

THE EFFECTS OF FOCUSED STIMULATION, VERTICAL STRUCTURING, AND
EXPANSIONS ON VERBAL LANGUAGE IN YOUNG MINIMALLY-VERBAL
CHILDREN WITH AUTISM SPECTRUM DISORDER

by

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A THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Science
in the Department of Communicative Disorders
in the Graduate School of
The University of Alabama

TUSCALOOSA, ALABAMA

2015

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ABSTRACT

Speech pathologists are often the first line of referral for young children at risk for an ASD. Often, SLPs, especially those who work in state-funded Early Intervention Programs (Part C-Early Intervention, *IDEA*, 2004), do not have access to training on autism-specific early intervention models (Stahmer, Collings, & Palinkas, 2005). In addition, children who are receiving Early Intervention in community settings often do not have available options for autism-specific interventions, which are offered in many university settings. As a result, the facilitation strategies of focused stimulation, vertical structuring, and expansions are often being implemented in therapy with these children. To our knowledge, no study has measured the effects of these commonly used language strategies on the verbal language in minimally verbal children with ASD. The purpose of this study was to measure the effects of focused stimulation, vertical structuring, and expansions on the acquisition of verbal language in minimally verbal children with ASD. Three toddlers diagnosed with autism were recruited for this study. Intervention took place twice a week for 20-minute sessions, followed by two-generalization probes 4 weeks post intervention. Two out of our three participants demonstrated gains in their verbal language inside of the intervention environment. Results of this study conclude that these intervention strategies are capable of being implemented in community-based intervention settings with successful outcomes.

DEDICATION

This thesis is dedicated to the participants of this study and their families. I am indebted to these children and the impact that they have made on my life. Each child, individually unique, witty, loving, and full of personality, taught me more and kept me more entertained than I could have possibly imagined.

LIST OF ABBREVIATIONS

ASD	Autism Spectrum Disorder
ASHA	American Speech-Language-Hearing Association
CDI	Communicative Development Inventory
CEU	Continuing Education Unit
CSBS	Communication and Symbolic Behavior Scales
DD	Developmental Delay
EI	Early Intervention
EX	Expansions
ESDM	Early Start Denver Model
FS	Focused Stimulation
IDEA	Individuals with Disabilities Education Act
JASPER	Joint Attention Symbolic Play Engagement Regulation
MCDI	MacArthur Bates Communicative Development Inventories
MSEL	Mullen Scales of Early Learning
SLP	Speech-Language Pathologist
TD	Typically Developing/Typical Development
TNDW	Total Number of Different Words
TNW	Total Number of Words
UA	University of Alabama
VS	Vertical Structuring

ACKNOWLEDGMENTS

I am pleased to have this opportunity to thank the many colleagues and faculty members who have helped me throughout the completion of this research study. First and foremost I would like to thank Dr. Angela Barber, the chairperson for this thesis. Dr. Barber continuously went above and beyond her call of duty as chairperson, dedicating long hours and her immeasurable knowledge of research, autism, and life throughout this process. Her personal investment in my success as a researcher and clinician will have a life-long impact on my career. I would like to thank my committee members, Dr. Anthony Buhr, Dr. Laura Moss, Dr. Jason Scofield, and Dr. Rachel Saffo for their invaluable support of this project and my academic progress. I would also like to thank my videographers and reliability coders Marie Tucker, Claire Henderson, and Kathleen Reeves for all their time and efforts.

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1: INTRODUCTION

Approximately 25% of individuals who are diagnosed with Autism Spectrum Disorders (ASD) in the United States are nonverbal (Autism Speaks, 2014). Unfortunately, there is a small amount of literature focused on effective language interventions for nonverbal children with ASD and furthermore, the definition of non-verbal is not consistent across researchers or clinicians. While improving communication is the most important aspect for any individual, obtaining verbal language is the gold standard and should always be the primary objective for young children with ASD. This study will evaluate the impact of naturalistic language facilitation strategies on verbal expressive language of young non-verbal children recently diagnosed with ASD. For the purpose of this study, non-verbal will be defined as having a maximum of 20 spoken words.

Typical Language Development

Language begins to emerge in infancy for typically developing children. The roots of language begin around 2 months of age when babies begin actively discriminating perceptual and sensational information (Owens, 2011). For example, a baby has the ability to selectively attend and can remain unresponsive to some background stimuli; a baby can discriminate frequency changes in voices that are familiar and unfamiliar to him and will search for his mother's voice but will turn away from unfamiliar ones. Babies begin to habituate to people and signals, which provides the basis for directing a child's attention to a stimulus to which he is not currently focused. The formation of auditory patterns is another aspect of perceptual development that contains a number of important pre-linguistic milestones, which contribute to

the developing language system.

Early vocalizations begin around the first month of life when an infant is capable of making pitch and speech sound durations similar to those of their caregiver's. By two months of age a baby's cooing has increased and often occurs in bursts or episodes that accompany different facial expressions (Owens, 2011). Around 3 months, once an infant starts to vocalize in response to speech, a baby's cooing is able to take on a new social-communication adventure with protoconversations. Protoconversations start becoming more complex around 5 months of age when an infant vocalizes to represent their different attitudes and begins to babble. The various stages of babbling (reduplicated and variegated) continue to develop and progress through the first year of life when an average utterance is less than a second in duration and contains fewer than three sounds with no repetition.

Communication provided by caregivers provides an influential component to language learning. Caregivers may use motherese which is characterized by using a higher pitched voice with exaggerated intonation, slower speech with longer pauses between utterances in an attempt to allow the infant to respond via vocalization, and simple vocabulary and utterances with more context words and less dysfluencies. Caregivers may also engage babies in a protoconversation, which involves the initiation of the conversation through a smile or eye contact paired with vocalization, the next step of mutual orientation is established when one partner responds to the other's actions through facial or verbal expression. Next, the greeting takes place which involves mutual smiles and eye gazes with little body or hand movement. Play-dialogue develops next in the sequence and is characterized as a back-forth conversation with the adult talking in bursts with pauses scattered throughout and the infant vocalizing during those pauses; this play-dialogue is also referred to as mirror play. The final component of a protoconversation is

disengagement and this happens simply when one partner looks away (Owens, 2011).

Babies learn to diversify their language through three general types of communicative intentions during their first year of life. During the first 8 months, an infant is in the perlocutionary stage where their communicative intentions are attentional (Owens, 2011). During 8 to 9 months of age an infant's communication is first expressed through gestures and then matures into using gestures with speech. After the perlocutionary stage, an infant progresses into the illocutionary stage where his/her communication evolves in numerous aspects. To begin, the infant's communicative intentions are that of intentional communication. Here we see the emergence of theory of mind and the use of the showing gesture. Once a baby says his/her first meaningful word he/she has progressed into the locutionary stage where we will begin to see the use of more words than gestures.

When a child begins to communicate they are often communicating for one of three purposes: behavior regulation, joint attention, or social interaction. These communicative functions involve the use of gestures and vocalizations as well as social tendencies such as anticipation. Behavior regulation involves a child using these forms of communication to request an object or an action, and to protest. A child also uses these forms of communication to comment and request information for the purposes of joint attention. For the function of social interaction, a child uses the communication forms previously stated in order to seek attention, play social games, and exhibit symbolic/representational gestures. These initial functions of communication are a stepping stone into the use of later spoken language for communication (Owens, 2011).

As a child's theory of mind progresses during their toddler stage of development the idea of presupposition emerges. Presupposition is the assumption that the listener knows or does not

know certain information which leads a child to include or delete that information from a conversation. We see that a child assumes the listener knows certain information with their use of an ellipsis during conversation. A toddler's presupposition usually follows 3 specific rules: if the object being spoken about is not in the child's possession it needs to be labeled, if an object in the child's possession is undergoing a change it needs to be encoded by the change, and once encoded, the change in the object becomes more certain and if the child continues, he will encode some other descriptive aspect (Owens, 2011).

A child's transition into two-word utterances involves a phase of combining words, sounds, and gestures. For an outline of structural language development see Table 1. The first phase often involves a word and a representational gesture; the second phase usually contains a CV syllable prior or subsequent to a spoken word. The final phase is the production of single-word reduplications such as "baby baby." Following these phases of word combinations comes the production of multi-word utterances around 18 months of age. As is typical of most language development, a child understands multi-word utterances before they are capable of producing them. By 24 months of age, an average child uses 2 word utterances frequently and is capable of producing 3 to 4 or more word combinations (Owens, 2011).

Table 1
Structural Language Development in Typically Developing Children

Child age (month)	Language Skill
3	More attentive to words than sounds
5	Respond to own name and capable of discriminating their language from other prosodically similar languages
6	Respond to “mommy” and “daddy”
8	Store sound patterns for words
6-10	Babbling
10-12	Comprehension of Spoken Language
13	First Word
13-18	First 50 words
18	Vocabulary Spurt
21	Two-Word Sentences

Owens, 2011

Language Development in ASD

ASD is a neurodevelopment disorder characterized by communication deficits, obsessive tendencies, and symptoms surfacing in early childhood (American Psychiatric Association, 2013). Due to the rapid increase of diagnoses and the advocacy of red-flag indicators, more and more parents are paying extra attention and catching symptoms of ASD early in development. Ozonoff et al. (2005) examined language regression patterns in children with ASD and suggested three patterns: early onset, definite regression, and heterogenous regression. Early onset is distinguished by no reported loss of skills while definite regression is defined as having lost communication and social skills for 3 months or longer, before 30 months of age, and heterogenous regression is defined as having lost skills in either communication or social skills

and/or if there was abnormal development prior to regression.

As research progresses, the age of diagnosis continues to decline. Studies focused on baby siblings have found features of atypical development, including little eye contact, present by 12 months of age in nearly half of children who have an older sibling already diagnosed with ASD (Ozonoff et al., 2014). Using eye-tracking technology, Jones and Klin (2013) found a decline between 2 and 6 months of age in infants who are later diagnosed with ASD. A research study conducted by Ozonoff et al. (2010) found that after 6 months of age, social communication begins to decline and behavioral symptoms of ASD begin to emerge with the greatest losses taking place between 6 and 18 months of age. Collectively, these studies indicate that ASD symptoms present very early in development, providing a window to implement effective intervention, which could dramatically improve a child's outcomes.

Typically, receptive and expressive language skills in children with ASD do not decline and are not deviant; rather, they are delayed in development compared to typically progressing children. Furthermore, nonverbal communication including coordinated attention, especially joint attention, and prelinguistic communicative behaviors (point, show, give, turn-taking) that progress in typically developing children are deficient in children with ASD and therefore, teaching these communication behaviors act as important goals in intervention for these individuals (Ingersoll, 2010; Kaiser & Roberts, 2011; Lieberman & Yoder, 2012; Wetherby et al., 2004). The lack of joint attention skills in children with ASD is detrimental as joint attention plays a very important role of predicting receptive and expressive language acquisition in young children (Tager-Flusberg & Kasari, 2013; Mundy, Sullivan, & Mastergeorge, 2009; Boucher, 2012). See Table 2 for a comparison between early social communication in typically developing children and children with ASD.

The use of echolalia in the speech of children with ASD is typical and may present as two different forms: immediate echolalia, in which the child immediately imitates what is heard, or delayed echolalia, in which what is heard is repeated later as a script (Paul & Norbury, 2012; Tager-Flusberg & Calkins, 1990). During the development of expressive language skills, the use of echolalia is often suppressed. In a study conducted by Wetherby et al. (2004) which researched indicators of children with ASD during the second year of life, 9 red flags were found to better differentiate children with ASD from children who are typically developing (TD) and those with developmental delays (DD). One of these red flags was the use of unusual prosody, which was seen in this study in 50% of children diagnosed with ASD compared to none of the TD or DD children. Tager-Flusberg and Calkins (1990) and Eigsti et al. (2011) also discuss the consistency of abnormal prosody use across children with ASD. Another characteristic of developing language in children with ASD is the use of neologisms with idiosyncratic meaning (Eigsti et al., 2007).

As language develops further in children with ASD, it is common to see impaired comprehension, odd utterances, and even deviant articulation and grammar (Boucher, 2012). After evaluating four studies of language in preschool children with ASD, Boucher (2012) concluded that most, but not all, children with ASD have markedly delayed language development that includes significant abnormalities of phonology and grammar up to approximately 6;0 years of age. Two of the most consistently-impaired language domains in ASD are discourse and pragmatics due to the complexity of their use requiring not only the understanding of the structural form of language but also how to use it in a social setting (Eigsti et al., 2011; Tager-Flusberg & Calkins, 1990). Eigsti et al. (2011) suggested, based on reviews of several conflicting studies on children with ASD in regards to their use of semantics, that the

size of their lexicon aside, these children have difficulty with semantic organization and the understanding of the meanings of verbs that are often used to describe someone’s mental state. The conclusions of these findings are parallel to numerous other findings that conclude that earlier diagnoses result in earlier intervention for social-communication skills, including language acquisition, which are important because of the indication that they present for later academic and social outcomes for individuals across the lifespan (Kaiser & Roberts, 2011; Ingersoll, 2010).

Table 2
Early Social Communication in ASD and TD

Social Behavior	Typically Develops	Develops in Autism
Looking at Faces	Birth	Less by 12 Months
Following Person’s Gaze	6-9 Months	Less by 18 Months
Turning When Name Called	6-9 Months	Less by 12 Months
Showing Objects to Others	9-12 Months	Less by 12 Months
Pointing at Interesting Objects	9-12 Months	Less often at 12 & 18 Months
Pointing to Request	9-12 Months	Not Delayed at 18 Months
Symbolic Play	14 Months	Absent at 18 Months

Baron-Cohen, et al., 1996; Osterling & Dawson, 1994

Early Intervention

The *Individuals with Disabilities Education Act (IDEA)* Part (C) was implemented “to enhance the development of infants and toddlers with disabilities, to minimize their potential for developmental delay, and to recognize the significant brain development that occurs during a child’s first 3 years of life.” Early intervention services address the needs of families and children from birth to 3 years of age who have or are at risk for developmental disabilities by

providing financial assistance for development and implementation of early intervention services as well as facilitating payment for these services, and enhancing the capacity of services to expand and improve existing early intervention services (IDEA, 2004).

Speech-Language Pathologists (SLPs) are charged with fulfilling these environments in order to attain a universal standard of procedures and protocols in all early intervention settings. Many of these roles and responsibilities include prevention; screening, evaluation, and assessment; planning, implementing, and monitoring intervention; consultation with and education of team members, including families, and other professionals; advocacy; awareness and advancement of the knowledge base in early intervention; etc. (ASHA, 2008). Furthermore, the American Speech-Language-Hearing Association (ASHA) has set forth standards and guidelines addressing the core knowledge and skills needed in early intervention speech-language pathology practice. Several of these standards already provide clinicians with the knowledge needed to implement the intervention strategies discussed in this study, as is the overriding hypothesis. Discussed in the section of planning, implementing, and monitoring intervention are two extremely necessary skill sets and two extremely necessary knowledgeable topics that adhere to ASHA guidelines (ASHA, 2008) and are imperative to our study: Skills (13) designing and arranging environments to encourage communication and participation (15) tracking performance in intervention activities to document change in response to treatment; Knowledge (7) single-subject designs and other methods of assessing change in intervention (10) strategies for facilitating infant/toddler engagement and interaction.

Communication is the first concern for parents whose children are later diagnosed with ASD (Kozlowski et al., 2011). Therefore, SLPs are often the first line of referral for children later diagnosed with ASD. ASHA guidelines suggest specific roles for SLPs in the diagnosis and

early intervention for children with ASD and allow for implementation of early intervention strategies with this population. However, SLPs typically do not receive training on ASD-specific intervention packages during their graduate work. Unless they electively attend CEU opportunities post-graduation, they are equipped with knowledge and practice of effective language facilitation techniques that are used with general language delays. This is significant in regards to the numerous studies that state how important early intervention is to the acquisition of language. In an interview conducted by Joe Cerquone, Dr. Amy Wetherby discussed the importance of early intervention stating, “Early intervention makes a big difference. So, the sooner you can figure out if it’s autism then the sooner you can start intervention...More and more children who get good early intervention who have autism are making it in a general ed. class” (Wetherby, 2008). There continues to be a growth of substantial evidence for the effectiveness of early intervention in young children with ASD due to the greater neuronal plasticity in younger children.

Mounting evidence indicates that greater effects are seen in children with ASD who receive early intensive intervention before 3 years of age in comparison to those who receive intervention after 5 years of age (ASHA, 2006; Fenske, Zalenski, Krantz, & McClannahan, 1985; Harris & Handleman, 2000). The malleability of a younger child’s brain, in combination with early intervention, may lead to reductions in ASD symptoms, the movement of a child with ASD into a general ed. classroom, and even to children “moving-off” the spectrum (Fein et al., 2013; Helt et al., 2008; Lord et al., 2012; Wetherby, 2008). Tager-Flusberg et al. (2009) stated, “the fact that language development can be positively affected by early treatment has tremendous potential significance, because the emergence of spoken language is one of the most important variables predicting better outcomes in later childhood and adulthood.” Thus, early language

intervention demonstrates effectiveness in a substantial amount of toddlers with ASD and should always be implemented in order to allow for maximum growth and development (ASHA, 2006).

Early Interventions for Children with ASD

Early social-communication and language delays and deficits in young children with ASD must be met with successful early intervention strategies. Furthermore, the capability of these strategies to be executed in community settings through Part C and other early intervention programs is ever crucial. While research indicates the efficacy of intervention strategies specific to the treatment of ASD such as *The Early Start Denver Model (ESDM; Rogers et al., 2010)*, there continues to be a disconnect between the build of these strategies and the ability to implement them across the clinical field (i.e. outside of the lab).

Many early intervention strategies that are distinctly designed for ASD treatment are manualized (i.e. *Project Impact, ESDM, Floortime*) and offer families and practitioners a comprehensive treatment paradigm for goal development and implementation. While these intervention packages are known to produce effective outcomes, they often require expensive training and certification, which is typically neither accessible nor affordable for SLPs who are often the first line of referral for toddlers at risk for ASD. Manualized treatment programs also specify the structure and frequency within which the treatment should occur. These requirements may not be realistic for SLPs working in certain contexts, especially those who practice within a medical model such as outpatient rehab clinics. However, SLPs are instructed on early language intervention strategies that involve two core principles of supporting and enabling language. Separately these strategies do not have scientific support; in order to successfully have an impact on language, SLPs should implement both supportive strategies and enabling strategies during a session. Supportive strategies encompass a number of characteristics including, but not limited

to, following a child's lead, choosing activities and materials based on a child's interests, and responding to a child's communication attempts. Enabling strategies are more explicit than supportive strategies and involve characteristics of using direct models, direct prompts and cues within an activity, descriptions, comments, and expanding on a child's utterance. Approaches that encompass both supportive and enabling strategies include: responsive interaction approaches, directive interaction approaches, and hybrid intervention approach. The major contrast between these approaches falls under the person responsible for directing the interaction. In responsive approaches, the interaction is child-led while in directive approaches, the interaction is adult-led. When responsive and directive approaches come together and form a hybrid intervention approach, the approach typically will be described as naturalistic (ASHA Guidelines, 2008). Paul (2007) describes three characteristics of hybrid approaches as (1) the clinician focusing on one or a small set of specific language goals (2) the clinician controlling the environment by filling it with activities and materials that are motivating to the child in order to tempt the child to produce spontaneous utterances of the target (3) the clinician models and highlights verbal language as well as uses verbal language to respond to the child's communication.

Numerous studies have concluded that the use of naturalistic approaches in the young ASD population result in greater communication improvements when compared to developmental approaches (Ingersoll, 2010; Delprato, 2001; Ingersoll & Schreibman, 2006). The foundation of naturalistic interventions includes the use of natural reinforcers and leaves the impression to an untrained eye that nothing further than play is taking place. See Chart 3 for the general composition of all naturalistic approaches as described by Ingersoll (2010). Naturalistic intervention looks like play; it is implemented in a play-based setting but has a strong target of

communication. A child's interests provide insight into what toys should be used during intervention to promote verbal language as well as what specific words should be targeted. The more objects a child shows interest in, the greater number of diverse opportunities arise for verbal bombardment from the clinician (Yoder & McDuffie, 2006 cited in Lieberman & Yoder, 2012). An increasing number of studies are being conducted to test the use of naturalistic interventions to teach language and other social-communication skills to children with ASD and are reporting results that conclude these interventions successful for these purposes. (Ingersoll, 2010).

Three naturalistic language interventions were targeted during this research study: *focused stimulation*, *vertical structuring*, and *expansions*. *Focused stimulation* is classified as a hybrid approach. Through maintaining a motivating environment a child is tempted, not required, to produce target words during play. The clinician provides the client with two options for play to ensure that the verbal bombardment surrounding the motivating object is in fact motivating for the child. The clinician demonstrates heavy modeling of the target word in a meaningful communicative context surrounding the immediate play activity in order to tempt the child to use the target. If the child verbalizes something other than the target, the clinician provides a positive response in order to motivate the child to continue to use verbal language and then proceeds with additional models of the target. The structure of the focused stimulation approach provides influential exposure to a child of not only language production but also comprehension because of its use in meaningful context (Paul, 2007).

Like focused stimulation, *vertical structuring* is classified as a hybrid approach. During this intervention the clinician and client engage in a question and answer modeling approach. The clinician provides a nonlinguistic stimulus such as a picture or a toy animal in order to elicit

verbal language from the client. The clinician may model the target form and then prompt the child to use the target through asking wh-questions about the object. The goal of this approach is to elicit multiple targets from the child and piece them together in order to form a more complex utterance. Once this goal is achieved it is the hope that the child will verbalize the complex utterance on their own as a spontaneous utterance. It is not required that the child verbalizes the new complex utterance and if the child doesn't, the clinician simply moves on to elicit a new target (Paul, 2007).

Expansions are more complex than focused stimulation and vertical structuring. Rather than a hybrid approach, expansions fall into the category of a responsive or child-centered approach. While using this intervention a clinician's goal is to expand on something the child says. The key to this approach is waiting. Once a child says something it is the clinician's job to take that utterance and expand on it by adding grammatical markers and semantic details in order to turn the simple utterance into a complex, adult utterance (Paul, 2007).

While these approaches are commonly used by SLPs in early intervention settings, the efficacy of their use with minimally-verbal young children with ASD is unclear. "Low-functioning," potentially nonverbal children with ASD are usually excluded from studies that test these naturalistic interventions (Tager-Flusberg & Kasari, 2013). Therefore, examining the efficacy of these interventions with minimally-verbal young children with ASD is imperative.

Table 3
General Composition of Naturalistic Approaches

Component	Description
1	Teaching occurs in the natural environment during ongoing interactions between the child and the adult, typically during play or daily routines
2	The child initiates the teaching episode by indicating interest in an item or activity, at which point teaching occurs around the child's expressed interest
3	The adult explicitly prompts the child to produce the target behavior
4	The child's production of the target behavior is reinforced with the item or activity of interest
5	The adult loosely shapes the child's response into a more complex response, providing reinforcement for attempts to respond

Ingersoll, 2010

Purpose

Individuals diagnosed with ASD prior to three years of age often receive their first language interventions through Part C-Early Intervention (EI) (IDEA, 2004), whose providers typically do not have training on ASD-specific early intervention models (Stahmer, Collings, & Palinkas, 2005), or through local speech language pathologists in private practices or outpatient rehab settings. Many community-based therapists do not have access to evidence-based programs designed for very young children with ASD, such as the *Early Start Denver Model (ESDM)*; Dawson et al., 2010) and *JASPER* (Kasari et al., 2008) due to limited resources, availability, and training. As a result, children and families served by community EI programs do not have access to evidence-based autism-specific interventions. Rather, they are most likely receiving interventions based on language facilitation strategies routinely used during speech and language therapy, including *focused stimulation*, *vertical structuring*, and *expansions*. While these three interventions are being used in Early Interventions across the country, the efficacy of their use in helping young, non-verbal children diagnosed with ASD has, to our knowledge, not

been determined. Therefore, this study aims to measure the impact of these naturalistic intervention strategies of *focused stimulation*, *vertical structuring*, and *expansions* on the acquisition of verbal language in young minimally-verbal children recently diagnosed with ASD.

Previous research validates our use of naturalistic intervention methods (Ingersoll, 2010; Delprato, 2001; Ingersoll & Schreibman, 2006). Research has also indicated that language acts as a predictor for future outcomes with individuals with ASD, thus, evaluating interventions to gain language is of the highest importance (Tager-Flusberg et al., 2009). Furthermore, the potential positive outcomes from this study would give a greater number of SLPs the ability to provide services to minimally-verbal children with ASD in order to help them gain verbal language. Thus, this study aims to answer the following primary research question:

1. Can the use of naturalistic interventions (*focused stimulation*, *vertical structuring*, and *expansions*) improve verbal language in young children who have been diagnosed with ASD?
 - a. Hypothesis 1: The verbal language of young children diagnosed with ASD will increase through the use of naturalistic interventions.

This study further aims to answer the following secondary research questions:

2. Can the use of the *focused stimulation* strategy improve verbal language in young children who have been diagnosed with ASD?
 - a. Hypothesis 2: The verbal language of young children diagnosed with ASD will increase through the use of the *focused stimulation* strategy.
3. Can the use of the *vertical structuring* strategy improve verbal language in young children who have been diagnosed with ASD?
 - a. Hypothesis 3: The verbal language of young children diagnosed with ASD will

increase through the use of the *vertical structuring* strategy.

4. Can the use of the *expansions* strategy improve verbal language in young children who have been diagnosed with ASD?
 - a. Hypothesis 4: The verbal language of young children diagnosed with ASD will increase through the use of the *expansions* strategy.

2: METHOD

Participants

Three children diagnosed with an autism spectrum disorder (ASD) from The University of Alabama Autism Spectrum Disorders Clinic were recruited for this study. The University of Alabama Autism Spectrum Disorders Clinic provides a comprehensive evaluation by a multidisciplinary team including a speech language pathologist, clinical psychologist, and a pediatrician. To be included in this study the following criteria were met by each participant: (1) a clinical diagnosis of ASD (2) between 24 and 36 months of age (3) minimally verbal having a maximum of 20 words (4) have received no prior direct language intervention.

Table 4
Summary of Participants

Participant	Age	Gender	Receptive T <i>MSEL</i> Pre	Receptive T <i>MSEL</i> Post	Expressive T <i>MSEL</i> Pre	Expressive T <i>MSEL</i> Post	ELC T score
001	32 mo	Male	47	----	30	----	82
002	27 mo	Male	20	33	<20	20	65
003	34 mo	Male	30	32	20	36	58

Measures

Language. Verbal language was coded following the definition of a word as defined by the *Communication and Symbolic Behavior Scales-Developmental Profile (CSBS; Wetherby & Prizant, 2003)*. Following this definition, Paul et al. (2013) conducted a strong study comparing spoken language treatments for minimally verbal children with ASD. For the purpose of using a well-founded definition of a word that has also been used in previous studies concerning spoken

language for children with ASD, a word was coded if:

- It was a consistent sound pattern that approximates a conventional word
- It was a form that was used to refer to a specific object, action, or attribute and only that word class (CSBS)

In addition, a second researcher (i.e. not the primary interventionist) administered the *Mullen Scales of Early Learning (MSEL; Mullen, 1995)* to assess language and developmental skills pre- and post- intervention. The *MSEL* is an assessment of developmental functioning standardized for children from birth to 5 years 8 months and is made up of 5 subtests: 1) gross motor skills, 2) fine motor skills, 3) visual reception, 4) receptive language, and 5) expressive language. Primary caregivers completed the *MacArthur Bates Communicative Development Inventories (MCDI; Fenson et al., 2007)* to measure receptive and expressive vocabulary pre- and post- intervention. The *MCDI* are parent report forms used to assess the development of language and communication skills in infants and young children. The *MCDI* contains three forms: the CDI: Words and Gestures form, designed for use with children that have language skills between the ages of 8 and 16 months, the CDI: Words and Sentences form, designed for the use with children that have language skills between 16 and 30 months, and the CDI-III form designed for the use with children that have language skills between 30 and 37 months. Due to the inclusion criteria of this study that no child will have a vocabulary of over 20 words, the Words and Gestures form will be completed in order to adhere to the manual guidelines. A Child Interest Survey was also completed by the primary caregiver to determine each child's specific interests (Appendix A). Both the *MSEL* and the *MCDI* are frequently used by researchers to characterize children's language (Ronski et al., 2013; Luyster et al., 2008). In addition, the *MSEL* has strong test/retest reliability for children between 25 and 56 months (Mullen) and the *MCDI* has excellent validity

and reliability for children with autism (Charman et al., 2003). Finally, prior to acceptance into the study, each child took part in a 20-minute language sample in order for the investigator to analyze the quantity of their speech in a natural play setting.

Setting

Pre and post intervention assessments took place at the University of Alabama ASD Clinic. Baseline and intervention sessions took place at the University of Alabama Speech and Hearing Center. During each intervention session, the room was set up based upon each individual participant's motivation. Targets for each session were chosen by matching answers from the Child Interest Survey with the results of the *MacArthur-Bates* in order to target words that were of interest to the child and developmentally appropriate, and that which had not yet been verbally acquired.

Experimental Design and Conditions

A multiple baseline AB design across participants was implemented for this study. This design is appropriate for the purpose of this research study due to its reliability in demonstrating the effect of an intervention, that is, that change in a certain domain did not take place before the intervention was implemented and as such is a direct result of the intervention (Kazdin, 2011). Furthermore, the use of single-subject design studies, including multiple-baseline experimental designs, have contributed to research studies that have concluded effective interventions for young children with ASD (Odom et al., 2003). Once a participant demonstrated stability in words produced verbally across 3-baseline sessions, intervention sessions began for that participant. The introduction of intervention was staggered across participants in accordance with a multiple baseline AB design, with each participant staying in baseline for a minimum of 3 sessions longer than the participant before them.

Baseline Sessions

Baseline sessions took place at the UA Speech and Hearing Center. During baseline, the primary interventionist played with each participant for 20-minute sessions without providing any strategies to increase language or play. Words were measured according to a coding manual used for baseline, intervention sessions, and post-intervention sessions. Once a pattern of stability was detected regarding the number of words produced, the intervention sessions began. Participant 001 took part in 5 baseline sessions, 002 had 8 baseline sessions, and 003 completed 15 baseline sessions.

Intervention Sessions

After baseline sessions were complete, intervention sessions commenced. The intervention sessions took place for 20 minutes twice a week for 8 weeks, followed by two-generalization probes 4 weeks post intervention. The intervention took place at the UA Speech and Hearing Center and functioned just as typical language intervention occurs at the clinic on a daily basis. That is, the length, intervention approach, frequency of sessions per week, materials, and basic intervention structure were comparative to the treatment as usual language programs at the Speech and Hearing Center. This intervention structure and schedule was maintained in order to emulate typical clinical practice. During the initial meeting with parents, and before pre-testing occurred, the parent signed a consent form that outlined the purpose, procedures, and potential risks and benefits of participating in this study. Parents were also periodically reminded that they may ask questions about the intervention and/or the study at any point during the intervention. In addition to obtaining parental consent, the investigator obtained verbal assent from the children. The clinician said to the child “Hi (child’s name). My name is Chelsea. I have some toys and games I’d like to play with you. Do you want to come play?”. Due to the young age of

participants, assent was accepted if the participant used gestures or body language to clearly indicate that they wanted to participate. For example, when asked, "Are you ready to play," a child may nod his or her head and/or take the hand of the examiner. Assent was obtained at the beginning of each intervention session.

The investigator set up the intervention room based upon each participant's motivation. Targets were chosen based upon the answers from the Child Interest Survey as well as the results of the *MacArthur-Bates*. By matching the interests of the child to age appropriate vocabulary that had not yet been acquired, a joint attention setting that provided motivation through the child's interests was adequately created. Once in the room, the investigator took the first two minutes of the session to allow for the child to warm-up before beginning the intervention strategies.

The clinician spent each session playing along with the child with whatever objects he was interested in. The investigator would place herself in a position that encouraged joint attention. Staying in front of the child for example, presented the greatest opportunity for eye contact and shared attention to the object, thus creating an optimal opportunity for joint attention within which the labels were able to be modeled in reference to the object of focus. During each intervention, disengagement was addressed in the same manner. Once a child disengaged from an object, the investigator would attempt to regain their attention by pointing to the object and vocalizing using one of the three methods or by following the child's attention to a new object or activity. After three unsuccessful attempts to regain the child's attention, the investigator would present new targets to the child or engage in the new object that he became interested in. Under the condition that the child vocalized a target and then disengaged, regaining attention was not attempted. Each session was constructed to include an amount of targets greater than the number

of spoken words by the participant in their previous sessions. Therefore, the amount of targets that were chosen for each session differed per participant depending on their level of interaction. The amount of targets that were addressed during a session depended on the participant, their frequency of verbalizations, their level of interaction, and the length of time they stayed interested in an object.

Language Intervention Strategies

Three language facilitation strategies were the core of this language intervention. The first language strategy is *focused stimulation*. During *focused stimulation* the investigator bombarded the child with multiple models of the target form during play without being required to imitate. EX: The child is playing with a ball. “You have a ball! The ball is round. We can bounce the ball. Bouncy ball bouncy ball. Oh your ball is red! Ball is red, red ball! Wow, we can roll the ball! Ball. This is a ball. What about this?” (pointing to the ball).

Another intervention used in this study was *vertical structuring*. During *vertical structuring* the investigator and participant engaged in a question and answer modeling technique. The investigator provided a specific nonlinguistic stimulus (ex: picture), targeted a particular form, and attempted to elicit particular language behavior from the child. While the participant played with an object, the investigator would try to elicit the specific one-word answer target by prompting the child through asking wh-questions about the object. The clinician responded to a child’s incomplete utterance with a contingent question in hopes that the child would respond to the question with another fragmentary remark. The clinician then took the two pieces produced by the child and expanded them into a more complete utterance. Ex: “What do you see here” “lion” “yes, and what is the lion doing” “roar” “yes, he’s roaring. The lion is roaring.” If the participant was reluctant to vocalize, the researcher modeled the answer and

waited for the child to imitate. The investigator then moved on, modeling other questions to elicit different targets.

The final intervention used in this study was *expansions*. During this method of intervention, the investigator took the child's utterance and added grammatical markers and semantic details to make it an acceptable adult utterance. For example, if a child vocalized "doggy house," the investigator may have replied, "the doggy is in the house."

All three interventions took place during each session if the language produced by the child allowed for them. The investigator implemented a specific intervention based upon the context of the current play situation and the verbalizations from the participant.

All verbalizations made by the participant were acknowledged whether the production was the target word or not. The investigator implemented an *expansion* to the production from the child. After the strategy had been used and the child disengaged, the investigator re-directed the subject of the conversation back to the target word.

Reliability Coding

Coding took place directly from the video-recordings of each intervention session. Using a pencil and paper method, the last 18 minutes of each session were coded, leaving the first two minutes of each session as warm-up. Sessions were coded for words produced by the child, and for the strategy used when the child produced a word. A word was coded following the *CSBS* definition of a word or lexical form. In addition, a detailed coding manual was constructed by the investigator that broke down specifically what distinguished a verbalization that was to be coded as a word from a verbalization that was not to be coded as a word. Two reliability coders were trained to accurately code words and the strategy used by the investigator. During training, the investigator taught reliability coders what defined a word, and what characterized each strategy.

The investigator reviewed previously coded video clips from the intervention sessions discussed each code relative to the rules in the coding manual. In addition, the investigator and coders-in-training consensus coded previously coded sessions in order for the coders-in-training to become familiar with the manual as it pertains to actual scenarios while still allowing the investigator to guide their judgment for clean coding. Next, reliability coders independently coded videos for practice and discussed any discrepancies with the investigator. Reliability coders achieved 80% or greater reliability on 5 videos before coding intervention sessions. In recent literature, using similar populations, researchers have consensus coded all data to ensure accuracy (Gordon & Watson, 2015). Following this recommendation, and to ensure accuracy of the data, the investigator and reliability coders consensus coded 100% of the data from intervention sessions. The investigator and reliability coders independently coded intervention sessions and then met to discuss codes in order to reach a consensus on discrepancies.

Prior to consensus coding, the average percent agreement between the investigator and the primary reliability coder was 72%. When broken down into strategy, the average percent agreement for focused stimulation was 50%, 80% for vertical structuring, 71% for expansions, 80% for total number of different words, and 82% for total number of words. A low number of opportunities contributed to lower reliability in some strategies in various sessions. For example, participant 001 had only one opportunity for expansions during several interventions sessions and participant 003 had only one opportunity for focused stimulation during several intervention sessions based upon the interaction level of the participant. Therefore, the lower end of the reliability range could likely be explained by the low base rate of these strategies (Bruckner & Yoder, 2006).

3. RESULTS

Hypothesis 1: The verbal language of young children diagnosed with ASD will increase through the use of naturalistic interventions.

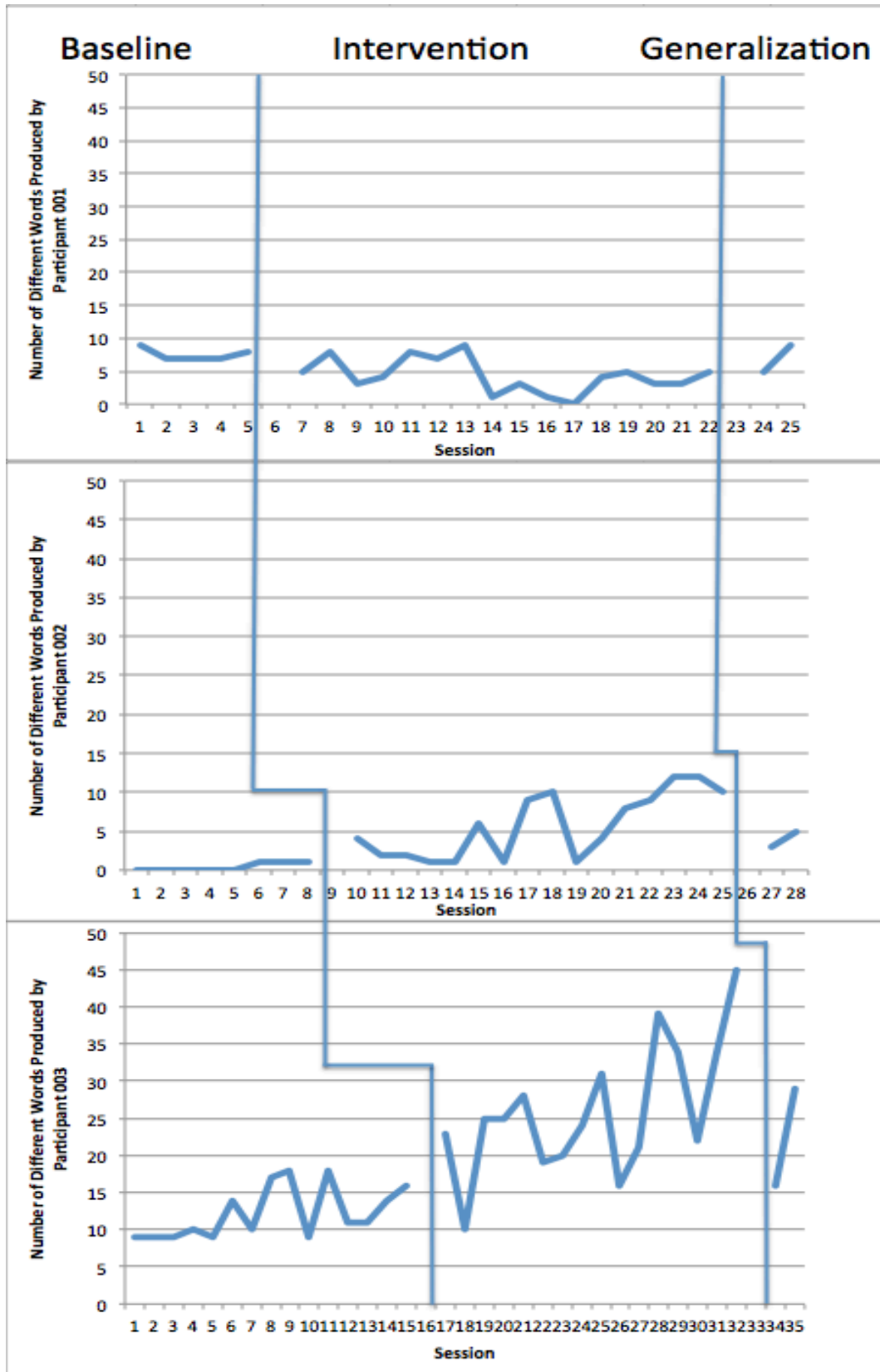
001. Participant 001's language did not show gains as a direct result of the use of naturalistic interventions inside of the intervention setting. Data coded for total number of different words produced yielded the following findings. His production of different words during baseline sessions ranged from 7 to 9 words. In comparison, his production of different words during intervention sessions ranged from 0 to 9 words. During his generalization sessions, his productions matched most closely with productions during baseline rather than intervention with verbal productions ranging from 5 to 9 words. However, language gains were noted through observation, pre-post measures, and parent report, which will be discussed later.

002. Participant 002's language resulted in gains within the intervention environment. Data coded for total number of different words produced yielded the following findings. 002 had a minimum of 0 verbal productions and a maximum of 1 verbal production during baseline sessions. During intervention sessions his productions ranged from 1 to 12 different words produced in an individual session. During generalization, 002's verbal productions ranged from 3 to 5 different words in an individual session.

003. Participant 003's verbal language production increased inside the intervention environment. Data coded for total number of different words produced indicated the following results. Participant 003's verbal productions ranged from 9 to 18 during baseline sessions. During intervention sessions, his productions ranged from 10 to 45 in an individual session. His

productions during generalization sessions ranged from 16 to 29. The total number of different words produced by each participant are outlined below in Figure 1.

Figure 1
Summary of Total Number of Different Words Produced by Participants



Hypothesis 2: The verbal language of young children diagnosed with ASD will increase through the use of the *focused stimulation* strategy.

Participant 001 produced a range of 0-4 words in the context of *focused stimulation* interaction.

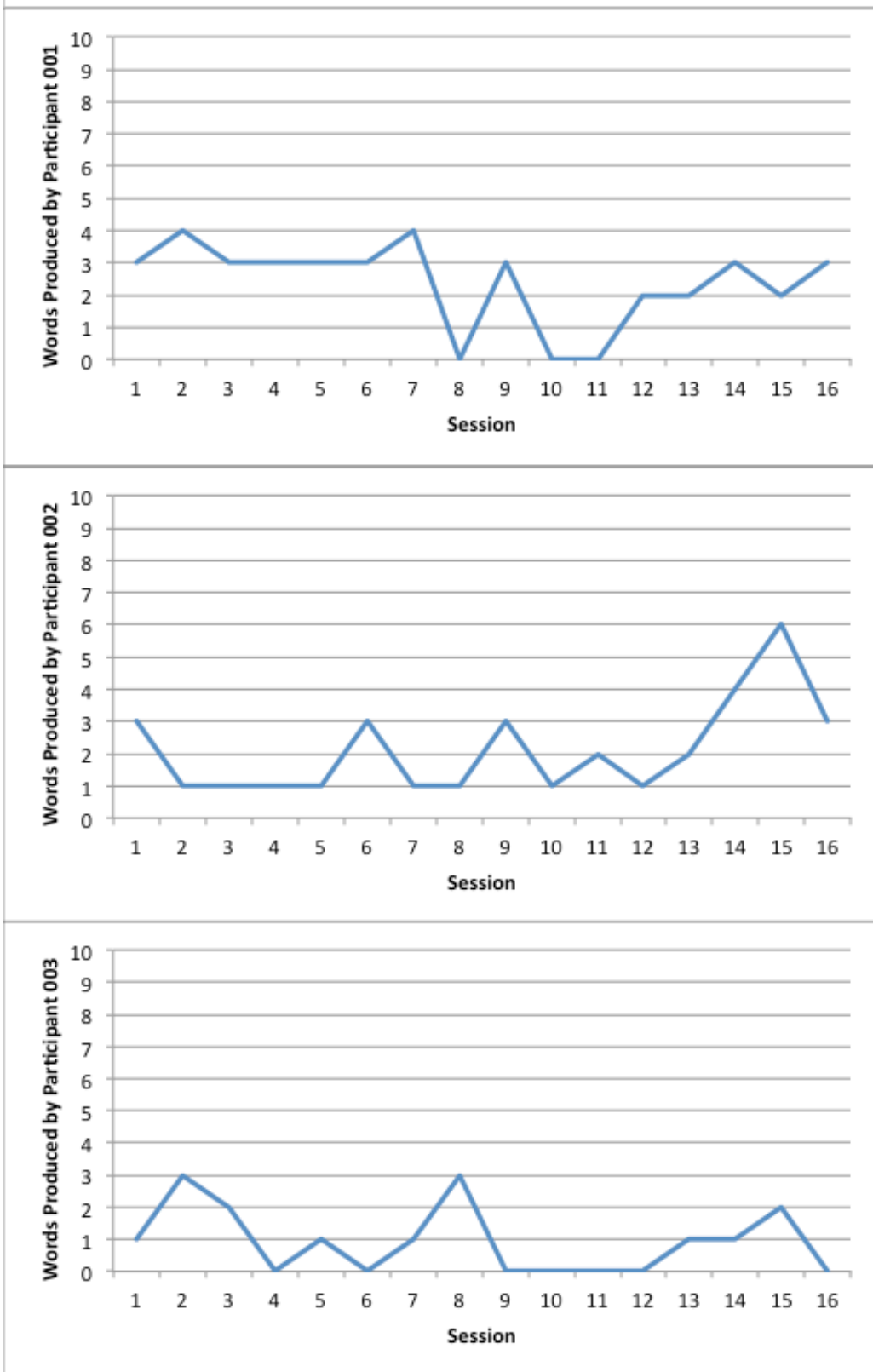
Participant 002 produced a range of 1-6 words in the context of *focused stimulation* interaction.

Participant 003 produced a range of 0-3 words in the context of *focused stimulation* interaction. Productions made in the context of the *focused stimulation* strategy are outlined in Figure 2.

Figure 2

Summary of TNDW Produced by Participants in the context of Focused Stimulation

Focused Stimulation



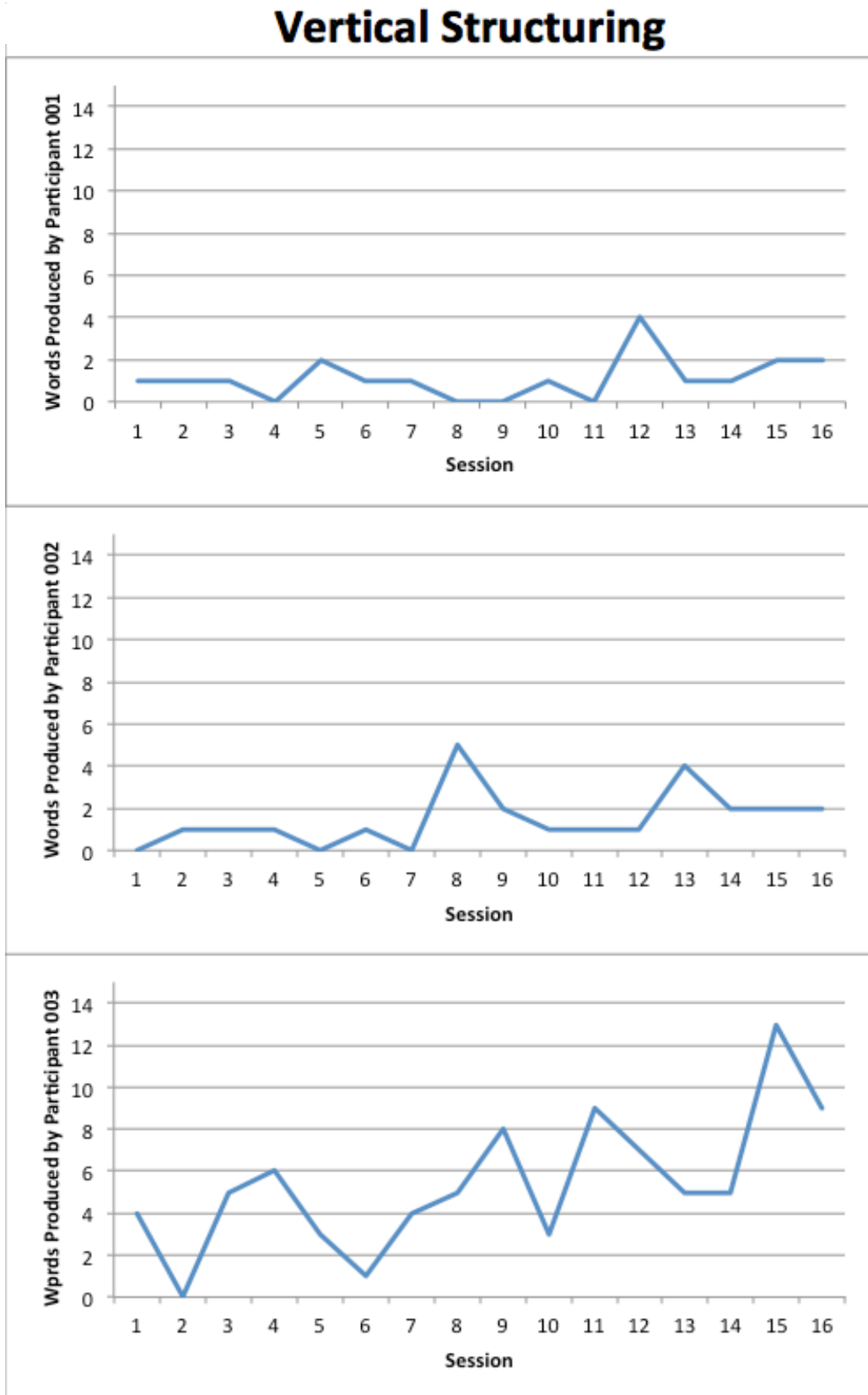
Hypothesis 3: The verbal language of young children diagnosed with ASD will increase through the use of the *vertical structuring* strategy.

Participant 001 produced a range of 0-4 words in the context of *vertical structuring* interaction.

Participant 002 produced a range of 0-5 words in the context of *vertical structuring* interaction.

Participant 003 produced a range of 0-13 words in the context of *vertical structuring* interaction. Productions made in the context of vertical structuring are provided in Figure 3.

Figure 3
Summary of TNDW Produced by Participants in the context of Vertical Structuring



Hypothesis 4: The verbal language of young children diagnosed with ASD will increase through the use of the *expansions* strategy.

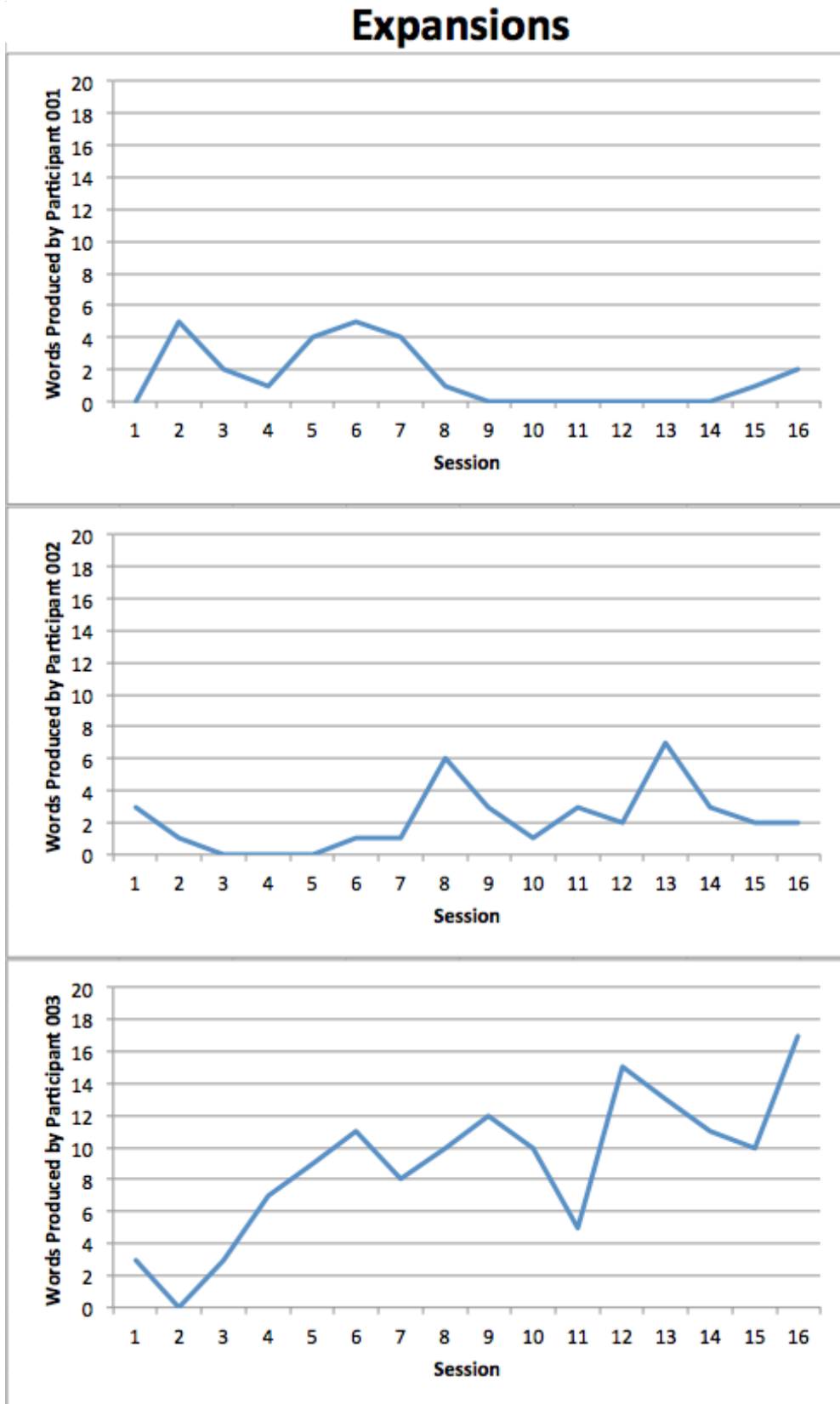
Participant 001 produced a range of 0-5 words in the context of *expansions* interaction.

Participant 002 produced a range of 0-7 words in the context of *expansions* interaction.

Participant 003 produced a range of 0-17 words in the context of *expansions* interaction.

Productions made in the context of the expansions strategy are provided in Figure 4.

Figure 4
Summary of TNDW Produced by Participants in the context of Expansions



MacArthur Bates Communicative Development Inventories

The *MacArthur* pre and post intervention scores for words produced and words understood are presented for each participant. As a reminder, the *CDI* is a parent report measure for vocabulary. Words produced and words understood increased for all 3 participants as documented by the *MacArthur Bates Communicative Development Inventories Words and Gestures* form. A summarization of scores for all three participants is outlined in Table 5 below.

Table 5
Summary of MacArthur Pre-Post Data

	Pre-Intervention Words Produced	Post Intervention Words Produced	Pre-Intervention Words Understood	Post Intervention Words Understood
001	31	79	252	328
002	1	106	75	224
003	115	262	282	353

Proportions

The frequency of intervention strategies implemented varied across subjects based on their language use. This variation is important to consider when interpreting results. A summary of proportions for intervention strategies implemented for all three participants is outlined in Table 6.

Table 6
Table of Proportions for IX Strategies

	Focused Stimulation	Vertical Structuring	Expansions
001	46%	14%	40%
002	55%	15%	30%
003	5%	40%	55%

4. DISCUSSION

The purpose of this study was to measure the impact of *focused stimulation*, *vertical structuring*, and *expansions* on the acquisition of verbal language in minimally verbal children with ASD. To date, no study has directly measured the impact of these commonly used language strategies in this population, although these are commonly implemented practices of speech language pathologists who often are the first line of referral for children at risk for ASD. Using a multiple baseline across participant design, language gains were measured for three participants. In addition, The *MacArthur Bates CDI* and parent questionnaire were used to measure progress.

Hypothesis 1: The verbal language of young children diagnosed with ASD will increase through the use of naturalistic interventions.

The current study hypothesized that naturalistic language interventions would positively impact the verbal language of young children diagnosed with ASD. This hypothesis is partially supported based upon the data from this study. Increases in the verbal language of all participants in this study were not observed. Rather, two out of our three participants demonstrated verbal language increases. Participant 001 did not produce a number of verbalizations during intervention that sustained above those verbalizations made during baseline sessions. As a result, we do not have the data to support that the strategies being provided resulted in language growth inside of the immediate intervention session environment for this participant. 001 developed seizures during the course of this study. We feel these medical complications may have contributed to his results.

Participant 002 and participant 003 both showed an increase above baseline during

intervention that sustained into generalization. 003 produced an amount of words during intervention that far exceeded his productions during baseline sessions. He demonstrated a considerable language “explosion” that could be attributed to the strategies being provided. While both 002 and 003 made gains in their verbal language during intervention sessions, they also both had some variability across the course of intervention. This variability may be attributed to every day experiences or events such as poor sleep or a bad day. For example, 003 had an ear infection during his first generalization session and he was on medication that had him feeling poorly. The research team felt that the combination of the ear infection and the medication may have contributed to his fewer productions during generalization, particularly since his second generalization session remained above baseline. As a result of these data we can conclude that while the use of naturalistic interventions may not increase the verbal language in every child diagnosed with ASD, it can contribute to language gains in some.

Hypothesis 2: Can the use of the *focused stimulation* strategy improve verbal language in young children who have been diagnosed with ASD?

The current study hypothesized that the *focused stimulation* intervention strategy would positively impact the verbal language of young children diagnosed with ASD. Increases in verbal language secondary to the use of the *focused stimulation* strategy were not observed for all participants. Rather, one out of our three participants demonstrated verbal language increases as a result of the use of *focused stimulation*. This variability is typical of language acquisition and learning where not every child learns best as a result of the same intervention. While participants 001 and 003 did not have growth in their verbal language above baseline due to *focused stimulation*, participant 003 has gains observed elsewhere. Participant 002’s data supports that while *focused stimulation* may not increase the verbal language in every child diagnosed with ASD, it can contribute to language gains in some.

Hypothesis 3: Can the use of the *vertical structuring* strategy improve verbal language in young children who have been diagnosed with ASD?

The current study hypothesized that the use of the *vertical structuring* strategy would positively impact the verbal language of young children diagnosed with ASD. Increases in the verbal language of all participants in this study were not observed. Rather, two out of our three participants demonstrated verbal language increases as a result of the *vertical structuring* strategy. Participant 001 did not show gains in verbal language as a result of this strategy. 002 and 003 both showed an increase in their verbal language above baseline as a result of the *vertical structuring* strategy. As a result of these data, we can conclude that while the use of *vertical structuring* may not increase the verbal language in every child diagnosed with ASD, it can contribute to language gains in some.

Hypothesis 4: Can the use of the *expansions* strategy improve verbal language in young children who have been diagnosed with ASD?

The current study hypothesized that the use of the *expansions* strategy would positively impact the verbal language of young children diagnosed with ASD. Increases in the verbal language of all participants in this study were not observed. Rather, two out of our three participants demonstrated verbal language increases in the context of this strategy. Participant 001 did not show gains as a result of the *expansions* strategy. Participants 002 and 003 both showed an increase in their verbal language above baseline within the context of this strategy. The *expansions* strategy yielded the greatest gains in language for both participant 002 and participant 003.

MacArthur Bates Communicative Development Inventories

The *MacArthur Bates CDI* was used to monitor each participant's language outside of the intervention environment and the verbal language being produced in their home settings as

reported by parents. *MacArthur* data collection was not used to determine eligibility for acceptance into this study due to parent report measures allowing for parents to inflate their child's production of language. Each participant met the inclusion criteria to be in this study of having no more than 20 words based upon their initial assessment as well as the pre-selection language sample. Pre and post intervention scores for both words produced and words understood increased among all participants. Participant 001's parents reported an increase in words produced from 31 to 79 words and words understood from 252 to 328. While 001's data did not show a growth of language inside of the intervention environment, *MacArthur* data indicates growth of language outside of the intervention environment. This growth in language was evident to the investigator based upon interactions with the participant in the waiting room and walking to the intervention room when 001 would verbally communicate with the investigator but did not produce language during the intervention environment. Participant 002's parents reported an increase of words produced from 1-106 and an increase in words understood from 75 to 224. Participant 003's parents reported an increased in words produced from 115 to 262 and an increase in words understood from 282-353. While this number is greater than our inclusion criteria of 20 verbal words, we attribute this high reported number of 115 as a result of using a parent-report measure, which gives the parent the ability to over score their child's language. Participant 003 had roughly 10 words during his pre-selection language sample, and although his *MacArthur* reports much higher verbal productions, the gains reported from pre to post intervention are still dramatic, as they more than doubled.

Clinical Implications

Based on our data from three participants, the naturalistic intervention strategies of *focused stimulation*, *vertical structuring*, and *expansions* resulted in an increase in verbal language.

Through the use of these strategies, an increase in verbal language is attainable for young children diagnosed with ASD. These findings parallel other studies that have concluded that the use of naturalistic interventions improve communication in young children with ASD (Ingersoll, 2010; Delprato, 2001; Ingersoll & Schreibman, 2006). Parents of children with ASD note that communication delays were their first concern (Kozlowski et al., 2011) and therefore SLPs are often the first service providers for children with ASD. Thus, research examining the efficacy of commonly used language strategies is crucial. As SLPs receive training on these strategies during their clinical training, and therefore often integrate them into their clinical practice, it is important that they have confidence in the efficacy of these practices. Tager-Flusberg et al. (2009) stated that the emergence of spoken language is one of the most important predictors of better outcomes in later childhood and adulthood therefore, there is tremendous potential significance for early treatment positively affecting language development. The positive findings of this study provide SLPs with a more readily accessed approach in order to implement treatment for the emergence of spoken language in young minimally-verbal children with ASD. It is important to remember that while these strategies may work for some, they may not work for all and it is best to implement interventions that are chosen based upon the individual client.

Limitations

Limitations of this study included the medical complications that took place with 001. While these were unforeseen, the parents of 001 were made aware that they were allowed to withdrawal from the study at any time however, they chose to stay enrolled. Another limitation of this study is that the participants in this study were young children who demonstrated delayed language skills, and therefore there is a possibility that language gains could be attributed to maturation. However, the data for two of our participants demonstrated considerable gains in

language in a short amount of time, which we contribute to the interventions implemented inside of the intervention environment. Finally, early language intervention would optimally occur in the child's natural environment rather than a clinical setting, which was the context for this study.

Future Directions

Further research is necessary in order to expand our knowledge on using *focused stimulation*, *vertical structuring*, and *expansions* to increase the verbal language in minimally-verbal children diagnosed with ASD. Suggestions for future research include using a larger number of participants, expanding outside of our specific inclusion criteria, and extending the intervention period. In addition, implementing strategies individually and randomized would give us a more in depth look into how each strategy increases language on its own.

5. CONCLUSIONS

In conclusion, the naturalistic intervention strategies of *focused stimulation*, *vertical structuring*, and *expansions* may increase the verbal language in minimally-verbal toddlers with ASD. Like most interventions, while these strategies work for some children, they may not work for all children. In addition, all three strategies may not work for an individual child while a combination of one or two of them might. Given the heterogeneity of language profiles seen in young children with ASD, one would expect heterogeneity in their response to intervention strategies. Even though maturation may have attributed to the language growth of the participants in this study, the design used in this study allows us to conclude that our intervention strategies did affect growth in verbal language rather than environmental contributions from outside of our intervention. While our intervention may not be the sole reason for language growth, it did in deed have an impact on that growth along with any environmental contributions such as maturation; otherwise, we would have likely seen growth in language during baseline sessions. The positive impact of the naturalistic interventions measured in 2 out of 3 participants in this study allow us to conclude the efficacy in their use of helping young minimally verbal children with ASD. Although only 2 participants were observed to have an increase in language inside of the intervention environment, all 3 families of the participants were overjoyed with the results and increase of verbal language demonstrated by their children. Participant 001's family reported, "this study was life-changing for our son; he has had the biggest language explosion we have ever seen." Likewise, participant 002's family reported, "He is much more calm and focused since he has gained some language skills. Being able to express his needs and wants

verbally have been a tremendous blessing. He has had a huge decrease in frustration and meltdowns due to being able to somewhat verbally communicate; he's been less withdrawn and has been interacting with others more. If he sees something that interests him he's been able to verbally make others aware (Look, car and look, truck are common while driving); I am no longer worried about if the language will come, he's got this!" The positive results of this study conclude that these intervention techniques of *focused stimulation*, *vertical structuring* and *expansions* are capable of being implemented in community-based intervention settings with successful outcomes. The teaching of these intervention strategies during graduate student education is highly beneficial due to the capacity of their success not only in teaching those with a language delay but also in teaching minimally-verbal children diagnosed with ASD. Having these interventions in an SLP's realm of knowledge at graduation allows for the ability to implement successful interventions to children with ASD without additional training.

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APPENDIX A

Child Interest Survey

(Please check your child's preferences)

Toys	A Favorite	Likes it	Doesn't Like it	Never Tried it
Blocks				
Racecars				
Dolls				
Pop-ups				
Puzzles				
Puppets				
Trains				
Books				
Action Figures				
Stuffed Animals				
Wind-Up Toys				
Balls				
Bubbles				
Play Dough				
Slinky				
Push Toys				
Picnic Sets				
Food				
Tools				
Doctor/Vet Kit				
Other:				
Other:				
Other:				

Characters	A Favorite	Likes it	Doesn't Like it	Never Tried it
Thomas & Friends				
Mickey Mouse				
Dora the Explorer				
Diego				
Sesame Street				
Blue's Clues				
Disney Characters (please name)				
Wiggles				
Veggie Tales				
Barney				
Backyardigans				
Hello Kitty				
Sponge Bob				
Shrek				
Peanuts				
Other:				
Other:				
Other:				
Activities	A Favorite	Likes it	Doesn't Like it	Never Tried it
Throwing ball				
Singing				
Dancing				
Coloring				
Physical activity (running, jumping, etc.)				
Painting				
Pretend Cooking				
Playing House				
Swinging				
Arts and Crafts				
Building				
Taking Things Apart				
Sand Play				
Water Play				
Other:				
Other:				
Other:				

APPENDIX B

Coding Manual

The investigator and reliability coders coded words as outlined below.

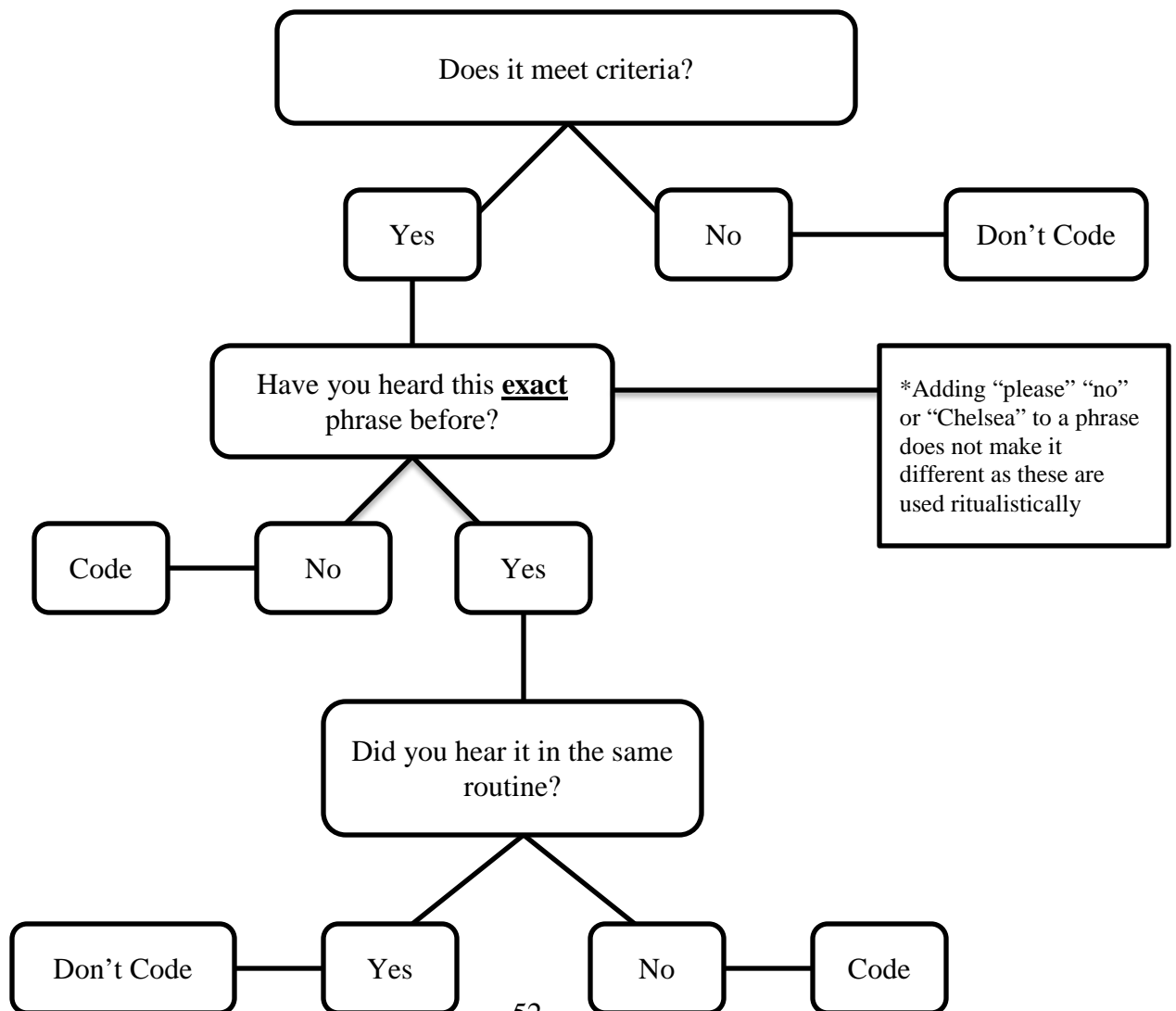
A word will be coded as a **single** word if:

- 1) It is an approximation of a word used only for one specific object/action
- 2) It is used intentionally> in context, with a purpose, with a gaze shift, directed towards a person or the object being spoken about
- 3) A child is counting for the initiation or continuation of a play routine
- 4) It is used out of context but as a request
- 5) It is a chunk “no thanks” “tick tock” “oops, sorry” “see it” “my seat” “bless you” “lock key” “go in” etc.
- 6) It is a ritualistic or habitual phrase used with intent and in the correct context “goes right here” “I wanna play choo choo train”
- 7) A chunk will be coded as two separate words if each word in the chunk was heard individually during the session. Example if the chunk “lock key” was said in the session but during the same session the participant said “lock” in one situation and “key” in another.
- 8) If a participant uses more than one name to refer to a specific object, one of those names will be coded.
 - a. If a child refers to a train as “choo choo” “train” “choo choo train”
 - b. Only one of the three of those uses will be coded in a session
- 9) It is an environmental noise (animals, vroom, beep) that is a transcribable word, not only a sound, and contextually appropriate
- 10) It is a sound such as “ut oh” or “woah” that is directed and used intentionally with a clear purpose
- 11) It is a new letter sound produced by the child, used consistently, to name one specific object.

A word will **not** be coded as a word if:

- 1) The child uses an approximation for more than one specific object/action
- 2) It is a ritualistic routine such as counting or saying ABCs
- 3) It is repeated after the investigator as echolalia and not produced with clear meaning (as to request, protest). Determined by:
 - a. Use of investigator’s intonation

- b. Immediate repetition
 - c. Spoken with no intent
- 4) It is spoken out of context with no regards to current situation
 - 5) If the child makes the first sound of the word (exception: see rule #12 above)
 - 6) If the child says a sound that sounds like a word but could be interpreted as another word out of the immediate context
 - 7) It is a sound that can be generalized to different situations such as “ut oh” or “woah” and not used with direct intent to another speaker.
 - 8) It is something being said ritualistically or repetitively throughout the session.
 - a. Such as that if/when it is used functionally there is no way to be sure that it was said functionally and not ritualistically
 - i. “Aww, man”
 - ii. “Right here”
 - iii. “Wash hands”
 - iv. Singing twinkle twinkle
 - v. Hide and Go Seek ritual



APPENDIX C

Office for Research

May 22, 2014

Institutional Review Board for the
Protection of Human Subjects



Angela Barber, PhD
Department of Communicative Disorders
College of Arts and Sciences
Box 870242

Re: IRB# 14-005
"The Effects of Language Facilitation Techniques on Language Skills in Young Minimally Verbal Children with Autism"

Dear Dr. Barber:

The University of Alabama Non-Medical IRB has granted initial approval of the above application for a one year period.

Your application will expire on May 15, 2015. If your research will continue beyond this date, you must complete the IRB Renewal Application. If you need to modify the study, please submit the Modification of an Approved Protocol form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure form.

Please use reproductions of the IRB approved stamped informed consent form to obtain consent from your participants.

Should you need to submit any further correspondence regarding this application, please include the above application number.

Good luck with your research.

Sincerely,



Stuart Usdan, PhD.
Chair, Non- Medical Institutional Review Board
The University of Alabama

358 Rose Administration Building
Box 870127
Tuscaloosa, Alabama 35487-0127
(205) 348-8461
FAX (205) 348-7189
TOLL FREE (877) 820-3066

IRB #: 14-005

PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

	Principal Investigator	Second Investigator	Third Investigator
Name:	Angela Barber, Ph.D. CCC-SLP	Chelsea Chiarelli	
Department:	Communicative Disorders	Communicative Disorders	
College:	Arts & Sciences	Arts & Sciences	
University:	University of Alabama	University of Alabama	
Address:	Box 870242	Box 870242	
Telephone:	205-348-7131	205-348-7131	
FAX:	205-348-1845	205-348-1845	
E-mail:	abarber@bama.ua.edu	crchiarelli@crimson.ua.edu	
Title of Research Project:	<i>The Effects of Language Facilitation Techniques on Language Skills in Young Minimally Verbal Children with Autism</i>		

Date Printed: January 14, 2014 Funding Source: None

Type of Proposal: New Revision Renewal Completed Exempt

<div style="border: 1px solid black; width: 80px; margin: 0 auto; padding: 2px;">Attach a renewal application</div> <div style="border: 1px solid black; width: 80px; margin: 2px auto; padding: 2px;">Attach a continuing review of studies form</div> <p style="font-size: small; margin: 0;">Please enter the original IRB # at the top of the page</p>
--

UA faculty or staff member signature: _____

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):

Type of Review: Full board Expedite

IRB Action:

<input type="checkbox"/> Rejected	Date: _____
<input type="checkbox"/> Tabled Pending Revisions	Date: _____
<input type="checkbox"/> Approved Pending Revisions	Date: _____

Approved—this proposal complies with University and federal regulations for the protection of human sul

Approval is effective until the following date: 5/15/2015

Items approved:	<input checked="" type="checkbox"/> Research protocol:	dated
	<input checked="" type="checkbox"/> Informed consent:	dated
	<input type="checkbox"/> Recruitment materials:	dated
	<input type="checkbox"/> Other:	dated

Approval signature _____ Date 5-22-14

The Effects of Language Facilitation Techniques on the Verbal Language in Young Minimally Verbal Children with Autism Spectrum Disorder

Caregiver Consent

You and your child are being invited to participate in a research study being conducted by Dr. Angela Barber, an assistant professor in the UA Department of Communicative Disorders, and her graduate student, Chelsea Chiarelli.

What is this study about?

The primary purpose of this study is to examine the impact of language strategies on the spoken language of young minimally-verbal children who have an Autism Spectrum Disorder (ASD).

Why is this study important- What good will the results do?

This study will contribute to the knowledge of effective language interventions to improve verbal language in young children with ASD.

Why has my child been asked to take part in this study?

Your child has been asked to take part because he/she has an ASD and is between 2 and 3 years of age.

How many other people will be in this study?

In total, three children with ASD will be asked to participate.

What will my child and I be asked to do in this study?

1. We will ask you to complete some paperwork so that we can learn more about your child. Specifically, we will ask you to complete a brief Child Interest Survey so we can learn more about what your child likes. We also will ask you to complete a vocabulary checklist so we can measure your child's language at the beginning and end of the study.
2. We will give your child a developmental test to assess his/her visual spatial, fine motor, receptive language, and expressive language skills. We also will complete a language sample with your child in which we will play with him/her for 15 minutes and count how many words he/she produces.
3. The language intervention will occur 2x/week for 20 minutes each at the Speech and Hearing Center for 8 weeks.
4. At the conclusion of the study, we will repeat the language sample with your child and we will ask you to complete the vocabulary checklist again.
5. Each intervention session will be video recorded for later analysis.

How much time will it take to complete this study?

The language intervention session will occur 2x/week for 20 minutes each session for 8 weeks. The pre and post testing will take approximately 1 hour each.

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EXPIRATION DATE: 5/15/2015

Where will the study take place?

The UA Speech and Hearing Center

Will my child be compensated for being in this study?

No.

Will being in this study cost me anything?

There is no charge for being in this study. However, you will be responsible for arriving at the UA ASD Clinic and the UA Speech and Hearing Center for assessments and intervention at your own expense.

Can the researcher take my child out of this study?

Your child will only be removed from the study if he seems upset by participating or if you choose to remove him/her from the study yourself.

What are the benefits that may happen to my child if he/she is in this study?

We think this study will result in improved language skills in our participants. However, note these gains are not promised.

What are the benefits to scientists or society?

We hope that this study will demonstrate that language facilitation techniques can directly improve verbal language skills in young children with ASD.

What are the risks (dangers of harm) to my child if he/she is in this study?

There are no expected risks associated with this study. However, your child's participation is voluntary and you may withdraw him/her from the study at any time.

How will my child's confidentiality (privacy) be protected? What will happen to the information the study keeps on my child?

Numbers will be used in place of names so all of your child's information will remain private. Videotapes and test scores will be locked in a file cabinet. Unless you give your permission for researchers to keep videotapes of your child for educational purposes, the videotapes will be destroyed at the completion of the study.

What are my child's rights as a participant?

Taking part in this study is your child's free choice. You and your child may choose not to take part at all. If your child starts the study, he/she can stop at any time. Leaving the study will not result in any penalty or loss of any benefits you and your child would otherwise receive.

In addition to obtaining your parental consent, we will attempt to obtain verbal assent from your child by asking, "Are you ready to play?" Due to the young age of participants, assent will be accepted if your child uses gestures or body language to clearly indicate that they want to participate. For example, when asked, "Are you ready to play," your child may nod his or her head and/or take the hand of the examiner. If your

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child demonstrates clearly negative behavior when asked if she/he wants to play, such as crying, resisting, yelling, or if she/he says, "no," the session will not occur. We will ask you to return at the next scheduled appointment. Assent will be obtained at the beginning of each intervention session. If at any point during the intervention, your child shows clear signs of distress toward the intervention conditions, the session will be terminated and the intervention will resume at the next scheduled appointment. If your child demonstrates clear distress or unwillingness to participate at any time during the intervention, the session will be terminated.

The University of Alabama Institutional Review Board (IRB) is the committee that protects the rights of people in research studies. The IRB may review study records from time to time to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

What do I do if I have questions or problems?

If you have questions about the study right now, please ask them. If you have questions about the study later on, please call Dr. Angela Barber at (205) 348-2010. If you have questions about your child's rights as a person taking part in a research study, you may call Tanta Myles, the Research Compliance Officer at UA at (205) 348-8461 or toll-free at 1-877-820-3066.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at http://osp.ua.edu/site/PRCO_Welcome.html or email us at participantoutreach@bama.ua.edu.

After you participate, you are encouraged to complete the survey for research participants that is online at the outreach website or you may ask the investigator for a copy of it and mail it to the University Office for Research Compliance, Box 870127, 358 Rose Administration Building, Tuscaloosa, AL 35487-0104.

I have read this consent form. I have had a chance to ask questions. I agree to take part in it.

Child's Name

Signature of Research Participant's Parent/Guardian

Date

Investigator

Date

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Video Recording Use Agreement

The video recordings of my child's session may be used for several different purposes. For example, the research team will watch the videos to measure the language produced during each session. Also, Dr. Barber might use my child's videos to train students or clinicians on a particular intervention approach. The videos might also be used to answer important research questions about autism. While my name and my child's name will not be used during any presentations; it is likely that my child's first name will be heard on the video recording.

I give my permission for videos of my child to be used for research, educational, or training purposes.

Parent/Guardian Signature

Date

Witness/Staff Member

Date

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EXPIRATION DATE: 5/15/2015