with others during daily activities in the school and in the home. Observations were scheduled from interview information and observations were conducted of each child communicating during three activities in the home and three activities in the school. Child communication behaviors were recorded across the forms of gesture, facial, vocal, AAC, physical, and speech.

Lara, a 4-Year-Old Girl. Lara's mother and father reported that she communicated most often with them in the home when: (a) they first come home from work and play with Lara; (b) Lara and her father play together at home or down the street in the park; and, (c) mother and Lara play together in the kitchen, in the family room, or in the back yard on the swing. Parents reported that during their communication exchanges, Lara used vocals, gestures, and pointing to or exchanging picture-symbols from her communication book. Occasionally she used single word or word approximations in her utterances. Parents stated that they used speech in sentences or phrases, gestures, and some pointing to or exchanging picture-symbols from her communication book. There is a similar picture-symbol communication exchange system available for Lara in the home as in the school. Individual picture-symbols were attached with Velcro on the refrigerator within her reach and in a small communication book. The parents reported their exchanges with Lara usually served the functions of sharing information, providing reassurance or comfort, requesting information or materials, refusing materials or interactions and protests, or giving directions and commands.

Lara's classroom teacher and SLP reported that Lara communicated most often with adults and a few children at school during: (a) small group snack; (b) free-choice learning centers (e.g., art, manipulatives, dramatic play); (c) arrival to school, greeting others; (d) transitions walking down the hallways (e.g., going to the kitchen or playcourt); and, (d) outdoor play time on playcourt with her class. They stated that Lara used vocals, gestures,

and exchanged picture-symbols to communicate. "Hi" was the only speech behavior reported by her teacher and SLP which she used as a greeting. The teacher and SLP reported that they used speech in sentences or phrases most often in their exchanges with Lara. They reported that their exchanges with Lara usually served the functions of requesting attention or directing attention towards objects or events, maintaining social interactions, protesting, commenting, greeting others, or giving directions and commands. Three observations of Lara were completed in the school and in the home (see Figure 1: Lara's Stage One Direct Observation and Probe Data).

At school Lara was observed during: (a) small group snack ("school-snack"), (b) free-choice learning centers ("school-play"; small group art center), and a transition activity walking in the hallway from her classroom to the playcourt ("school-transition"). Two adults and three to four classmates participated along with Lara at the free-choice learning center and small group snack. Three adults and 12 classmates accompanied Lara at the transition activity from the classroom to the playcourt.

In her home Lara was observed during: (a) a meal time activity with her mother ("home-meal"); (b) a play activity with her father when he came home from work ("home-play"); and, (c) a transition activity from a meal time with her mother to a play time with her father when he came home from work ("home-transition"). Meal time was not identified by parents as a "most often communicates" activity, however it was decided with parents to be similar to the snack activity at school.

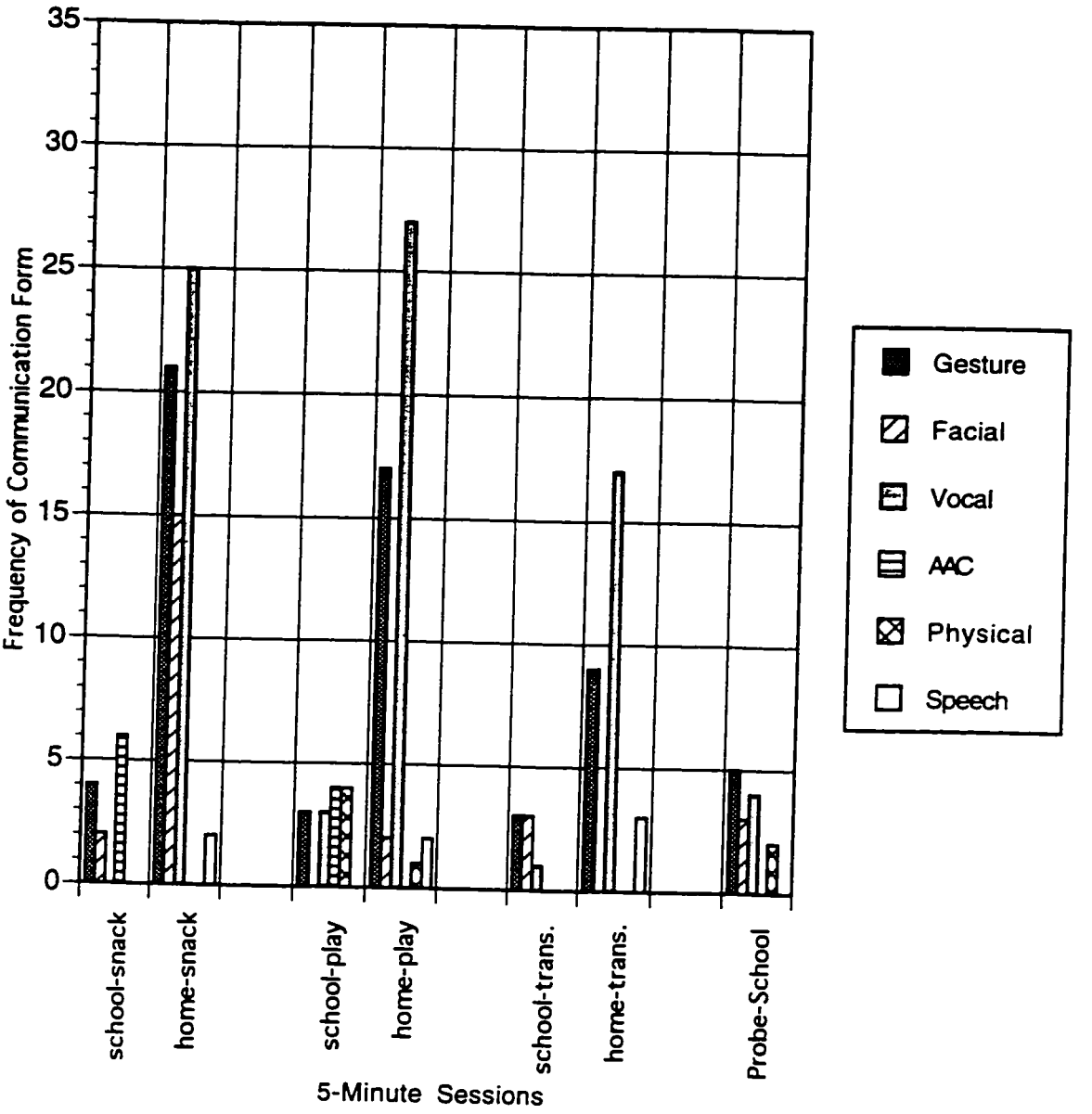


Figure 1: Lara's Stage One Direct Observation and Probe Data.

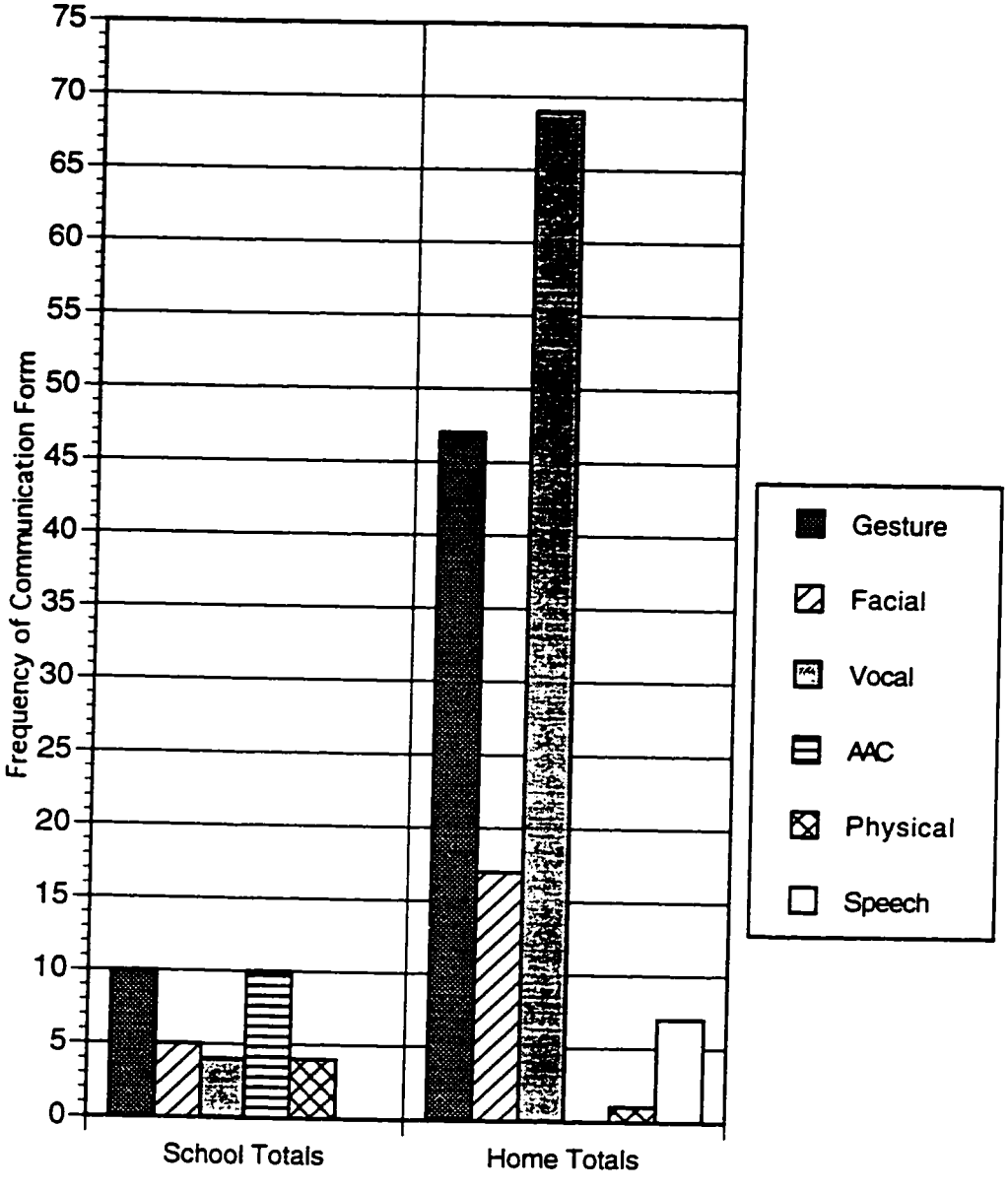


Figure 2: Lara's Stage One Direct Observation Totals.

The sums of Lara's communication behaviors observed and recorded during the six 5-minute observations across three activities in each setting were 33 forms in the school and 141 forms in the home (see Figure 2: Lara's Stage One Direct Observation Totals). A comparison of Lara's rate of communication acts across the 15-minutes of observations in each setting was 9.4 acts per minute in the home and 2.2 acts per minute in the school.

Kevin, a 6-Years and 8-Months-Old Boy. Kevin's mother and father reported that he communicated most often with them in the home when: (a) he and his father read books in the evening; (b) Kevin first comes home from school in the afternoon, has a snack and plays and interacts with his mother and sometimes a friend who rides his bus; and, (c) when he plays with his two cousins, boys 12- and 14-years-old (e.g., at games, grocery store, or shooting indoor basketball hoops). Parents reported that during communication exchanges, Kevin used speech as words or word approximations in four or five word sentences or phrases. They stated that it was difficult to understand Kevin's speech because of his articulation errors and use of vocalizations. Parents reported that they used speech in sentences or phrases and gestures. They reported that their exchanges with Kevin usually served the functions of sharing information and materials; controlling social interactions or protesting; commenting on play interactions; or, requesting social interaction, information, or material.

Kevin's classroom teacher and SLP reported that he communicated most often at school during: (a) small group snack; (b) free-choice learning centers (e.g., library books, manipulatives, art, dramatic play); (c) transitions walking down the hallway; (d) playcourt outside-play (e.g., shooting basketball hoops); and, (e) large group circle lead by an adult. They reported that Kevin used speech in up to three word sentences or phrases and gestures to communicate. The teacher and SLP stated that he communicated mostly to adults and was often not understood by others because of his articulation errors and use of vocalizations rather than speech. The teacher and SLP reported that they used

speech in sentences or phrases, gestures, and occasional manual sign language in exchanges with Kevin. They reported that their communication exchanges with Kevin usually served the functions of requesting attention or materials, protesting, or giving directions, commands, and instructions. Three observations of Kevin were completed in the school and in the home (see Figure 3: Kevin's Stage One Direct Observation and Probe Data).

At school, Kevin was observed during: (a) playcourt shooting basketball hoops ("school-hoops"), (b) small group snack ("school-snack"), and (c) free-choice learning centers ("school-play"; small group book play activity at the library center that included a transition from class across the hall to playcourt). One adult and six classmates participated with Kevin during the small group activities and four adults and 14 classmates accompanied Kevin during the transition activity from the classroom to the playcourt and at playcourt shooting hoops. At playcourt, two to three other children were shooting hoops with Kevin.

In his home Kevin was observed during: (a) play with his cousins in his living room with toys and games and a movie on television ("home-play"), (b) a snack time activity after coming home from school ("home-snack"), and (c) shooting indoor basketball in the living room ("home-hoops"). Kevin's two cousins participated with him during the "home-play" and the "home-hoops" activities. During the "home-play" activity the children played as the movie ran in the background on the television. Kevin's mother and a friend from school participated with him during the home-snack activity.

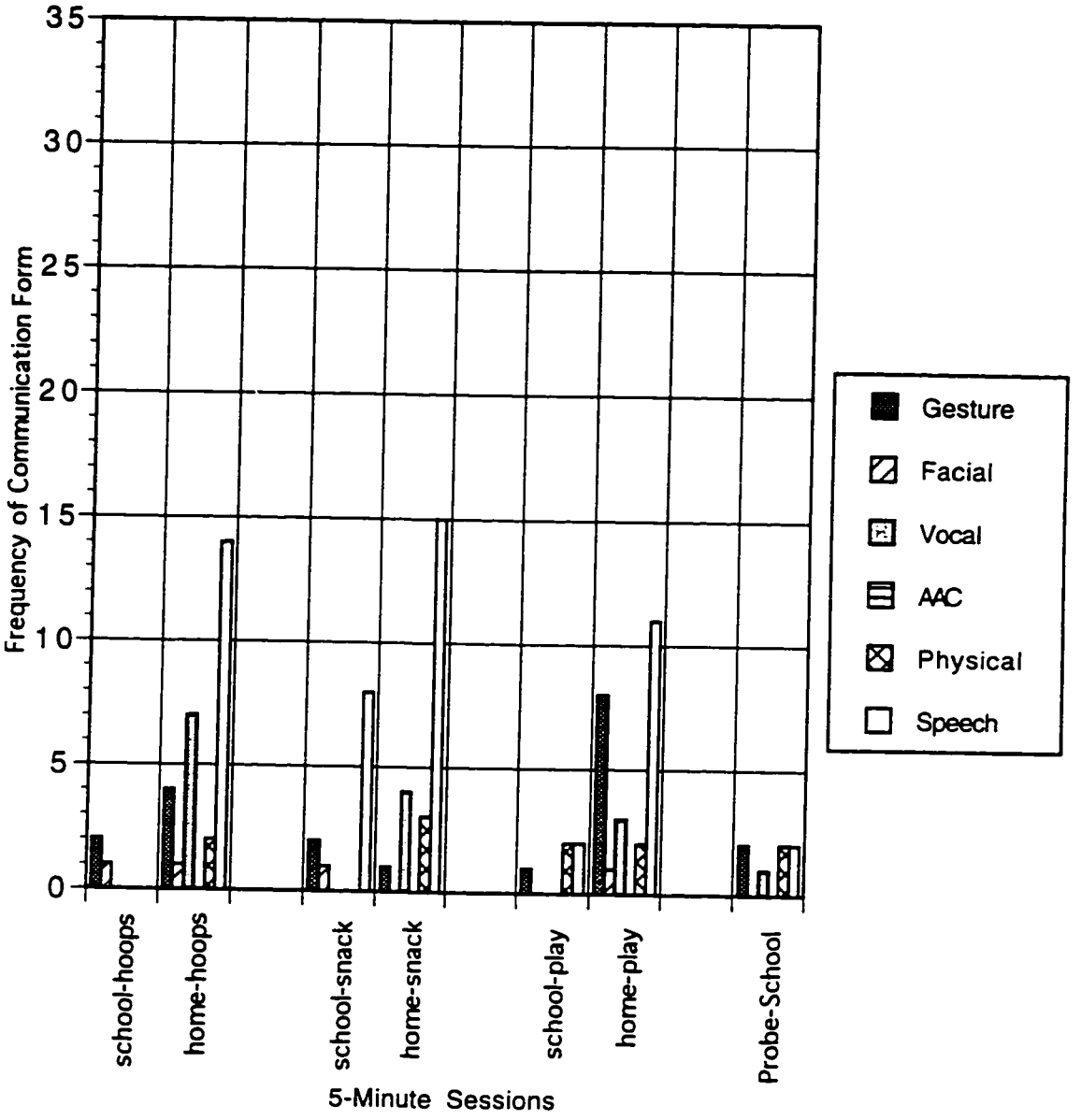


Figure 3: Kevin's Stage One Direct Observation and Probe Data.

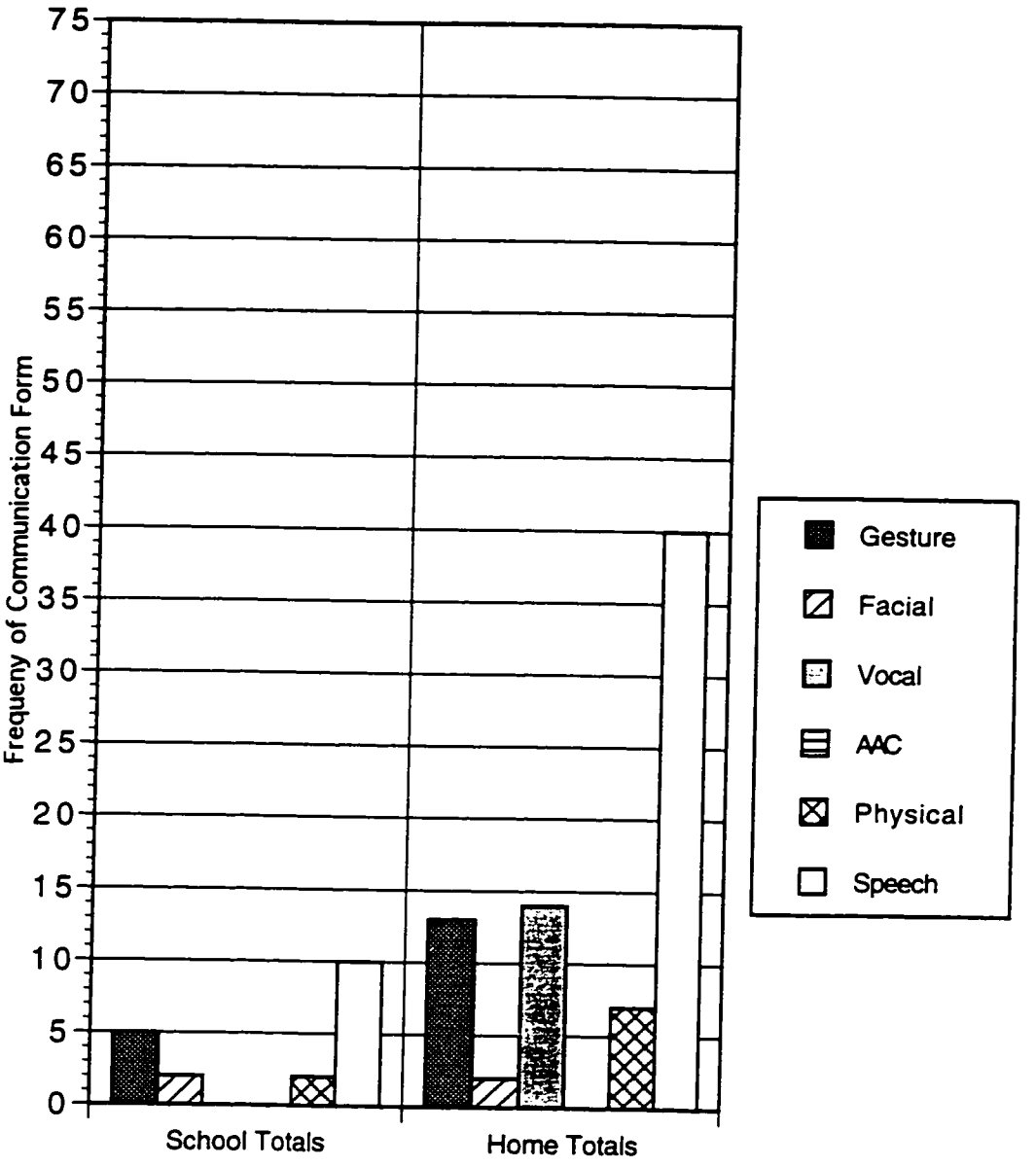


Figure 4: Kevin's Stage One Direct Observation Totals.

The sums of Kevin's communication forms observed and recorded during the six 5-minute observations across the three activities in each setting were 19 forms in the school and 76 forms in the home (see Figure 4: Kevin's Stage One Direct Observation Totals). A comparison of Kevin's rate of communication acts across the 15-minutes of observations in each setting was 1.3 per minute in the school and 5.1 per minute in the home.

Will, a 5-Years and 4-Months-Old Boy. Two changes were made in the interview procedures for Will. A telephone call interview was completed with Will's SLP. This was necessary to accommodate her schedule. In addition, the Stage One and Two parent interviews were combined for Will. This decision was prompted by time constraints to accommodate family participation in assessment activities and to reduce redundant questions in the two interviews. Will's parents reported that they were very busy and this change in procedures used their time more efficiently. This more efficient use of family time and reduction of redundant interview questions, added to the practical value and social validity of these functional assessment and analysis procedures (Schwartz & Baer, 1991; Wolf, 1978).

Will's mother and father reported that he communicated most often with them in the home when: (a) he plays games (e.g., computer), cars, blocks, or puzzles with his mother in late afternoon before dinner; (b) his father first comes home from work and plays with Will inside or in the back yard; and, (c) Will eats dinner with his mother, father, and older sister. The parents reported that Will used speech and word approximations, vocals, gestures, and some manual sign language in two to four word sentences or phrases. Parents reported that they used speech in sentences or phrases, gestures, and occasional manual sign language in communication exchanges with Will. Parents stated that the hours between 3:15 p.m. and 7:00 p.m. is when Will seemed to communicate most often because that is when other family members are home. Parents reported that playing with puzzles, blocks and cars, outside play, and meal times were the most similar activities for Will

between school and home. They reported that their communication exchanges with Will usually served the functions of sharing information and materials; controlling social interactions; commenting on play interactions; requesting social interactions, information, or materials; or, protesting and expressing feelings.

Will's classroom teacher reported that he communicated most often at school during: (a) learning centers (e.g., small group snack, puzzles, manipulatives, dress-up, and art); (b) outside play on the climber; and, (c) large group circle directed by an adult. The teacher and SLP reported that Will communicated infrequently with others, but, when he did communicate, he used speech in one or two word phrases, vocalizations, and gestures. They emphasized that Will's speech was difficult to understand because of articulation errors. The teacher stated that she used speech in sentences or phrases, gestures, and some manual sign language in exchanges with Will. The teacher reported that communication exchanges with Will usually served the functions of requesting attention or materials or giving directions, commands, and instruction. Three observations of Will were completed in the school and in the home (see Figure 5: Will's Stage One Direct Observation and Probe Data).

At school Will was observed during: (a) a puzzle activity at learning centers ("school-puzzle center"), (b) outside play on the climber ("school-outside play"), and (c) teacher directed large group circle ("school-adult lead circle") (These activities corresponded to occasions (a), (b), and (c) identified during the teacher interview). Two teachers, one parent volunteer, and 11 classmates were in the classroom with Will during learning centers activities. One teacher and three classmates were at the "school-puzzle center" activity along with Will. Two teachers, two adults, and 17 classmates participated with Will at "school-outside play". Two teachers, one adult, and 14 classmates participated along with Will at "school-adult lead circle".

In his home Will was observed during: (a) a puzzle activity in the living room with his mother ("home-puzzles at table"), (b) outside play on the climber with his father and sister before dinner ("home-outside play"), and (c) an interactive computer game with his mother ("home-adult lead computer") (These activities corresponded to occasions (a) and (b) identified during the parent interview).

The sums of Will's communication forms observed and recorded during the six 5-minute observations across three activities in each setting were 24 forms in the school and 152 forms in the home (see Figure 6: Will's Stage One Direct Observation Totals). A comparison of Will's rate of communication acts across the 15-minutes of observations in each setting was 1.6 per minute in the school and 10.1 per minute in the home.

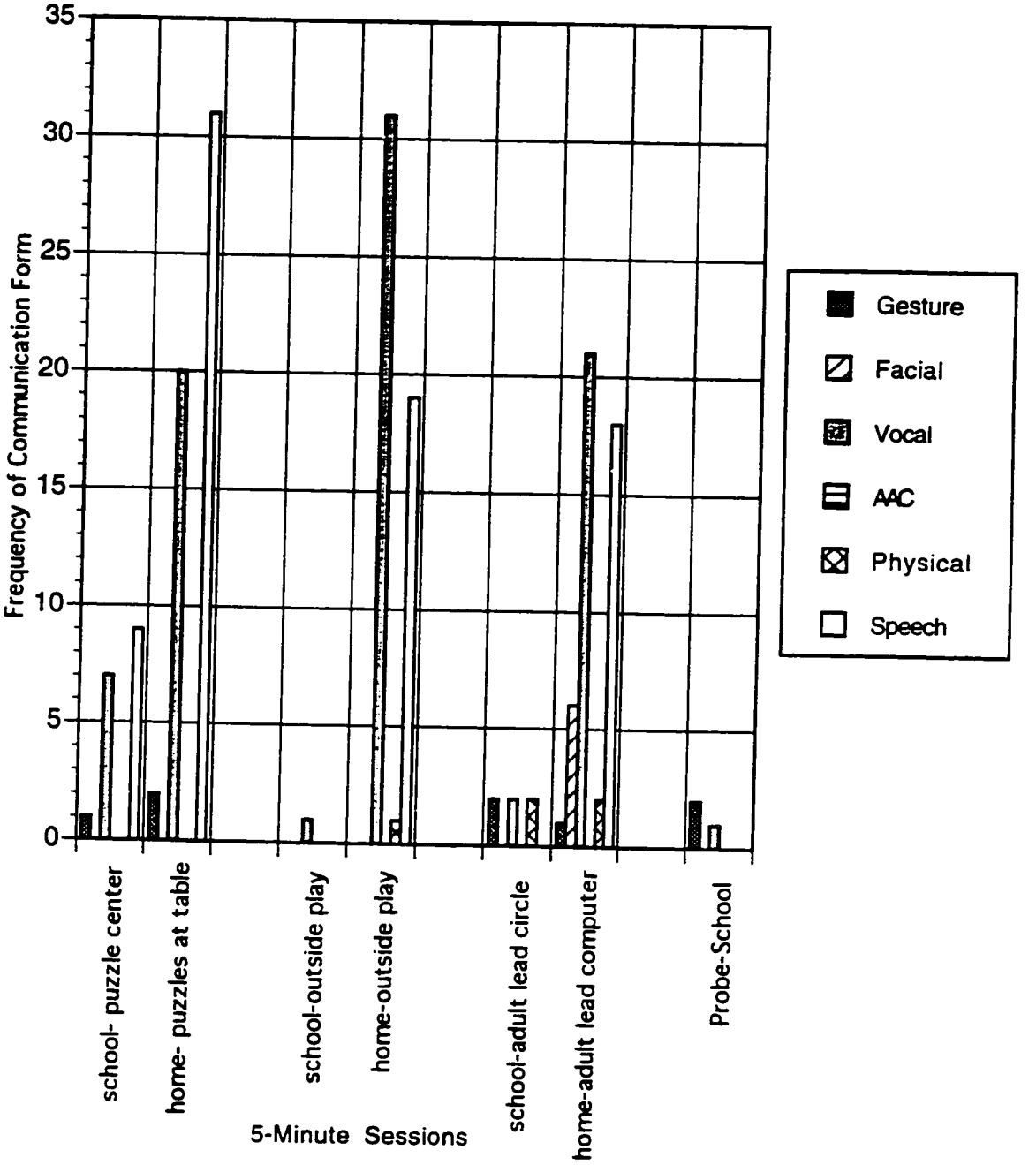


Figure 5: Will's Stage One Direct Observation and Probe Data.

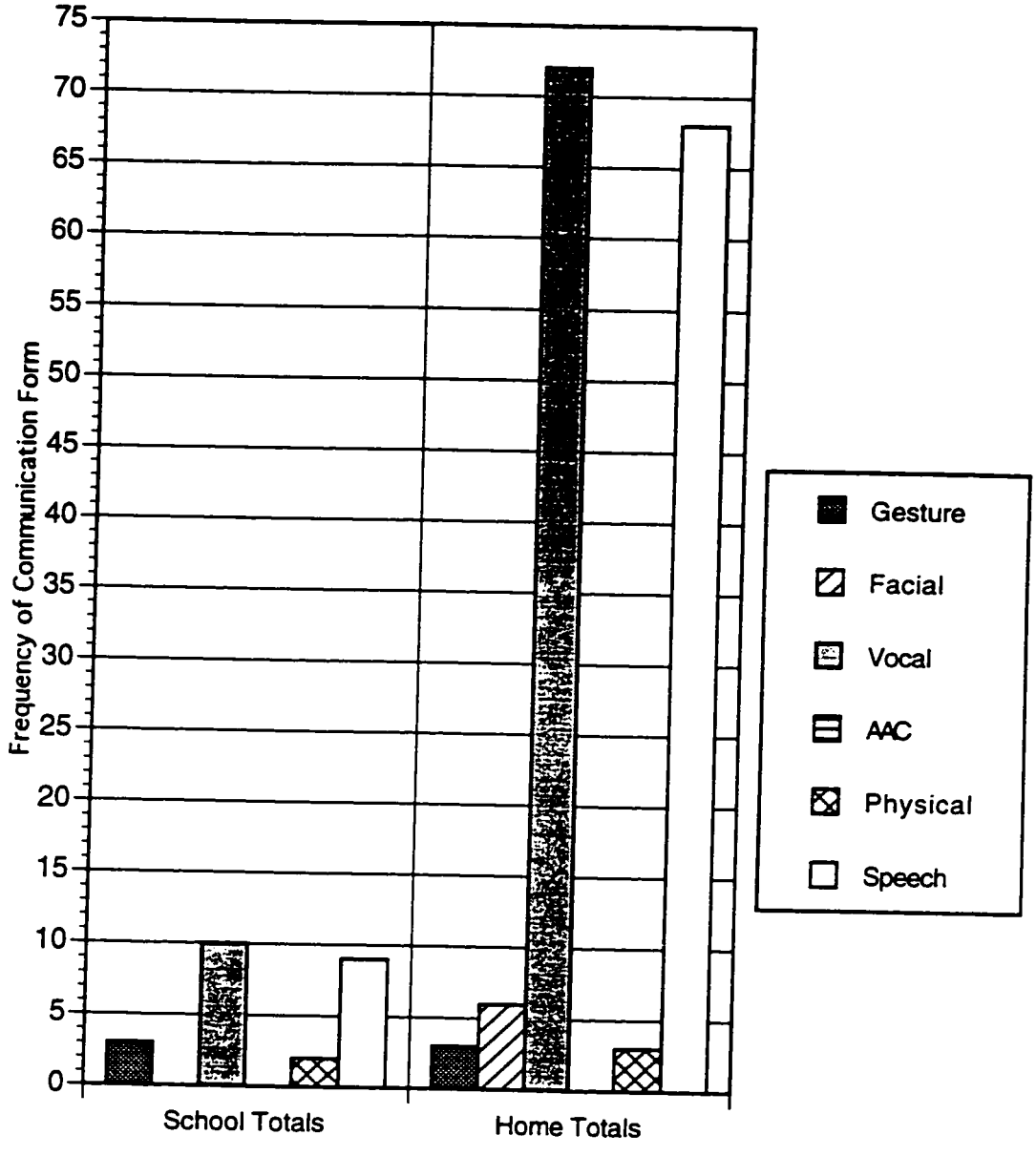


Figure 6: Will's Stage One Direct Observation Totals.

Cory, 4-Years and 11-Months-Old Boy. Cory's mother and father reported that he communicated most often with them in the home when: (a) he plays with family members in late afternoon before the evening meal, (b) his father first comes home from work and plays with him, and (c) Cory and his mother interact and play during different activities in the afternoon (e.g., cooking, baking, playing with toys, books, or art materials). Parents reported that during communication exchanges, Cory used speech and word approximations, vocals, and gestures in two to three word sentences or phrases. They stated that Cory often spoke quietly and turned his face away from the listener which made his utterances difficult to understand by others. Parents reported they used speech in sentences or phrases, gestures, and occasional vocalization in imitation of Cory. They reported that their exchanges with Cory usually served the functions of sharing information or materials; controlling social interactions; commenting on interactions or context; requesting social interaction, information, material, or food; or, protesting and expressing emotions.

Cory's classroom teacher and SLP reported that he communicated most often at school during: (a) learning centers and small group activities with adult support (e.g. manipulatives center with 3-4 other children), (b) adult directed large group circle activities with adult support, and (c) small group snack directed by an adult and with 3-4 other children at the table. The teacher and SLP reported that Cory communicated infrequently with others, but when he did he used vocalizations, cries, some words spoken very quietly, and occasionally he pointed to or exchanged picture-symbols. They stated that Cory sometimes used objects as referents in his communication exchanges along with gestures. For example, when requesting an object, he may use pointing and reaching gestures while leading the adult to the object. The teacher and SLP reported that they used speech in sentences or phrases in their exchanges with Cory and that their exchanges with Cory usually served the functions of requesting materials or food, giving directions,

commands, or instructions, or protesting and expressing emotions. Three observations of Cory were completed in the school and in the home (see Figure 7: Cory's Stage One Direct Observation and Probe Data).

At school Cory was observed during: (a) small group snack ("school-snack"), (b) small group manipulatives learning center ("school-play"), and (c) a large group circle time activity directed by an adult ("school-adult"). Two teachers, two graduate students in special education, and eight classmates participated along with Cory in the "school-adult" activity; one teacher and five classmates participated in the "school-snack" activity; and one SLP, a graduate student, and 3-4 classmates participated along with Cory at the "school-play" activity (These activities corresponded to occasions (a), (b), and (c) identified during the teacher interview).

In his home Cory was observed during: (a) an activity preparing and eating toast in the kitchen ("home-snack"), (b) an activity preparing and mixing chocolate milk and mixing cookie batter to form cookies for baking ("home-play"), and (c) an activity reading a book in the family room while cookies baked in the oven ("home-adult"). Cory's father made toast with him after he came home from work, his mother made chocolate milk and mixed cookie batter with him, and he read a book with his mother while the cookies baked in the oven (These activities corresponded to occasions (a), (b), and (c) identified during the parent interview).

The sums of Cory's communication forms observed and recorded during the six 5-minute observations across three activities in each setting were 32 forms in the school and 94 forms in the home (see Figure 8: Cory's Stage One Direct Observation Totals). A comparison of Cory's rate of communication acts across the 15-minutes of observations in each activity was 2.1 per minute in the school and 6.3 per minute in the home.

Stage One Results. All four children were observed to communicate more in the home than in the school during similar activities. Table IV., Total Frequencies of

Communication Forms From Three 5-minute Stage One Direct Observations displays these data. The shaded cell indicates the setting where each communication form was observed at the higher frequency. All the child participates that started study activities moved on to the functional assessment and analysis activities in Stages two, Three, and Four.

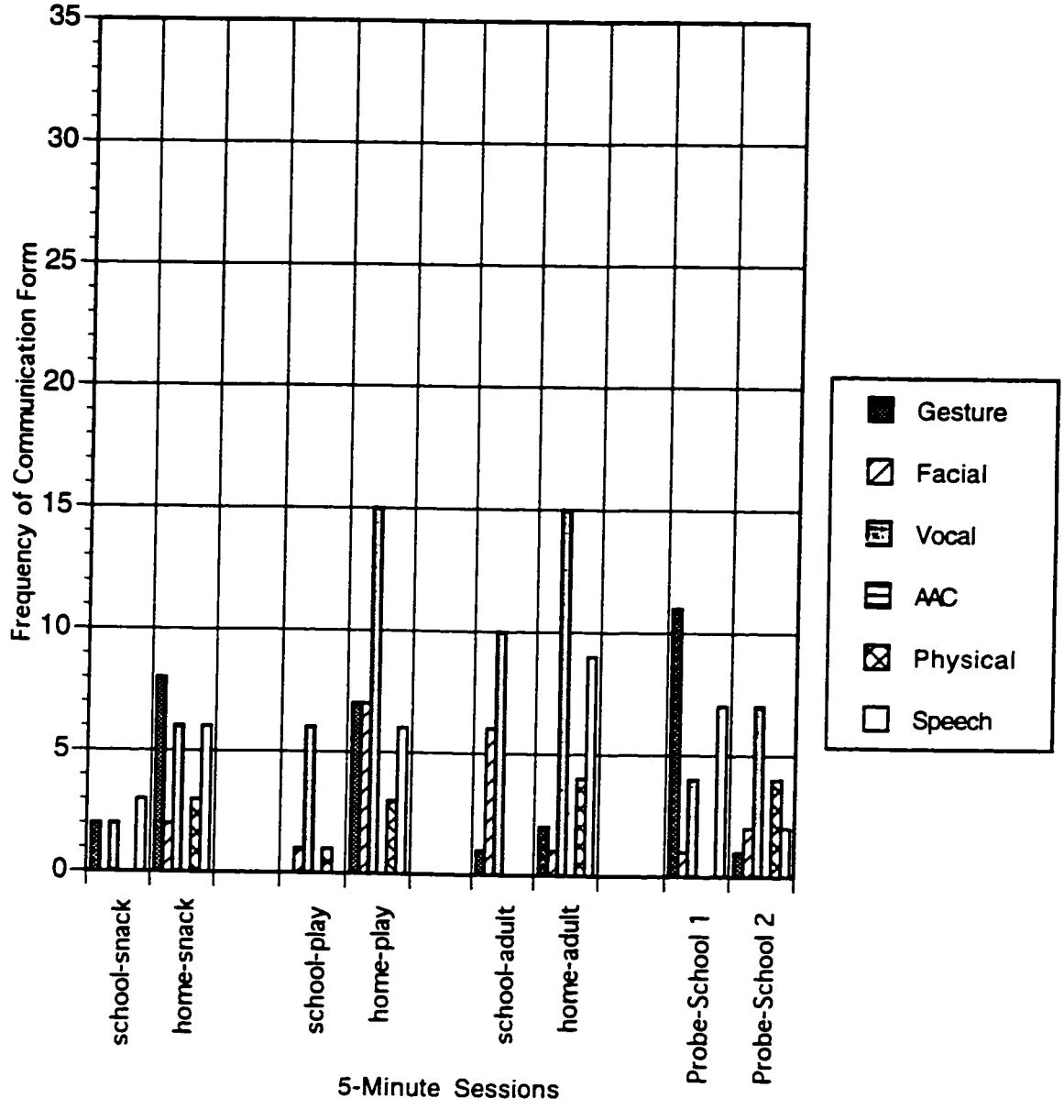


Figure 7: Cory's Stage One Direct Observation and Probe Data.

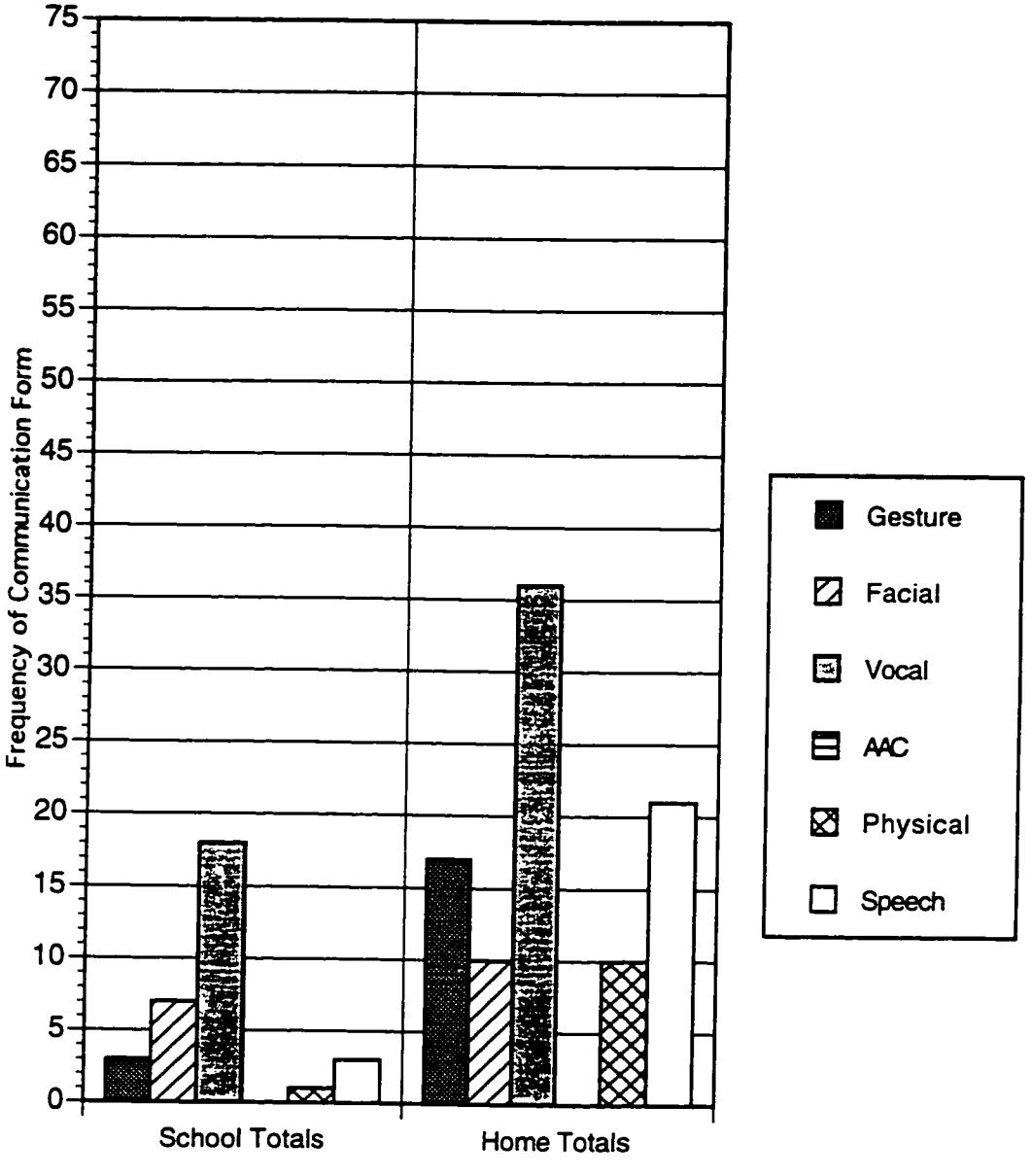


Figure 8: Cory's Stage One Direct Observation Totals.

Table IV. Total Frequencies of Communication Forms From Three 5-minute Stage One Direct Observations

Child	Setting	Gesture	Facial	Vocal	AAC	Physical	Speech	Total Acts / Acts Per Minute
Lara	school	10	5	4	10	4	0	33/2.2
	home	47	17	69	0	1	7	141/9.4
Kevin	school	5	2	0	0	2	10	19/1.3
	home	13	2	14	0	7	40	76/5.1
Will	school	3	0	10	0	2	9	24/1.6
	home	3	6	72	0	3	68	152/10.1
Cory	school	3	7	18	0	1	3	32/2.1
	home	17	10	36	0	10	21	94/6.3

Lara - Stage Two Functional Assessment Activities

Stage Two activities were conducted after Stage One direct observations identified a discrepancy in Lara's communication behaviors between home and school. Additional information was provided by Lara's parents to complete the functional assessment interview. Specific information associated with Lara's communication behaviors included: (a) Lara communicates often before, after, and during meal times; (b) she communicates less when tired or just waking-up from sleeping; (c) she communicates less when experiencing an upset stomach (she was allergic to many kinds of foods); and, (d) the asthma medication she takes daily through a nebulizer produce side effects that make her active, communicating less with others. Parents stated that for unknown reasons and at unpredictable times, Lara remains still, moves her hands and arms quickly in front of her chest repeatedly, closes her eyes, and vocalize non-communicatively blowing air out of her mouth. They stated that she displays these behaviors up to once or twice each hour for several seconds. They also stated that Lara's communication behaviors have become more recognizable and understandable in the last couple of years. Next, observations of Lara's communication behaviors were scheduled to record language samples of exchanges with her parents during activities in the home.

One observation was of Lara and her mother playing with a commercially produced stickerbook on wild animals. Her parents identified this type of interactive play activity as a high interest for Lara. The activity took place in the kitchen at a child size table and chairs. The activity corresponded to occasion (c) from the Stage One parent interview. Lara and her mother removed and placed colored stickers of wild animals on corresponding pages that had written descriptions and outlines of the animals. Mother read the passages and provided Lara opportunities to identify where on the page to place the different animal stickers. Lara and her mother regularly shared this type of activity in the afternoons, 30-45 minutes after Lara woke up from her nap.

The other observation was of Lara playing with her father after her dinner. On most days when Lara's father came home from work, she was just finishing her evening meal. After greetings and clean-up from the meal, Lara and her father played together with Lara's toys from her toy box on the rug. This activity corresponded to occasion (a) identified during the parent interview.

Both of these activities were audio-tape recorded with written notes of nonverbal communication and context. The observation of Lara and her mother with the stickerbook ran 38-minutes, 14-seconds; the observation of Lara and her father with the toys from her toy box ran 28-minutes, 34-seconds in length. The activities took place on different days of different weeks during the same month.

The observation of Lara and her father contained 238 turns between them (approximately 8 turns per minute). Lara's father expressed 118 turns of mostly speech in sentences or phrases and Lara expressed 120 turns (approximately 4 turns per minute) of mostly vocals or vocals with gestures. Lara used speech eight times that included the words "baby," "ball," "good," and "bye". The observation of Lara and her mother contained 436 turns between them (approximately 11 turns per minute). Lara's mother expressed 214 turns of mostly speech in sentences or phrases and Lara expressed 222 turns (approximately 6 turns per minute) mostly vocals or vocals with gestures. Lara used speech 15 times that included the words "hi," "baby," "bye," "cut", and "bird". She often used a finger pointing gesture with her vocalizations.

For one condition Lara's parents hypothesized that long communication exchanges contained adult turns with mostly comments and open-ended questions directed to Lara (e.g., see Table V. Long Communication Exchange Between Lara and Her Father). In this example, Lara expressed 10 turns (five vocal, four vocal plus gesture, and one vocal plus speech) and her father expressed 10 turns of multiple words in sentences or phrases.

Within her father's 10 turns were 16 comments, 3 unrestricted obliges, and 3 restrictive obliges. In another example, Table VI., Long Communication Exchange Between Lara and Her Mother (transcript 4/26/96, lines 95-117), Lara expressed 12 turns and her mother expressed 11 turns. The information in this table is divided into six columns: (a) codes from two individual coders of adult language (UO = unrestrictive oblige, RO = restrictive oblige, C = comment), (b) agreement or disagreement of code used by coders, (c) cumulative time of exchange, (d) speaker, and (e) the communication turn. When more than one code occurred in a turn the most frequent code recorded was used; if equal number of codes were recorded, then the multiple codes were identified.

In contrast, short communication exchanges appeared with adult turns that included directions, commands, or yes/no questions (see Table VII., Short Communication Exchanges and Turns Between Lara and Her Father and Lara with Her Mother). In the example with her father, Lara's turns contained one vocalization, one gesture, and one vocalization and gesture. These behaviors were observed in exchanges where her father's language contained four yes/no questions or directions and one comment. In the exchanges with her mother, Lara's turns contained three vocalizations and gestures, and three vocalizations in exchanges with her mother's four comments, two yes/no question or direction, and one open-ended question. Also the eight turns with her father and eleven turns with her mother are examples of short exchanges.

Table V. Long Communication Exchange Between Lara and Her Father (transcript 5/1/96, lines 51-72)

Speaker	Communication Exchange
Lara	*Eh*
Father	Gonna want to put the books in that box **(Comment)**
Lara	*Eeeh [point]*
Father	What do you wanna do? **(Unrestricted Oblige)** Oh, you want to put the books in that box **(Comment)**; which box should have the books? **(Restrictive Oblige)** That's the book box **(Comment)**
Lara	*Oouu*
Father	'Kay you want me to lift it **(Comment)**; where do you want me to put it? **(Unrestricted Oblige)**
Lara	*Eaeh- [point]*
Father	Over there? [Father moved book box in response to Lara, with exaggerated comical affect] **(Restricted Oblige)**
Lara	*Eeeh- [point]*
Father	Put it over here [Father moved book box in response to Lara] **(Comment)**
Lara	*Eaeh- [point]*
Father	Put it over there [Father moved box with exaggerated comical affect] **(Comment)**; put it over there [Father moved box] **(Comment)**
Lara	*[laughs]*
Father	Put it over there **(Comment)**; put it over there **(Comment)**; put it over there **(Comment)**; what do you want me to do with it? **(Unrestrictive Oblige)**
Lara	*Aaah-*
Father	Okay, right there **(Comment)**
Lara	*Eeh- ; ah'ball*
Father	Oh, the ball **(Comment)**; where's the ball? **(Restrictive Oblige)** I see one in there **(Comment)**
Lara	*Aaeeh-*
Father	[Father walked into the kitchen, Lara is in the family room; Father put food into microwave oven] I see one in there **(Comment)**; Lara I see that black'n white ball in there **(Comment)**; there's the black'n white ball **(Comment)**; you don't want to use that one? **(Restrictive Oblige)**

Table VI. Long Communication Exchange Between Lara and Her Mother (transcript 4/26/96, lines 95-117)

Coder 1	Coder 2	Agree	Time	Speaker	Communication Turn
			07'53''	Lara	*Eeah^* **(vocal)**
UO	UO	YES	07'54''	Mother	Ya, what?
			07'56''	Lara	*Eeh^* **(vocal)**
RO	UO	*NO*	07'57''	Mother	Which one would you like me to put there?
				Lara	*[points and gestures]*
C	C	YES	08'00''	Mother	Yes a bird, that's right, bird, bird
			08'05''	Lara	*[laughs]*
RO	UO	*NO*		Mother	Ya, which one should I put on?
			08'08''	Lara	*Eaaah-* **(vocal)**
RO/C	RO/C	YES	08'10''	Mother	Can you help me? Well I know they don't come off very, here it is; okay
			08'13''	Lara	*Byee [puts sticker in book]*
C/RO	C/RO	YES	08'14''	Mother	Bye birdie, you gotta put sticky side down
			08'20''	Lara	*Eah* **(vocal)**
C	C	YES	08'23''	Mother	Yep
				Lara	*[laughs]; oouu* **(vocal)**
C	C	YES	08'26''	Mother	Oouu
				Lara	*Eah*
C	C	YES	08'28''	Mother	Oouu; go birdie
			08'29''	Lara	*Bye [puts sticker into book]*
C	C	YES	08'30''	Mother	Bye birdie; pretty, oh it's pretty; okay
			08'35''	Lara	*Bye [puts sticker into book]*
RO	RO	YES	08'36''	Mother	Bye birdie; is it flying away?
C	C	YES	08'40''	Lara	*[laughs]*

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

Table VII. Short Communication Exchanges and Turns Between Lara and Her Father (transcript 5/1/96) and Lara with Her Mother (transcript 4/26/96)

Code	Speaker	Cumulative Time and Communication Turn
RO	Father	(00'48") Ya, I am cooking something, do you want something from there?
	Lara	*D'eae* **(vocal)**
RO	Father	(00'53") What?
	Lara	[E picks up a book and hands book to D] **(gesture)**
C/RO	Father	(01'03") Do you want something from the kitchen? Oh, you wanna read a book; do you wanna read a book? Do you want me to read the book? I don't think so, I guess you don't want me to read this book
	Lara	[E looks at book in the kitchen as D prepares food]
RO	Father	(01'39") You don't want to read this book, do you; what do you want to do? Just lay there
	Lara	(01'44") *Eeeh-* [points] [E laying on rug in family room next to kitchen] (0145") **(vocal, gesture)**
	Lara	(19'39") *Eaeh^* [point] **(vocal, gesture)**
C	Mother	(19'40") The flowers are outside, that's right; grow'in the yard
	Lara	(19'45") *Eaeh^* [point] **(vocal, gesture)**
UO/C	Mother	(19'47") Ahh, O' what's up? Oh ya there's flowers out in back too
	Lara	(19'52") *ouuu eaeh^* **(vocal)**
C	Mother	(19'54") Yep^
	Lara	(19'55") *Aeh^* [points] **(vocal, gesture)**
RO/C	Mother	(19'56") Ya, that's me; Oh, who's gonna get a bow tie? Nice bow tie [M and E put stickers in book]
	Lara	(20'11") *Eeh* **(vocal)^**
RO	Mother	(20'12") Ahh, let's see; here
	Lara	(20'16") [E puts stickers in book] [E touches pictures in book] ; *shhuu, shhuu; eh* **(vocal)^**

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

Possible condition variables and values associated with increases in Lara's communication behaviors or long communication exchanges were: (a) following her lead in interactions; (b) using comments and open-ended questions; and, (c) talking about the play, materials, and physical context of the activity. Conversely, condition variables and values that appeared to be associated with decreases in Lara's communication behaviors and short or no communication exchanges were: (a) having the adult lead the play and interaction; (b) using directions and saying, "It is time to do ..."; and, (c) talking about topics that were physically removed from the activity context.

Thus, the hypothesis predicting increases in Lara's communication behaviors was: Lara will use vocals, gestures, AAC, and speech to comment, request, initiate, and maintain communication exchanges with an adult partner when the partner follows her lead with comments and open-ended questions that have referents in the physical context and are logically linked to the sequence of their interactions. The hypothesis predicting decreases in Lara's communication behaviors was: Lara will use vocals and gestures to reject and terminate communication exchanges with adult partners when they lead the play and tell her it is time to do something that is not referenced in the physical context or logically linked to the sequence of their interactions.

Before moving on to the functional analysis analog tests a direct observation probe of Lara was conducted in the school. Lara was observed at a large group opening circle activity directed by a teacher in her classroom. This activity corresponded to arrival and greeting occasion (c) identified during the Stage One teacher interview. There were five adults and 12 children along with Lara at the activity. During the 5-minute event-recording, observed were: 5 gesture, 3 facial, 4 vocal, and 2 physical communication behaviors (see probe-school data in Figure 1).

Lara's Stage Three Functional Analysis Analog Test

The two hypotheses were represented as Condition A (to increase) and Condition B (to decrease). These were controlled as two sets of conditions within a single-case reversal design across two different activities in the home. The settings for the analog test were in the family room and at the dining room table. The two activities were Lara and her father playing with toys on the rug, and Lara and her father sitting at the dining table playing with an animal stickerbook. The presentation sequence was Condition A (to increase) with toys, Condition B (to decrease) with stickerbook, Condition A (to increase) with stickerbook, and Condition B (to decrease) with toys (see Figure 9: Lara's Functional Analysis Test Data).

These conditions were presented over four consecutive 5-minute sessions, with a 2-3 minute transition between activities and conditions. During each condition, cue cards were used with the hypothesis variables and values written in large print were in view for Lara's father. The cue cards reminded him what behaviors to include in his communication exchanges with Lara most of the time for each condition (see Table VIII., Hypotheses Conditions Adult Partner Cue Card Language Across Children). Two observers collected direct observation event-sampling of Lara's expressions of the six communication forms and Lara's and her father's speech and vocalizations were audio-tape recorded. The sums of Lara's observed communication forms, within both Condition As were 24 gesture, 1 facial, 35 vocal, and 9 speech. The sums of her communication forms observed within Condition Bs were 12 gesture, 28 vocal, 15 physical, and 1 speech (see Figure 10: Lara's Functional Analysis Test Summary).

Table VIII. Hypotheses Conditions Adult Partner Cue Card Language Across Children

	Lara	Kevin	Will	Cory
Cue Card Language for Condition A (to increase)	1. Follow Her Lead 2. Use Comments and Open-Ended Questions 3. Talk About the Play, Materials, and Physical Context of the Activity	1. Look at him 2. Use comment and unrestricted obliges 3. Pause to signal an expected response	1. Respond to and interpret his vocals 2. Use comments and yes/no questions 3. Use activity materials and play for topics of conversations	1. Provide direct models of speech 2. Use 4-5 word comments and open-ended statements 3. Use concrete referents from the activity to support language
Cur Card Language for Condition B (to decrease)	1. You lead the Play and Interaction 2. Use Directions and Say, "It is time to do ..." 3. Talk About Topics that are Physically and Logically Away from the Activity Context	1. Look away from him 2. Make requests with yes/no questions, directions, and commands (i.e., restrictive obliges) 3. Speak quickly to allow little time for him to respond	1. Ignore his vocals 2. Use divergent or open-ended questions 3. Use past or future events outside play context for topics of conversation	1. Ask "yes" or "no" questions 2. Give directions and commands during play 3. Talk about topics other than the activity context and materials

Table IX. Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations

Child		Stage One Acts Per Minute	Stage Three Acts Per Minute			
			Condition A1 (to increase)	Condition B1 (to decrease)	Condition A2 (to increase)	Condition B2 (to decrease)
Lara	school	2.2 T				
	home	[redacted]	5.8 F	6.0 F	8.0 F	5.2 F
Kevin	school	1.3 T				
	home	[redacted]	5.6 NF	4.2 NF	5.4 NF	4.6 NF
Will	school	1.6 T				
	home	[redacted]	6.2 NF	4.8 NF	5.2 NF	3.8 NF
Cory	school	2.1 T				
	home	[redacted]	5.8 F 4.4 NF	9.6 F 7.2 NF	7.4 F 3.8 NF	9.0 F 5.4 NF

F = parent was adult communication partner

NF = non-family member was adult communication partner

T = teacher or SLP was adult communication partner during activity

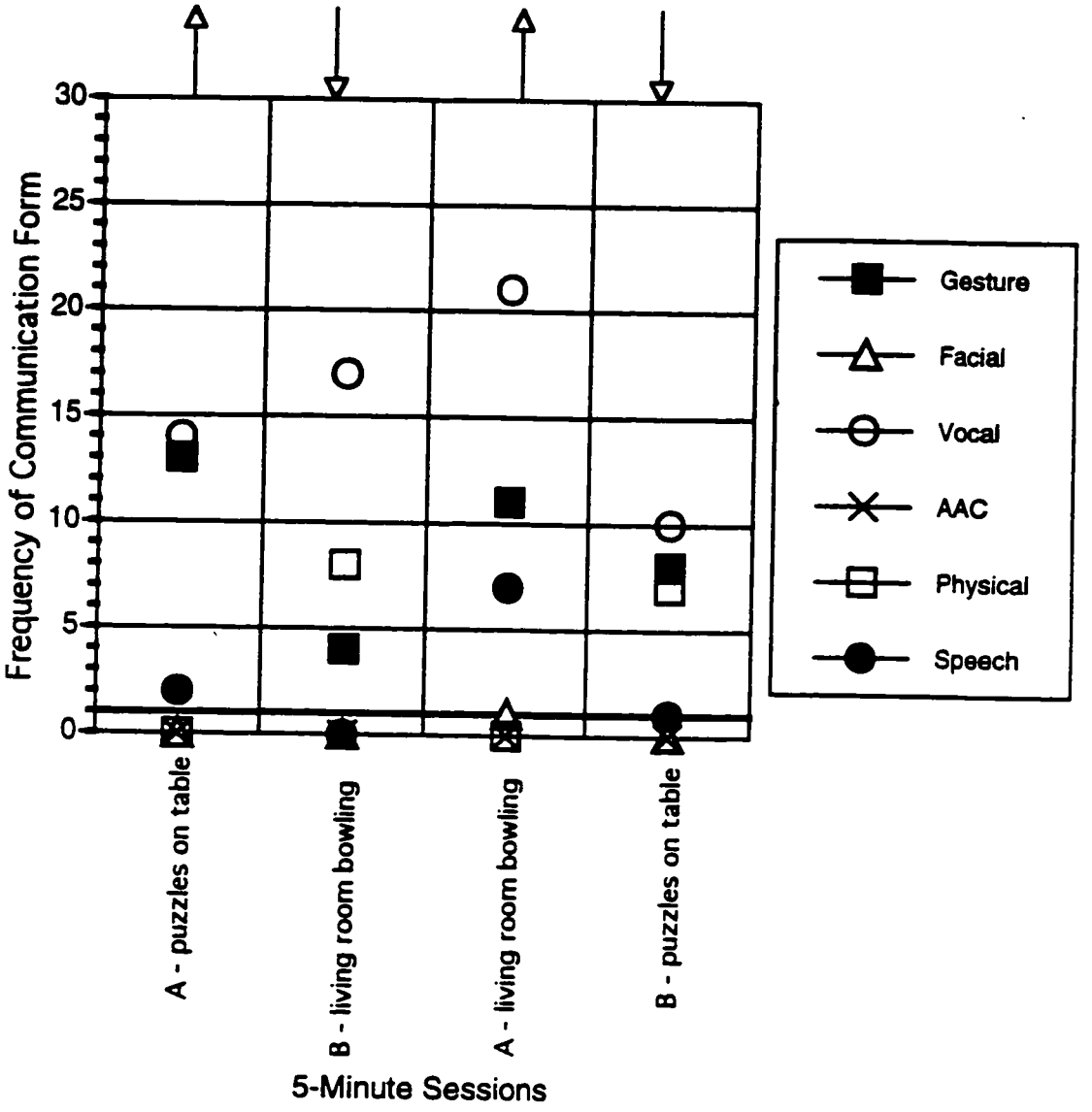


Figure 9: Lara's Functional Analysis Test Data

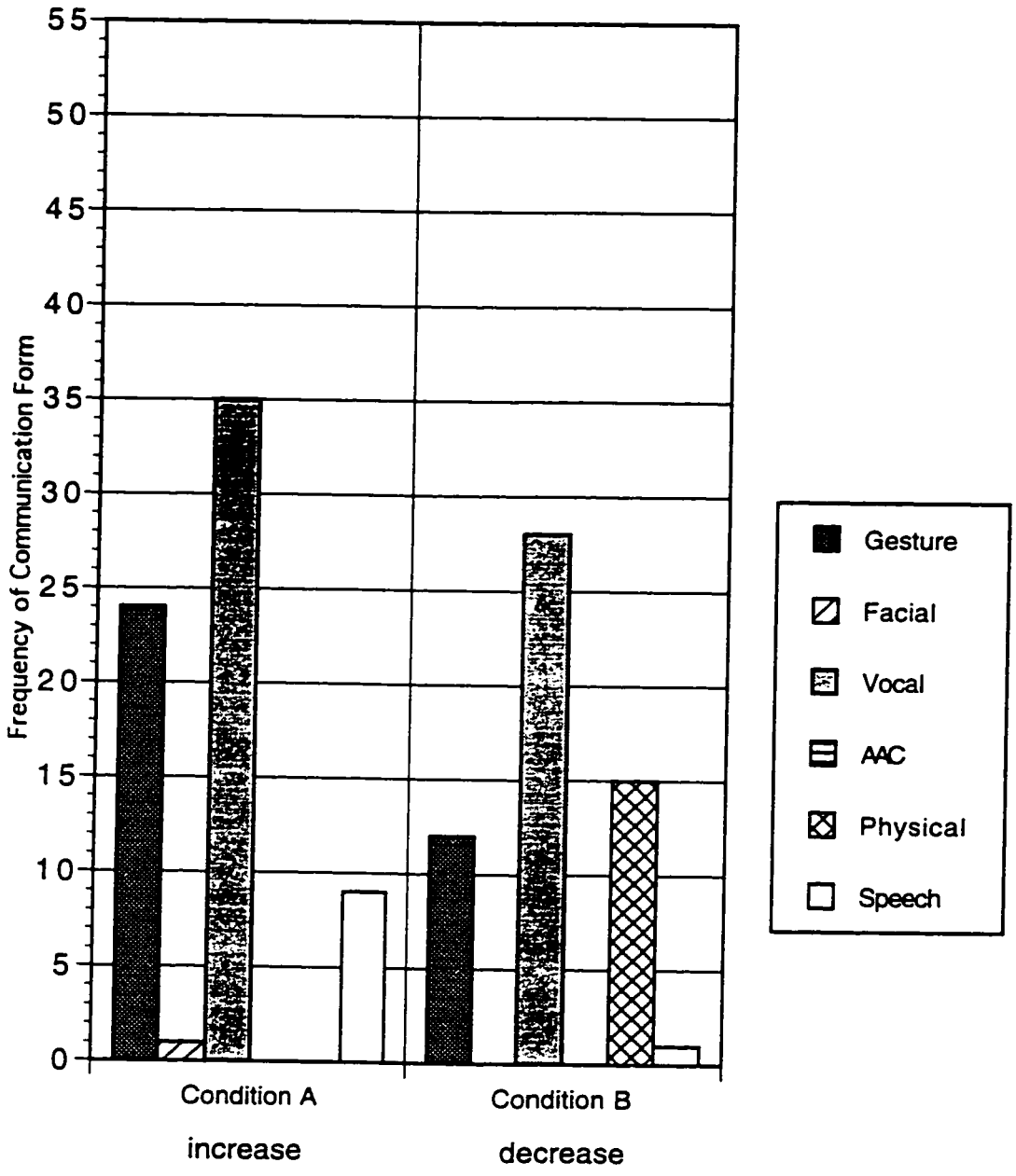


Figure 10: Lara's Functional Analysis Test Summary.

Overall, 69 communication forms were observed in Condition A and 56 communication forms were observed in Condition B. Lara's observed communication forms or acts calculated per minute were 5.8 during Condition A1, 6.0 during Condition B1, 8.0 during Condition A2, and 5.2 during Condition B2 (see Table IX. Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations).

Kevin - Stage Two Functional Assessment Activities

After the discrepancy in Kevin's communication behaviors between school and home was identified from Stage One Observations, additional information was provided by Kevin's parents for the functional assessment interview. Specific information associated with Kevin's communication behaviors included: (a) he usually communicates only as required by communication partners (e.g., he uses single words and gestures unless prompted with verbal cues and demonstrations to use more words in his speech); (b) he communicates most often while playing, especially with his older cousins or parents; and, (c) his speech is difficult to understand because of articulation errors and vocalizations, particularly when tired, frustrated, or protesting. Parents reported that he started to use speech with manual signs and vocalizations in the home at about 3-years-old.

Two activities in the home were chosen to observe and record language samples of Kevin's communication exchanges with others. One activity was Kevin with his mother and father shooting hoops and bowling in their living room after school. This activity corresponded to occasion (b) identified during the Stage One parent interview. This observation ran 35-minutes 44-seconds. The other activity was Kevin playing with his two cousins in the living room on a Saturday afternoon. This activity corresponded to occasion (c) identified during the parent interview. The boys played with a variety of games and toys with the television on in the background. This observation ran 43-minutes 48-seconds in length. Both of these activities were audio-tape recorded along with written notes of

nonverbal communication and context. The observations took place on different days within the same week.

The observation of Kevin with his mother and father contained 509 turns (approximately 14 turns per minute). Dad and mom expressed 309 turns of mostly speech in sentences or phrases and Kevin expressed 200 turns (approximately 6 turns per minute) of mostly speech and vocalizations. The observation of Kevin and his cousins contained 313 turns (approximately 7 turns per minute). His cousins expressed 225 turns of mostly speech in sentences or phrases and Kevin expressed 88 turns (approximately 2 turns per minute) of mostly speech and vocalizations.

For one condition, Kevin's parents hypothesized that long communication exchanges included adult turns with more comments directed to Kevin than directions or questions. For example, during one exchange that contained 15 turns (see Table X. Long Communication Exchange Between Kevin and His Father and Mother): Kevin's parents contributed eight turns of multiple words in phrases and sentences that contained nine comments and seven oblidges; Kevin contributed seven turns of speech and vocalizations. Kevin's parents thought that his speech occurred more often in communication exchanges when his parents expressed comments about their interactions than when they gave Kevin commands and directions or asked him yes/no questions.

Table XI., Long Communication Exchange Between Kevin and His Mother and Father (transcript 5/2/96, lines 203-214) and Table XII., Long Communication Exchange Between Kevin and His Mother and Father (transcript 5/2/96, lines 287-303) contain examples of long communication exchange segments between Kevin and his parents from the bowling activity in their living room. These data illustrate the longer communication exchanges and adult comments associated with Kevin's communication behaviors.

Further examination and discussion with Kevin's parents of the long versus the short communication exchange segments identified possible condition variables and values

associated with occurrences of Kevin's communication behaviors. Parents considered the adult language characteristics and other context variables when developing hypotheses (e.g., looking away from Kevin when communicating, talking fast and not waiting for Kevin's responses).

In contrast, short communication exchanges appeared with adult turns that included directions or yes/no questions (see Table XIII., Short Communication Exchanges and Turns Between Kevin and His Mother). In these examples, there are several turns between Kevin's turns contained four speech, two speech and vocalizations, two vocalizations and one physical. These behaviors were observed in exchanges where his mother's language contained seven yes/no questions or directions and five comments.

Possible condition variables and values thought to be associated with increases in Kevin's communication behaviors or long communication exchanges were: (a) looking at Kevin, (b) using comments and open-ended questions, and (c) pausing and waiting with expectation for Kevin's responses. Conversely, condition variables and values that appeared to be associated with decreases in Kevin's communication behaviors and short or no communication exchanges were: (a) looking away from Kevin, (b) using directions, commands, and yes/no questions, and (c) talking fast and not waiting for Kevin's responses.

Table X. Long Communication Exchange Between Kevin and His Father and Mother (transcript 5/2/96, lines 16-32)

Speaker	Communication Exchange
Kevin	*Ooooooooooohhh [pretend to blow the referee's whistle]*
Father	You gotta take the ball **(Restrictive Oblige)**, you're not taking the ball **(Comment)**
Mother	He's blow'in the whistle **(Comment)**
Father	It's too late **(Comment)**; it's already in play **(Comment)**
Kevin	*oooooooh [Kevin gets the ball and dribbles the ball to avoid his father]*
Father	'Come on, I gonna hand check ya **(Comment)**; okay, let's say you went this way **(Comment)**; okay; okay better do a spin move and come around me **(Restrictive Oblige)**, spin move, okay, all right **(Comment)**; you're not getting close to the basket **(Comment)**; gotta go... **(Restrictive Oblige)**
Kevin	*Almost did it*
Father	Okay, gotta go for a shot **(Restrictive Oblige)**; I am going to steal it **(Comment)**
Kevin	*[dribbles the ball]*
Father	Gonna shoot it? **(Restrictive Oblige)**
Kevin	*Ya I'll Shoot it; eh oo, eh; ah ehh - do da eh ehhe [laughs]*
Father	Come on **(Restrictive Oblige)**
Kevin	*'Kay*
Father	Gotta shoot it? **(Restrictive Oblige)**
Kevin	*- - - - - - - (vocals) [shoots ball]; Yay [laughs]*

Table XI. Long Communication Exchange Between Kevin and His Mother and Father (transcript 5/2/96, lines 203-214)

Coder 1	Coder 2	Agree	Time	Speaker	Communication Turn
RO			14'34''	Mother	"Kay, try again
			14'37''	Kevin	*[laughs]* - -- **(vocals)**
C			14'43''	Mother	Yey, good shot
C	C	YES	14'44''	Father	Okay, all right, that's ten
			14'46''	Kevin	*Ya*
RO	RO	YES	14'49''	Father	Big spin
			14'50''	Kevin	*Yey, daddy clap, mommy clap [everyone claps]*
C	C	YES	14'53''	Father	That was good, that was good
			14'56''	Kevin	*Mommy clap*
C	C	YES	14'58''	Father	All right
			14'59''	Kevin	*Daddy clap, mommy clap*
RO	RO	YES	15'01''	Father	Everybody clap

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

Table XII. Long Communication Exchange Between Kevin and His Mother and Father (transcript 5/2/96, lines 287-303)

Coder 1	Time	Speaker	Communication Turn
C	20'35''	Father	[laughs]; that was pretty good
	20'38''	Kevin	*[laughs]*
C	20'40''	Father	Okay
	20'41''	Kevin	*Okay;* - **(vocal)**
C	20'42''	Father	It's my turn then it's [Kevin's] turn
	20'44''	Kevin	*Okay*
C	20'45''	Father	Okay, first it's daddy's turn
	20'48''	Kevin	*All right daddy* --- -- **(vocal)**
C	20'48''	Father	I'll curve it around the corner [father bowls]
	20'53''	Kevin	*All right daddy; whoa ahghgh daddy!* **(speech & vocal)**
C	20'57''	Father	Oh boy
	21'01''	Kevin	*Come here Barnie [Kevin picks up Barnie stuffed animal]*
RO	21'05''	Father	Is Barnie go'n to bowl? Okay
	21'07''	Kevin	-- **(vocal)**; *I am gonna bowl [Kevin speaks for Barnie]; okay,* -- **(vocal)** *my turn my turn now?*
RO	21'14''	Father	Okay, not yet, not yet
C	21'17''	Mother	Gotta get the pins up here

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

Table XIII. Short Communication Exchanges and Turns Between Kevin and His Mother (transcript 5/2/96)

Code	Speaker	Cumulative Time and Communication Turn
C	Mother	(08'30") Okay, very good; whoa; Sean Kemp had better look out (08'45")
	Kevin	(0847) *I do up to ceiling* **(speech)**
RO	Mother	(08'48") No, not on the ceiling; let's shoot it the hoops, shoot it through the hoop; ooou, okay
	Kevin	[E shoots ball]
C	Mother	(09'15") Oh, good shot
	Kevin	(09'18") *Ya, I made it!* ---- ----- **(speech, vocal)**
RO	Mother	(09'27") I am sorry, what did you say?
	Kevin	(09'29") ----- **(vocal)**
RO	Mother	(09'32") I didn't understand; do you want to shoot some more or are you all done? No you want to jump ball?
	Kevin	*Ya* **(speech)**
RO	Mother	Okay, ready; [Mother throws ball] there (09'42")
	Kevin	(09'45") *Ya* **(speech)**
RO	Mother	(10'03") [Kevin] are you done with basketball?
	Kevin	*Yes* [Kevin walks into next room] **(speech)**
RO	Mother	(13'05") Okay, take another shot; Kevin you're only 2 feet away [Mother laughs], take it back farther
	Kevin	(13'19") *Oooh, ya, did you see that?* [Kevin talks to observer who says, "I saw that"] ; [Kevin laughs] ; ---- --- -- ---- **(vocal)** [Kevin laughs] ; *all the way!* (13'42") **(speech)**
C/RO	Mother	(13'43") Good grief [Mother laughs], [Kevin] that's a little too wild; [Mother laughs] okay, wait 'till the pins are up and then roll it on the floor, okay (13'51")
	Kevin	- **(vocal)**

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

The hypothesis predicting increases in Kevin's communication behaviors was: Kevin will use speech and vocals with gestures to initiate and maintain communication exchanges with partners when they look at him, comment and use unrestricted obliges, and use pauses to signal expectation for responses. The hypothesis predicting decreases in Kevin's communication behaviors was: Kevin will use speech, vocals, and gestures to reject and terminate communication exchanges with partners when they look away from him, request with restrictive obliges, and speak quickly allowing little time for his responses.

An observation probe was conducted of Kevin during a classroom activity to re-examine observed frequencies of six communication forms. In his classroom Kevin was observed at a small group language activity and a transition activity to playcourt. This activity corresponded to occasion (b) and (c) identified during the Stage One teacher interview. There were two adults (one teacher and one SLP) and four children along with Kevin at the small group language activity. Kevin's class of 12 students and two adults made the transition to playcourt. During the 5-minute direct observation event-sampling, observed were: 2 gesture, 1 vocal, 2 physical, and 2 speech communication behaviors. These frequencies of communication forms were within the range that Kevin demonstrated during his Stage One direct observations (see probe-school data in Figure 3).

Kevin's Stage Three Functional Analysis Analog Test

A functional analysis analog test was used to evaluate the two hypotheses. Kevin's parents had experimented informally with the different condition variables and values in the home. For example, in their exchanges with Kevin they used the variables of facial orientation, restricted or unrestricted oblige, and pace of turn-taking. They reported that the values identified in the hypotheses indeed appeared associated with Kevin's communication behaviors and length of communication exchanges. Subsequently, Kevin's parents wanted to examine Kevin's communication behaviors when someone outside the family controls

the condition variables and values during exchanges. Their specific interest was in generalization across partners. Kevin would be attending a new school in the Fall and his parents wanted to share the results with his new teacher and SLP. His parents thought that results from analog test with someone outside the family might be more convincing than results obtained with them.

A graduate student in early childhood special education was Kevin's communication partner during the analog tests. Kevin and the graduate student knew each other from his school, but they had not shared the same classroom. The two hypotheses were represented as Condition A (to increase) and Condition B (to decrease). The settings for the functional analysis analog test were in the family room and in the dining room at the table.

The two activities were Kevin and the adult partner playing with an interlocking puzzle on the dining room table, and then bowling in the living room. The sequence of conditions and activities was Condition A (to increase) with puzzles at the table, Condition B (to decrease) with bowling in the living room, Condition A (to increase) with bowling in the living room, and Condition B (to decrease) with puzzles at the table (see Figure 11: Kevin's Functional Analysis Test Data).

The conditions were presented over four consecutive 5-minute sessions with a 2-3 minute transition between activities and conditions. During each condition, cue cards were used with the hypothesis variables and values written in large print in view for the adult. The cue cards reminded the adult what behaviors to include in her communication exchanges with Kevin most of the time during each condition (see Table VIII. Hypotheses Conditions Adult Partner Cue Card Language Across Children). Two observers collected direct observation event-sampling of Kevin's expressions of the six communication forms, and Kevin's and the adult's speech and vocalizations were audio-tape recorded. The sums of Kevin's observed communication forms within both Condition As were 24 vocal, 2

physical, and 29 speech communication behaviors. The sums of his observed communication forms within Condition Bs were 19 vocal, 5 physical, and 20 speech communication behaviors (see Figure 12: Kevin's Functional Analysis Test Summary). Overall, 55 communication forms were observed in Condition A and 44 communication forms were observed in Condition B. Kevin's observed communication forms or acts calculated per minute with a non-family member were 5.6 during Condition A1, 4.2 during Condition B1, 5.4 during Condition A2, and 4.6 during Condition B2 (see Table IX. Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations).

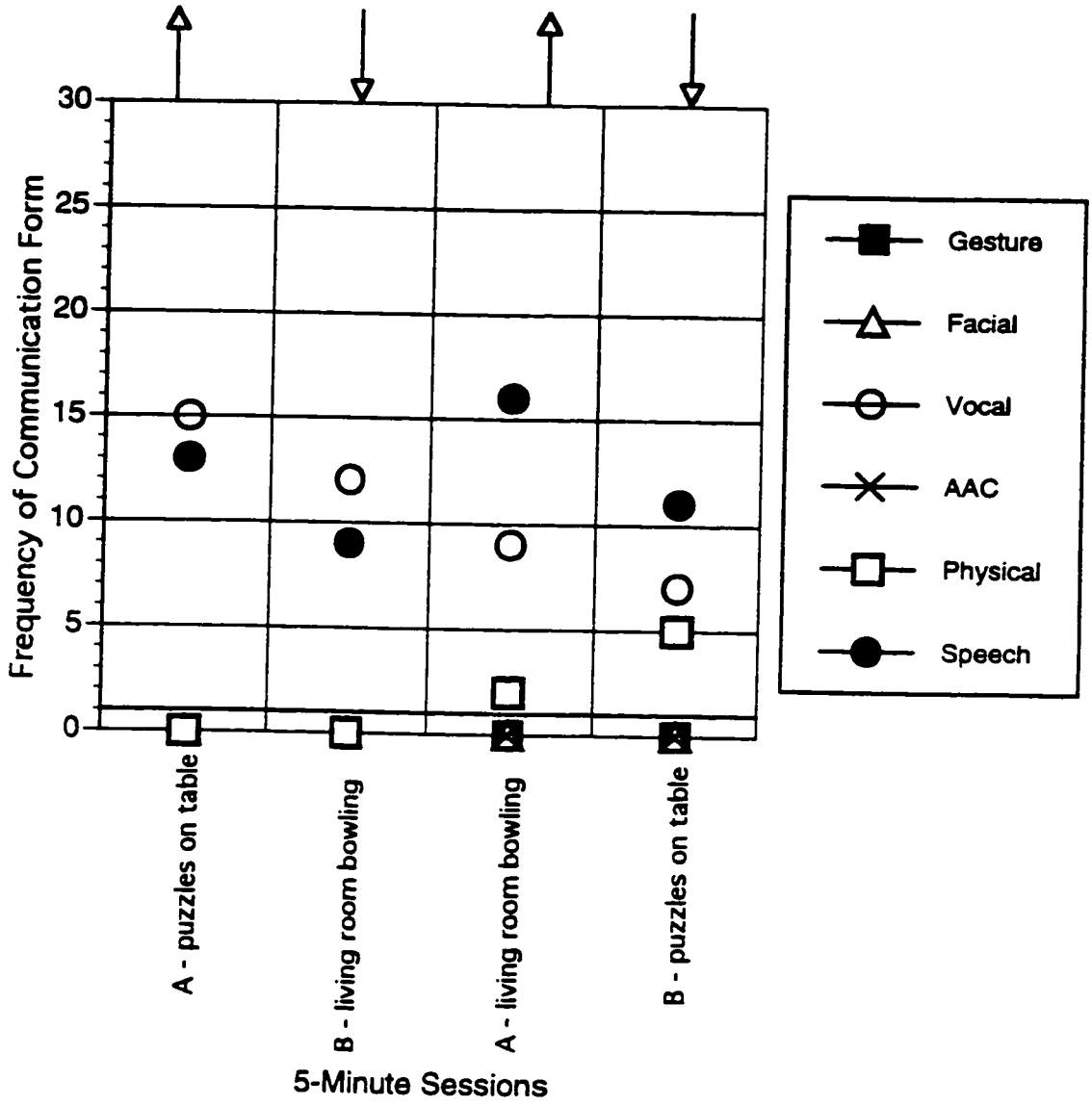


Figure 11: Kevin's Functional Analysis Test Data

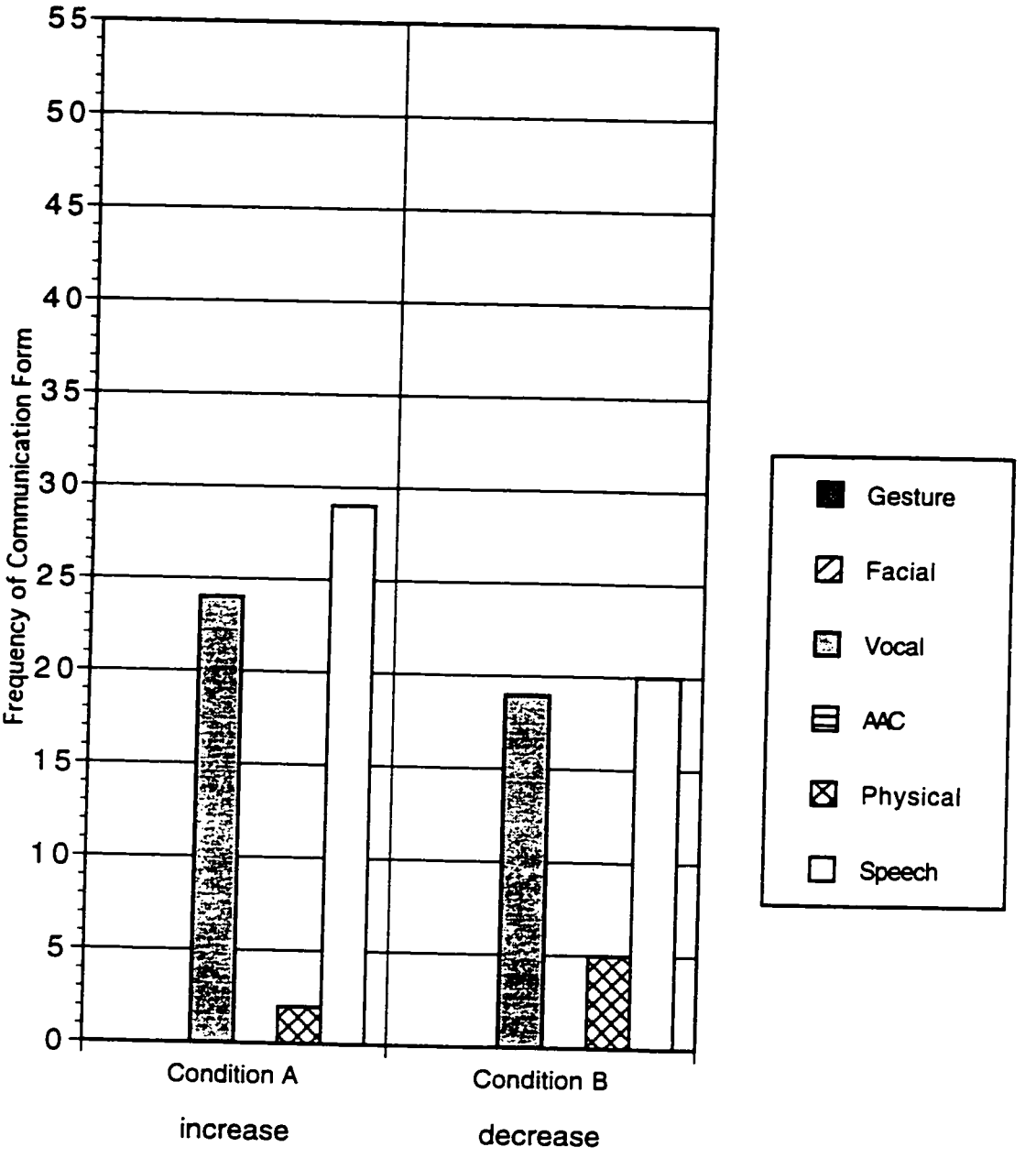


Figure 12: Kevin's Functional Analysis Test Summary.

Will - Stage Two Functional Assessment Activities

Will's parents provided information during one interview that combined Stage One screening and Stage Two assessment interview questions. Specific information associated with Will's communication behaviors included: (a) Will communicates less when he is tired and "cranky"; (b) meal times are a communication and social interaction time for the whole family; and, (c) Will often communicates in long responses when he told "no" to his requests. In this latter case, his responses contain single words and vocalizations with gestures in attempts to persuade others to meet his requests. Parents reported that Will started communicating with manual signs as a toddler and they use some signs in their communication exchanges in the home. However, mother reported that as he began using more speech and vocalizations the signs have taken on their own idiosyncratic forms. His mother stated that Will has started using nouns as speech in single words and has recently begun to use more qualifying and location words (e.g., hot, in).

One observation was conducted to construct the language sample of Will's communication behaviors during activities in the home. The decision to use one observation rather than two was based on three issues. First, Will's mother was self-employed in the home and there were less opportunities to schedule more than one observation. Second, Will's parents believed that his communication abilities could be assessed adequately in one session, particularly since he demonstrated his communication abilities over the three Stage One observations. Third, Kevin's hypotheses were developed primarily from an examination of the one activity transcript with his mother and father. Therefore, there was evidence that one observation activity was sufficient to answer research questions two and three.

The observation of Will and his mother playing together with puzzles and shape matching games in the living room before dinner. This activity corresponded to occasion (a) identified during the Stage One parent interview. Will's parents chose this activity

because it was most similar to activities Will participates in at school and it was one of their daily activities in the home when Will communicates most often with others. The activity was audio-tape recorded along with written notes of nonverbal communication and context. The observation ran 39-minutes 30-seconds in length.

During observation, Will's mother expressed 232 turns of mostly speech as words in sentences and Will expressed 233 turns mostly vocals and speech as words or word approximations in phrases (approximately 6 turns per minute). Table XIV., Long Communication Exchange Between Will and His Mother (transcript 6/20/96, lines 219-233), displays a long communication exchange of 13-turns. Will's mother's language contained 3 comments, 1 unrestrictive oblige, and 4 restrictive obliges. Will's speech appeared to follow adult turns that were coded as restrictive obliges. Table XV., Long Communication Exchange Between Will and His Mother (transcript 6/20/96, lines 160-185) provides another example of a long communication exchange segment of 24-turns. The activity was solving an alphabet puzzle. Will's mother reported that her comments and restrictive obliges appeared associated with increases in the conversational turn-taking.

Will's mother hypothesized from examination of long versus short exchanges that long communication exchanges included adult turns with directions and yes/no questions directed to Will. For example, during the exchange that contained 24 turns, Will's mother contributed 8 comments, 3 combined comment/restricted oblige, and 1 restricted oblige.

In contrast, short communication exchanges appeared with adult turns that included comments and open-ended questions (see Table XVI. Short Communication Exchanges and Turns Between Will and His Mother). In the three examples with his mother, Will's turns contained two vocalizations, four speech and vocalizations, one speech and gesture, and three speech. These behaviors were observed in short exchanges where his mother's language contained three open-ended questions, three directions, and five comments.

Table XIV. Long Communication Exchange Between Will and His Mother (transcript 6/20/96, lines 219-233)

Speaker	Communication Exchange
Mother	Do you think, or do you think it goes there? **(Restrictive Oblige)**
Will	*Ummm, no, I da bouba*
Mother	Here let's see; do you want a star? **(Comment/Restrictive Oblige)**
Will	*Star*
Mother	Where does the star go? **(Restrictive Oblige)**
Will	*No want star I need*
Mother	Okay, not ready **(Comment)**
Will	*No, not star; doo do ees*
Mother	What? **(Unrestricted Oblige)**
Will	*Do da va doo ees; minna aaes too ees*
Mother	I don't know what you're saying **(Comment)**
Will	*Win win too ees*
Mother	Turn the clock on? **(Restrictive Oblige)** [The puzzle has a spring mechanism to wind up that ejects the pieces form the puzzle.]
Will	*I dee do; iiee; iee ou eeou*

Table XV. Long Communication Exchange Between Will and His Mother (transcript 6/20/96, lines 160-185)

Coder 1	Coder 2	Agree	Time	Speaker	Communication Turn
C	C	YES	05'58''	Mother	Good job [mother whispers]
			05'59''	Will	*Here, me do it; iea see there; tee* ^ **(speech & vocal)**
C	C	YES	06'07''	Mother	"U"
			06'08''	Will	*Uu [places piece into puzzle]; hurple* ^ **(speech)**
C/RO	C/RO	YES	06'11''	Mother	Purple, what letter?
			06'18''	Will	*Hurple* **(speech)**
C	C	YES	06'26''	Mother	Tee
			06'21''	Will	*Tee, one; what's that?* **(speech)**
RO/C	UO/C	*NO*	06'24''	Mother	What's that? You know
			06'29''	Will	*Hey* **(speech)**
C	C	YES	06'30''	Mother	"Ss"
			06'31''	Will	*"Ss"; there me do it [laughs]; this is doin'; ahh* **(speech)**
C	C	YES	06'43''	Mother	"r"
			06'44''	Will	*Here, you do it; there, 2* **(speech)**
C	C	YES	06'51''	Mother	"Q"
			06'57''	Will	*Teebeee* **(vocal)**
C	C	YES	06'59''	Mother	"Z"
			07'00''	Will	*Zee* **(speech)**
RO	RO	YES	07'04''	Mother	Can you turn
			07'05''	Will	*Turn [turns puzzle piece]* **(speech)**
RO/C	RO/	YES	07'08''	Mother	Work? There you go
			07'14''	Will	*"X"* **(speech)**
C	C	YES	07'16''	Mother	"X"
			07'17''	Will	*"Y"* **(speech)**

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

Table XVI. Short Communication Exchanges and Turns Between Will and His Mother (transcript 6/20/96)

Code	Speaker	Cumulative Time and Communication Turn
C	Mother	(01'32") Yaah! All done bus.
	Will	[Will claps hands together]; *Are we through yet?* (01'37") **(gesture, speech)**
UO	Mother	(01'38") What?
	Will	(01'40") *Eee doo* [Will dumps letter puzzle onto table top] **(vocal)**
C	Mother	(01'45") Ohh; it worked I guess
	Will	(01'48") *Oh right, all right; oh ehs slo oei oei* **(vocal, speech)**
RO	Mother	(01'51") Put'm in
C	Mother	(25'39") Yuck
	Will	(25'42") What's this for, right, here (25'47") **(speech)**
RO	Mother	(26'01") Turn
	Will	(26'02") Ya; there; here it is (26'08") [F and M solve Noah puzzle] **(speech)**
C	Mother	(26'16") You are fast
	Will	(26'17") You fast, hiee up; um um um; ees home fast; (26'26") sting, ees bus sing (26'31") **(speech, vocal)**
C	Mother	(26'32") The sky
	Will	(26'36") *Here* **(speech)**
RO	Mother	(36'02") Wake-up
	Will	(36'04") Bye; seembe in there [F talk into a play telephone] hello, gimme this here this here this, hold this **(speech, vocal)**
UO	Mother	(36'24") Who's there?
	Will	(36'25") Dearears dee **(vocal)**
UO	Mother	(36'27") Who is it?
	Will	(36'29") Who is that for; isa be eeba car; (36'34") aubot eesa car; (36'37") hey, hey **(speech, vocal)**

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

Parents considered the adult language codes as well as other context variables when developing hypotheses. His parents stated that Will did not know how to respond to open-ended questions and that he needed direct choices and yes/no questions to facilitate his communication abilities and intelligibility of speech. Further discussion and examination with the parents of long versus short communication exchanges identified possible condition variables and values associated with occurrences of Will's communication behaviors. Possible condition variables and values associated with increases in Will's communication behaviors included: (a) responding to and interpreting his vocals, (b) using comments and yes/no questions (i.e., restrictive obliges), and (c) using activity materials and play as topics of conversation. Condition variables and values that appeared associated with decreases in Will's communication behaviors included: (a) ignoring Will's vocals, (b) using open-ended questions (i.e., unrestrictive oblige), and (c) using past or future events as topics of conversations.

The hypothesis to predict increases in communication behaviors was Will will use speech and vocals with gestures to initiate and maintain communication exchanges with partners when they respond to and interpret his vocalizations and word approximations, use comments and yes/no questions (i.e., restricted oblige), and use the activity materials and the play context as topics for conversation. Conversely, the hypothesis to predict decreases in Will's communication behaviors was Will will use speech, vocals, and gestures to reject and terminate communication exchanges or withdraw from interactions with partners when they ignore his vocalizations, ask divergent or open-ended questions, and use past or future events beyond the context of the play activity as topics for conversation.

An observation probe was conducted of Will during a classroom activity to re-examine the observed frequencies of six communication forms. In his classroom, Will was observed during a free-choice center activity time. This activity corresponded to occasion

(a) identified during the Stage One teacher interview.. There were four adults (two teachers and two parents) and 17 who participated with Will at the different center activities. Will played at the flannel board story center along with two to four other students. During the 5-minute direct observation event-sampling, observed were: 2 gesture and 1 vocal communication behaviors. These frequencies of communication forms were within the range that Will demonstrated during the Stage One direct observations (see probe-school data in Figure 5).

Will's Stage Three Functional Analysis Analog Test

A functional analysis analog test was used to evaluate the two hypotheses. The hypotheses were represented as Condition A (to increase) and Condition B (to decrease), and presented as two separate sets of variables and values within a single-case reversal design across two different activities in the home. Will's parents wanted to examine the condition variables and values with an adult communication partner outside the family (e.g., teachers). They reported that the values identified in the hypotheses indeed appeared associated with Will's communication behaviors. Subsequently, Will's mother wanted to examine his communication behaviors when someone outside the family controls the condition variables and values during exchanges. Her specific interest was the generalization across adult partners so that results could be used with his new teacher and his SLP. Therefore, a graduate student in early childhood special education acted as Will's communication partner during the analog tests. The graduate student had acted as an adult communication partner for other study child participants. Will and the graduate student had not known each other before the functional analysis analog tests were conducted in his home. The settings for the tests were in the living room and in an adjacent family play room.

Two activities were used for the analog test. One activity was playing with puzzles at the living room coffee table and the other activity was playing with cars and toys on the

rug in the play room. These activities corresponded to occasion (a) identified during the Stage One parent interview. The sequence of hypothesis conditions presented across activities was Condition A (to increase) with puzzles in the living room, Condition B (to decrease) with cars and toys in the play room, Condition A (to increase) with cars and toys in the play room, and Condition B (to decrease) with puzzles in the living room (see Figure 13: Will's Functional Analysis Test Data).

The conditions were presented over four consecutive 5-minute sessions, with 2-3 minutes transition between activities. During each condition, cue cards with the hypothesis variables and values written in large print were in view for the adult. The cue cards reminded the adult what behaviors to include in her communication exchanges with Will most of the time during each condition (see Table VIII. Hypotheses Conditions Adult Partner Cue Card Language Across Children). Will's mother was in an adjacent room listening to the communication exchanges during the procedures. Two observers collected direct observation event-sampling of Will's communication behaviors and Will's and the adult's speech and vocalizations were audio-tape recorded.

The sums of Will's observed communication forms observed within both Condition As were 2 gesture, 29 vocal, and 26 speech communication behaviors (see Figure 14: Will's Functional Analysis Test Summary). The sums of his observed communication forms within Condition Bs were 33 vocal and 10 speech communication behaviors. Overall, 57 communication forms were observed in Condition A and 43 expressive communication forms were observed in Condition B. Will's observed communication forms or acts calculated per minute with a non-family member were 6.2 during Condition A1, 4.8 during Condition B1, 5.2 during Condition A2, and 3.8 during Condition B2 (see Table IX. Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations).

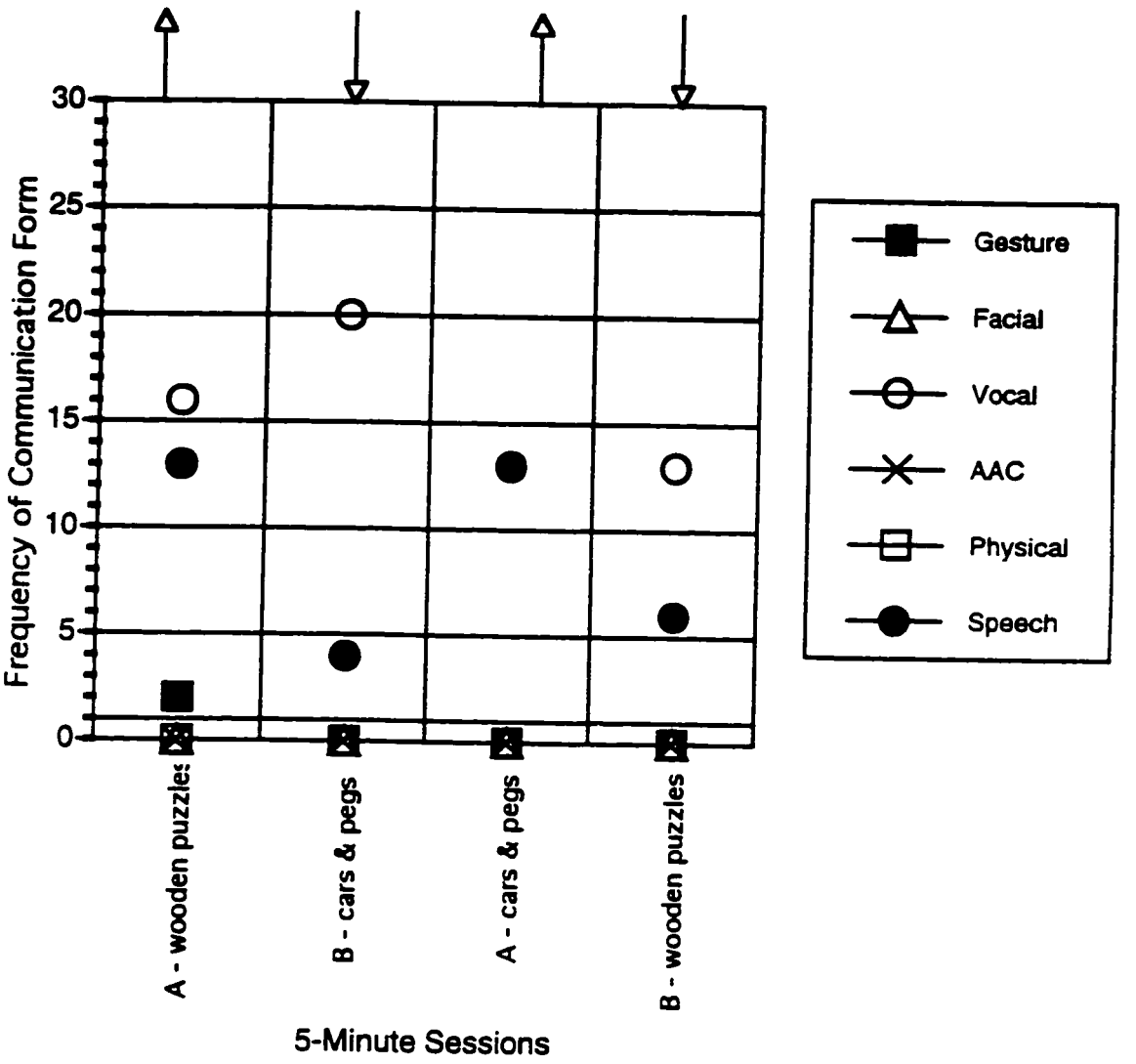


Figure 13: Will's Functional Analysis Test Data.

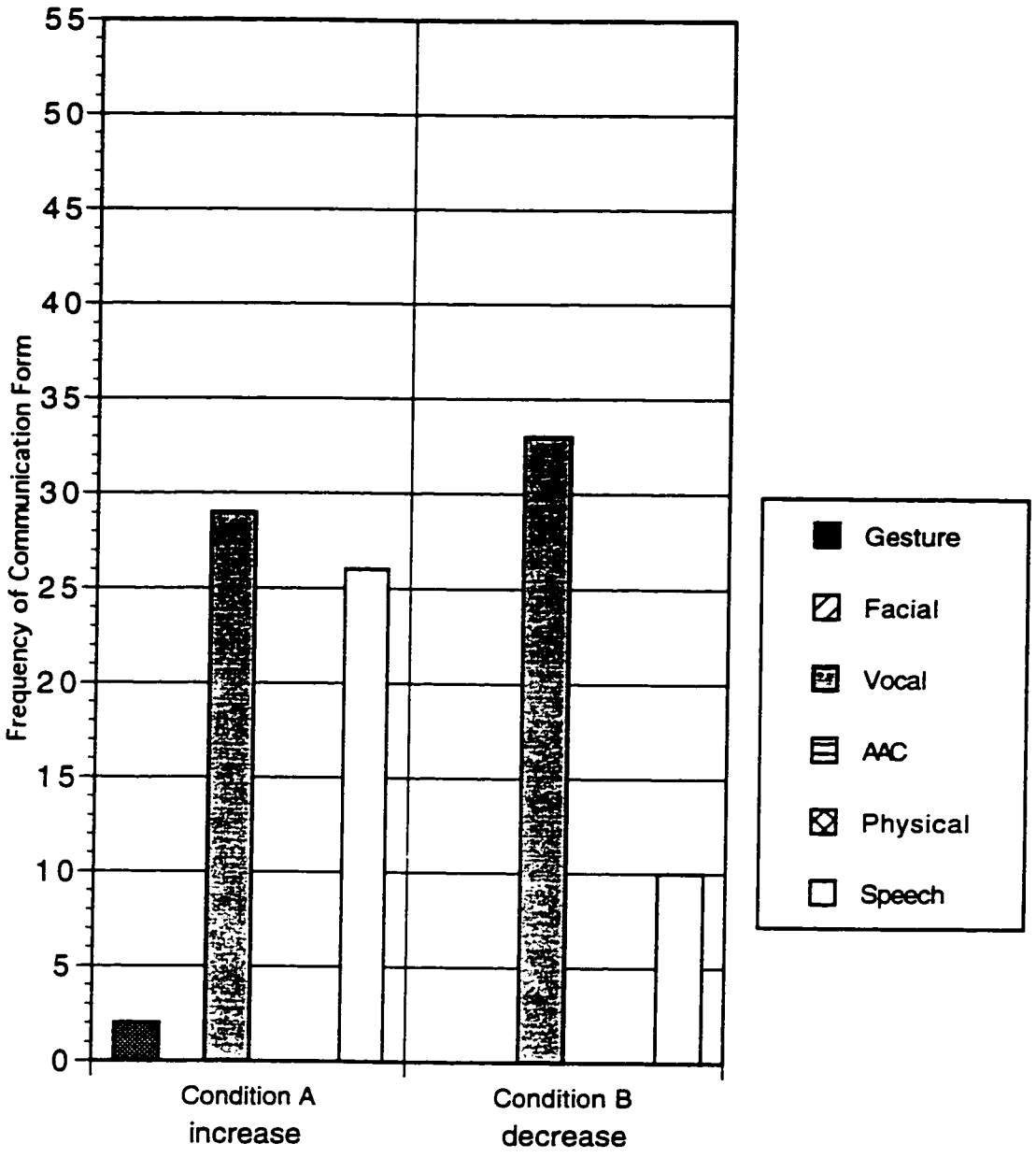


Figure 14: Will's Functional Analysis Test Summary.

Cory - Stage Two Functional Assessment Activities

Cory's parents provided additional information on Cory's communication behaviors after the Stage One observations identified a discrepancy in his communication behaviors between home and school. For example, when tired he becomes "cranky," easily frustrated with events and interactions with others, requests his blanket, and quietly talks to himself. Parents reported that the different types of "self-talk" seemed to correspond with different activities and emotional states (e.g., basketball, swimming; being happy, tired, or protesting). Cory's mother stated that he participates in many recreational activities with his family and often uses vocalizations and speech that are difficult for others to interpret. In these cases, she stated they provide Cory with a multiple choice of options using speech in phrases with objects as referents. Cory, then, makes his choice from the options with an "okay" and affirming gestures and facial expressions. An example of using object as referents reported by his mother is if Cory's is hungry he will check the cupboards, find the peanut butter jar, go and lead his her to the jar, point to the jar and say, "and this, and this, and this."

Parents' stated that Cory's communication abilities were age-appropriate during his first year. He used crying and vocalizations to communicate with others. During his second and third year, they said that he seemed to have lost some of his communication abilities. Then at 3-4 years old he began to make choices and respond to adult language in conversational turn-taking. For example, he would look at a fire truck when a parent said, "Cory, there's a fire truck." Parents stated that he uses loud vocalizations, screams, cries, and tantrums to control social interactions and activities.

One observation was conducted of Cory to construct the language sample of his communication behaviors. During the observation Cory and his mother participated in three separate consecutive daily activities: (a) preparing chocolate milk, (b) pressing cookies for baking, and (c) playing with puzzles and toys in the family room. These were

typical daily activities they shared in the early afternoons and corresponded to occasion (c) identified during the Stage One parent interview. The observation was audio-tape recorded with written notes of nonverbal communication and context. The observation of Cory and his mother ran 38-minutes 28-seconds in length.

During the observation Cory's mother expressed 263 turns of mostly speech as words in sentences or phrases and Cory expressed 263 turns mostly vocals and speech as words (approximately 7 turns per minute). Long versus short communication exchanges were marked on the transcription and examined with Cory's parents. Long communication exchanges appeared associated with adult turns that contained mostly comments, questions with options or yes/no answers, and directions. In one example, Table XVII., Long Communication Exchange Between Cory and His Mother (transcript 4/26/96, lines 230-254) displays 25 communication turns between Cory and his mother. Within mother's 12 turns there were 10 comments, 3 unrestricted oblige, and 5 restricted obliges coded in adult partner language. In another example of a long exchange, Table XVIII., Long Communication Exchange Between Cory and His Mother (transcript 4/26/96, lines 37-53), within her 7 turns, Cory's mother expressed 3 turns of comments, 2 turns of comments and restrictive obliges, and 2 turns of restrictive obliges.

Cory's parents hypothesized that he communicated in long versus short communication exchanges when adult turns contained mostly comments, questions with options or yes/no answers, and directions. Cory's father stated that when he used directions, commands, and yes/no questions this seemed to help Cory focus on the communication exchange. Cory's mother agreed, but qualified this point in that directions and commands facilitated his receptive or listening abilities (e.g., following directions) rather than his use of expressive communication behaviors (e.g., speech). She stated that from the transcripts, it appeared that Cory's expressive communication behaviors were facilitated by adult turns embedded with open-ended questions and comments. Cory's

mother stated that he uses these as models of expressive language to imitate during communication exchanges.

In contrast, short communication exchanges appeared with adult turns that included directions, commands, or yes/no questions (see Table XIX., Short Communication Exchanges and Turns Between Cory and His Mother). In the three examples with his mother, Will's turns contained one physical and three speech. These behaviors were observed in exchanges where his mother's language contained turns with five yes/no questions and directions, two comments, and one open-ended question.

Condition variables and values thought to be associated with increases in Cory's communication behaviors included: (a) providing indirect language models of speech, (b) using 4-5 word comments and open-ended statements or questions, and (c) using concrete referents from the activity to support language. Condition variables and values that appeared associated with decreases in Cory's communication behaviors included: (a) asking yes/no questions, (b) giving directions and commands during play, and (c) talking about topics other than those connected with the activity materials.

Table XVII. Long Communication Exchange Between Cory and His Mother (transcript 4/26/96, lines 230-254)

Speaker	Communication Exchange
Cory	*A light, a light*
Mother	A light, light on **(Comment)**; okay, oooo, nice **(Comment)**; there they are, cool, nice job bud **(Comment)**
Cory	*[laughs]*
Mother	Look at those **(Restrictive Oblige)**; pretty cool huh **(Restrictive Oblige)**; shall we turn the light off? **(Restrictive Oblige)**
Cory	*Turn light; [Cory vocalized]*
Mother	There's the cookies **(Comment)**
Cory	*[Cory vocalizes in sing-song manner]; wu right, wright peck*
Mother	What? **(Unrestricted Oblige)**
Cory	*Do you like*
Mother	Do you like 'm **(Restrictive Oblige)**; I like 'm **(Comment)**
Cory	*Okay, yaa*
Mother	I like 'm **(Comment)**
Cory	*[Cory vocalizes and laughs]; it soo*
Mother	I like cookies **(Comment)**
Cory	*It soo so; it soo, it soo like*
Mother	It's your what? **(Unrestricted Oblige)**
Cory	*It soo so*
Mother	It's what? **(Unrestricted Oblige)**
Cory	*It soo done, it so right, it so*
Mother	It's your **(Comment)**
Cory	*It's your*
Mother	[Mother laughs] **(Comment)**
Cory	*It's your*
Mother	It's all right? **(Restrictive Oblige)** It's all right **(Comment)**
Cory	*[Cory laughs]*

Table XVIII. Long Communication Exchange Segment Between Cory and His Mother (transcript 4/26/96, lines 37-53)

Coder 1	Coder 2	Agree	Time	Speaker	Communication Turn
RO	RO	YES	01'10''	Mother	Hey, Cory, do you want almond milk or chocolate milk?
			01'14''	Cory	*Ah, chocolate* **(speech)**
C/RO	C/RO	YES	01'15''	Mother	Chocolate milk; okay you need to sit down
			01'18''	Cory	*Ah, chocolate milk* **(speech)**
C	C	YES	01'20''	Mother	Chocolate milk okay
			01'24''	Cory	*Chocolate; eaahh- eah eh* **(speech & vocal)**
RO	RO	YES	01'29''	Mother	Oohhh, I am not fast enough, okay [mother sets milk on table for Cory to drink]; wanna stir stir stir? Okay, put the chocolate in; squeeze; nice; wanna taste it?
			01'50''	Cory	*Chocolate milk* **(speech)**
C/RO	C/RO	YES	01'51''	Mother	Chocolate milk; oopsey [chocolate bottle cap dropped on floor]; stir stir stir; stir it, you do it? Ya, stirrr it [Mother and Cory stir milk together]
				Cory	*No* **(speech)**
C	C	YES	02'06''	Mother	Okay
			02'08''	Cory	*Eaaha-* **(vocal)**
C	C	YES	02'12''	Mother	Oouha; mmmm, mmm
			02'15''	Cory	*Eaaha-ha* **(vocal)**

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

Table XIX. Short Communication Exchanges and Turns Between Cory and His Mother (transcript 4/26/96)

Code	Speaker	Cumulative Time and Communication Turn
RO	Mother	(35'01") Turn it over, all right; mmm, (35'05") nice; you put it on, which one? (35'10") You do it; Sean, let's go; Aahh, oopsey (35'20")
	Cory	[E changes pictures on board] **(physical)**
C/RO	Mother	Oooo, I like stars, I like stars; which one; (35'35") put it on; ooo, nice, ready? (35'44") Turn it on? (35'48")
	Cory	[turns on computer game] ; *Ya* **(speech)**
RO	Mother	No (35'57")
C/RO/UO	Mother	(30'20") Ya, help you; there you go, dot; (30'28") dot dot (30'44") dot dot dot [M makes dots on magnet board] ; X, X; (30'49") what do you see [M whispers to E]; (31'05") doesn't work, doesn't work; ya almost done, with your cookie? (31'17")
	Cory	(31'18") *Almost done* **(speech)**
RO	Mother	(33'52") Come to me? Where are we going? (33'55") Ya, (34'01") you wanna to do some more cookies? You wanna to do some more crash? (34'05") You wanna do some more crash? What? (34'10") You want (34'18")
	Cory	(34'19") [E vocalizes quietly] ; *come to me* **(speech)**

(UO = Unrestrictive Oblige, RO = Restrictive Oblige, C = Comment)

The hypothesis to predict increases in Cory's communication behaviors was Cory will use vocals, gestures, and speech to comment, request, and initiate and maintain communication exchanges with one adult partner when he or she comments and asks open-ended questions during a shared predictable activity with concrete physical referents chosen by Cory. The hypothesis to predict decreases in Cory's communication behaviors was Cory will use vocals, gestures, and speech to reject and terminate communication exchanges with one adult partner when he or she uses yes/no questions, commands or directions, without physical referents during an activity chosen by the partner.

An observation probe was conducted of Cory during a classroom activity to re-examine the frequencies of the six communication forms prior to the functional analysis analog tests. Cory was observed at a small group snack activity. There were two adults (one student teacher and one SLP) and four children along with Cory at the snack activity. During the 5 minute direct observation event-sampling, observed were: 11 gesture, 1 facial, 4 vocal, and 7 speech communication behaviors (see Probe-School 1 data in Figure 7). These were higher levels of observed communication forms than during the Stage One observations. Therefore, another observation probe was conducted to examine the stability of these increased frequencies.

During School Probe 2 Cory was observed outside at playcourt with 12 students and three teachers. During the 5-minute direct observation event-sampling, observed were: 1 gesture, 2 facial, 7 vocal, 4 physical, and 2 speech communication forms. These frequencies of communication forms were within the range that were observed during his Stage One direct observations (see Probe-School 2 data in Figures 7). Cory's teacher and mother reported that there had been no significant changes in his communication behaviors in the school since the study began. His increased communication behaviors during the School-Probe 1 may have been a result of the SLP's prompts and cues to communicate directed to Cory during the snack activity.

Cory - Stage Three Functional Analysis Analog Tests

The functional analysis analog test was used to evaluate the two hypotheses. The hypotheses were represented as Condition A (to increase) and Condition B (to decrease). Conditions A and B were presented within a single-case reversal design across two different activities in the home. The settings for the functional analysis analog test were in the living room and the family room. Cory and his mother interacted in two activities: One activity was playing with toys in the family room and the other activity was playing with dot paints and playdough in the living room. The sequence of hypothesis conditions presented across activities was Condition A (to increase) with toys in the family room, Condition B (to decrease) with dot paints and playdough in the living room, Condition A (to increase) with dot paints and playdough in the living room, and Condition B (to decrease) with toy box toys in the family room (see Figure 15: Cory's Functional Analysis Test Data with Family).

The conditions were presented over four consecutive 5-minute sessions, with 3-4 minutes transition between activities and conditions. During each condition, cue cards were used with the hypothesis variables and values written in large print in view for Cory's mother. The cue cards reminded her what behaviors to include in her communication exchanges with Cory most of the time for each condition (see Table VIII., Hypotheses Conditions Adult Partner Cue Card Language Across Children). Two observers collected direct observation event-sampling of Cory's communication behaviors and Cory's and his mother's speech and vocalizations were audio-tape recorded.

The sums of Cory's communication forms observed within both Condition As were 2 gesture, 2 facial, 50 vocal, 1 physical, and 11 speech communication behaviors. The sums of his communication forms observed within Condition Bs were 1 facial, 53 vocal, 9 physical, and 30 speech communication behaviors (see Figure 16: Cory's Functional Analysis Test Summary With Family). Overall, 66 communication forms were observed in

Condition A and 93 communication forms were observed in Condition B. Cory's observed communication forms or acts calculated per minute with his mother were 5.8 during Condition A1, 9.6 during Condition B1, 7.4 during Condition A2, and 9.0 during Condition B2 (see Table IX. Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations).

These levels of observed communication forms were opposite of those predicted in the hypotheses. The frequency levels of observed communication forms were higher during Condition B (to decrease) than Conditions A (to increase). These results prompted questions and discussion with Cory's parents. Are the controlling variables and values of Cory's communication behaviors those stated in the hypotheses? Cory's mother's conversational turns were coded from the transcript as restricted or unrestricted obliges as a general measure of procedural reliability (see Table XX., Child Communication Behaviors Per Minute During Stage Three Analog Test Observations With Cory and His Mother). The unrestricted oblige was a component of Condition A and the restricted oblige was a component of Condition B. The adult language matched the condition component three of the four opportunities.

Possibly other unknown variables and values associated with Cory's and his mother's conversational turn-taking and interactions affected the length of their exchanges? Would these results be replicated when another adult communicates with Cory using only the cue cards during a similar analog test? Cory's parents decided to repeat the analog test with an adult partner outside the family to address these questions. Within two weeks, the second functional analysis analog test was conducted with a non-family member in the home (see Figure 17: Cory's Functional Analysis Test Data With Non-Family).

The second adult communication partner was a graduate student in early childhood special education. Cory and the graduate student knew each other from his school, but were never assigned to the same classroom. The two settings for the analog test were in

the family room and the play room downstairs in Cory's home (mother suggested the play room downstairs rather than the living room as the setting for the second activity). Cory's mother was present in the home, but did not participate in the test activities. Cory and the graduate student interacted in two activities: One activity was playing with toys in the family room and the other activity was playing with pegs and playdough in the play room downstairs.

Table XX. Child Communication Behaviors Per Minute During Stage Three Analog Test Observations With Cory and His Mother

		Stage Three Acts Per Minute			
		Condition A1 (to increase)	Condition B1 (to decrease)	Condition A2 (to increase)	Condition B2 (to decrease)
Mother	unrestrictive oblige	11.8	8.4	7.6	5.4
	restrictive oblige	1.8	6.6	5.2	8.4
	total	13.6	15	12.8	13.8
Cory	total	5.8	9.6	7.4	9.0

Shaded areas represent hypothesis condition variable.

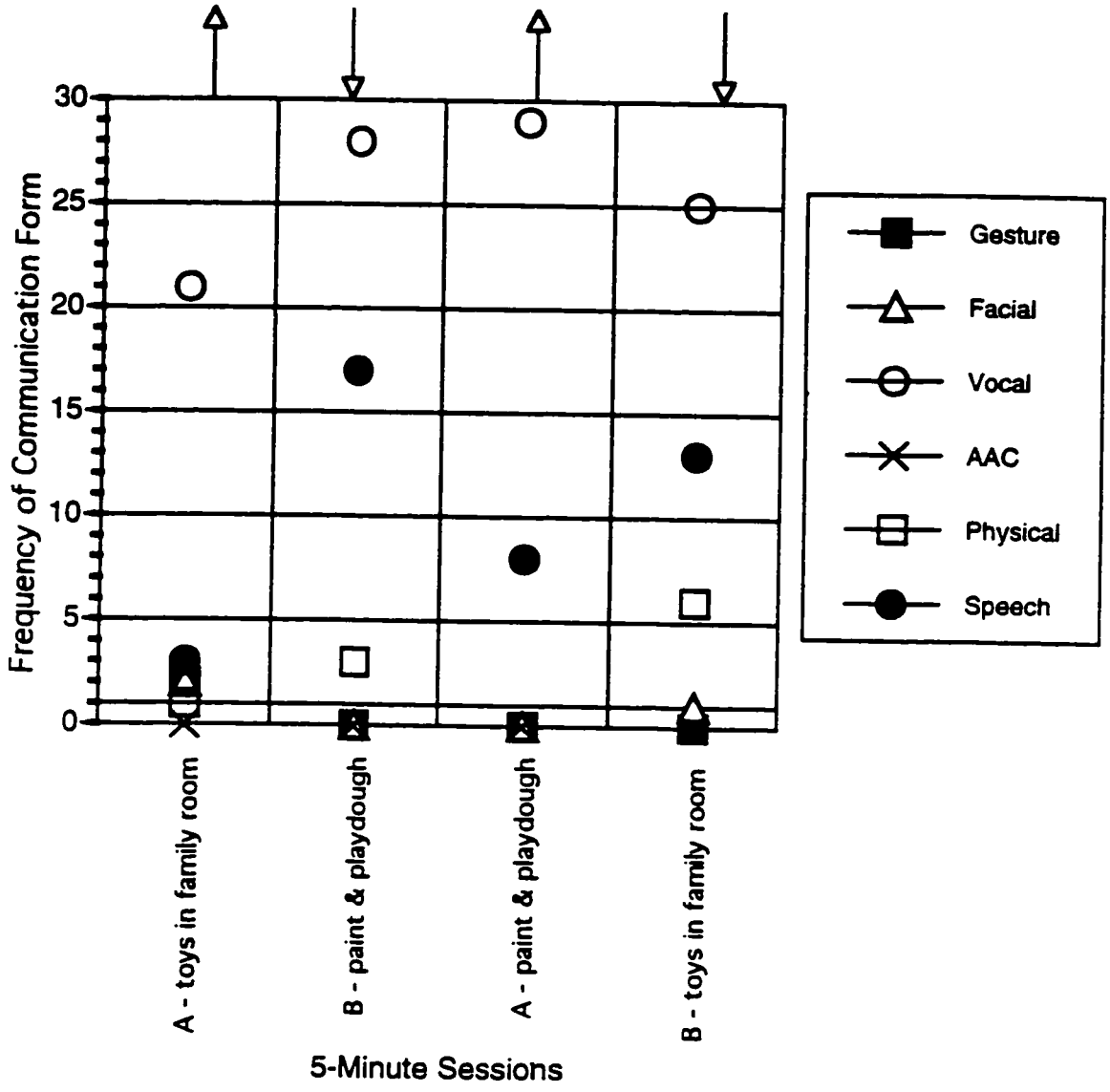


Figure 15: Cory's Functional Analysis Test Data With Family.

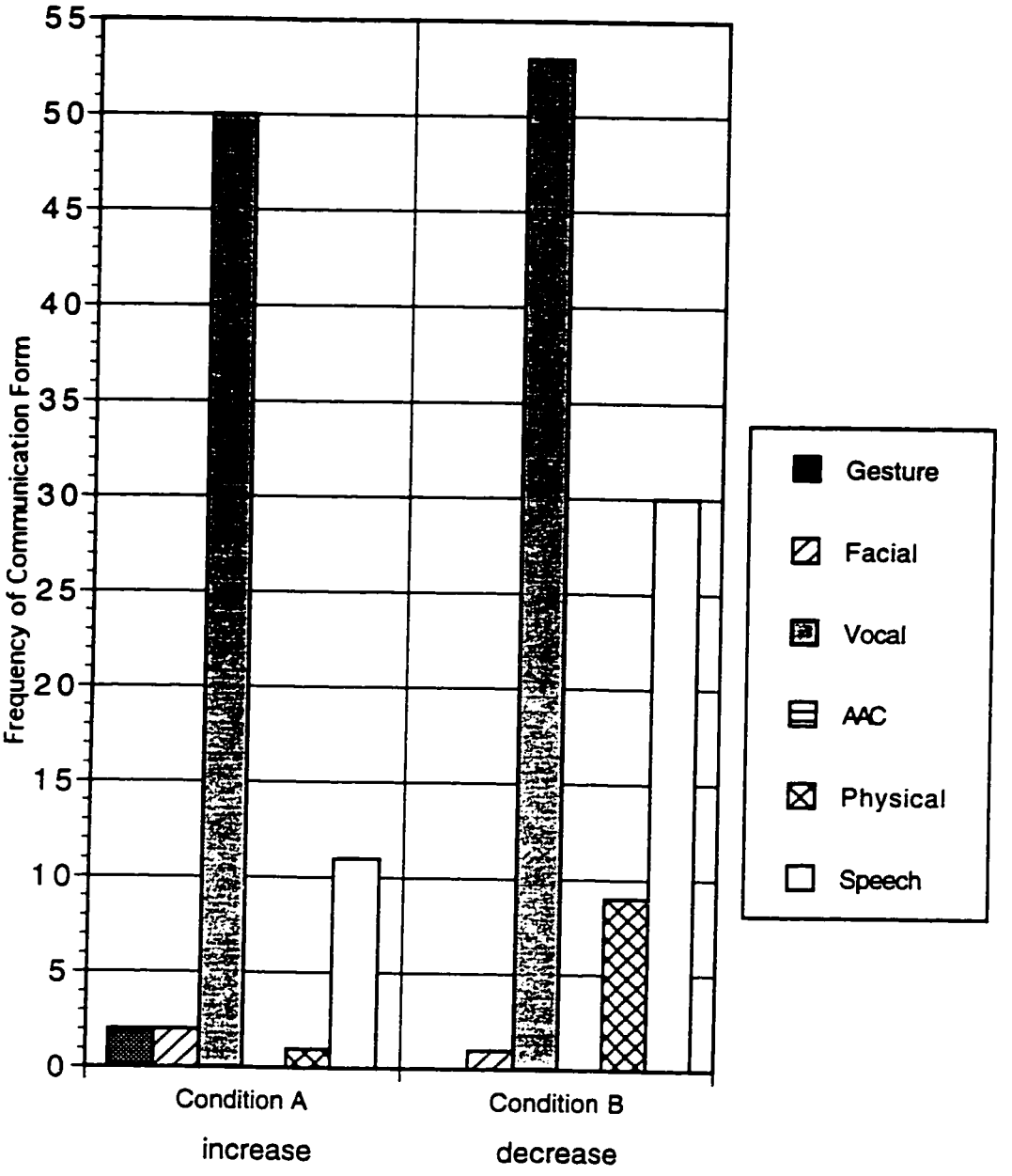


Figure 16: Cory's Functional Analysis Test Summary With Family.

The sequence of conditions was Condition A (to increase) with toys in the family room, Condition B (to decrease) with playdough and pegs in play room downstairs, Condition A (to increase) with playdough and pegs in the play room downstairs, and Condition B (to decrease) with toys in the family room. The procedures were identical to those used in the analog test with Cory and his mother. The same cue cards were in view to remind the adult partner what behaviors to include in her communication exchanges with Cory most of the time during conditions and she was aware of the hypotheses predicting Cory's communication behaviors . Two observers collected direct observation event-sampling of Cory's communication behaviors and Cory's and the adult's speech and vocals were audio-tape recorded.

The sums of Cory's communication forms observed within Condition As were 2 gesture, 23 vocal, 3 physical, and 13 speech communication behaviors. The sums of his communication forms observed within Condition Bs were 1 gesture, 27 vocal, 17 physical, and 18 speech communication behaviors (see Figure 18: Cory's Functional Analysis Test Summary With Non-Family). Overall, 41 communication forms in Condition A and 63 communication forms were observed in Condition B. Cory's observed communication forms or acts calculated per minute with a non-family member were 4.4 during Condition A1, 7.2 during Condition B1, 3.8 during Condition A2, and 5.4 during Condition B2 (see Table IX. Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations). The observed levels of communication behaviors were again the opposite of what was predicted in the hypotheses and at similar levels to those observed in the analog tests with Cory and his mother. Thus, similar results were replicated over several days and the controlling variables and values effecting Cory's communication behaviors generalized across adult communication partners, play materials, and settings.

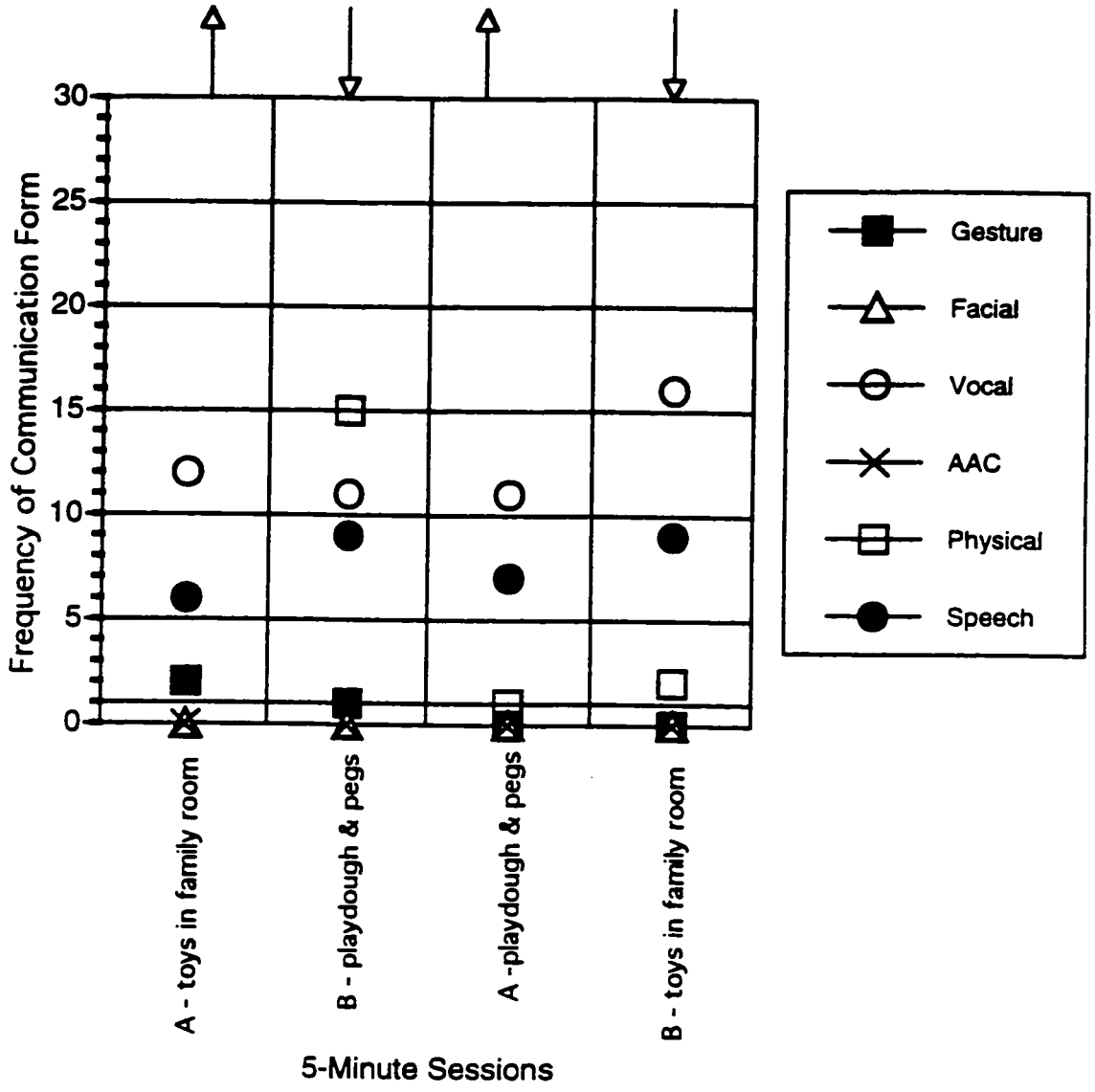


Figure 17: Cory's Functional Analysis Test Data With Non-Family.

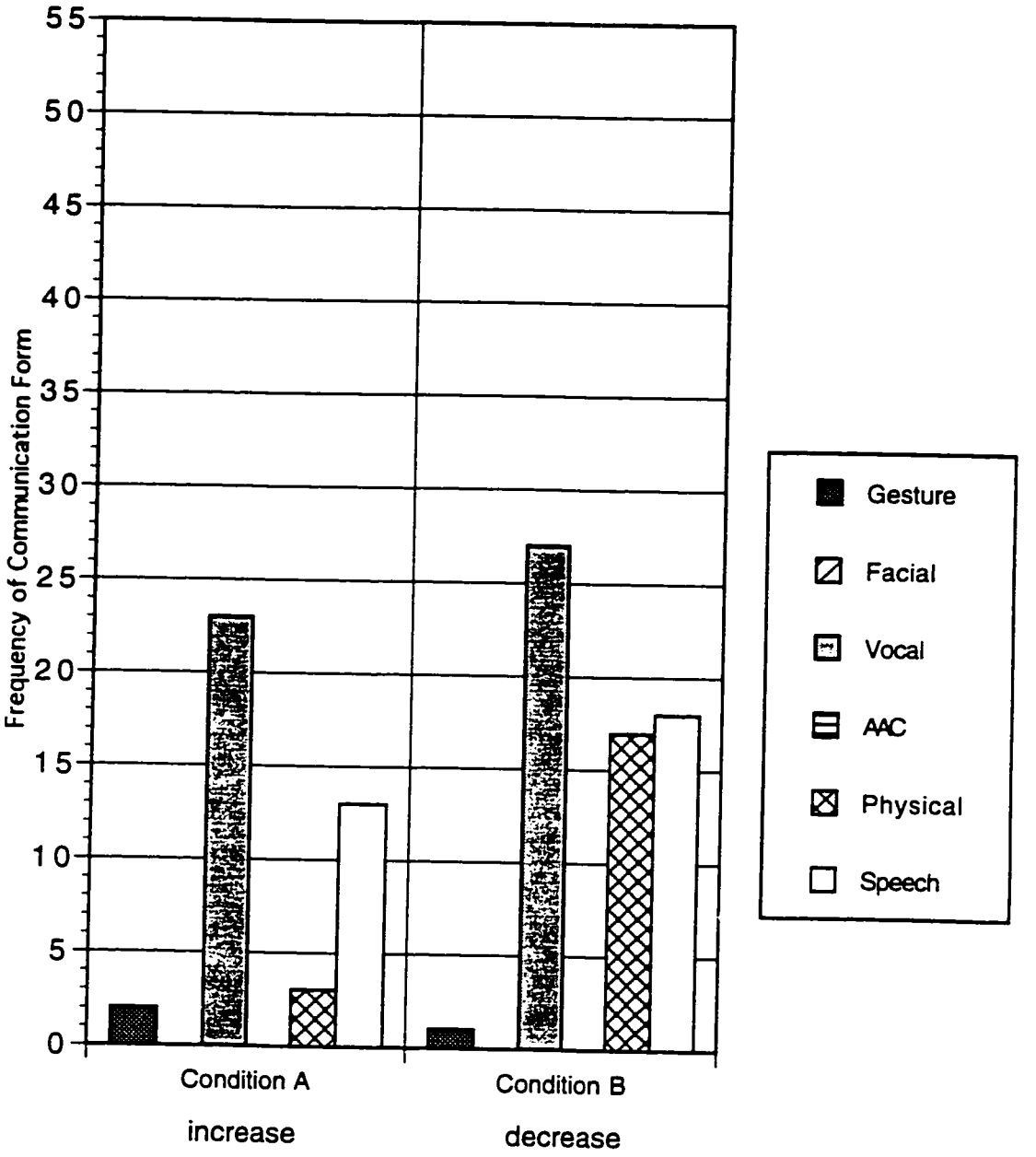


Figure 18: Cory's Functional Analysis Test Summary With Non-Family.

Reliability Tests

Identical direct observation procedures of the six communication forms (i.e., speech, vocal, gesture, AAC, physical, facial) were used during Stage One observations in the school and in the home and during Stage Three functional analysis analog tests. Inter-observer agreement procedures were followed for 88% of Stage One observations and 100% of Stage Three observations. The agreement scores are of two observers recording communication forms within and across 10-second intervals of 5-minute observations. Inter-observer agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Within each of the thirty 10-second intervals of a 5-minute observation, scores were computed for agreement of the same communication form recorded (i.e., Total Agreement or TA) and for agreement of the occurrence of any communication form recorded (i.e., Occurrence Agreement or OA). For example, if the two observers recorded two speech communication behaviors in interval number 15, and then, in interval 16 observer one recorded a speech form and observer two recorded a vocal form, the former would be calculated as agreement of form type within the interval (TA), while the latter would be calculated as an agreement of communication act occurrence within the interval (OA). The TA score is a more descriptive and complete measure of observed child communication behaviors.

Stage One Inter-Observer Agreement. The question for Stage One direct observations was whether a discrepancy existed between the child's communication behaviors expressed in the home versus in the school during similar activities. In particular, was the child communicating more at home than at school during similar activities and contexts? In this case the less precise calculation of OA was sufficient to address this question. Table XXI., Inter-Observer Agreement Scores During Stage One Observations, displays the overall inter-observer agreement scores for all four child participants during Stage One observations. Individual OA and TA scores are presented on

each child across observation sessions. In addition, overall OA and TA mean agreement scores were calculated for each child: The OA mean scores represent the average percent of agreement across all sessions two observers recorded a communication form within 10-second intervals. The TA mean scores represent the average percent of agreement across all sessions that two observers recorded the same type of communication form within 10-second intervals. The relatively low levels of observer TA agreement for Kevin (75%) and Cory (78%) were a concern in regards to measuring each child's use of specific communication forms, but acceptable given that the OA agreements were used to measure overall communication acts and those agreement scores were at relatively high levels.

Table XXII., Stage One Observation Raw Scores of Agreements and Disagreements for Children Across Communication Forms, displays the raw scores for each child across the six communication forms recorded during concurrent observation sessions of Stage One. For example, from sessions in the home and in the school, TA was 87% for observations of Lara's communication behaviors (see bottom score of Lara column). At the top of this column the numbers indicate that the observers agreed on 32 and disagreed on 4 occurrences of Gesture behaviors. An example of relatively low TA agreement is Kevin. In the column under Kevin, the observers' TA was 68%. This relatively low levels of agreement on TA for Will (77%), Cory (76%), and Kevin (68%) appeared to be related to low frequencies of behaviors observed, as well as the possible difficulty individual observers may have had discriminating speech versus vocalizations from children's severe articulation errors. For example, there were only nine recorded occurrences of vocal and four of facial which contributed to the low

The totals in the right column of Table XXII are the scores of observers' agreements on each communication form observed across child participants. For example, observers agreed on 66 and disagreed on 11 occurrences of Gesture across all children, TA 86%. The relatively low levels of agreement for physical and speech may be due to

ambiguous definitions of these behavior categories, particularly as they relate to specific children's nonconventional and idiosyncratic communication behaviors. TA of 68%; as well as, observers agreed on 20 and disagreed on 15 occurrences of speech. One implication from these data is that three, 5-minute event-recordings in a setting are not sufficient to discriminate low frequency communication behaviors, especially those expressed from children who have severe communication disorders.

Table XXI. Inter-Observer Agreement Scores During Stage One Observations

Child and Activity	Communication Acts Within Intervals (OA)	Communication Forms Within Intervals (TA)
Lara	mean = 89%	mean = 84%
school-snack	82%	73%
school-play	86%	86%
school-transitions	100%	86%
home-play	94%	94%
home-transitions	83%	83%
Kevin	mean = 82%	mean = 75%
school-hoops	67%	67%
school-snack	92%	83%
school-play	100%	100%
home-hoops	68%	57%
home-play	84%	68%
Will	mean = 98%	mean = 87%
school-puzzle center	100%	100%
school-adult lead circle	100%	83%
school-outside play	100%	100%
home-puzzles at table	91%	79%
home-outside play	100%	75%
Cory	mean = 88%	mean = 78%
school-snack	71%	71%
school-play	88%	88%
school-adult directed	94%	94%
home-snack	88%	72%
home-play	92%	82%
home-adult directed activity	97%	61%

Table XXII. Stage One Observation Raw Scores of Agreements and Disagreements for Children Across Communication Forms

Form	Lara	Kevin	Will	Cory	Total and Inter-Observer Agreement Score
Gesture agree/disagree	32/4	12/5	4/0	18/2	66/11 (86%)
Facial agree/disagree	5/1	3/1	0/0	17/0	25/2 (93%)
Vocal agree/disagree	42/6	7/2	36/18	37/17	122/43 (74%)
AAC agree/disagree	8/2	0/0	0/0	0/0	8/2 (80%)
Physical agree/disagree	4/1	6/0	2/1	5/6	17/8 (68%)
Speech agree/disagree	5/0	20/15	44/6	19/5	88/26 (77%)
Totals agree/disagree	96/14	48/23	86/25	96/30	326/92
Inter-Observer Agreement Scores	(87%)	(68%)	(77%)	(76%)	(78%)

Stage Three Observations During Analog Tests. Table XXIII., Inter-Observer Agreement Scores of Concurrent Observations During Four 5-Minute Sessions of Stage Three Functional Analysis Analog Tests, displays the overall inter-observer agreement scores for all four child participants. As mentioned in the previous section, the scores represent agreement of communication form type (TA) and agreement of communication form occurrence (OA) recorded by two observers during each session. Scores were calculated within thirty 10-second intervals of each of the four 5-minute conditions (i.e., ABAB). For example, Lara's Condition A scores during the Toy Box activity had a TA of 79% and an OA of 83%. During Condition B the scores were TA of 87% and OA of 96%. As mentioned earlier, relatively low levels of TA may be related to few occurrences of behaviors observed, as well as the difficulty for observers to discriminate speech versus vocalizations. As an example, Cory's observers during the session with a non-family member scored a TA of 68% and an OA of 100%. The disagreements were one observer recording seven vocals that the other observer recorded as speech. Because Cory often spoke softly, facing down or away from his communication partner it was difficult to differentiate speech versus vocalizations during the flow of a natural activity.

Table XXIV., Stage Three Functional Analysis Analog Test Direct Observation Raw Scores of Agreements and Disagreements Across Children and Communication Forms, displays the raw scores of agreements and disagreements for each child and each of the six communication forms observed during analog tests. The two observers of Lara's sessions scored a TA of 85% (see the bottom score of the Lara column). At the top of this column the numbers indicate that the observers agreed on 29 and disagreed on 7 occurrences of gesture behaviors. In the Cory column, different numbers represent different pairs of observers recording during the separate analog tests with family (F) and non-family (NF). Thus, there are two sets of scores for each communication form. For example, during the sessions with a family member, observers agreed on 34 and disagreed

on 7 occurrences of speech behaviors; and, for sessions with a non-family member, observers agreed on 26 and disagreed on 5 occurrences of speech behaviors.

The totals on the right column of Table XXIV are the observers' agreements and disagreements of communication forms recorded across the children. For example, observers agreed on 32 and disagreed on 12 occurrences of gesture behaviors, TA of 73%. The relatively lower levels of agreement for gesture, facial, and physical may be due to ambiguous definitions of the behavior categories making it difficult for observers to differentiate these communication forms when expressed by children who have severe disabilities. The relatively higher agreement scores during the analog tests may be attributed to observers improving their discrimination skills between communication forms for each child, as well as the stimulus control of the hypotheses conditions. The conditions were selected based on their association with child communication behaviors. All of the TA agreement scores were in acceptable levels across children. However, the observers agreement on speech (77%) and gesture (73%) remained at relatively low levels as reported during Stage One observations.

Table XXV., Inter-Rater Agreement Scores on Random Samples of Adult Partner Language from Stage Three Functional Analysis Analog Tests, displays the raw scores of two individuals coding adult language, post hoc from transcripts of the functional analysis analog tests. The categories of restrictive oblige, unrestrictive oblige, and comment were used to code adult language within the communication exchanges. For example, during Lara's analog test, two coders agreed on 20 adult turns and disagreed on 5 adult turns during Condition A (to increase) for a score of 80% agreement, and they agreed on 29 turns and disagreed on 2 turns during Condition B (to decrease) for a score of 94% agreement. The overall inter-rater agreement scores of coded adult language ranged from 80% to 97%.

Table XXIII. Inter-Observer Agreement Scores of Concurrent Observations During Four 5-Minute Sessions of Stage Three Functional Analysis Analog Tests

Child/Activity	Condition A	Condition B
Lara	TA - OA	TA - OA
Toy Box	79% - 83%	92% - 96%
Sticker Book	83% - 90%	87% - 90%
Kevin	TA - OA	TA - OA
Puzzles on Table	100% - 100%	91% - 91%
Living Room Bowling	96% - 96%	81 - 90%%
Will	TA - OA	TA - OA
Puzzles at Table	84% - 94%	89% - 100%
Cars, Pegs, and Blocks in Play Room	85% - 92%	96% - 96%
Cory	TA - OA	TA - OA
Test-1 with family, Toys in Family Room	83% - 90%	82% - 93%
Paint/Playdough in Living Room	76% - 81%	80% - 96%
Test-2 non-family, Toys in Family Room	68% - 100%	96% - 100%
Playdough & Pegs	89% - 95%	78% - 92%

Table XXIV. Stage Three Functional Analysis Analog Test Direct Observation Raw Scores of Agreements and Disagreements Across Children and Communication Forms

Form	Lara	Kevin	Will	Cory	Totals and Inter-Observer Agreement Score
Gesture agree/disagree	29/7	0/0	1/1	0/3F* 2/1NF**	32/12 (73%)
Facial agree/disagree	0/1	0/0	0/0	3/0F 0/0NF	3/1 (75%)
Vocal agree/disagree	57/6	40/3	54/8	88/15F 39/11NF	278/43 (87%)
AAC agree/disagree	0/0	0/0	0/0	0/0F 0/0NF	0/0 (.00)
Physical agree/disagree	12/3	6/1	0/0	3/7F 19/1NF	40/12 (77%)
Speech agree/disagree	8/2	46/3	33/3	34/7F 26/5NF	147/20 (88%)
Totals agree/disagree	106/19	92/7	88/12	128/32F 86/18NF	500/88
Inter-Observer Agreement score	(85%)	(93%)	(88%)	(80%) (83%)	(85%)

* Cory's Functional Analysis Analog Test with Family

** Cory's Functional Analysis Analog Test with Non-Family

Table XXV. Inter-Rater Agreement Scores on Random Samples of Adult Partner Language from Stage Three Functional Analysis Analog Tests

Child Subject	Condition A	Condition B
Lara		
Number of Coded Turns in Agreement	20	29
Number of Coded Turns in Disagreement	5	2
Inter-Rater Agreement Score	80%	94%
Kevin		
Number of Coded Turns in Agreement	23	28
Number of Coded Turns in Disagreement	5	2
Inter-Rater Agreement Score	82%	93%
Will		
Number of Coded Turns in Agreement	21	36
Number of Coded Turns in Disagreement	3	3
Inter-Rater Agreement Score	88%	92%
Cory(Test with non-family member)		
Number of Coded Turns in Agreement	28	26
Number of Coded Turns in Disagreement	1	1
Inter-Rater Agreement Score	97%	96%

Stage Four Follow-up Interviews

Stage Four activities addressed the third research question regarding the extent that functional assessment and analysis results were reported as useful by parents and teachers? Separate interviews with parents and teachers addressed the third research question.

3. When parents present results of functional assessment and analysis of hypotheses that predict occurrences of the child's communication behaviors to school personnel, to what extent are results reported as useful to inform the development of intervention programs that target the acceleration of the child's communication behaviors at home and school? Lara's mother and teacher; Kevin's mother, father, and teacher; Will's mother and father (Will's teacher was unavailable at this point in the study because the school year had ended); and, Cory's mother, father, and teacher responded to interview questions. The following sections summarize parent and teacher responses from the interview protocol (see Appendix B).

How important is the area of communication for children with severe disabilities? All parents and teachers reported that interventions aimed to improve the child's communication abilities were critical for the child's success in future education placements. They further stated that the child's communication abilities directly affected the child's quality of life by providing them control over their environments and social relationships, facilitating their overall development and learning. All teachers stated that the children's learning, growth, and development were contingent on the child's abilities to communicate with others within age-appropriate social contexts. All parents reported that improved communication abilities directly affected: (a) how well their child "gets along in society," (b) occurrences of their child's positive versus negative behaviors, and (c) the quality of their child's relationships with other children. All parents noted that their child's limited communication abilities were directly related to the frustrations that their child experiences daily.

How well did the functional assessment and analysis procedures describe the child's communication abilities? All parents and teachers reported that the functional assessment and analysis procedures described the child's current communication abilities. The parents stated that the procedures helped them put into words what they were experiencing with their children during their shared communication exchanges in the home. The direct observations of child communication behaviors, the tape recordings and transcriptions of their shared communication exchanges, the new vocabulary and terminology to describe their language and their child's communication forms and functions, and the analog tests as a tool to evaluate their hypotheses were identified by all parents as useful procedures they would like to repeat with their children's teachers and SLPs in the future.

For example, Will's parents reported that the transcripts help them "to see what kind of communication was going on," "[it] was a big eye opener; we go through our day and never think about [the] kinds of communication [we're] using and how it's affecting Will." Moreover, they reported that "the ABAB tests were a real eye-opener, he was doing a lot of vocalizing both times, but there was obviously more speech going on in Condition A." Cory's mother was amazed how much she missed of Cory's vocal and speech communication behaviors that the tape recording picked-up. She stated, "that's the case in point for Cory because with his soft voice and turning away from communication partners, a lot of his communication is missed." Lara's mother reported that now she can describe her communication behaviors with Lara so that others can communicate with Lara too.

How useful were the results in improving your communication exchanges with the child? Parents and teachers had differing opinions in regards to the usefulness of the study results. Teachers stated that they were more interested in increasing "higher level" or more age-appropriate conventional, symbolic communication target behaviors for these children. They wanted to accelerate the child's symbolic communication forms such as speech and

the use of picture-symbols rather than the nonsymbolic communication forms such as vocalization, facial, gesture. In addition, they reported that the adult-child activities used in the study activities in the home limited the usefulness of the results in a classroom of children.

All parents reported that the results were very helpful and helped them improve their communication exchanges with their child. For example, Will's parents reported that "at home I know how to better interact with him; I see his responses a lot more quicker; he feels more confident; he tries more, his is more persistent because he knows I am listening; he seems to feel less pressure and wants to learn. "The results made Will's communication behaviors clear and concise," They stated, and "when people understand him more he talks more." Kevin's parents reported that the results helped to put into words his communication behaviors and what they do to facilitate his communication in the home.

Cory's parents stated that the results helped them develop communication techniques into a package to use in exchanges with Cory. They reported that they knew both directives and commands were necessary to communicate with Cory and "now we know that a mix between directives and more open-ended communication works [given] that he is moving towards more communication exchanges that are less directive." Cory's parents reported that [we] "need to recognize his communication when it happens so we know both sides of the dance. [These results] will give credence to what we tell teachers and others [about] what he can do."

How useful were the results in your efforts to improve the child's communication? All teachers indicated that other teachers who were less familiar with communication forms, functions, and communication interventions would find the functional assessment and analysis procedures and results helpful designing interventions to improve the child's combination abilities. Kevin's teacher felt that the results could be used to teach his peers

in the new school how to accelerate Kevin's communication behaviors during group activities.

All parents reported that the results were used to improve their child's combination in the home. Will's mother stated, "I know how to better interact with him [and] see his responses a lot quicker." Cory's parents stated that now with the results they can work with his teacher and SLP to improve his communication abilities. Kevin's parents reported that the results can be used to improve his communication "in the home, school, and with other people too." Lara's mother stated that "we now know how to share and make it [Lara's communication behaviors] happen more."

How were results used to improve the child's communication exchanges? Lara's mother reported that they pay more attention to what and how they communicate with her in order to improve their exchanges with Lara. Will's mother stated that when they use the hypothesis condition variables to increase his communication Will "feels more confident" and "seems to feel less pressure - wanting to learn." Kevin's parents and teacher stated that he will enter a new public school program next year and that his new teacher would be able to use the hypothesis variables and values associated with increases in Kevin's communication behaviors to facilitate this transition.

To what extent were the functional assessment and analysis procedures and results new information for you? The teachers reported that the information and the results from the study were common knowledge for most good teachers and SLPs. In particular, the hypotheses conditions variables and values were components they already used in the design of communication interventions in the school. The use of adult language to facilitate child language development are effective techniques in both parent-child interventions (e.g., Kaiser, 1993; Bricker & Cripe, 1992) and in other child-adult language intervention practices (e.g., Reike, Lynch, & Soltman, 1977; McCathren, Yoder, & Warren, 1995). Reike et al. (1977) describe a "communicating environment" where adult language

consisting of comments and directives provides language models, suggestions to say and suggestions to do that facilitate language development. McCathren et al.(1995) makes distinctions among directives in adult language that effect a child's engagement in joint activities and language development.

The research data are unclear as to which types of adult language are most effective to facilitate child language development for children who have severe communication disorders. However, McCathren et al., (1995) reported differential effects of types of adult directives on child language development. They found that different types of directives, follow-in, redirectives, or introductions, affected child communication behaviors in different ways. The results of the current study demonstrated for three of the children that different types of adult language were associated with the length of adult-child exchanges. The follow-in directives, redirectives, and introductions are more precise descriptors of adult language than the restricted and unrestricted obliges used in the hypotheses conditions of this study.

Will's mother reported that [his results were] not new but made things much more clear, not vague; now I know how to tell others how to communicate with him if they want him to talk back; looking at the communication, breaking it down on paper was useful." Lara's mother stated that "we know what she was able to do, just not sure how to talk about it and make it always occur." Cory's parents reported that they learned how directives increased his communication behaviors. Kevin's parents stated that the results "helped us see what we already do - pulled together what we already knew - our thoughts were abstract - this brought it easy to understand with usable techniques."

Potential use of these functional assessment and analysis procedures may be when recommended practices have failed to support the generalization of the child's communication repertoire between the school and the home. A closer identification of adult communication behaviors during daily activities using these procedures may reveal

hypothesis conditions useful to facilitate the generalization of the child's communication abilities across settings.

What kind of information was missing from the communication functional assessment and analysis results that would help you design more effective interventions? All parents reported no missing information. The teachers reported that they would like to know more on how to improve the child's pragmatic abilities during communication exchanges with peers. For example, the teacher for two of the children stated that she was able to get similar results with one-on-one teacher facilitation, but wanted to generalize these results to communication exchanges with peers. She stated that her problem was providing the necessary amount of teacher support throughout the day, especially during large and small group activities. Lara's teacher wanted more information on how to increase her symbolic communication, particularly her use of speech and picture-symbols during daily activities and routines in the school. Lara's teacher stated that her vocalizations and gestures were unique and idiosyncratic behaviors and not age-appropriate target communication behaviors in the school. She stated that Lara needed to take more responsibility in her communication exchanges instead of relying on adults and peers to interpret her inconsistent idiosyncratic vocalizations and gestures.

What other comments can you share to improve the usefulness of the communication functional assessment and analysis procedures and results?

All parents reported immediate usefulness and benefits from the functional assessment and analysis procedures and results. In particular, Lara's, Kevin's, and Will's parents felt they were now able to tell others how to communicate with their child to increase or decrease their child's communication behaviors. Will's parents stated that the procedures and results were useful because, "it made me a lot more aware of the things that help Will and the things that don't really help; I always had a vague idea. I had thought at the beginning of the study about what could help Will communicate, but [my ideas] weren't

clear and concise. I thought that if people understood him more, he would talk more, then I saw what it meant to make him feel understood: responding to everything he says is what makes him feel understood."

Some parents provided a few suggestions on how to improve the functional assessment and analysis procedures. They reported the need to document the process and develop the techniques and procedures into a package that parents and teachers can use together "so that teachers and parents can plot their own data and create graphs." Another idea was to video-tape at the beginning and at the end of the process so "we could see the communication." All of the parents were interested to see how they could use what they learned about their child's communication behaviors with other teachers and therapists that their child will work with in the schools. Will's mother exclaimed, "it's important for me to do that because I'll need to do that every year when he goes to school."

Lara's teacher stated that infant-toddler programs would find the most value from the functional assessment and analysis procedures because of the need for adults to assess and identify children's current communication forms and then to shape them towards conventional forms within the social contexts of family activities.

CHAPTER V

Summary of Results Across Participants

The focus of this study was the examination of child communication behaviors within the context of their home. In particular, the study attempted to validate procedures for determining condition variables and values associated with occurrences of child communication behaviors during activities in the home using a hypothesis-driven functional assessment and analysis model. These procedures have been used to assess nonsymbolic, nonconventional and conventional communication behaviors of children and youth with severe disabilities with results used to develop intervention programs (e.g., Brady & Halle, 1997; Drasgow & Halle, 1995). Parents of children with severe disabilities have actively participated with their child's functional assessment and analysis procedures, but to date, parents have not participated in these procedures to examine their own communication exchanges with their child during daily activities in the home (e.g., Brady & Halle, 1997; Drasgow & Halle, 1995).

Of particular benefit for children with severe disabilities is a functional assessment and analysis of their communication behaviors during daily activities in the home when the child communicates more in the home than in the school (cf. Brady & Halle, 1997). Conditions present in the home associated with child communication behaviors could then be made available in the school to facilitate the child's communication abilities. A practical application of hypothesis-driven procedures is a collaboration with parents who reported that their child communicates more in the home than in the school during similar daily activities. This study used a variation of hypothesis-driven functional assessment and analysis procedures and included inter-observer agreement measures on event-recording data collection.

Stage One Interviews and Observations

All children initially identified to participate in this study demonstrated a discrepancy in communication behaviors between the home and the school, and with their families these children completed all study activities. For all four child participants, the observations of six possible communication forms during similar activities in their homes and in their schools indicated overall higher frequencies of child communication in their homes (see Table IV, Total Frequencies of Communication Forms From Three 5-minute Stage One Observations).

Lara's gesture, facial, vocal, and speech behaviors were observed at higher frequencies in the home than in the school. Her AAC (i.e., picture-symbol exchange) and physical communication forms were observed at higher frequencies in the school than in the home. Overall, however, her communication acts were more than twice as frequent in the home than in the school. Kevin's gesture, vocal, physical, and speech behaviors were observed at higher frequencies in the home than in the school. His facial behaviors were observed at equal frequencies in the school and in the home and no AAC behaviors were observed in either setting. Overall, his communication acts were almost four times as frequent in the home than in the school. Will's facial, vocal, physical, and speech behaviors were observed at higher frequencies in the home than in the school, his gesture behaviors were observed at equal frequencies in the school and in the home, and no AAC behaviors were observed in either setting. Overall, his communication acts were nearly six times as frequent in the home than in the school. Cory's gesture, facial, vocal, and speech behaviors were all observed at higher frequencies in the home than in the school. Overall, his communication acts were nearly three times as frequent in the home than in the school.

In The School. One explanation for Lara's AAC form observed at higher levels in the school than in the home (Lara's picture symbol communication book was available to her in both settings) is that Lara's AAC was the target behavior of her communication

intervention programs in the school. It appeared that these instructional programs were successful in selecting her picture symbol communication behaviors (i.e., AAC) over gestures, vocalizations, or speech during classroom activities. Lara's observed use of physical forms more at school than at home may have been because the category included following directions and commands and school may have provided Lara more opportunities to follow directions than at home.

A possible explanation for the generally lower levels of communication observed in the school is that the children have spent less time in these settings establishing and maintaining communication repertoires with teachers and peers than in their homes with their parents. Parents share a learning history of interaction and communication with their child during daily activities that affects the child's communication development (Kaiser, 1993; McLean & Snyder-McLean, 1978). Some infant-toddler intervention programs are designed to have parents work with their children during daily activities in order to facilitate child language and communication development (e.g., Bricker & Cripe, 1992). In this intervention format the interactions shape the child's and the parents' behaviors, strengthening the contingencies of their communication behaviors as "speakers" and "listeners" to each other's repertoires (Skinner, 1957). This learning is particularly significant for children with severe and multiple disabilities when the child has acquired idiosyncratic communication behaviors not easily recognizable to communication partners outside of the family. In this case, parents need to interpret their child's behaviors to those outside the family. The hypothesis-driven functional assessment and analysis results of their conversational turn-taking during daily activities is one method to accomplish this. Only recently have school personnel been encouraged to become aware of family, community, and cultural characteristics in order to facilitate the child's learning in the school and to bridge the culture of the school with the culture of the home (e.g., Harry, 1992; Notari-Syverson & Losardo, 1996).

The classroom teachers view of the child as a communicator may also account for the lower levels of communication observed in the school setting. For example, Will was placed in a general education classroom where he was the only child in the class with a disability. The teacher described Will's communication as needing to improve through development and SLP therapy. She reported that it was very difficult to understand anything he said, and that she was unsure how to respond to his articulation errors and vocalizations. General education teachers may not typically be familiar with strategies that facilitate and support communication exchanges with children who have disabilities. The early childhood special education teachers for Lara, Kevin, and Will reported that they were familiar with adult facilitation strategies and stated that they were interested in increasing the children's use of speech or AAC, rather than the vocalizations, gestures, or overall communication behaviors recognized by the parents in the home.

In the Home. Lara's parents reported that they recognized, interpreted, and responded to all of her communication forms (e.g., gesture, vocal, AAC, physical, speech). Thus, all of her communication behaviors were maintained within the daily activities in her home. The other parents in the study also reported that they responded to all of their child's communication behaviors, rather than responding to any one specific communication form (e.g., speech). Whereas, all teachers stated that they consistently reinforced and responded to specific target communication forms. For example, Lara's teacher was interested in increasing her speech and AAC behaviors, Kevin's teacher wanted to increase his speech behaviors, Will's teacher wanted him to use more speech, and Cory's teacher had dropped an AAC picture-symbol exchange system because the focus was to use more speech during classroom activities. The nonsymbolic communication forms (e.g., gesture, vocal) were, therefore, more consistently reinforced within daily activities in the home than in the school. This differential reinforcement of

child communication behaviors may account, in large measure, for the overall higher rates of child communication behaviors observed in the home across all children.

The response rates per minute of child communication behaviors between home and school settings indicated that these children were responding more often in the home (see Table IX). Overall, the Stage One observations substantiated the parents' reports that their children were communicating more in the home than in the school during similar activities. Opportunities, therefore, were present to address the research questions across the four child participants.

These results are significant given historical reports that parents' estimates of their child's developmental skills and abilities are higher and less reliable than those of professionals (Sheehan, 1988). Also, these results are significant given the potential value of the unique knowledge or linguistic intuition parents have of their child's communication repertoire based on their daily shared exchanges (Dale, 1996). Dale (1996) adds that parent reports are more likely to be accurate when assessment is on the child's current or emergent behaviors. The teachers who participated in this study were openly skeptical of the parents' reports that their children communicated more at home than at school. The Stage One observation event-recording results provided a framework to quickly quantify a child's use of communication forms during daily activities across settings.

Stage Two - Research Question # 1

To what extent will a structured functional assessment interview lead to the identification of variables associated with occurrences of the child's communication behaviors? For the most part, the functional assessment parent interview data lead to observations of all children communicating with family members during daily activities and subsequent identification of possible condition variables predicting child communication behaviors. The investigator lead discussions with parents of specific communication forms and functions enabled parents to describe in detail both theirs and their child's

communication behaviors. The Stage One observation results were used to facilitate the discussions of their child's use of different communication forms. The examination of observation transcriptions, as well as listening to tape-recorded exchanges from the observation, were necessary to identify potential condition variables associated with short versus long exchanges. This type of parent participation assessment of their child's communication behaviors increases in accuracy with this recognition format of examining the transcripts and listening to taped recordings of their shared communication exchanges (Dale, 1996).

Interviews. The goal was to describe the child's communication behaviors during exchanges with others and identify opportunities to observe possible relevant condition variables and values associated with these behaviors during activities in the home. In Stage Two interviews, parents described the different communication behaviors their child used requesting and refusing food, drink, materials or comfort and making comments or protesting during daily activities. The investigator facilitated these discussions, recording information onto the interview form and providing examples of their child's use of specific forms (e.g., speech, gesture) and communication functions (e.g., requesting, refusing).

The Stage One observation results provided discussion points and a recognition strategy on the different communication forms in their child's repertoire. However for the most part, specific child communication forms linked to specific communication functions, or form and function correspondence, were absent in the information provided by parents. Parents tended to describe the overall occurrences of their child's use of different communication forms with different communication partners across different daily activities. In addition, parents explained how family members helped each other interpret their child's communication, which was described as a guessing game.

All parents reported that immediate family members in the home understood their child's communication more than individuals outside of the immediate family. One

explanation seemed to be that one communication form often served multiple functions for their child across and within activities. In Lara's case, her parents reported that she used her vocalizations with a point gesture as a request, a comment, and a command all during one activity. However, they reported that other adults outside the immediate family often failed to understand Lara's differential use of these communication forms. The interview results were collected within a discussion process that combined (a) parents learning new terms pertaining to their child's communication behaviors in actual exchanges with family members, and (b) parents describing their exchanges during daily activities and how they interpret their child's communication behaviors. In all cases, these data lead to observations of longer and shorter communication exchanges between the children and family members during daily activities in the home.

Observations. The activities parents chose for observations were those that occurred regularly during a typical week in their home and contained numerous opportunities for communication exchanges with their child. For example, Lara's activities overlapped waking-up from a nap, ending a meal time, and greeting her father just home from work; Cory's activities overlapped baking cookies and snack time; Kevin's activities followed coming home from school; and Will's activities were playing games before the evening meal. For all children, the observations provided opportunities to record single turns and short and long communication exchanges with family members during daily activities in the home.

The observation transcriptions were analyzed with parents as a recognition strategy to identify relevant condition variables and values with potential differential effects on occurrences of child communication behaviors. In discussions lead by the investigator, parents used their experiences as a communication partner with their child (i.e., parent's linguistic intuition) and examination of their transcribed communication exchanges, sometimes supplemented with listening to the tape-recordings of exchanges, to develop

hypotheses in collaboration with the investigator. Overall, a hypothesis needed to predict occurrences of child communication behaviors in short versus long exchanges during the activity. The longer versus shorter exchanges contained potential condition variables and values controlled by the adult communication partner that either acted to facilitate or to extinguish their child's conversational turn-taking in an exchange.

All parents reported that the style or manner in which the adult communication partner spoke and listened to their child was a critical condition variable that affected their child's communication behaviors. The style or manner was described in terms of language such as "giving directions and commands," "talking with, versus at, their child," "asking yes/no questions versus more open-ended questions, in playful interactions with the child," and "listening to understand and interpret the words, word approximations, or vocals" their child was saying. Parents stated that a particular manner or style of adult communication either "shut down" or encouraged their child to communicate. From these discussions the investigator introduced the terms "restricted oblige" and "unrestricted oblige" as possible categories that were similar to this notion of manner or style of adult communication and language. However, in discussions with different parents of the longer communication exchanges with their child, the adult language categories of restricted oblige and unrestricted oblige were viewed to have differential effects on different children's communication behaviors. The longer exchanges were assessed as numbers of conversational turns with the parent in exchanges rather than length of a child turn.

The use of specific types of adult language to facilitate child language development within a communicative interaction is common practice in early childhood special education (e.g., Reike et al., 1977; Bricker & Cripe, 1992; Kaiser, 1993). However, distinctions need to be made regarding differential affects of types of adult language and the context of shared engagement on types of child communication behaviors (e.g., McCathren et al., 1995). Also, further study with children and parents from distinct cultural groups

examining the style or manner of adult communication behaviors may uncover cultural differences in facilitating child communication behaviors during daily activities that could inform the design of interventions (e.g., Dale, 1996; McCathren et al., 1995; Notari-Syverson & Losardo, 1996).

All parents developed two hypotheses with the investigator that included different types adult communication behaviors and language. The condition variables and values predicted increases or decreases in child communication behaviors.

Hypotheses Condition Variables and Values. The different types of adult language (e.g., restrictive and unrestrictive obliges, comments; cf. mands, tacts) along with specific strategies to support the child were hypothesized to correspond with occurrences of child communication behaviors. The possible relevant condition variables and values identified for hypotheses were different for each child (see Table XXVI., Hypotheses Condition Variables and Values Across Children). For example the following child support strategies were identified as condition variables for Cory, Will, Kevin, and Lara:

1. Follow Lara's lead in play and use referents of play to facilitate her communication abilities.

2. Look at Kevin and pause to wait for him to respond.

3. Provide direct models of speech vocabulary with immediate physical referents to support Cory's engagement and imitation abilities.

4. Will's parents stated that comments used as direct models of speech followed by yes/no questions prompted him to attend to the communication exchange, imitate and then expand on the comment to answer the yes/no question. For example, from Table XIV., Will's mother asked him, "Do you think, or do you think it goes there?" Will's response was "Ummm, no, I da bouba." The " no," preceded and followed by vocals, provided recognizable information to build into the next response. She responded with, "Here let's see; do you want a star?" Will's response was an imitation of the word "star." She then

asked, "Where does the star go?" Will stated that, "No want star I need," which mother acknowledged, "okay, not ready." However, later in the exchange mother asked the open-ended question, "What?" (i.e., unrestricted oblige) and Will responded with 12 vocalized syllables that his mother was unable to understand or interpret.

Table XXVI. Hypotheses Condition Variables and Values Across Children

	Lara	Kevin	Will	Cory
Condition A (to increase)	1. Follow her lead in play 2. Use comments and open-ended questions with referents in physical context and linked to interactions	1. Look at him 2. Use comment and unrestricted obliges 3. Pause to signal an expected response	1. Respond to and interpret his vocals 2. Use comments and yes/no questions 3. Use activity materials and play for topics of conversations	1. Provide direct models of speech 2. Use 4-5 word comments and open-ended statements 3. Use concrete referents from the activity to support language
Condition B (to decrease)	1. Adult lead play 2. Use directions and commands to control her actions referring to topics that are not referenced in the physical activity or play sequence.	1. Look away from him 2. Make requests with yes/no questions, directions, and commands (i.e., restrictive obliges) 3. Speak quickly to allow little time him to respond	1. Ignore his vocals 2. Use divergent or open-ended questions 3. Use past or future events outside play context for topics of conversation	1. Ask "yes" or "no" questions 2. Give directions and commands during play 3. Talk about topics other than the activity context and materials

These types of hypotheses conditions predicted overall child communication behaviors and were different from earlier functional assessment and analysis studies of child communication behaviors (e.g., Brady & Halle, 1997; Drasgow & Halle, 1995). Drasgow and Halle (1995) used functional assessment interviews and observations to describe specific child communication forms and the functions they served across specific contexts. The results were stated as inferences rather than hypotheses and used to design interventions aimed to replace the child's unconventional communication forms with more socially conventional forms.

Brady and Halle (1997) also used functional assessment interview and observation data to describe specific communication form and function relationships across specific activity contexts. In one case, additional mass-trial functional analysis analog test results were collected to determine the communication forms used across the functions of requesting, rejecting, and commenting. These results were summarized with the assessment results and stated as intervention implications to teach new communication forms within activity contexts. In the second case, the functional assessment interview and observation results were combined with situation analog probes to answer specific questions stated as hypotheses. For example, one hypothesis stated that the child did not comprehend the words spoken, but rather attended to the contextual cues. Situation probes were used to test this hypothesis that intentionally withheld visual cues.

Both Brady and Halle (1997) and Drasgow and Halle (1995) used functional assessment interview and observation results to infer or predict child communication behaviors across activity contexts, but their functional analysis procedures were different from the hypothesis-driven model. Brady and Halle (1997), reported two different methods of functional analysis. One method was called a structured protocol and was conducted in an adult-child mass-trial format to identify the communication forms used by the child across the communication functions of requesting, rejecting, and commenting.

The other method was called a situational probe were a daily activity was altered to assess child communication, in this case to determine whether auditory cues were sufficient for the child to follow directions. Drasgow and Halle (1995) used what they called environmental modifications as a functional analysis method to describe child communication behaviors across communication forms, functions (i.e., rejecting, requesting), and daily contexts. In the current study, the hypothesis-driven model provided a framework to collaborate with parents to describe conditions associated with occurrences of child communication behaviors. The child's use of specific communication forms that served specific functions was less important than the child's overall participation in communication exchanges as conversational turns during daily activities. Both overall child communication in exchanges with others and a variety of communication forms and functions are important components of a child's communication repertoire. One approach for assessment and intervention would be to first increase overall child communication during exchanges with others and then expand the types of forms and functions the child uses within those exchanges during daily activities and routines.

Overall, the Stage Two assessment interview needs to be streamlined by including general rather than specific form and function questions. These results are sufficient to schedule observations of their use during daily activities. An interview structure that follows an ecological inventory format incorporating questions regarding the child's current overall functional skills along with communication abilities across daily activities and environments may be a more efficient assessment process (Nietupski & Hamre-Nietupski, 1987). This change would correspond to how all parents described their child's overall communication behaviors and how two families suggested a shorter assessment interview process.

The interview descriptions of child communication behaviors within and across activity contexts were sufficient for observations of child communication behaviors in

longer versus shorter exchanges during daily activities in the home. The investigator lead discussions with parents to examine child communication behaviors from observation transcriptions lead to the development of hypotheses condition variables and values associated with occurrences of child communication behaviors.

Stage Three - Research Question # 2

To what extent do a combination of structured interview and direct observation functional assessment results lead to hypotheses that predict functional relationships between variables and occurrences of the child's communication behaviors with adult communication partners during shared activities in the home? The functional assessment hypotheses predicted child communication behaviors for three of the four children during the functional analysis analog tests. Moreover, for two children these results were observed with a communication partner outside the immediate family (i.e., special education graduate student). The hypothesis conditions predicted occurrences of all child communication behaviors, however the analog tests only occasioned some communication forms rather than all or specific communication forms.

With the exception of Cory, all child participants were observed to communicate at overall higher levels under Condition A (to increase), than under Condition B (to decrease). The modest functional relationships demonstrated between conditions and specific child communication forms indicated that the condition variables and values were not clearly defined for child participants to discriminate during analog tests, and/or that the adult communication partners failed to reliably provide conditions as prescribed in hypothesis conditions. A measure of procedural reliability is necessary to interpret with confidence any observed functional relationships (Billingsley, White, & Munson, 1980). A partial measure of procedural reliability was obtained through the coding of adult partner's language during the analog tests (see Table XXV). However, the categories of restricted oblige, unrestricted oblige, and comment that were used as codes represented only some of

the components of hypothesis conditions. Other components such as following the child's lead in play, looking at the child, and pausing to wait for child responses were omitted from procedural reliability measures. The design of the study was to test hypothesis conditions as a cluster or set of stimuli and the decision to limit the procedural reliability measure to a sample of adult turns and a sample of hypothesis components was to conform to the limitations of natural settings and the preliminary examination of the hypothesis-driven model. This lack of procedural integrity is a significant limitation to any interpretation of specific functional relationships reported in this study. In addition, this limitation may have contributed to Cory's unexpected results.

As sets of stimuli, the condition variables and values represented components of the instructional universe of child communication behaviors for each child in their home (Horner & Billingsley, 1988). An assumption was that omissions of relevant condition variables and values in the school that were in place in the home explained some of the generalization problems of child communication behaviors across settings (Horner, Bellamy, & Colvin, 1984).

Communication Forms. Lara was observed using different combinations of the six communication forms across conditions. Higher levels of "gesture," "facial," "vocal," and "speech" were recorded in the Condition A (to increase) than in Condition B (to decrease) as predicted in the hypothesis. However, only "gesture" followed a clear pattern. For Kevin, the same three communication forms of "vocal," "speech," and "physical" were observed across conditions ("physical was observed only during the last two conditions). Kevin discriminated the conditions as predicted with "speech." His "vocals' decreased in levels across conditions with no apparent functional relationship across conditions. Will appeared to discriminate conditions as predicted with "speech". There seemed to be a possible relationship between conditions and the proportion of "speech" and "vocals". For example, more "speech" and less "vocal" were recorded in Condition A (to increase),

whereas, more "vocal" and less "speech" were recorded in Condition B (to decrease). In other words, "vocal" followed opposite the hypothesis analog test expectations. Cory's discrimination of condition variables and values and communication forms is discussed in a following section.

Condition Variables and Values. The hypotheses contained similar relevant condition variables across children (see Table XXVI., Hypotheses Condition Variables and Values Across Children). One similar condition variable was the delivery of adult behaviors contingent on child communication behaviors that acted to lead or follow in the social interactions (e.g., McCathren et al., 1995). For example, in Condition A (to increase), "following Lara's lead in play," "looking at Kevin," and "responding to and interpreting Will's vocals and word approximations" all described adult interaction behaviors or a readiness to deliver adult interaction behaviors contingent on the child beginning the turn-taking within the exchange. The inverse values of these variables in Condition B (to decrease), having "adult leads Lara's play," "look away from Kevin," and "ignore Will's vocals and word approximations" described adult interaction behaviors or a readiness to deliver adult interaction behaviors contingent on stimuli other than child behaviors during communication exchanges. For example, ignoring Will's vocalizations and word approximations while playing, responding contingent on play events or stimuli, appeared to extinguish both Will's speech and overall frequencies of turn-taking within communication exchanges. These relationships may correspond to what McCathren et al. (1995) referred to as adult follow-in versus redirectives and introduction directives. Follow-in directives are those that follow the child's lead and refer to the event, object, or person, to which the child is already attending (McCathren et al., 1995). They reported that follow-in directives sustained joint attention between the child and a adult communication partner which lead to opportunities for language models facilitating child communication behaviors.

For Lara, Cory, and Will, the topic of conversation was a considered a relevant condition variable. When the topic of conversation referenced the play activity and material, the joint attention on objects provided a visual reference for child and adult communication behaviors, thus facilitating potential turn-taking and communication exchanges. However, if the topic was not related to the play activity (e.g., what did you do this weekend?), Lara's and Will's communication behaviors were observed at lower levels. In addition, Will's and Lara's parents stated that their children did not know how to respond to open-ended questions. They reported that their children used the objects and actions of their play to facilitate and cue their communication behaviors for each other during exchanges. Cory's parents also reported similar relationship between play materials and child communication behaviors, however, the analog tests indicated an opposite association.

Overall Communication Responding. The six communication forms recorded during the event-recording during the analog tests were used to count frequency levels and compute rates per minute of child communication behaviors across conditions. For Will and Kevin, the recorded rates per minute of child communication behaviors were higher in Condition A (to increase) than in Condition B (to decrease) (see Table IX. Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations). Lara's recorded rates per minute of child communication behaviors were higher overall in Conditions A; however, a slightly higher rate was recorded during the first Condition B than was recorded in the first Condition A. Cory's recorded rates per minute of child communication behaviors were higher in Condition B than in Condition A.

In the analog tests for Kevin and Will, a non-family member was the adult communication partner (i.e., graduate student in early childhood special education). This demonstrated that parents were not only able to help develop hypotheses that predicted increases or decreases in their child's communication behaviors, but also that their children

were able to discriminate between these condition variables with a non-family member. Thus, suggesting a more generalized effect of the condition variables controlling child communication behaviors. However, Cory's recorded rates of child communication behaviors were the opposite of predictions in the hypotheses. This held true during the analog test with his mother and during the analog test with a non-family member.

Cory's Results. Cory's observed rates of communication behaviors were higher in Condition B when adult partners were: (a) asking yes or no questions, (b) giving directions and commands during play, and (c) talking about topics other than the activity context and materials. The functional assessment activity which examined the exchanges in the transcripts indicated that Cory imitated adult models of speech when they were presented as comments and open-ended statements. There were also examples of Cory participating in long exchanges with adult turns that contained mostly directives and yes/no questions. During the discussion of these relevant condition variables for hypothesis development, Cory's father stated that he used directions and commands to facilitate Cory's engagement in their shared activities. The conclusion was that that these adult communication behaviors were associated with engagement in the activity, but not necessarily child communication behaviors. However, from the analog tests it was clear that the variables and values of Condition B were associated with higher rates of child communication behaviors, than those in Condition A which included 4-5 word comments and open-ended statements as models for Cory to imitate.

Cory was able to discriminate between these conditions with his mother and later with a non-family member; however, lower rates of child communication behaviors were recorded with the non-family member (see Table IX., Child Communication Behaviors Per Minute During Stage One and Stage Three Analog Test Observations). This suggests an generalized effect of relevant condition variables and values controlling Cory's overall child communication behaviors.

To further examine Cory's analog test results, a partial measure of procedural reliability was examined on the analog test with his mother. A sample of her communication turns were coded and counted separately as two different categories of adult language. Each adult turn was coded either as Unrestricted Obliges and Comments (open ended questions and comments) or Restricted Obliges (yes/no questions, direction, and commands) (see Table XX., Child Communication Behaviors Per Minute During Stage Three Analog Test Observations With Cory and His Mother). This distinction was made because these categories were broad, yet differentiated the Condition A and B variables and values (i.e., adult expressions of yes/no questions, directions and commands versus commenting and open-ended questions).

During the first Condition A, Cory's mother was observed to express 13.6 communication acts per minute of which 11.8 acts per minute were unrestrictive obliges and 1.8 acts per minute were restrictive obliges. During the first Condition B that followed, it was recorded that she expressed 15 communication acts per minute of which 8.4 acts per minute were unrestrictive obliges and 6.6 acts per minute were restrictive obliges. In the following second Condition A, it was recorded that she expressed 12.8 acts per minute of which 7.6 acts per minute were unrestrictive obliges and 5.2 acts per minute were restrictive obliges. Finally, during the second Condition B, it was recorded that Cory's mother expressed 13.8 communication acts per minute of which 5.4 acts per minute were unrestrictive obliges and 8.4 acts per minute were restrictive obliges. Thus, the adult communication language coded as categories within Cory's Mother's communication turns were consistent with the hypothesis condition variables and values across the ABAB withdrawal design with the exception of the first Condition B (the adult partner was to express condition variables and values most of the time during each condition). However, the adult language coded represented only a small component of each condition, thus the interpretation of any functional relationship in the results are limited at best.

Higher rates of communication behaviors were recorded for Cory's mother than for Cory across all conditions (see Table XX., Child Communication Behaviors Per Minute During Stage Three Analog Test Observations With Cory and His Mother). His mother's rates changed from 13.6 per minute to 15 per minute comparing the first Condition A and Condition B; Cory's rates moved from 5.8 per minute to 9.6 per minute. Within these turns, mother changed from 11.8 per minute of unrestricted obliges in Condition A to 8.4 per minute in Condition B; and, she changed from 1.8 per minute restrictive obliges in the first Condition A to 6.6 per minute in the first Condition B. The increase in restrictive obliges and the slight decrease in unrestrictive obliges across the first Conditions A and B corresponded to increases in Cory's communication behaviors. Conditions A2 and B2 recorded similar relationships between Cory's and his Mother's communication behaviors. Thus, as more yes/no questions, directions and commands were expressed by the mother, Cory's communication behaviors increased. Moreover, between the first Condition B and the second Condition A when these same adult behaviors decreased, Cory's communication behaviors decreased also. A limited interpretation may be that an increase in adult restricted obliges is associated with increases in child communication behaviors. This may correspond to Cory's father's report that directives facilitated their joint attention and engagement on a task, thus providing potential opportunities for language models and increased child communication behaviors (cf. McCathren et al., 1995).

The play activities for Conditions "B1" and "A2" were dot painting and playdough and this may also account for some of Cory's communication behaviors during these conditions. He may have more language and more things to say when playing with playdough and dot painting than with toys. However, higher levels of communication forms were observed during the combined "B" conditions than the combined "A" conditions.

A potential problem with functional analysis analog tests are the reporting of contradictory information during the hypothesis development process. For example, Cory's hypotheses were formulated for the most part on parent reports (i.e., their "clinical intuition") in order to clarify the complexity of the communication exchanges in the transcripts. The communication exchanges in the transcripts provided examples of adult language communication behaviors in both long and short communication exchanges. One possible future direction would be to develop a systematic approach of transcription analysis with decision rules to follow when assessment results and parent reports appear unclear or contradictory. Such a process might indicate when an additional assessment observation is needed to examine specific examples of child communication behaviors and relevant condition variables and values. One method might be structured like the situational probes reported by Brady and Halle (1997). The situational probe altered daily activities or routines to examine a hypothesis regarding child communication behaviors.

A procedure to develop decision rules would include an empirical analysis of functional assessment interview and observation transcripts across a larger sample of children. The analysis would identify the temporal associations across (a) different types of adult language, (b) levels joint attention on play context and materials, and (c) child communication behaviors as initiations and responses within communication exchanges (cf. McCathren et al., 1995). The purpose would be to develop a set of questions, possibly as a decision tree, that identified possible temporal associations among these components, thus providing opportunities to develop and test hypotheses for analog tests. Examples might include using questions to establish joint attention between the child and the adult and then identifying possible adult language associated with increases child communication behaviors. Joint attention during an activity may be necessary for adult language to facilitate child communication behaviors (cf. McCathren et al., 1995).

Overall, functional assessment and analysis hypothesis-driven procedures described modest positive associations between condition variables and values and occurrences of child communication behaviors for three child participants. The condition variables and values used for hypotheses development appeared to effect a general level of child communication responding during daily activities. The generalization of this effect across adult partners strengthen the possible value of refining the procedures for application within education settings. However, the hypothesis-driven process requires more work than a functional assessment interview alone particularly when there are contradictory results between parent reports and transcribed communication exchanges. Moreover, a clearer discrimination between specific communication forms and condition variables and values would increase the value of results in designing interventions aimed to increase specific child communication behaviors.

Stage Four - Research Question # 3

When parents present results of functional assessment and analysis of the child's communication behaviors to school personnel, to what extent are results reported as useful to develop intervention programs that target the acceleration of the child's communication behaviors at home and at school? All parents reported that study results on their child were informative and would help them in describing their child's communication abilities to teachers and SLPs, as well as others outside of the family. All teachers reported that study results were not new information and would not be helpful to them personally in designing communication interventions for the child. One explanation for this difference between the reports of the parents and those of the teachers and SLPs appeared to be the unit of analysis and definition of child communication behaviors.

Parents described their child's communication behaviors including all communication forms (e.g., speech, vocalizations, gestures, facial expressions). Teachers were most interested in specific communication forms such as speech or picture symbol

communication and how the child used these forms within social interactions with peers. In the parent interviews, the child's communication behaviors and abilities were described within the communication exchanges of daily activities and the social uses of language (i.e., pragmatic and functional). On the other hand, teachers and SLPs reported on the absence of specific syntax (i.e., word order) or semantic (i.e., word meaning) aspects of the child's symbolic and pragmatic communication abilities with peers and adults. However, the unit of analysis seemed to be the child rather than the communication exchanges within social contexts. The general procedures of hypothesis development and testing were viewed as potentially useful by teachers and parents in obtaining results to design interventions; however, the hypothesis-driven functional assessment and analysis model needs to be clearly connected with an intervention component and conducted in collaboration with parents and teachers in order to examine socially valued intervention outcomes (Schwartz & Baer, 1991).

The functional assessment activities could focus on specific child communication forms or syntax structures to develop hypotheses for analog tests rather than overall child communication behaviors. In this case the concern would be the generalization of child communication abilities across settings, persons, or materials, rather than initial acquisition.

Conclusions

When parents were provided with the vocabulary and opportunities to participate in systematic assessment activities of their child's communication behaviors, they became transdisciplinary partners in a nontraditional assessment process (Dunn, 1991). The condition variables and values parents identified with the investigator lead to observations of child communication behaviors in the home and the development of hypotheses predicting occurrences of child communication behaviors. However, the success of the analog tests of these hypotheses were successful in only three of the four child participants.

The functional assessment and analysis procedures in this study were completed over three to four, 1-2 hour home visits in order to examine the various unknown condition variables and values associated with child communication behaviors during daily activities in the home. More systematic steps to assist parents in the analysis of functional assessment results might include procedures to code and count adult and child communication behaviors in the Stage One observations, functional assessment interview, and in the observation transcriptions in order to answer decision rule questions to determine potential associations between specific condition variables and child communication behaviors.

Prior studies have used a hypothesis-driven functional assessment and analysis procedures with parents in their homes designed to decelerate target problem behaviors (e.g., Arndorfer et al., 1994) and analyzed natural occurrences of behaviors in order to develop hypotheses to decelerate communication behaviors (Mace & Lalli, 1991). The evidence is clear that parents can successfully participate in functional assessment and analysis procedures within clinical as well as in the natural settings of the home (e.g., Arndorfer et al., 1994; Cooper et al., 1990). The current study extended the practical use of the hypothesis-driven functional assessment and analysis model with parents in the home to accelerate target child communication behaviors.

The parents' collaboration with the investigator using hypothesis-driven procedures demonstrated a potential model to examine the variance in their child's communication behaviors within natural contexts. The overall value of these procedures is their use of natural contexts and family communication partners to identify and examine context conditions that may be undetected in other settings. Prior studies of functional assessment and analysis of child communication behaviors involved parents in limited roles and focused on replacing child communication problem behaviors within the school setting (e.g., Drasgow & Halle, 1995).

In addition, Drasgow and Halle (1995) and Brady and Halle (1997) reported the use of functional assessment observation procedures that omitted opportunities for parents to assist in the data collection and interpretation, as well as opportunities for parents to participate in the design of interventions to replace their child's communication behaviors. Brady and Halle (1997) used analog tests structured in an investigator directed, mass-trial format with the child that appeared to approximate a multielement single-case design. However, with limited descriptions of the procedures and no inter-observer agreement data, the potential value of the results were difficult to determine within natural settings. Moreover, in these studies the parent involvement was limited to interviews during the functional assessment procedures. In addition, parent reports were overlooked when they were discrepant with teacher reports of child communication abilities (Brady & Halle, 1997). This is in direct contrast to the types of ecological assessments and family partnerships needed in the collection, interpretation, and analysis collecting and analyzing assessment information to design more effective and efficient interventions for children who have disabilities (Cole, Dale, & Thal, 1996; Fleischer, Belgredan, Bagnato, & Ogonosky, 1990; Harry, 1992; Nietupski & Hamre-Nietupski, 1987).

From the parent interviews, this study appeared to move the parents to a higher level of understanding regarding the definition of communication and their role in facilitating child communication behaviors. Their learning history with their child during daily activities provided empirical evidence for them to describe and predict their child's general communication behaviors. The vocabulary, discussions, and procedures provided parents opportunities to examine more precisely their participation in affecting their child's communication abilities and could be organized within a handbook format for parents to use with their child's teacher and SLP.

In comparison to the parents, the teachers reported a more narrow definition of age-appropriate communication behaviors. This difference may be explained to some extent by

their non-involvement in the data collection and analysis procedures of the study. Also, the teachers may rely more on their knowledge of typical child development and a linguistic model of language and communication that emphasizes syntax, semantic, and pragmatic developmental stages. Their concern seemed to be the development of child communication behaviors from the nonsymbolic, nonconventional to the symbolic and conventional representations within communication exchanges with others. This was a shared goal for parents; however, the parents acknowledged the daily functional use of all six communication forms identified in the study to facilitate their child's communication development. The parents in this study reported that they wanted to do more of these types of assessments in the future with their child's teachers and SLPs. The use of the hypothesis-driven functional assessment and analysis methods with family members provides an educational assessment model for collaboration between school and home. A potential format is a functional assessment and analysis handbook written for parents to use with their child's teacher and SLP. This type of parent initiated model could be useful for the initial generalization of child communication behaviors from the home to the school, and in the design of initial interventions aimed to shape nonsymbolic, nonconventional child communication behaviors to the symbolic and conventional forms more socially recognized within the larger contexts of the school and community. Considering the value of family-school collaboration within early intervention and early childhood special education, the principles and procedures of the hypothesis driven model of functional assessment and analysis provides a useful framework for educational assessment of child communication behaviors across natural contexts to accelerate child communication behaviors in the home and in the school.

Limitations of the Study

This study was a demonstration of a collaborative assessment process with families to examine their child's communication behaviors in the home and in the school. The

implications that study results would inform the design of effective communication interventions for the children was not tested. The power of the hypotheses condition variables and values as necessary stimuli within the instructional universe of child communication behaviors was only tested with a non-family member inside the home for three children. These functional assessment and analysis procedures and results need to be tested within interventions aimed to increase child communication behaviors across home, school, and community settings. The hypothesis-driven model of functional assessment and analysis began the examination of necessary and sufficient context conditions to facilitate child communication behaviors, but failed to determine which condition variables and values were actually necessary to effect specific child communication behaviors, forms, and functions.

The relatively low levels of observer TA agreement is a limitation of the study to the extent that specific communication forms were observed as accelerating or decelerating during analog test procedures. However, the higher levels of observer OA agreement was sufficient and a modest beginning to demonstrate the potential use of the hypothesis-driven functional assessment and analysis procedure to accelerate child communication behaviors.

The omission of procedural reliability measures to examine the integrity of conditions provided by adult communication partners during analog tests limits the interpretation of results (Billingsley, White, & Munson, 1980). It is possible that low procedural reliability could provide an explanation for Cory's unexpected results. In addition, for the other child participants it can not be stated with confidence which component or combination of components was necessary and sufficient to replicate the analog test results.

Implications for Future Research

Future study in the area of hypothesis-driven functional assessment and analysis in early childhood special education needs to address the practical application of procedures,

the development of decision rules when results are unclear or contradictory, and the examination of specific communication forms with specific age-appropriate syntactic, semantic, and pragmatic skills and abilities. In addition, the hypothesis-driven functional assessment and analysis procedures need to be studied as part of an intervention package. This may be structured within a ecological inventory interview and observation format of child functional skills and abilities across settings and environments. The results could be used as context variables, antecedents, or consequences within a modified incidental teaching model or activity-based systematic instruction intervention.

In addition, the hypothesis-driven functional assessment and analysis procedures need to be further refined and examined within the home, school, and other community settings in order to define the necessary and sufficient steps to be more efficiently applied within natural settings. The potential of these procedures have been demonstrated with the family members and school personnel; however further examination of these procedures are necessary to identify relevant condition variables and values across social contexts aimed to increase functional and pragmatic communication abilities of children with severe and multiple disabilities.

The hypothesis-driven functional assessment activities need to be examined on more specific relationships between context, adult communication behaviors, and child communication behaviors. More precision in analyzing the independent and dependent variables with the hypothesis-driven procedures are necessary in order to identify conditions that occasion the subtle requirements of age-appropriate communication exchanges in natural settings. In this case, the concern is the generalization of child communication abilities across settings, persons, or materials, along with initial acquisition learning.

Another future direction is the development of a systematic approach to analyze functional assessment results with decision rules. The decision rules could be structured as

a decision tree to follow when assessment results and parent reports appear unclear or contradictory. Such a process might indicate when an additional assessment observation is needed such as situational probes (Brady and Halle, 1997). The development of decision rules would include an empirical analysis of functional assessment interview and observation transcripts across a larger sample of children. An analysis needs to identify the functional relationships across (a) different types of adult language (e.g., follow-in directives, redirectives), (b) levels of adult-child joint attention on play context and materials, and (c) child communication behaviors as initiations and responses within communication exchanges (cf. McCathren et al., 1995). The purpose would be to develop a set of questions to develop hypotheses and examine them within analog tests.

References

Abbeduto, L., & Rosenberg, S. (1987). Linguistic communication and mental retardation. In S. Rosenberg (Ed.), Advances in applied psycholinguistics: Vol. 1. Disorders of first language development (pp. 76-125). Cambridge: Cambridge University Press.

Adamson, L. B., Bakeman, R., & Smith, C. B. (1988). Gestures, words, and early object sharing. In V. Volterra, & C. Ertig (Eds.), From gesture to language in hearing children. New York, NY: Springer-Verlag.

Afflect, G., McGrade, B. J., McQueeney, M., & Allen, D. (1982). Promise of relationship-focused early intervention in developmental disabilities. Journal of Speech Education, 16, 413-430.

Alpert, C. L., & Kaiser, A. P. (1992). Training parents as milieu language teachers. Journal of Early Intervention, 16, 31-52.

American Speech-Language-Hearing Association. (1989). Competencies for speech-language pathologists providing services in augmentative communication. American Speech-Language-Hearing Association, 31, 107-110.

American Speech-Language-Hearing Association. (1991). Report: Augmentative and alternative communication. American Speech-Language-Hearing Association, 33 (Suppl. 5), 9-12.

Arndorfer, R. E., Miltenberger, R. G., Woster, S. H., Rortvedt, A. K., & Gaffaney, T. (1994). Home-based descriptive and experimental analysis of problem behaviors in children. Topics in Early Childhood Special Education, 14, 64-87.

Bakeman, R., & Adamson, L. B. (1986). Infants conventionalized acts: Gestures and words with mothers and peers. Infants Behavior and Development, 7, 215-230.

Barlow, D. H., & Hersen, M. (1984). Single case experimental designs: Strategies for studying behavior change (2nd Ed.). New York: Pergamon Press.

Barlow, D. H., & Hayes, S. C. (1979). Alternating treatments design: One strategy for comparing the effects of two treatments in a single subject. Journal of Applied Behavior Analysis, 12, 199-210.

Bates, E., Benigini, L., Bretherton, I., & Volterra, V. (1979). The emergence of symbols: Cognition and communication in infancy. New York: Academic Press.

Bates, E., Camaioni, L., & Volterra, V. (1975). The acquisition of performatives prior to speech. Merrill-Palmer Quarterly, 21, 205-226.

Baumgart, D., Johnson, J., & Helmsetter, E. (1990). Augmentative and alternative communication systems for persons with moderate and severe disabilities. Baltimore, MD: Paul H. Brookes.

Baumgart, D., Brown, L., Pumpian, I., Nisbet, J., Ford, A., Sweet, M., Messina, R., & Schroeder, J. (1982). Principle of partial participation and individualized adaptations in education programs for severely handicapped students. Journal of the Association for the Severely Handicapped, 7, 17-28.

Beukelman, D. R., & Mirenda, P. (1992). Augmentative and alternative communication: Management of severe communication disorders in children and adults. Baltimore: Paul H. Brookes.

Billingsley, F. F., White, O. R., & Munson, R. (1980). Procedural reliability: A rationale and an example. Behavior Assessment, 2, 229-241.

Blank, M. (1983). Teaching learning in the preschool. Cambridge, MA: Brookline Books.

Brady, N. C., & Halle, J. W. (1997). Functional analysis of communicative behaviors. Focus on Autism and Other Developmental Disorders, 12, 95-104.

Bretherton, I., McNew, S., & Beeghly-Smith, M. (1981). Early person knowledge as expressed in gestural and verbal communication. In M. E. Laurels, & L. R. Sherod (Eds.), Infant social communication. Hillsdale, NJ: Earlbaum Associates.

Bricker, D. (1992). The changing nature of communication and language intervention. In S. F. Warren, & J. Reichle (Eds.), Causes and effects in communication and language intervention (pp. 361-375). Baltimore: Paul H. Brookes.

Bricker, D. (1993). Then, now, and the path between: A brief history of language intervention. In A. P. Kaiser, & D. B. Gray (Eds.), Enhancing children's communication: Research foundations for intervention (pp. 11-31). Baltimore, MD: Paul H. Brookes.

Bricker, D., & Cripe, J. (1992). An activity-based approach to early intervention. Baltimore: Paul H. Brookes.

Brown, L., Branston, M. B., Hamre-Nieptupski, S., Pumpian, I., Certo, N., & Gruenewald, L. (1979). A strategy for developing chronological-age appropriate and functional curricular content for severely handicapped adolescents and young adults. The Journal of Special Education, 13, 81-90.

Brown, R. (1958). Words and things. New York: The Free Press of Glencoe.

Bruner, J. (1977). Early social interaction and language acquisition. In H, Schaffer (Ed.), Studies in mother-infant interaction (pp. 271- 289). London, England: Academic Press.

Bruner, J. (1981). The social context of language acquisition. Language and Communication, 1, 155-178.

Bruner, J. (1983). The acquisition of pragmatic commitments. In R. Golinkoff (Ed.), The transition from prelinguistic to linguistic communication (pp. 27-42). Hillsdale, NJ: Lawrence Erlbaum Associates.

Bryen, D. N., & Joyce, D. G. (1985). Language intervention with the severely handicapped: A decade of research. The Journal of Special Education, 19, 7-39.

Carlson, F., Hough, S., Lippert, E., & Young, C. (1988). Facilitating interaction during mealtime. In S. Blackstone, E. Cassatt-James, & D. Bruskin (Eds.), Augmentative communication: Implementation strategies (pp. 5.8-10-5.8-20). Rockville, MD: American Speech-Language-Hearing Association.

Carr, E. G. (1994). Emerging themes in the functional analysis of problem behavior. Journal of Applied Behavior Analysis, 27, 393-399.

Carr, E. G., & Carlson, J. I. (1993). Reduction of severe behavior problems in the community using a multicomponent treatment approach. Journal of Applied Behavior Analysis, 26, 157-172.

Carr, E. G., & Durand, V. M. (1985). Reducing behavioral problems through functional communication training. Journal of Applied Behavior Analysis, 18, 111-126.

Carr, E. G., Levin, L., McConnachie, G., Carlson, J. I., Smith, C. E., & Kemp, D. C. (1994). Communication-based intervention for problem behavior. Baltimore: Paul H. Brookes.

Cheseldine, S., & McConkey, R. (1979). Parental speech to young Down's syndrome children: An intervention study. American Journal of Mental Deficiency, 83(6), 612-620.

Cole, K., Dale, P., & Mills. P. (1991). Individual differences in language delayed children's responses to direct and interactive preschool instruction. Topics in Early Childhood Special Education, 11, 99-124.

Cole, K. N., & Fey, M. E. (1996). Cognitive referencing in language assessment. In K. N. Cole, P. S. Dale, & D. J. Thal (Eds.), Assessment of communication and language (pp. 143-160). Baltimore, MD: Paul H. Brookes.

Cole, K. N., Dale, P. S., & Thal, D. J. (1996). Assessment of communication and language. Baltimore, MD: Paul H. Brookes.

Cooper, L. J., Wacker, D. P., Sasso, G. M., Reimers, T. M., & Donn, L. K. (1990). Using parents as therapists to evaluate appropriate behavior of their children: Application to a tertiary diagnostic clinic. Journal of Applied Behavior Analysis, 23, 285-296.

Dale, P. S. (1976). Language development: Structure and function (2nd Ed.). New York: Holt Rhinehart and Winston.

Dale, P. S. (1996). Parent report assessment of language and communication. In K. N. Cole, P. S. Dale, & D. J. Thal (Eds.), Assessment of communication and language (pp. 161-182). Baltimore, MD: Paul H. Brookes.

Derby, K. M., Wacker, D. P., Sasso, G., Steege, M., Northup, J., Cigrand, K., & Asmus, J. (1992). Brief functional assessment techniques to evaluate aberrant behavior in an outpatient setting: A summary of 79 cases. Journal of Applied Behavior Analysis, 25, 713-721.

Drasgow, E., & Halle, J. W. (1995). Teaching social communication to young children with severe disabilities. Topics in Early Childhood Special Education, 15, 164-186.

Dunlap, G., Kern-Dunlap, L., Clarke, S., & Robbins, F. R. (1991). Functional assessment, curricular revision, and severe behavior problems. Journal of Applied Behavior Analysis, 24, 387-397.

Dunn, W. (1991). Integrated related services. In L. H. Meyer, C. A. Peck, & L. Brown (Eds.), Critical issues in the lives of people with severe disabilities (pp. 353-377). Baltimore, MD: Paul H. Brookes.

Durand, V. M., & Crimmins, D. B. (1988). Identifying the variables maintaining self-injurious behavior. Journal of Autism and Developmental Disorders, 18, 99-117.

Durand, V. M., & Crimmins, D. (1991). Teaching functionally equivalent responses as an intervention for challenging behavior. In B. Remmington (Ed.), The challenge of severe mental handicap: A behaviour analytic approach (pp. 71-95). Chichester, England: John Wiley & Sons.

Fleischer, K. H., Belgredan, J. H., Bagnato, S. J., & Ogonosky, A. B. (1990). An overview of judgment-based assessment. Topics in Early Childhood Special Education, 10, 13-23.

Ford, A., Schnorr, R., Meyer, L., Davern, L., Black, J., & Dempsey, P. (1989). The Syracuse Community-Referenced Curriculum Guide for Students with Moderate and Severe Disabilities. Baltimore: Paul H. Brookes.

Gaylord-Ross, R., & Browder, D. (1991). Functional assessment: Dynamic and domain properties. In L. H. Meyer, C. A. Peck, & L. Brown (Eds.), Critical issues in the lives of people with severe disabilities (pp. 45-66). Baltimore, MD: Paul H. Brookes.

Guess, D., Keogh, W., & Sailor, W. (1978). Generalization of speech and language behavior: Measurement and training tactics. In R. L. Schiefelbusch (Ed.), Bases of language intervention (pp. 373-395). Baltimore: University Park Press.

Guess, D., Sailor, W., & Baer, D. (1974). To teach language to retarded children. In R. L. Schiefelbusch, & L. L. Lyle (Eds.), Language perspectives: Acquisition, retardation, and intervention. Baltimore, MD: University Park Press.

Guralnick, M. J. (1978). Early intervention and the integration of handicapped and nonhandicapped children. Baltimore: University Park Press.

Haring, N. G. (1988). Generalization for students with severe handicaps: Strategies and solutions. Seattle, WA: University of Washington Press.

Haring, T. A., Neetz, J. A., Lovinger, L., Peck, C., & Semmel, M. I. (1987). Effects of four modified incidental teaching procedures to create opportunities for communication. Journal of the Association for Persons With Severe Handicaps, 12, 218-226.

Haring, T. G. (1991a). Social competence revisited: Reflections on relations, relationships, and generativity. In C. G. Breen, C. H. Kennedy, & T. G. Haring (Eds.), Social context research project: Methods for facilitating the inclusion of students with disabilities in integrated school and community contexts (pp. 169-188). Santa Barbara, CA: University of Santa Barbara.

Haring, T. G. (1991b). Social relationships. In L. H. Meyer, C. A. Peck, & L. Brown (Eds.), Critical issues in the lives of people with severe disabilities (pp. 195-217). Baltimore, MD: Paul H. Brookes.

Harry, B. (1992). Cultural diversity, families, and the special education system: Communication and empowerment. New York: Teachers College Press.

Hart, B. (1985). Naturalistic language training techniques. In S. Warren, & A. Rogers-Warren (Eds.), Teaching functional language (pp. 63-88). Baltimore: University Park Press.

Hart, B., & Risley, T. R. (1974). Using preschool materials to modify the language of disadvantaged children. Journal of Applied Behavior Analysis, 7, 243-256.

Hart, B., & Risley, T. R. (1975). Incidental teaching of language in the preschool. Journal of Applied Behavior Analysis, 8, 411-420.

Hart, B., & Risley, T. (1982). How to use incidental teaching for elaborating language. Lawrence, KS: H 7 H Enterprises.

Hart, B., & Rogers-Warren, A. (1978). A milieu approach to teaching language. In R. Schiefelbusch (Ed.), Language intervention strategies. Baltimore: University Park Press.

Higginbotham, D. J., & Yoder, D. E. (1982). Communication within natural conversational interaction: Implications for severe communicatively impaired persons. Topics in Language Disorders, 2, 1-19.

Horner, R. H. (1994). Functional assessment: Contributions and future directions. Journal of Applied Behavior Analysis, 27, 401-404.

Horner, R. H., Bellamy, G. T., & Colvin, G. T. (1984). Responding in the presence of nontrained stimuli: Implications of generalization error patterns. Journal of the Association for Persons with Severe Handicaps, 9, 287-296.

Horner, R. H., & Billingsley, F. F. (1988). The effect of competing behavior on the generalization and maintenance of adaptive behavior in applied settings. In R. H. Horner, G. Dunlap, & R. L. Koegel, (Eds.), Generalization and maintenance: Life-Style changes in applied settings (pp. 197-220). Baltimore: Paul H. Brookes.

Houghton, J., Bronicki, G. J. B., & Guess, D. (1987). Opportunities to express preferences and make choices among students with severe disabilities in classroom settings. Journal of the Association for Persons With Severe Handicaps, 12, 18-27.

Iwata, B. (1994). Functional analysis methodology: Some closing comments. Journal of Applied Behavior Analysis, 27, 413-418.

Iwata, B., Dorsey, M., Slifer, K., Bauman, K., & Richman, G. (1982). Toward a functional analysis of self-injury. Analysis and Intervention in Developmental Disabilities, 2, 3-20.

Kaiser, A. P. (1993). Parent-implemented language intervention: An environmental system perspective. In A. P. Kaiser, & D. B. Gray (Eds.), Enhancing children's communication: Research foundations for intervention (pp. 63-84). Baltimore, MD: Paul H. Brookes.

Kaiser, A., Hendrickson, J., & Alpert, K. (1991). Milieu language teaching: A second look. In R. Gable (Ed.), Advances, in mental retardation and developmental disabilities (Vol. IV, pp. 63-92). London, Jessica Kingsley Publishers.

Kaiser, A. P., Alpert, C. L., & Warren, S. L. (1987). Teaching functional language: Strategies for intervention. In M. E. Snell (Ed.), Systematic instruction of persons with severe handicaps (pp. 247-272). Columbus, OH: Charles E, Merrill.

Kangas, K. A., & Lloyd, L. L. (1988). Early cognitive skills as prerequisites to augmentative and alternative communication use: What are we waiting for? Augmentative and Alternative Communication, 4, 211-221.

Kantor, J. R. (1929). Can psychology contribute to the study of linguistics? The Monist, 38, 630-648.

Kennedy, C., & Itkonen, T. (1993). Effects of setting events on the problem behavior of students with severe disabilities. Journal of Applied Behavior Analysis, 26, 321-327.

Klee, T. (1992). Measuring children's conversational language. In S. F. Warren, & J. Reichle (Eds.), Causes and effects in communication and language intervention (pp. 315-330). Baltimore, MD: Paul H. Brookes.

Light, J., Collier, B., & Parnes, P. (1985a). Communicative interaction between young nonspeaking physically disabled children and their primary caregivers: Part I - Discourse patterns. Augmentative and Alternative Communication, 1, 74-83.

Light, J., Collier, B., & Parnes, P. (1985b). Communicative interaction between young nonspeaking physically disabled children and their primary caregivers: Part II - Communicative function. Augmentative and Alternative Communication, 1, 98-107.

Light, J., Collier, B., & Parnes, P. (1985c). Communicative interaction between young nonspeaking physically disabled children and their primary caregivers: Part III - Modes of communication. Augmentative and Alternative Communication, 1, 125-133.

Linder, T. W. (1993). Transdisciplinary play-based assessment: A functional approach to working with young children. Baltimore, MD: Paul H. Brookes.

Mace, F. C. (1994). The significance and future of functional analysis methodologies. Journal of Applied Behavior Analysis, 27, 385-392.

Mace, F. C., & Lalli, J. S. (1991). Linking descriptive and experimental analyses in the treatment of bizarre speech. Journal of Applied Behavior Analysis, 24, 553-562.

McCathren, R. B., Yoder, P. J., & Warren, S. F. (1995). The role of directives in early language intervention. Journal of Early Intervention, 19, 91-101.

McFall, R. M. (1982). A review and reformulation of the concept of social skills. Behavioral Assessment, 4, 1-33.

McKirdy, L. S., & Blank, M. (1982). Dialogue in deaf and hearing preschoolers. Journal of Speech and Hearing Research, 25, 487-499.

McLean, J. E., & Snyder-McLean, L. K. (1978). A transactional approach to early language training. Columbus, OH: Charles E. Merrill.

McLean, J., & Snyder-McLean, L. (1988). Application of pragmatics to severely mentally retarded children and youth. In R. Schiefelbusch, & L. L. Lloyd (Eds.), Language and perspectives: Acquisition, retardation, and intervention (2nd ed., pp. 343-366). Austin, TX: PRO-ED.

Meyer, M. (1911). Sixteenth lecture. In The fundamental laws of human behavior. Boston, MA: Badger.

Michael, J. (1988). Establishing operations and the mand. The Analysis of Verbal Behavior, 6, 3-9.

Mirenda, P., & Donnellan, A. (1986). Effects of adult interaction style on conversational behavior in students with severe communication problems. Language, Speech, and Hearing Services in Schools, 17, 126-141.

Mirenda, P., Iacono, T., & Williams, R. (1990). Communication options for persons with severe and profound disabilities: State of the art and future directions. Journal of the Association for Persons With Severe Handicaps, 15, 3-21.

Mittler, P., & Berry, P. (1977). Demanding language. In P. Mittler (Ed.), Research to practice in mental retardation: Education and training (pp. 245-252). International Association for Scientific Study in Mental Deficiency.

Mustonen, T., Locke, P., Reichle, J., Solbrack, M., & Lindgren, A. (1991). An overview of augmentative and alternative communication systems. In J. Reichle, J. York, & J. Sigafoos, Implementing augmentative and alternative communication: Strategies for learners with severe disabilities (pp. 1-37). Baltimore: Paul H. Brookes.

Neel, R. A., & Billingsley, F. F. (1989). Impact: A functional curriculum model for students with moderate and severe disabilities. Baltimore, MD: Paul H. Brookes.

Nietupski, J. A., & Hamre-Nietupski, S. M. (1987). An ecological approach to curriculum development. In L. Goetz, D. Guess, K. Stremel-Campbell (Eds.), Innovative program design for individuals with dual sensory impairments (pp. 225-253). Baltimore: Paul H. Brookes.

Notari-Syverson, A., & Losardo, A. (1996). Assessing children's language in meaningful contexts. In K. N. Cole, P. S. Dale, & D. J. Thal (Eds.), Assessment of communication and language (pp. 257-279). Baltimore, MD: Paul H. Brookes.

North, J., Wacker, D., Sasso, G., Steege, M., Cigrand, K., Cook, J., & DeRaad, A. (1991). A brief functional analysis of aggression and alternative behavior in an outclinic setting. Journal of Applied Behavior Analysis, 24, 509-522.

Olswang, L. B., Bain, B. A., & Johnson, G. A. (1992). Using dynamic assessment with children with language disorders. In S. F. Warren, & J. Reichle (Eds.), Causes and effects in communication and language intervention (Vol. 1, pp. 187-215). Baltimore: Paul H. Brookes.

O'Neill, R. E., Horner, R. H., Albin, R. W., Storey, K., & Sprague, J. R. (1990). Functional analysis of problem behavior. Sycamore, IL: Sycamore Publishing Company.

Peck, C.A. (1989). Assessment of social communicative competence: Evaluating environments. Seminars in Speech and Language, 10, 1-15.

Pena, E. D. (1996). Dynamic assessment: The model and its language applications. In K. N. Cole, P. S. Dale, & D. J. Thal (Eds.), Assessment of communication and language (pp. 281-307). Baltimore, MD: Paul H. Brookes.

Pien, D., & McKibbin-Klein, J. (1989). Gestures: The missing link to language. University of Washington, unpublished document.

Reichle, J. (1991). Developing communicative exchanges. In J. Reichle, J. York, & J. Sigafoos (Eds.), Implementing augmentative and alternative communication: Strategies for learners with severe disabilities (pp. 133-156). Baltimore: Paul H. Brookes.

Reichle, J., & Karlan, G. (1988). Selecting augmentative communication interventions: A critique of candidacy criteria and a proposal alternative. In R. L. Schiefelbusch, & L. L. Lloyd (Eds.), Language perspectives: Acquisition, retardation, and intervention (2nd ed., pp. 321-339). Austin, TX: PRO-ED.

Reichle, J., & Sigafoos, J. (1991). Establishing spontaneity and generalization. In J. Reichle, J. York, & J. Sigafoos (Eds.), Implementing augmentative and alternative communication: Strategies for learners with severe disabilities (pp. 133-156). Baltimore: Paul H. Brookes.

Reichle, J., Halle, J., & Johnston, S. (1993). Developing an initial communicative repertoire: Applications and issues for persons with severe disabilities. In A. P. Kaiser, & D. B. Gray (Eds.), Enhancing children's communication: Research foundations for intervention (pp. 105-136). Baltimore, MD: Paul H. Brookes.

Reichle, J., Sigafoos, J., & Remington, B. (1991). Beginning an augmentative communication system with individuals who have severe disabilities. In B. Remington (Ed.), The challenge of severe mental handicap: A behaviour analytic approach (pp. 189-213). Chichester, England: John Wiley & Sons.

Reichle, J., York, J., & Sigafoos, J. (1991). Implementing augmentative and alternative communication: Strategies for learners with severe disabilities. Baltimore, MD: Paul H. Brookes.

Repp, A. C., Felce, D., & Barton, L. E. (1988). Basing the treatment of stereotypic and self-injurious behaviors on hypotheses of their causes. Journal of Applied Behavior Analysis, 21, 281-289.

Rice, M. L. (1993). "Don't talk to him; he's weird", a social consequences account of language and social interactions. In A. P. Kaiser, & D. B. Gray (Eds.), Enhancing children's communication: Research foundations for intervention (pp. 139-158). Baltimore: Paul H. Brookes.

Reike, J. A., Lynch, L. L., & Soltman, S. F. (1977). Teaching strategies for language development. New York: Grune & Stratton.

Rogers-Warren, A., & Warren, S. F. (1977). Ecological perspectives in behavior analysis. Baltimore, MD: University Park Press.

Rowland, C., & Stremel-Campbell, K. (1987). Share and share alike: Conventional gestures to emergent language for learners with sensory impairments. In L. Goetz, D. Guess. & K. Stremel-Campbell (Eds.), Innovative program design for individuals with dual sensory impairments (pp. 49-75). Baltimore: Paul H. Brookes.

Romski, M. A., & Sevcik, R. A. (1988). Augmentative and alternative communication systems: Considerations for individuals with severe intellectual disabilities. Baltimore, MD: Paul H. Brookes.

Sasso, G. M., Reimers, T. M., Cooper, L. J., Wacker, D., Berg, W., Steege, M., Kelly, L., & Allaire, A. (1992). Use of descriptive and experimental analysis to identify the functional properties of aberrant behavior in school settings. Journal of Applied Behavior Analysis, 25, 809-821.

Schreibman, L. (1975). Effects of within-stimulus and extra-stimulus prompting on discrimination learning in autistic children. Journal of Applied Behavior Analysis, 8, 91-112.

Schreibman, L. (1988). Parent training as a means of facilitating generalization in autistic children. In R. H. Horner, G. Dunlap, & R. L. Koegel, (Eds.), Generalization and maintenance: Life-Style changes in applied settings (pp. 21-40). Baltimore: Paul H. Brookes.

Schwartz, I. S., & Baer, D. M. (1991). Social validity assessments: Is current practice state of the art? Journal of Applied Behavior Analysis, 24, 189-204.

Seitz, S. (1975). Language intervention: Changing the language environment of the retarded child. In R. Koch & F. de la Cruz (Eds.), Down Syndrome (pp. 157-179). New York: Brunner/Mazel.

Siegel-Causey, E., & Downing, J. (1987). Nonsymbolic communication development: Theoretical concepts and educational strategies. In L. Goetz, & Stremel-Campbell (Eds.), Innovative program design for individuals with dual sensory impairments (pp. 15-48). Baltimore: Paul H. Brookes.

Siegel-Causey, E., & Ernst, B. (1989). Theoretical orientation and research in nonsymbolic development. In E. Seigel-Causey, & D. Guess (Eds.), Enhancing nonsymbolic communication interactions among learners with severe disabilities (pp. 17-51). Baltimore, MD: Paul H. Brookes.

Siegel-Causey, E., & Guess, D. (1989). Enhancing nonsymbolic communication interactions among students with severe disabilities. Baltimore, MD: Paul H. Brookes.

Sheehan, R. (1988). Involvement of parents in early childhood assessment. In T. D. Wachs, & R. Sheehan (Eds.), Assessment of young developmentally disabled children. New York: Plenum.

Sigafoos, J., & York, J. (1991). Using ecological inventories to promote functional communication. In J. Reichle, J. York, & J. Sigafoos (Eds.), Implementing augmentative and alternative communication: Strategies for learners with severe disabilities (pp. 133-156). Baltimore: Paul H. Brookes.

Skinner, B. F. (1957). Verbal behavior. New York: Appleton-Century-Crofts.

Snow, C. E. (1977). The development of conversation between mother and babies. Journal of Child Language, 4, 1-22.

Stillman, R., & Siegel-Causey, E. (1989). Introduction to nonsymbolic communication. In E. Seigel-Causey, & D. Guess (Eds.), Enhancing nonsymbolic communication interactions among learners with severe disabilities (pp. 1-13). Baltimore, MD: Paul H. Brookes.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. Journal of Applied Behavior Analysis, 10, 349-367.

Stokes, T. F., & Osner, P. G. (1988). The developing applied technology of generalization and maintenance. In R. H. Horner, G. Dunlap, & R. L. Koegel, (Eds.), Generalization and maintenance: Life-Style changes in applied settings (pp. 5-18). Baltimore: Paul H. Brookes.

Sugarman, S. (1983). The development of preverbal communication. In R. L. Schiefelbusch, & J. Pickar (Eds.), Communication Competence: Acquisition and intervention (pp. Communication intervention, typical development). Baltimore, MD: Paul H. Brookes.

Wahler, R. G., Berland, R. M., Coe, T., D., & Leske, G. (1977). Social systems analysis: Implementing an alternative behavioral model. In A. Rogers-Warren and S. F. Warren (Eds.). Ecological perspectives in behavior analysis (221-228). Baltimore, MD: University Park Press.

Walker, J. A., & Kershman, S. M. (1981). Deaf-blind babies in social interaction: Questions of maternal adaptation. In Society for Research in Child Development. Boston, MA:

Warren S. F., & Reichle, J. (1992). Causes and effects in communication and language intervention. Baltimore, MD: Paul H. Brookes.

Weiss, A. P. (1929). The language responses. In A theoretical basis of human behavior. Columbus, OH: Adams.

Wetherby, B. (1978). Miniature language and functional analysis of verbal behavior. In R. Schiefelbusch (Ed.). Bases of language intervention (pp. 397-448). Baltimore: University Park Press.

Wetherby, A. M., & Prizant, B. M. (1992). Profiling young children's communicative competence. In S. F. Warren, & J. Reichle (Eds.), Causes and effects in communication and language intervention (pp. 217-253). Baltimore: Paul H. Brookes.

Watson, J. B. (1924). Talking and thinking. In Behaviorism. New York: Norton.

White, O. R. (1971). A glossary of behavioral terminology. Champaign, IL: Research Press.

White, O. R. (1980). Adaptive performance objectives: Form versus function. In W. Sailor, B. Wilcox, & L. Brown (Eds.), Methods of instruction for severely handicapped students (pp. 47-70). Baltimore: Paul H. Brookes.

Willems, E. P. (1974). Behavioral technology and behavioral ecology. Journal of Applied Behavior Analysis, 3, 131-160.

Wolf, M. M. (1978). Social validity: The case for subjective measurement, or how behavior analysis is finding its heart. Journal of Applied Behavior Analysis, 11, 203-214.

Yoder, D. E., & Kraat, A. (1983). Intervention issues in nonspeech communication. American Speech-Language-Hearing Association Reports, 12, 27-51.

Appendix A

Human Subjects Consent Information

UNIVERSITY OF WASHINGTON

OFFICE OF SPECIAL EDUCATION
College of Education

December 8, 1995

Dear Parent or Legal Guardian:

The following material packet describes a study I am going to complete as partial fulfillment of requirements for my doctoral degree in education at the University of Washington. The purpose of the study is to identify the communication abilities of preschool age children, 4 to 5 years old with developmental disabilities, and describe under what conditions they communicate during daily activities in their homes. We will work closely with each child's parents to collect this information and the family will share the study results with each child's teacher and Speech Language Pathologist (SLP).

Preschool age children with disabilities or developmental delays often communicate differently in different settings. For example, a child may make requests at meal time in the home but not during snack time in school. Often family members are unable to clearly explain to their child's teacher how to help their child communicate at school like he or she communicates in the home.

We will use family interviews and observations of your child interacting and communicating with family members to describe how your child communicates during daily activities in your home. Your child's teacher and SLP has agreed to participate in this study, and with your consent, to provide opportunities for us to observe your child's communication abilities during classroom activities too.

I am also asking your permission to read your child's school records to obtain information on your child's developmental delays or disabilities, Individual Education Program (IEP), and any medications your child might take.

Please read the enclosed material that describes the study in more detail. If you have any questions regarding the study please call me at 543-1827. If you have no questions and would like your child to participate in my study please complete both copies of the Study Participant Consent page by marking ***yes*** or ***no*** for each activity and signing and dating the pages at the bottom. You need to keep one copy of this material packet with the consent page checked off and signed for your records, and send the other complete material packet with the consent page checked off and signed to me in the enclosed stamped envelope. Please inform your child's teacher when you send me the signed consent form and I will contact you within 1 week to begin the study activities. Thank you for considering to participate in my study.

Sincerely,

Mark J. Larson, M.Ed.
Doctoral Student

[illegible] Seattle, Washington [illegible] (206) [illegible] Voice/TDD FAX (206) [illegible]

UNIVERSITY OF WASHINGTON
COLLEGE OF EDUCATION

FAMILY CONSENT FORM

THE USE OF FUNCTIONAL ASSESSMENT AND ANALYSIS TO ACCELERATE SOCIAL COMMUNICATION TARGETS OF CHILDREN WITH SEVERE DISABILITIES AT HOME AND SCHOOL

Investigator: Mark J. Larson, M.Ed., Graduate Student, Special Education, 543-1827.

Faculty Sponsor: Felix F. Billingsley, Ph.D., Professor, Special Education, 543-4011.

Investigator's Statement

PURPOSE AND BENEFITS

The purpose of this study is to identify the communication abilities of preschool age children, 4 to 5 years old with developmental delays or disabilities, and describe under what conditions they communicate during daily activities in their homes. The family will share this information with their child's classroom teacher and Speech Language Pathologist (SLP).

Children learn to communicate with family members during their interactions in daily activities such as meal times and play times. In this study we will learn to describe how your child communicates in the home through interviews and discussions with you and other family members, and though planned observations of your child communicating and interacting with family members daily activities in the home.

We see 5 benefits for you and your child if you choose to participate in our study:

1. You will learn to describe your child's communication abilities during different daily activities in the home.

2. You will receive a copy of your child's study results aimed to increase his or her appropriate communication behaviors.

3. You will receive help organizing and summarizing these study results to share with your child's teacher and SLP.

4. Study results may assist you in facilitating your child's communication exchanges with family members during daily activities in the home.

5. Your involvement with this study will help SLPs, teachers, and professional educators to better understand and meet the communication needs of other children with developmental delays or disabilities.

PROCEDURES

Family interviews and observations of your child during daily activities in the home are the main activities of the study. The investigator will perform all interviews and observations. Occasionally, one other project staff person will accompany the investigator to verify components of the observations. All interviews and observations will avoid any potentially intrusive or embarrassing questions, activities, and situations for you or your child. We will ask questions about your child's communications and interactions with family members during daily activities in the home for a typical week.

As an example, some of the most personal or sensitive questions we will ask includes how your child lets you know he or she is ready to get up from bed in the morning; how your child lets you know when he or she is tired and wants to go to bed; how your child lets you know when he or she is hungry or has had enough food or drink; how you tell your child to stop doing something; how your child tells you to stop doing something; and, how others respond to your child during conflicts or misunderstandings during an activity. You are free not to answer any questions you do not wish to answer.

This is a study designed to identify and describe a child's communication abilities when he or she communicates more often in the home than in the school. Therefore, there are 2 stages of activities in this study. In both stages we will use information from family members to observe the child communicating in the home and information from contacts with your child's teacher and SLP to observe your child communicating in school.

The first stage is a family interview and observation screening in the home and a teacher and SLP contact to plan an observation screening in the school. We are using the following criteria to find children that will benefit most from the study.

> The child's communication behavior at home and at school is complex, difficult to predict, and the child's communication is more complete at home than what he or she shows at school and has displayed during previous assessments. Thus, a discrepancy exists in the way the child communicates in the home and in the school.

Stage 1 screening will be completed over 1-2 days. If your child communicates equally well in the home and in the school then it will not be necessary to continue with the second stage of the study.

In the second stage of the study we will examine why a child may communicate differently at home than at school and begin to gather information on how to describe under what conditions the child communicates at home. The following are stage 2 study activities.

1. A more complete interview with you to describe your child's communication abilities and to plan observations of your child communicating during daily activities in the home.

2. Observations of your child during daily activities to write down the when, where, with whom, how, and why of your child's communication exchanges with family members.

3. A second family interview to discuss observations and statements that predict when your child will communicate.

4. Final observations to see exactly the **when, where, with whom, how, and why** of your child's communication acts during daily activities in the home. The investigator and family members will work together to plan and set-up these final observations during daily activities in your home.

Information from the interviews will be used to plan observations of your child during daily activities in your home. We will only observe those activities that you agree as important, and we will only observe at those times that you identify as the best times to see your child communicating with family members. The total average amount of time required of you and your child during the study will be 10-12 hours. That will include 5-6 sessions of interviews to plan an average of 10 observations in your home over a period of 3-5 weeks. Each interview and observation session will take about 1 hour to complete. There will also be an exit meeting to determine the extent to which the study results were useful.

An example of observation procedures may be that your child points to pictures symbols to request food items during lunch time in the home, but does not make these requests at snack time in school. We would plan a test observation of this daily activity with your child in the home. We might discover that when you sit at the table with your child and show your child a banana and ask, "Want some (Banana)?", that your child then points to the picture symbol of a banana placed on the table within 3 inches of her plate to request a piece of banana.

The final observation would look at the importance of the different parts of this communication exchange. Will your child still point to the picture symbol if you are standing? Will your child still point to the picture symbol if the banana is not shown to the child? Will your child still point to the picture symbol if it is 10 inches from her plate? We will try out different ways of asking your child if she wants a piece of banana to test what parts are necessary for your child to request the banana by pointing to the picture symbol.

It may turn out in our final observation that showing the food item to your child and having the picture symbol within 6 inches are the necessary components for her pointing to the picture symbol to request not only bananas but other food items at meal times in the home. We will organize the final observation results so that you can share them with your child's teacher and SLP.

While study activities are being conducted in the home, a second teacher and SLP contact and observation of your child during classroom activities will take place. The purpose of this observation is to document whether a discrepancy still exists in your child's communication abilities at home and at school. Because the study activities are not an intervention, we expect the discrepancy to maintain during the study.

Within 6 weeks after you have shared the study results with your child's teacher and SLP, individual exit meetings will be conducted with you and your child's teacher and SLP. Also, during this time period the last teacher and SLP contact and child observation during class activities will be completed.

In addition, we would like your permission to take information from your child's school records regarding his or her developmental delays or disabilities, Individual Education Program (IEP), and medications your child is taking. This information will be used during the screening of your child to determine if he or she meets our study criteria, and during study activities to help us organize and summarize study results for your child. This specific child record information will be written onto child participation forms and kept in locked files for use by study personnel for 1 year, after which time this information will be destroyed.

RISKS, STRESS, OR DISCOMFORT

The study activities will take place in the child's home and school. All study activities will only take place at the convenience of the family, SLP, and teacher. Only those daily activities that the family view as important will be observed in the home and only those classroom activities that the teacher and SLP view as important will be observed in school.

All family interviews will be audio-taped and all observations will be recorded on written forms so that the accuracy of the information can be checked. As with all research activities, even when the investigator follows required procedures to protect confidentiality of information, there is a potential risk for study participants to experience invasion of privacy and breach of confidentiality. However, all precautions will be taken by the investigator to respect and protect the privacy and the confidentiality rights of all study participants.

OTHER INFORMATION

All of the information that you provide will be confidential. However, as with all state and federally supported research projects, the only exceptions would be incidents of child abuse that you might report and risks of imminent harm to others or to yourself.

Study participants may review all audio-tapes of their individual interviews and delete any portions that they do not like before they are transcribed onto study forms. All audio-tapes of interviews will be erased within 1 year. Other records of study activities and their data summaries will be maintained in locked files for up to 10 years, after that time these records will be destroyed. Only study personnel will have access to written records, data collected on audio-tapes, and data summarized on computer diskettes. Study products and reports will be used for dissemination of study results and training educational personnel. Copies of study products and reports will be provide to study participants upon request.

You may withdraw your child from the study at any time without loss of any benefits or services to which you or your child are entitled. The written results of the study will be placed in the thesis section of the University of Washington library and may be included in professional journal articles and presentations. However, the identity of your child, family members, or school personnel will not be revealed in any written or oral communication.

Signature of investigator: _____ Date: 5-31-96

Signature of faculty Sponsor: _____ Date: 5/31/96

Study Participant Consent

The study described above has been explained to me. I voluntarily agree to participate and give my consent to the following study activities:

1. Stage 1 screening interview and observations of my child in the home and in the school.

   yes ____ no ____

2. Stage 2 additional interviews and observations in the home and in the school.

   yes ____ no ____

4. To assist the investigator to obtain information from my child's school records regarding his or her developmental delays or disabilities, Individual Education Program (IEP), and any medications my child is currently taking.

   yes ____ no ____

I have had an opportunity to ask questions of the investigator. I understand that future questions I may have about the study or about my rights or my child's rights as a subject participant will be answered by the investigator listed above.

Signature of parents or legal guardians:

_____ Date:_____

_____ Date:_____

On behalf of: _____ (child's name)

cc: Subject
Investigator's file

Appendix B

Functional Assessment and Analysis Protocol

Communication Screening Interview - Home

Child Participation Code: _____ Age: _____ Sex: M F

Family codes of communication partners: _____

_____

Interview respondent code: _____

Interviewer: _____ Date: _____

General Descriptions of Communication Exchanges

Setting: When and where do exchanges take place?	What communication forms do the child and Partner use?	Function: Why do exchanges occur, what do individuals want?	Duration: How long are exchanges?	What are the outcomes of exchanges?	Intensity: What are the feelings being shared?
(1)					
(2)					
(3)					

Participant code: _____-95
Page 1

Communication Screening Interview - School

Child Participant Code: _____ Age: ____ Sex: M F

Communication partner codes: _____

_____

Interview respondent code: _____

Interviewer: _____ Date: _____

General Descriptions of Communication Exchanges

Setting: When and where do exchanges take place?	What communication forms do the child and Partner use?	Function: Why do exchanges occur, what do individuals want?	Duration: How long are exchanges?	What are the outcomes of exchanges?	Intensity: What are the feelings being shared?
(1)					
(2)					
(3)					

Communication Observation Screening Between Home and School

Home Activities Checklist		School Activities Checklist	
Day/Time	(1) Activity, (2) Participants, (3) Communication Forms, (4) Functions and (5) Outcomes of Communication	Day/Time	(1) Activity, (2) Participants, (3) Communication Forms, (4) Functions and (5) Outcomes of Communication

Participant code: _____-95
Page 3

Communication Assessment Interview

Child Participation Code: _____ Age: _____ Sex: M F

Family codes of communication partners: _____

_____

Interview respondent code: _____

Interviewer: _____ Date: _____

General Descriptions of Communication Exchanges

Setting: When and where do exchanges take place?	What communication forms do the child and Partner use?	Function: Why do exchanges occur, what do individuals want?	Duration: How long are exchanges?	What are the outcomes of exchanges?	Intensity: What are the feelings being shared?
(1)					
(2)					
(3)					
(4)					

Your Child's Daily activities and Communication Partners

Day/Time	Activity, Type of Support Required, and Communication Partners	Day/Time	Activity, Type of Support Required, and Communication Partners

Participant code: ____-95
Page 2

Ecological Events Associated with Communication Exchanges

- Describe your child's sleeping patterns.

- How does your child communicate when he or she is tired?

  When she or he is awaken from sleep?

  When she or he is waking?

- How do any medications your child takes effect his or her communication when tired, awaking, needing comfort, or at play?

- How is your child's communication behavior different at these times when you are in a new or strange place, for example when you are on vacation or travelling?

More Ecological Events Associated . Communication Exchanges, continued

- Describe your child's eating patterns.

- How does your child communicate when he or she is hungry?

  When a meal is being prepared?

  When he or she is eating?

- How do any medications your child takes effect his or her communication when hungry, eating or drinking, needing comfort, and at play?

- How is your child's communication behavior different at these times when you are in a new or strange place, for example when you are on vacation or travelling?

More Ecological Events Associated \ Communication Exchanges, continued

- Describe how your child's communication exchanges with you and members of your family have changed over the years (infancy, toddler, preschool-age)?

Communication Summary Hypotheses From Interview with Family

Child Participation Code:

Communication Interview Date:

Interviewer's Name:

Time	Setting	Communication Partner(s)	Forms of Communication Used. Child, partner, type of AAC and support required	Communication Function Comment, request, reject	Social Function Initiate, maintain, terminate	Outcome Get/obtain, escape/avoid	Comments
(1)							
(2)							
(3)							
(4)							

Participant code: ____-95
Page 1

Communication Functional Observation
Hypothesis Test

Child Participation Code: **Observer's Name:** **Date:**

Time	Setting	Communication Partner(s)	Form of Communication Used Child, partner, type of AAC and support required	Communication Function Comment, request, reject	Social Function Initiate, maintain, terminate	Outcome Get/obtain, escape/avoid	Comments
Hyp #							

Occurrence number 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39

Communication Follow-Up Interview

Child Participation Code: _____ **Age:** _____ **Sex:** M F

Respondent Code: _____ **Date:** _____

Relationship to Child: _____

Interviewer: _____

General Impression of Functional Assessment and Analysis Procedures

How important is the area of communication for children with severe disabilities?	How well did the functional assessment and analysis procedures describe the child's communication abilities?	How useful were the results in improving your communication exchanges with the child?	How useful were the results in your efforts to improve the child's communication?	How were results used to improve the child's communication exchanges?	To what extent were the functional assessment and analysis procedures and results new information for you?

Specific Input on the Functional Assessment and Analysis Procedures and Results

Question	Response
1. What kind of information was missing from the communication functional assessment and analysis results that would help you design more effective interventions?	
2. What other comments can you share to improve the usefulness of the communication functional assessment and analysis process and results?	

VITA

Mark James Larson

DATE & PLACE OF BIRTH: February 23, 1953; Seattle, Washington

EDUCATION:

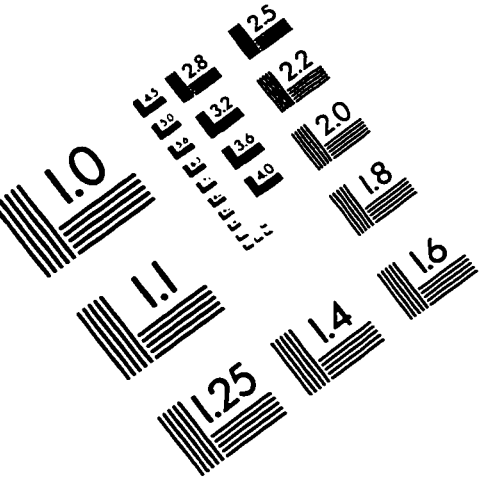
Institution	Degree and Date	Major
University of Washington Seattle, Washington	Ph.D., 1998	Special Education (Severe Disabilities)
University of Washington Seattle, Washington	M.Ed., 1982	Special Education (Early Childhood)
University of Washington Seattle, Washington	B.A., 1979	Social Welfare
Seattle Central Community College, Seattle, Washington	1975-1977 (college transfer)	Early Childhood Care and Education

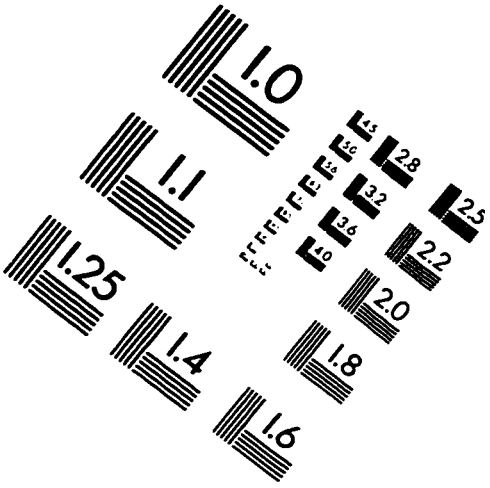
Honors: Pi Lambda Theta, National Honorary (1981-82),
University of Washington

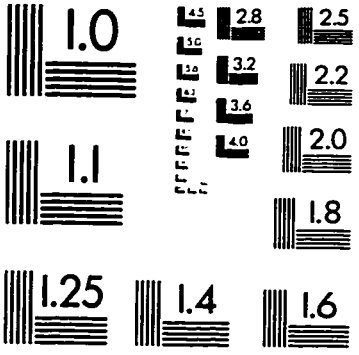
Leadership Training Fellowship (1991-1992, 1995-1996),
University of Washington

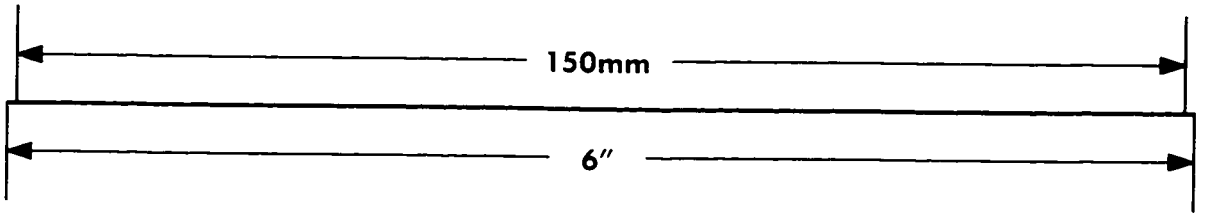
CERTIFICATION: State of Washington Professional Education Certificate (Number 250121A). Continuing Teacher Endorsements: K-12 special education, K-8 elementary education, 4-12 anthropology, 4-12 psychology, 4-12 sociology.

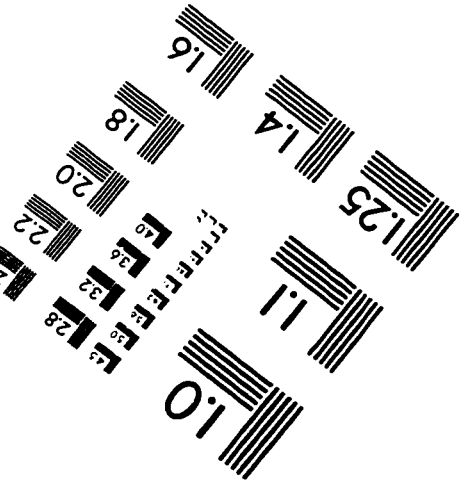
IMAGE EVALUATION TEST TARGET (QA-3)

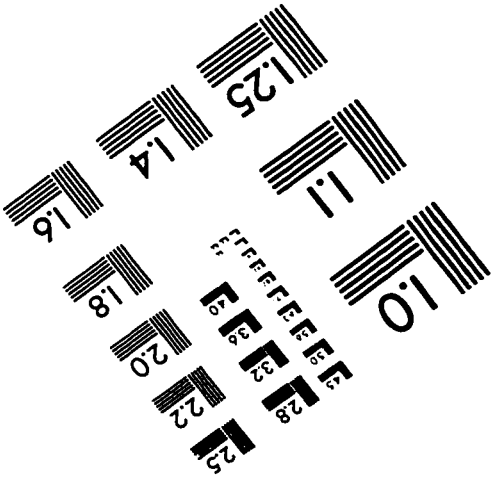












APPLIED IMAGE, Inc
1653 East Main Street
Rochester, NY 14609 USA
Phone: 716/482-0300
Fax: 716/288-5989