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Developmental Checklists: A Tool for Clinicians

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Developmental Checklists: A Tool for Clinicians

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Dedication

I would like to dedicate this master's report to all of my fellow aspiring clinicians, and to the kiddos and their families we will work with throughout our careers.

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Abstract

Developmental Checklists: A Tool for Clinicians

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Parents of children with developmental disabilities seek out therapy in order to assist their child to reach full potential. In order to help parents understand where their child should be in comparison to a typically developing child, they must be provided with proper resources. While commercially available assessments are available to speech-language pathologists, parents only have access to checklists that provide minimal direction at certain age ranges. The purpose of this literature review is to discuss developmental domains important for the developing child, examine developmental milestone checklists available to parents as well as two commercially available assessments for speech-language pathologists, investigate available research on developmental milestones in the areas of language output, language comprehension, cognition, social-emotional skills, and motor development, and identify ages at which developmental milestones within the identified domains occur in typically developing children. The aim of this project will be to create developmental milestone checklists available for speech-language pathologists to provide to parents.

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Chapter 1: Introduction

When a child is receiving clinical intervention for speech and language, it is helpful for parents to understand their child's development in comparison to typically developing children. Information on developmental milestones is needed. Milestones provide a framework for observing and monitoring a child over time (Johnson & Blasco, 1997; Gerber, Wilks, & Erdie-Lalena, 2010). Currently, there are commercially available resources available to speech-language pathologists, such as standardized tests, and to parents, such as developmental milestone checklists through the Centers for Disease Control and Prevention (CDC) (Center for Disease Control and Prevention, 2014). However, the developmental milestones checklists through the CDC provide only minimal direction for parents and are provided in increasingly bigger monthly increments. Due to the lack of adequate resources available to parents, it is important that developmental milestone checklists in the key developmental areas of communication output, language comprehension, cognition, social-emotional, and motor are created based on typically developing children. Therefore, the outcome of this paper will provide a developmental milestone resource for speech-language pathologists to use in early intervention to provide parents as a source of reference.

Typically, between the ages of birth and 24 months, parents are the main individuals interacting and monitoring the child's development. To help parents have a realistic understanding of developmental milestones, they must be provided with the proper resources, some of which may come from a child's pediatrician. However, if a child is thought to have a developmental delay or difference, the child is typically referred for services. If a child is developmentally delayed in speech and language skills,

a speech-language pathologist is likely to conduct a thorough diagnostic evaluation in order to determine the proper diagnoses and current need for therapy. Once an evaluation is complete and/or speech-language therapy is underway, it is likely that parents will need additional information about how the current status of their child compares to that of typically developing children of the same chronological age.

It is particularly important that speech-language pathologists have a proper resource to provide for parents as a source of reference for particular developmental domains. Unfortunately, there are limited thorough developmental milestone resources available in accessible form to provide to parents of children who are developmentally delayed. Clinicians are able to rely on standardized tests and clinical expertise for assessment and intervention, but this does little to address parental concerns and does not provide parents with appropriate knowledge of what is different between their child's development and a typically developing child.

While there is a large amount of research addressing developmental milestones, the literature has not been compiled into accessible developmental checklists for parental reference. In addition, current researchers compile developmental milestones with diverse sample sizes (i.e., the number of children sampled), limited diversity of samples, through standardized testing measures, parental report, direct observation, and through a combination of parental report and observation. The results from the available research are presented in a variety of ways as well, through tables using both averages, and age ranges, making it difficult to decipher which is the most appropriate measure to understand when a milestone occurs in a typically developing child.

Additionally, physicians refer to typical development as milestones reached at the 50th percentile for age (Gerber et al., 2010). It has been noted by Sices (2007) that, "tables [relaying information often] include ambiguous labels such as 'emerging patterns

of behavior,' 'developmental expectations,' 'landmarks/guidelines,' 'approximate ages of skill attainment,' and 'milestones by the end of the period." Sices (2007) also reported that the comparison of a child's current developmental skills to milestone data is the most frequently reported method of developmental surveillance.

DEFINITION AND RATIONALE FOR INCLUSION OF DEVELOPMENTAL DOMAINS

"Children need communication skills in early childhood to gather information, express needs, grow cognitively and linguistically, and to interact appropriately with others in the environment," (Greenwood et al., 2013, p. 540; Warren and Walker, 2005). The first two years of life provide a crucial time period for the development of communication skills. Typically developing children develop in a hierarchical and predictive manner, however considerable variability in normal acquisition due to intrinsic forces, such as physical characteristics or temperament, and extrinsic forces, such as a child's family or socioeconomic status, have been noted (Beuker, Rommelse, Donders, & Buitelaar, 2013; Sices, 2007; Greenwood et al., 2013; Johnson & Blasco, 1997; & Gerber et al., 2010). For example, Greenwood et al. (2013) reports previous findings that early gestures predict later vocabulary development and early word use predicts later social-emotional development. Furthermore, a delay in babbling has been associated with a higher risk of speech and language-related disorders (Greenwood et al., 2013). Delays or differences during this important developmental period are sensitive indicators of developmental problems and there is vitality in communication and language delays being identified as early as possible in order to being intervention services targeting the prevention of disabilities (Conti-Ramsden & Durkin, 2012; Greenwoord et al., 2013; Wetherby, Cain, Yonclas, & Walker, 1988; Hagan et al., 2008). In turn, early identification of a developmental delay allows for early intervention, which has been

shown to improve the outcomes of children (Majnemer, 1998; Sices, 2007). Sonnander (2000) reported early intervention leading to positive effect sizes of one-half to three quarters of a standard deviation. As noted by Gerber et al. (2010), "milestones provide a framework for observing and monitoring a child over time," (p. 267). In addition, Greenwood et al. (2013) reports the prevalence of communications being widespread and when not addressed leads to significant costs.

Several areas of development are relevant to helping parents understand important aspects of their child's development that may be contributing to speech and language delay or, alternatively that may be strength areas in their child's developmental profile. Additionally, an understanding of a typical sequence of development in all domains allows for an impression to be made of a child's true developmental status (Gerber et al., 2010). In this regard, developmental checklists in the areas of communication output, language comprehension, cognition, social-emotional skills, and motor skills for ages birth to 24 months will allow for clinicians to provide parents with simple checklists demonstrating where their child is expected to be at their chronological age. These areas are *communication output*, *language comprehension*, *cognition, social-emotional*, and *motor development*. Authors who provide the basic research about the broad developmental domains have differentially defined the categories they use. For this reason, the previously mentioned terms will be objectively defined. Table 1.1 provides the developmental domains with accompanying brief definitions for quick reference.

Table 1.1. Definitions of Developmental Domains and Relative Importance in Development.

Developmental Domain	Definition	Rationale for Inclusion
Communication Output	Expressive language (producing words to communicate) and prelinguistic means (language-based forms including gestures, vocalizations, and non-verbal dimensions).	Communicative output is an important aspect of communication for a child to express wants and needs, likes, dislikes, etc.
Language Comprehension	The understanding of language-based input from various speakers in the environment as well as an understanding of what is seen in the environment; Receptive language (a child's ability to understand communication).	Language comprehension is an important aspect of vocabulary growth and understanding what is occurring in the environment around them, and provides reference to what is seen and heard.
Cognition	A child's problem-solving abilities, such as learning to self-soothe or finding a hidden object.	Cognition is an important aspect of development that influences many aspects of a child's life such as expressive and receptive language, play, etc.

Table 1.1 (continued)

Social-Emotional	A child's ability to socialize with other children and temperament development; Joint attention (when a child shares experiences about objects and events by directing and/or following the visual gaze of his or her social partners).	Social-emotional development is important for a child to interact with others and create relationships with people and things in the environment. Specifically, joint attention is important for early language at the adult-child interaction level and the times during these interactions when attempts are made to coordinate language with a joint attention focus.
Motor	A child's physical development including whole body movements (gross motor) as well as smaller movements (fine motor) such as pointing, pinching, and grasping.	Motor development is important aspect in a child's life as the child begins to have a greater ability to explore the environment and objects within the environment.

Conti-Ramsden & Durkin, 2012; Greenwood et al., 2013; Hagan et al., 2008; Guastaferro, Lutker, Jabaley, Shanley, & Crimmins, 2013; Wilks et al., 2010; Belsky & Most, 1981; Mundy & Jarrold, 2010; Tomasello & Farrar, 1986.

Communication Output

Communication output can be broadly defined as a developmental domain that includes expressive language and prelinguistic means. Table 1.2 below refers to the areas of communication output and the corresponding definitions. To further classify information for this developmental domain, expressive language is defined as producing

words to communicate (Conti-Ramsden & Durkin, 2012). Additionally, as part of expressive language, child can produce single-word or multiple-word utterances. Single-word utterances are "singular-voiced or signed words by the child that are recognized and readily understood by the partner," (Greenwood et al., 2013, p. 541; Walker & Carta, 2010). For example, a child may say, "mama," "dada," "more," "no," or "doggy." Bates and Dick (2002) note that gestures and naming come together to help children produce single-word utterances. Multiple-word utterances are classified as "two or more different-voiced or signed words by the child, that are readily understood by the partner," (Greenwood et al., 2013, p. 541; Walker & Carta, 2010). For example, a child may say, "big doggy," "more milk," or as a child grows older, "I want milk." Additionally, Bates and Dick (2002) report that children use multiple-word utterances to make sentences.

Table 1.2. Areas of Communication Output and Corresponding Definitions.

Area of Communication Output	**Definition**
Expressive Language	Producing words to communicate- includes single-word and multiple-word utterances.
Prelinguistic communication	Gaze, gestures, babbling – emergence prior to spoken language.
Gestures	Physical movements made by the child in an attempt to communicate with a partner (e.g. pointing, giving).
Vocalizations	Non-word verbal utterances voiced by the child to the play partner.
Non-verbal dimensions	Can be a gesture, facial expression, or eye gaze.

Table 1.2 (continued)

Discourse	The meaning created by integrating sentences into an idea which has more meaning than an isolated sentence

Conti-Ramsden & Durkin 2012; Greenwood et al., 2013; Yoder, Warren, & Macathren, 1998.

Prelinguistic means refer to non- verbal language-based forms including gestures, vocalizations, and non-verbal dimensions. Yoder et al. (1998) classify prelinguistic communication skills as gaze, gestures, and babbling vocalizations, which emerge before spoken language. Furthermore, prelinguistic communication skills develop prior to expressive language (Yoder et al., 1998). Gestures are defined as "physical movements made by the child in an attempt to communicate with the partner," (Greenwood et al., 2013, p. 541; Walker & Carta, 2010). A child may express him or herself through gestures by pointing at an object, extending his or her arm, or giving an object to another person. Vocalizations are defined as "non-word verbal utterances voiced by the child to the play partner, occurring alone or with gestures," (Greenwood et al., 2013, p. 541; Walker & Carta, 2010). A major achievement of the prelinguistic stage of communication output is the emergence of intentional communication, when a child purposefully uses a certain signal that has a preplanned effect on a specific person (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979).

Discourse may be considered as part of communication output. According to Coustley (2014), discourse is the meaning created by integrating sentences into an idea which has more meaning than an isolated sentence; any communication in which more than one idea (sentence) is linked in some way. Additionally, Coustley (2014) uses the term to describe the communication as a whole; the maintenance of a topic, the thread

that links ideas at a conceptual level, and that gives the communication relevance to a particular audience or situation. A child may engage in discourse with a parent, sibling, other family members, or toys, such as stuffed animals. Typically in discourse, two or more people are involved. As a child interacts with his or her sibling, they may talk about their previous vacation to Disneyland in which each child would speak solely about the trip and use multiple sentences to express him or herself.

Behavior regulation, also known as self-regulation, may also be considered part of communication output. Vallotton and Ayoub (2011) describes self-regulation as "a critical social-emotional skill underpinning children's abilities to act pro-socially with peers and adults, participate productively in learning activities, and adapt successfully to new or challenging situations."

Language Comprehension

Language comprehension can be described as the understanding of language-based input from various speakers in the environment as well as an understanding of what is seen in the environment (Hagan et al., 2008). Within language comprehension, one may find receptive language. Guataferro et al. (2013) defines receptive language as a child's understanding of language and progress toward communication. More simply put, receptive language can be defined as a child's ability to understand communication (Wilks et al., 2010). A child who has normal receptive language skills understands language that is directed toward them or that is spoken within their environment. For example, if a child's mother asks the child to clean up his or her toys, the child would demonstrate understanding the command by picking up his or her toys. A child can also demonstrate receptive language skills by pointing to an appropriate picture in a picture book when a parent says, "Where is the cow?" or "Point to the house."

Cognition

Cognition refers to a child's problem-solving abilities, such as learning to self-soothe or finding a hidden object. Within cognition, one may also classify attention, memory, representational competence, and information processing/processing speech (Wilks et al., 2010). Refer to Table 1.3 below for definitions of areas covered in cognition.

Table 1.3 Definitions of Aspects of Cognitive Development.

Aspect of Cognitive Development	Definition
Memory	Proper encoding, storing, and retrieving of information.
Representational Competence	Ability to create and manipulate a mental image of an object or an idea that is not seen.
Attention	Learning how to focus and shift focus.
Processing Speed	Linking factor of all other functions.

Wilks et al., 2010.

In addition, play may be categorized as a child behavior that gives insight into cognitive development. Belsky and Most (1981) report, "that play provides opportunities to affect and control the environment," (p. 630). Furthermore, it is believed that infants acquire skills through play that are used later in life in a more goal-directed aspect (Belsky & Most, 1981).

Social Emotional Skills

Social-emotional skills involve a child's ability to socialize with other children and temperament development (Guastaferro, et al., 2013). As part of social-emotional skills, one can find joint attention, which is when a child shares experiences about objects

and events by directing and/or following the visual gaze of his or her social partners (Mundy & Jarrold, 2010). Furthermore, joint attention can be broken down into two functional categories: responding to joint attention and initiating joint attention. According to Mundy and Jarrold (2010), responding to joint attention can be defined as a child's ability to follow the direction of the gaze and gestures of others. The purpose of responding to joint attention is to share a common point of reference, which also functions as an automatic reaction to the potential that another person's gaze leads to a source of information about the environment. An example of responding to joint attention may be when a child follows another person's gaze or pointing gestures (Mundy & Jarrold, 2010). Initiating joint attention can be defined as a child's generation of gestures and eye contact to direct another's attention to objects, events, and/or themselves (Mundy & Jarrold, 2010). The function of initiating joint attention is to show or seek to share interests and experiences with others in the child's immediate environment. An example of initiating joint attention is when a child uses a pointing gesture to share attention regarding a toy, which would also involve alternating eye contact, to ensure the conversational partner is also referencing the same toy. Beuker et al. (2013) defines joint attention as the capacity to engage in coordinated social interaction, including sharing attention, following the attention of others, and directing the attention of another.

Motor Skills

Motor skills involve a child's physical development including whole body movements as well as smaller movements such as pointing, pinching, and grasping (Guastaferro et al., 2013). Greenspan and Shanker (2007) describes a young child's motor skills as growing in motor control and responding to stimuli with actions such as reaching towards a touch or turning away from an unpleasant touch. Gerber et al. (2010)

state that the ultimate goal of gross motor development is to gain independent and volitional movement. Gross motor development includes reflexes, posture, and head control. A child demonstrating gross motor skills may roll over, get to his or her hands and knees, and pull to a stand. Fine motor development is related to the use of the upper extremities to engage and manipulate the environment. Fine motor skills are necessary for a child to perform self-help tasks, play, and eventually work (Gerber et al., 2010). For example, a child may use a pincer grasp to pick up and release a block into a bucket. More specifically, during the first 18 months of a child's life, he or she acquires and refines a large variety of motor skills that change the way in which their body moves and interacts in the environment (Iverson, 2010).

PROJECT RATIONALE AND REPORT PURPOSES

These developmental areas will also help parents understand the potential need for services. These resources will also help with the aspect of early identification of developmental delays, as the earlier a delay is identified, the greater the likelihood of prevention (Geerant, Van den Noortgate, Grietens, & Onghena, 2004). Data in three-month increment developmental checklists on tearable and/or copyable forms provides a convenient alternative for clinicians to provide to parents. The increments in these checklists will allow for clinicians to provide parents with a more exact picture of where their child is expected to be developmentally when compared to typically developing peers, and will also allow for consideration of individual variations.

Pediatricians are also involved in developmental surveillance. Furthermore, pediatricians typically identify developmental conditions associated with neonatal risk factors, motor delays, and genetic conditions in a timelier manner than the more prevalent conditions, which include speech and language delays, mild cognitive disabilities, and

atypical behaviors (Sices, 2007). According to Sices (2007), pediatric residents are taught to elicit parental concern about specific areas of a child's development during preventative care visits, along with making clinical observations, and referring for further assessments when there are significant concerns. However, this procedure points to the fact that residents are taught to rely on the concern parents may or may not have about their child's development, along with the fact that parents may or may not have the appropriate knowledge of developmental milestones.

Based on present practices that do not include easily parent accessible materials, this report will: 1.) Examine available developmental milestone checklists available to parents and two commercially available assessments for speech-language pathologists, 2.) Investigate available research on developmental milestones in the areas of language output, language comprehension, cognition, social-emotional skills, and motor development, and 3.) Identify ages at which developmental milestones occur in typically developing children. With the information gathered from the available literature, parents and SLPs' will have a comprehensive resource available to understand how developmental milestones vary across individuals and how the collections and presentation of these milestones varies. The relative ranges that are created to monitor typical development in children, who are between birth and 24 months, will be outlined as well. Developmental milestone checklists in critical domains of development will be provided as a resource for parents of children with developmental delays and disabilities. The goal of gathering this information is to create developmental milestone checklists in the domains of language output, language comprehension, social-emotional, cognition, and motor development. The ages at which the milestones occur with be based off those gathered from previous research. The developmental milestone checklists created will be accessible to speech-language pathologists to provide to parents of children with

developmental delays as a source of reference to where their child should be in comparison to typically developing children.

Information about milestones was gathered based upon the developmental domains of communication output, language comprehension, cognition, social-emotional, and motor. Specifically, the following search engines were used Google Scholar, Journal of Speech, Language, and Hearing Sciences, Pediatrics in Review via PubMed, PsychInfo, EbscoHost, JSTOR, Inter Library Services requests. Within these search engines, the following key terms were used *typically developing, language comprehension, language output, motor, cognition, cognitive, babbling, speech, developmental milestones, milestones, children, infants, birth to three, and birth to 24 months*. Furthermore, upon review of some literature, additional references were pulled to gather proper background information.

Chapter 2: Existing Developmental Checklists

This chapter will address question number one by examining existing developmental checklists easily accessible to parents as well as several commercially available tests available to speech-language pathologists. In order for the reader to gain an understanding of the developmental checklists available to parents, as well as the two commonly used checklists used by speech-language pathologists, several checklists are reviewed in chapter three. Two checklists available to parents are reviewed first. The information for each was gathered from the respective websites found through a Google search. Two commercially available checklists commonly used by speech-language pathologists are also reviewed. The information for these checklists was gathered through the respective user's manuals located in the University of Texas Speech and Hearing Center's clinician materials room.

The first checklist was gathered from an online search through the Texas Department of Assistive and Rehabilitative Services (DARS, 2014). Specifically, the search through DARS focused on developmental milestones and services available through Early Childhood Intervention (ECI). In addition, an additional search through the Centers for Disease Control and Prevention (CDC) was completed for possible developmental checklists. The standardized tests available to clinicians chosen were the *MacArthur Communicative Development Inventories* (CDI) (Fenson et al., 1991) and *The Rossetti Infant-Toddler Language Scale* (Rossetti, 1991). These commercially available tests were chosen to provide readers with an understanding of how clinicians assess developmental milestones in young children.

DEVELOPMENTAL CHECKLISTS AVAILABLE FOR PARENTS

Early Childhood Intervention and the Individuals with Disabilities Act Part C

Early Childhood Intervention (ECI), part of the Individuals with Disabilities Education Act (IDEA) Part C and Public Law (PL) 108-446, is a federal program mandated in all states within the United States for families and children, birth to three, with disabilities and developmental delays (DARS, 2014). ECI covers children ages birth to three, while IDEA Part C encompasses children ages birth to two. The ECI program provides developmental services and aims to support families to help children reach potential. In addition, evaluations and assessments are provided at no cost to determine eligibility and individual need for services. ECI programs support the belief that the earlier a problem is identified, the greater the change of reducing the impact. Specifically, IDEA Part C serves infants and toddlers with developmental delays or who have been diagnosed with physical or mental conditions with high probability of resulting in developmental delays (DARS, 2014). According to the United States Secretary of Education, Arne Duncan, "…it is important for infants and toddlers with disabilities to have access to high-quality early intervention services that prepare them to successfully transition to preschool and kindergarten," (U.S. Department of Education, 2014).

The Texas Department of Assistive and Rehabilitative Services (DARS) provides the public with information about typical developmental milestones across various developmental domains (Table A1.1) (DARS, 2014). The developmental milestones compiled for these checklists, broken into three-month increments beginning at three months and extending to 36 months, provide parents with six to eight bullet points about the typical development of children during the given age range. However, ECI does not cite where the milestone development checklists originated, nor does ECI provide parents with warning signs of delayed development.

Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) provides milestone checklists available to parents through the CDC website, which can be viewed online or downloaded for more personal and consistent use. The CDC briefly defines developmental milestones for parents and provides common examples, such as crawling and walking. The CDC begins milestones at age two months extending to five years, with two-month increments for ages two months through six months, three-month increments for ages nine months through 12 months, six-month increments for ages 12 months to 24 months, and one-year increments for ages two years to five years.

At each age increment, the CDC divided developmental milestones into the following domains: social/emotional, language/comprehension, cognitive (learning, thinking, problem-solving, and movement/physical development. Each age increment is also accompanied by an informational box, "Act Early by Talking to Your Child's Doctor if Your Child:" followed by several statements regarding milestones a child should be doing at the given age, which should be used as warning signs if a child is not reaching the specific milestones listed.

The CDC adapted the developmental checklists from *Caring for Your Baby and Young Child: Birth to Age 5* (CDC, 2014), Fifth Edition from the American Academy of Pediatrics and Bright Futures: Guidelines for Health and Supervision of Infants, Children, and Adolescents, Third Edition (Hagan et al., 2008). The CDC also clearly states that the available checklists are not a substitute for standardized developmental screening tools. The book, *Caring for Your Baby and Young Child: Birth to Age 5, Fifth* Edition (Shelov & Altmann, 2009; CDC, 2014), is available for sale online for $22.00. The book serves as a parenting guide that includes: basic child care from birth to five years, guidelines and milestones for physical, emotional, social, and cognitive growth, a health encyclopedia,

pregnancy information, and more (HealthyChildren.Org, 2014). The Bright Futures: Guidelines for Health and Supervision of Infants, Children, and Adolescents - Third Edition (Hagan, Shaw, & Duncan, 2008), is an implementation tool providing detailed information on child-care for health care practitioners (Bright Futures American Academy of Pediatrics, 2014). While developmental checklists were not found through the Bright Futures website, Bright Futures does provide a downloadable paper (Hagan et al., 2008), "Promoting Child Development." The paper includes information about child development and developmental domains, with some examples of development across age ranges.

COMMERCIALLY AVAILABLE DEVELOPMENTAL CHECKLISTS/TESTS

MacArthur-Bates Communicative Development Inventories (CDI)

According to the examiner's manual available to clinicians for administration and scoring, the *MacArthur-Bates Communicative Development Inventories* (CDIs) are said to build on the foundations laid by earlier initiatives (Fenson et al., 1991). The CDI targets current and emerging behaviors, specifically looking at language development through signs of comprehension and expression, nonverbal gestures, early vocabulary, and grammar use.

For clinical use, there are several versions of the CDI: Words and Gestures, and Words and Sentences. Brief versions have also been compiled. To accommodate for second language learners, Mexican-Spanish versions of the CDI have been created. It is important to note that these instruments were note created as direct translations, but rather assessment tools for linguistic and cultural differences.

The CDI uses mainly parents and caregivers as informants. The examiners manual (Fenson et al., 1991) claims that this is an advantage because the CDI is compiled

to be straightforward to parents and caregivers, leading to a more valid assessment, and the CDI is also responsive to IDEA Part C. Furthermore, the CDIs can be used as screening tools and for part of a diagnostic evaluation. However, because the CDI takes into account parental report and can be completed by parents, parents may under- or overestimate their child's abilities (Fenson et al., 1991). Because the CDI takes on a format including representative lists and the recognition strategy for parents, it is easier for parents to provide accurate information when selecting vocabulary and gesture use.

The CDI can be used for children ages 8 to 30 months. However, the CDI: Words and Gestures form is used for children ages 8 to 18 months, while the CDI: Words and Sentences form is used for children ages 16 to 30 months. The CDI: Words and Gestures form produces scores in the areas of vocabulary comprehension, vocabulary production, and the use of gestures (Fenson et al., 1991). This form consists mainly of a 396-item vocabulary checklist, where parents indicate the words their child understands and the words their child understands and says. These words are animal names, vehicles, toys, food and drink, clothing, body parts, furniture and rooms, small household items, outside things and places to go, people, sound effects and animal sounds, games and routines, action words, words about time, descriptive words, pronouns, question words, prepositions and locations, and quantifiers and adverbs. The form also asks several questions about whether a child has begun to respond to language, if the child is able to imitate and label, and also touches on a child's comprehension of everyday phrases and routines (Fenson et al., 1991). Additionally, the form asks about 63 gestures, such as communicative gestures, games and routines, actions with objects, pretending to be a parent, and imitating other adult actions

The CDI: Words and Sentences form focuses on expressive language and produces scores in the areas of vocabulary production, sentence complexity, and mean

length of utterance (MLU) (Fenson et al., 1991). This form consists mainly of a 680-item vocabulary checklists, where parents indicate only the words their child says. These words include words from the same categories as the CDI: Words and Gestures form, with additional words relating to outside things and places to go. In addition, this form also assesses regular and irregular bound morphemes, regular plural –s, possessive –s, progressive –ing, past tense –ed, irregular plural nouns, irregular past tense verbs, over-regularized plural nouns, and over-regularized past tense verb forms. The form also asks parents about their child's multiword utterances, complex early utterances, and to choose paired sentences that reflect the way their child is speaking.

Clinicians are able to use the CDI to examine a child's gestures, vocabulary development, to compare a child's vocabulary comprehension and production to other children of the same chronological age, to compare a child's vocabulary comprehension and production to their use of gestures, to track a child's development, to examine early grammatical skills, to compare a child's level of vocabulary comprehension with grammatical skills, and to examine typical development (Fenson et al., 1991).

The CDI has been under review for 30 plus years. It was originally normed between 1988 and 1989 in Connecticut, California, and Washington, and included 334 girls and 325 boys. To include additional low-income families and ethnic diversity, the researchers distributed additional forms during the norming period. The updated norming sample included 544 girls and 545 boys between the ages of 8 and 18 months, and 728 girls and 733 boys between the ages of 16 and 30 months, from Texas, Wisconsin, Louisiana, Connecticut, Rhode Island, California, and Washington. It is important to note that while the updated norming sample included a significantly larger number of children, the sample does not accurately represent all demographics, as roughly 64% of

the norming population is Caucasian, 13% African American, 4% Asian, 14% Hispanic, and 3% Other.

While the CDI forms are available to clinicians, it is important to note that these forms are not available to parents. Therefore, parents are unable to access these resources to document the language development of their child. However, for clinical purposes, the CDI forms are reliable measures of language development. As previously mentioned, clinicians need to use a level of caution when relying on parental report, but clinicians can also use observation to determine the reliability of the reports being made.

The Rossetti Infant-Toddler Language Scale

According to the user's manual, the *Rossetti Infant-Toddler Language Scale* is designed to assess the communication skills of children between the ages of birth and 36 months (Rossetti, 1990). Specifically, the assessment examines preverbal and verbal areas of communication interaction in the following areas: interaction-attachment, pragmatics, gestures, play, language comprehension, and language expression (Rossetti, 1990). A rather unique aspect of the *Rossetti* is that an examiner has the ability to observe behaviors exhibited by the child spontaneously, or when elicited, and/or the examiner can have the child's parent report on developmental milestones.

The *Rossetti* was compiled by a mix of author observation, descriptions from developmental hierarchies and behaviors used by leading individuals in the infant and toddler assessment field. Furthermore, items were selected based upon current information and are considered a representative sample of developmental skills at specific ages (Rossetti, 1990). At each three-month age interval, the number of items on the scale differs. For this reason, it is important to note that a child is not considered as mastering a developmental age level until all of the behaviors in the developmental area

are mastered. It is also important to note that due to the overlapping nature of language development, the Rossetti Infant-Toddler Language Scale notes that some skills are likely to be found in more than one of the developmental areas assessed by the scale.

Like the CDI, the *Rossetti* reports that parent report provides valuable information to the range of skills a child is capable of (Rossetti, 1990). Furthermore, the assessment contains a specific Parent Questionnaire to collect information about past and present interactions and communication skills. The questionnaire includes questions about the child's development of communication and interaction skills. The questionnaire also includes a list of words commonly used by young children, such as 'all,' 'all gone,' 'cookie,' 'go bye-bye,' 'drink,' and many others. Unlike the CDI, the *Rossetti* has basal and ceiling levels to help determine possible areas of intervention. When using the assessment, the clinician starts six months below the child's chronological age or developmental level. The same protocol may also be used three times per child, allowing for the assessment to be used at varying age levels and monitor changes in performance (Rossetti, 1990).

Items on the *Rossetti* are scored by observation, in which the clinician directly observed the child spontaneously demonstrating a skill; by elicitation, where the clinician or parent elicits the skill or behavior directly; and by report, in which the behavior was neither observed nor reported, but rather the parent reports that the child has mastered the skill (Rossetti, 1990). For example, the *Rossetti* (Rossetti, 1990) for birth to three months in terms of interaction-attachment, examines if a child maintains brief eye contact during feeding, if the child shows differing responses to a caregiver's vocalizations, if the child's crying diminishes with adult eye contact, if the child smiles purposefully in response to a caregiver's face or voice, along with many other aspects of communication and interaction.

Similar to the CDI, the *Rossetti* is an assessment tool available to clinicians, but not parents. However, clinicians can use the scale to learn more about the child's level of skills via parental report. In turn, the results from the assessment can be used to show areas where intervention may be warranted.

Chapter 3: Literature Review

The goal of this chapter is to examine existing literature in the areas of communication output development, language comprehension development, cognition development, social-emotional development, and motor development in typically developing children from birth to 24 months. In this chapter, a literature review is conducted with the papers gathered via searches. Each paper reviewed was analyzed by the author's purpose, methods, and results. Each developmental domain has a compilation of literature to provide a comprehensive outlook on how previous research has impacted the development of milestone checklists. Additionally, when necessary, the results of a study are presented for the reader after a summation of the research questions and methods.

The existing literature will be presented under each domain and divided into subdomains when necessary. For example, communication output has several subdomains that will be presented to the reader under the major domain of "Stages of Communication Output Development." The information will be presented one paper at a time, including a summation of the purpose, methods, and results. In certain situations, additional results will be presented to the reader in a table.

STAGES OF COMMUNICATION OUTPUT DEVELOPMENT

Communication output refers to gestures, babbling, prelinguistic vocalizations, expressive language/vocalizations, and discourse. Each subdomain is divided within this section and includes a literature review based on typical development.

Gestures

Gestures serve as a mode of communication, especially for young children, which enhance language development. "Gestures are actions produced with the intent to communicate and are typically expressed using the fingers, hands, and arms, but can also include facial features and body motions," (Crais et al., 2004). Crais et al., (2004) describe deictic gestures, gestures used to establish reference by calling attention to or indicating an object or event, and representational gestures, gestures that establish reference and indicate a particular semantic content. Furthermore, Crais et al., (2004) indicate that representational gestures can be broken into object-related or symbolic gestures, gestures that signify some feature or referent, and conventional gestures, gestures that are culturally defined and are used socially, but have no specific object represented. Crais et al. (2004), go on to define contact gestures, gestures that require contact between a child and an object or caregiver, and distal gestures, gestures that require no contact with the caregiver or object.

Crais et al. (2004) briefly reviewed previous research compiled on gestures in order to set the stage for the current study in which the development of deictic and representational gestures was tracked for 12 typically developing children, ages 6 to 24 months. The participants included 12 infant-parent dyads, with an equal number of boys and girls (six each). Each participant was a typically developing, Caucasian, from a monolingual, middle-class family. In addition, eight of the children were firstborns, while four were not. Crais et al. (2004) used the *Bayley Scales of Infant Development-II* (Bayley, 1993) along basic case history information to determine that all children demonstrated age-appropriate skills.

To document gesture development, Crais et al. (2004) used the Gesture Recording Forms (GRFs), focusing on requesting objects, requesting actions, and protesting to

regulate behavior, commenting and requesting information to gain joint attention, and representational gestures, attention seeking, and social games to gain and maintain social interaction. For the current study, Crais et al. (2004) classified a gesture as a behavior of which was directed toward an adult and served one of the three previously mentioned communicative functions.

To gather gesture development data, researchers (the authors along with speech-language pathology graduate students) followed the children through monthly 45 to 60 minute home visits. During the monthly visits, Crais et al. (2004) focused on discussing changes in the child's behavior, reviewing the current GRF, providing and discussing the next two months of the new GRF, documenting and videotaping the child's behaviors, eliciting and videotaping any parent-reported behaviors, and gaining parent feedback about the GRF.

The study revealed high congruence between parents and researchers on the GRFs, ranging from 85% to 95% agreement. Crais et al. (2004) also report high inter-observer reliability (97%), as well as high inter-researcher agreement (all categories above 94%). Additionally, the authors did not find statistical differences across gender; thus, it can be assumed that gestures for boys and girls emerge at relatively the same age-range. Compared to previous studies, the results yielded from Crais et al. (2004) indicate similarities as well as differences from previous research. Further results can be found in Table 3.1. It is important to note that Crais et al. (2004) used a rather small population sample of similar cultural backgrounds, which is important to take into account when using the gestural milestones with populations of diverse backgrounds.

Table 3.1 Overview of Gestures in Typically Developing Children.

Milestone	Description	Average Age Emergence	Age Range of Emergence
Declarative giving	Giving an object to comment.	9.33 months	8 to 11 months
Pointing to request objects	Pointing to an object that is wanted.	10.64 months	9 to 12 months
Pointing to comment	Pointing to an object or person to comment on.	10.75 months	9 to 14 months
Using words to comment	Using words to comment on a person or object.	11.42 months	8 to 15 months
Imperative giving	Giving an object to request.	11.91 months	11 to 14 months
Words to seek attention	Using words to gain attention.	11.92 months	10 to 15 months
Requesting objects	Using words to request an object.	12.58 months	9 to 14 months
Requesting actions	Using spoken language to request an action.	13.17 months	11 to 15 months
Pointing to request actions	Using the gesture of pointing to request an action.	13.58 months	11 to 18 months
Rising intonation at the end of a word to request information	Using a rising intonation to request information.	14.00 months	9 to 17 months
Pointing to request information	Using the gesture of pointing to request an object.	14.42 months	12 to 16 months

Table 3.1 (continued)

Protests	Pushing away food, toys, or saying, "no."	14.42 months	10 to 18 months
Initiating social games	Initiation of a social game, such as peek-a-boo, hide and seek, or patty cake.	15.25 months	11 to 21 months
Acknowledging questions produced by others	Showing an understanding that another person asked a question.	15.92 months	11 to 19 months

Crais et al., 2004.

Capone and McGregor (2004) reviewed literature examining three types of manual gestures, deictic, symbolic play schemes, and representational, and the relationship the gestures pose for the development of early language. The authors state that early gestures serve to obtain and maintain attention and communication with adults in order to establish language-learning opportunities and also enhance language development. Furthermore, they note that gestures serve several functions: communication, compensation, and transition to spoken language. Gestures are one of the most consistent early indications of intentionality and provide a view into the development of early communication skills (Capone & McGregor, 2004; Crais et al., 2004).

According to Capone and McGregor (2004), the developmental course of gestures begins when an infant shows-off, followed by using objects as a means of obtaining others' attention. However, the use of gestures is in itself a milestone, taking an infant into the use of deictic gestures, such as showing, giving, and pointing. Deictic gestures are also referred to as prelinguistic gestures or performatives, as they occur prior to

expressive language. Importantly, certain gestures, such as pointing, are continually used throughout development. Capone and McGregor (2004) report that showing, giving, and pointing in a predictable sequence around ten months of age. Around 11 months of age, showing, pointing, and giving occur more frequently, and at this time, reaching and emotive gestures also begin.

Additionally, ritualized requests, such as reading with an open-close grasping motion, appear between the ages of 9 and 13 months. It is around 12 months of age that recognitory gestures or play schemes appear. These gestures in particular are actions carried out on an object that depict the object in terms of its function. Before an infant reaches an expressive vocabulary of 25 words, representational gestures appear, which are not instrumental like play schemes, but carry meaning in their form to symbolize a referent and stay consistent through various contexts.

Furthermore, Capone and McGregor (2004) analyzed previous studies suggesting that pointing when accompanied by eye contact with another individual, such as an adult, function to seek confirmation or approval prior to spoken naming. In addition, single gestures and gesture-word combinations produced at 16 months of age are correlated with vocal production at the age of 20 months. Specific results on gestural development compiled from Capone and McGregor's (2004) literature review can be viewed below in Table 3.2.

Table 3.2. Additional Overview of Gestures Found in Typically Developing Children.

Milestone	**Description**	**Age Range of Emergence**
Showing	Deictic gesture/prelinguistic gesture/performative.	10 to 13 months
Giving	Deictic gesture/prelinguistic gesture/performative.	10 to 13 months

Table 3.2 (continued)

Pointing	Deictic gesture/prelinguistic gesture/performative; continued use throughout development.	10 to 13 months
Ritualized request	Reaching with an open-close grasping motion, placing an adult's hand on an object to request setting it in motion, or pulling at an empty hand to obtain something.	10 to 13 months
Point predicts first words	Spontaneous extension of index finger toward an object or event outside of immediate proximity while accompanied by eye contact with another individual.	10 to 13 months
Eye contact	Simultaneously looking at another individual with intent.	10 to 13 months
Joint attention	Not defined.	10 to 13 months
Turn-taking	Not defined.	10 to 13 months
Representational gestures/ play schemes	Actions carried out on an object and depict the object in terms of its function.	12 to 13 months
First words emerge	The time at which a child's first word(s) emerges.	12 to 13 months
Gestures as a complementary function to spoken forms	Use of gestures to complement spoken words.	12 to 13 months
Gesture or vocal preference	Preference is shown for use of gestures or use or words.	15 to 16 months

Table 3.2 (continued)

Spoken-word preference	Preference is shown for use of words over gestures or other ways of obtaining wants and expressing self.	18 to 20 months
Gesture-plus-spoken combinations	Not defined.	18 to 20 months
Increase in words	Total number of words increases.	18 to 20 months
Increase in pointing in combination with spoken words	Use of pointing while speaking increases.	18 to 20 months
Transition to empty-handed schemes	Not defined.	18 to 20 months

Capone & McGregor, 2004.

Babbling

A child's babbling is defined as a systematic expression of rhythmic syllables with the possibility that some vocalizations are related to the development of a child's speech capacity (Oller, Wieman, Doyle, & Ross, 1975). More specifically for this specific study, Oller et al. (1975) defined babbling as consisting of at least one syllable with a consonant and vowel in which the child was not crying, laughing, etc. MacNeilage, Davis, and Matyear (1997) also report that infants favor the consonant-vowel syllable sound pattern. Oller et al. (1975) examined recordings of babbling collected in the Seattle area, lasting between 30 minutes to one hour in length. The sample population consisted of around 50 typically developing children between four months of age and 13 months of age. Due to sampling errors, such as children crying, not

talking, or collection error, such as poor recording signal, the number of tapes selected for the overall study was lessened. Oller et al. (1975) examined recordings from five children between the ages of 12 months and 13 months, and five children between the ages of six months and 8 months.

Oller et al. (1975) specifically analyzed speech-like utterances, including acoustic and articulatory approximations of consonantal elements, which occur in meaningful child speech. Oller et al. (1975) found that 90 percent of the time in babbling, children produced consonant singletons in place of consonant clusters. Additionally, children tended to show a preference for unaspirated sounds over aspirated stops, and Oller et al. (1975) also reported that most final consonants in babbling are unvoiced. The samples from the children also showed that initial stops were more common than fricatives and affricates, and that prevocalic glides were more common than prevocalic liquids.

MacNeilage et al. (1997) conducted a data analysis to determine if the increase in labials in infants' first words represents the simpler speech-like form, if there are any changes in overall organization of sound patterns in the first words, and the development of vowels between babbling and first word production. MacNeilage et al. (1997) examined four subjects from a previous study conducted from two of the researchers in the study at hand, which involved 152 hours of recordings. Specifically, MacNeilage et al. (1997) analyzed all speech-like canonical babbling and word forms, where a "word" was considered to be when a child's vocalization had a clear referent in the environment as agreed upon between the child's parent and the researcher. In addition, MacNeilage et al. (1997) analyzed the data for the frequency of consonant singletons in labial and alveolar positions, the frequency of vowels in first and second syllables of monosyllables and disyllables, and the frequency of reduplication and variegation in utterance strings for consonants and vowels.

MacNeilage et al. (1997) found that of the four subjects, three of them produced more than twice the number of labials (i.e. p, b, m, and w) as alveolars (i.e t, d, n, and j) in the production of their first words. During the babbling stage, three of the subjects produced more alveolar sounds, while the remaining subject produced nearly equal amounts across categories. MacNeilage et al. (1997) also found that all of the subjects increased the number of vowel types used from babbling to speech, that is vowels that are not produced in the lower left quadrant of the vowel space, typically in the final word position. Additionally, the authors found that all four subjects produced fewer syllable pairs that were reduplicated in their first words. The subjects also produced more other vowels in their first words than in babbling (MacNeilage et al., 1997). While MacNeilage et al. (1997) only used four subjects in the study, it is important to remember that over 150 hours of tape were analyzed.

Prelinguistic Vocalizations

Bates et al. (1979) reported that children communicate intentionally for a number of reasons through prelinguistic vocalizations. Furthermore, Bates et al. (1979) remarked that intentional communication emerges during the prelinguistic stage, in which a child purposefully uses a particular signal to have a preplanned effect on another person. Babies coo by the age of eight weeks, produce consonant-vowel combinations between six and eight months, and produce single words by one year (Hagan et al., 2008). Between 12 and 18 months, children move from sound imitation and babbling, to acquiring several meaningful words and through repeated use, infants are taught how to use words to communicate. Furthermore, Hagan et al. (2008) reports that around 18 months of age, children learn on average, nine new words per day. By 24 months of age,

children typically speak in two-word phrases, using noun-verb phrases (Hagan et al., 2008).

Wetherby et al. (1988) investigated intentional communicative behaviors in typically developing children during the prelinguistic stage or development. Specifically, Wetherby et al. (1988) examined the rate of intentional communicative acts during a 30 minute communication sample with a clinician, if the children displayed communicative acts that served as behavior regulation, social interaction, and joint attention, what percentage of communicative acts served as behavior regulation, social interaction, and joint attention, what percentage of communicative acts were initiated by the children, what percentage of communicative acts were in response to a clinician's speech, what percentage of communicative acts were gestural versus vocal, and what percentage of vocal communicative acts were of syllabic shapes.

Wetherby et al. (1988) enrolled 16 Caucasian children from Tallahassee, Florida in the study who had an age appropriate receptive and expressive language no more than four months behind their chronological age, had normal hearing with no more than two each infections, were between the ages of 11 and 14 months, were full-term babies, were raised in a monolingual English-speaking home, and had an age appropriate mean length of utterance (MLU) no more than one standard deviation behind their age. Additionally, the sample consisted of eight boys and eight girls, with four subjects falling in each monthly age interval.

Each child took part in four 30-minute communicative behavior samples, each obtained over the course of a year's time. Two samples were conducted while the child was in the prelinguistic stage, one sample was conducted during the one-word stage, and one sample was conducted during the multiword stage. Each session took place in a therapy room at the Speech and Hearing Clinic at Florida State University, with the

parents present. One graduate clinician interacted with the children during the prelinguistic stage samples, another for the one-word stage samples, and a third for the multiword stage samples. During the communicative behavior samples, 15 minutes consisted of a structure context in which the clinician presented a series of situations to entice child-initiated communicative acts. The remaining 15 minutes, the child was presented with toys and allowed to initiate play as part of the unstructured context.

To analyze the data obtained from the study, Wetherby et al. (1988) separated the sample population between the seven younger children and the eight older children, and also combined the children together for overall analyses. The authors report that linguistic abilities came increasingly more variable as the children increased in age. Additionally, 13 of 15 children did not use words during the prelinguistic stage and only used single-word utterances during the one-word stage. Based on the children's lexicons, 11 of the children did not use words during the prelinguistc stage, while two of them at single protowords, and two others had six to eight words in their lexicons. Wetherby et al. (1988) also report that 11 subjects used at least one word during the one-word stage, but by parental report measures, all of the children in the study used two or more words. Each child's lexicon was variable at the multiword stage and corresponded with Brown's Stages using measures of MLU. Thirteen of the subjects increased their rate of communication from the prelinguistic stage to the one-word stage and all 15 children in the study increased their rate of communication from the one-word stage to the multiword stage (Wetherby et al., 1988).

Wetherby et al. (1988) also analyzed communicative functions. Fourteen of the subjects showed communicative acts for behavioral regulation, social interaction, and joint attention during all three stages of language development. Furthermore at each language stage, all children in the study used at least three different acts of behavioral

regulation and joint attention. They also report that acts containing gestures only and vocal means only decreased at each language stage. It was also noted that during the prelinguistic stage, approximately half of the children used acts that had both gesture and sound as the most frequent means of communication; however, this increased from the prelinguistic stage to the one-word stage for nearly all of the children in the study. At the multiword stage, Wetherby et al. (1988) found that children decreased the use of gestures combined with sounds, while there was an increase in the use of acts using only words. Furthermore, by the multiword stage, all of the children in the study used verbal acts as their means of communication in isolation or with gestures. Intelligibilty was also found to increase from 0% to 94% across the sample (Wetherby et al., 1988).

While Wetherby et al. (1988) provide measures regarding normal communication development at three main points in the developmental sequence, it is important to remember that only 15 children took part in the study. It is also important to understand that the children may have felt more comfortable during the second and third sample periods, as they were more familiar with the situation from the first sample. However, Wetherby et al. (1988) found that the rate of communication increased with age and language abilities; displaying one act per minute at the prelinguistic stage, two acts per minute at the one-word stage, and five acts per minute at the multiword stage. Further results can be found in Tables 3.3 and 3.4 below.

Table 3.3. Communicative Behaviors Seen in Typically Developing Children.

Communicative Function	**Definition**
Behavior Regulation- Request Object	Acts used to demand a desired tangible object.
Behavior Regulation- Request Action	Acts used to command another to carry out an action.

Table 3.3 (continued)

Behavioral Regulation- Protest	Acts used to refuse an undesired object or to command another to stop undesired action.
Social Interaction- Request Social Routine	Acts used to command another to start or continue carrying out a game/social interaction.
Social Interaction- Showing Off	Acts used to attract another's attention to oneself.
Social Interaction- Greeting	Acts used to indicate notice or another's presence or to signal initiation or termination of an interaction.
Social Interaction- Calling	Acts used to gain attention of another.
Social Interaction-Acknowledgement	Acts used to indicate notice of another's previous statement or action; involves focusing attention on other person.
Social Interaction- Request Permission	Acts used to seek another's approval to carry out action; involves carrying out or wanting to carry out action.
Joint Attention- Comment	Acts used to direct another's attention to an object or event.
Joint Attention- Request Information	Acts used to seek information or clarification about an object, event, or previous utterance; includes wh- questions and rising intonation.
Joint Attention- Clarification	Acts used to clarify child's previous utterance.

Wetherby et al., 1988.

Table 3.4. Percentage of Acts by Category of Communicative Functions at Each Language Stage

Communicative Function	**Prelinguistic Stage**	**One-Word Stage**	**Multiword Stage**
Behavior Regulation- Request Object	5.81	9.78	13.41
Behavior Regulation- Request Action	25.19	26.33	19.11
Behavioral Regulation- Protest	4.74	5.53	11.11
Social Interaction- Request Social Routine	7.04	10.53	1.12
Social Interaction- Showing Off	1.93	2.57	3.42
Social Interaction- Greeting	7.11	6.25	.51
Social Interaction- Calling	0	0	.13
Social Interaction-Acknowledgement	0	0	3.24
Social Interaction- Request Permission	0	0	1.55
Joint Attention- Comment	48.98	39.18	37.73
Joint Attention- Request Information	0	0	4.17
Joint Attention- Clarification	0	0	4.42

Wetherby et al., 1988.

Expressive Language/Vocalizations

In regards to expressive language, a positive correlation by 18 months was found with a child who used declarative gestures without gaze alternation at nine months. Beuker et al. (2013) also found a positive correlation between directing attention by the

use of gestures with gaze alternation at nine months and expressive vocabulary at 12 months.

According to Bakeman and Adamson (1984) early language develops through social contexts when infants and adults interact with one another through objects. Newland, Roggman, and Boyce (2001) argues that mother-infant interaction during play is linked to developing infant language because during the first and second year of life, play between mothers and infants becomes more complex, mutual, and extensive, while language and communication becomes more effective, reciprocal, and verbal. Additionally, play provides mothers and infants with a context to attend to the same object or objects, which is important when learning language and also allows for mothers to encourage their infant to use words and gestures to express themselves (Newland et al., 2001). Furthermore, mothers direct and encourage attention towards objects, allowing infants to explore objects, creating a larger productive vocabulary (Bornstein & Tamis-LeMonda, 1990).

A higher level of infant play corresponds with infants' expressive language and play is encouraged by maintaining attention toward toys, introducing new toys, and responding to an infant's lead in play (Tomasello & Farrar, 1986). It is also important to note that when a mother and infant are interacting in play, they coordinate their attention and actions to the toys, which contributes to language learning. Tomasello and Farrar (1986) note that language is also fostered when mothers and infants are interacting in a joint attention task, since speaking occurs more frequently.

Newland et al. (2001) examined two sets of mother-infant dyads to determine age changes between 11 and 17 months during mother-infant interactions with toys and the effect on language development. Additionally, the authors aimed to clarify the relation between mother-infant toy play and emerging language and wished to assess infant

language abilities based upon maternal and infant contributions on toy play. The first set of individuals used in the study consisted of 98 mother-infant dyads, which included 52 sons and 46 daughters. This group was assessed at 11 months of age and again at 14 months of age.

However, it is important to note that Newland et al. (2001) was only able to collect longitudinal data on 83 mother-infant dyads, as some infants did not return at the 14 months mark for various reasons such as declining to return, not being invited to return because of incomplete data at 11 months, technical problems, crying, incomplete language data, and short taped sessions. The second set of individuals used in the study consisted of 70 mother-infant dyads, which included 37 sons and 33 daughters. The group was assessed at 14 months of age and again at 17 months of age. However, it is important to note that Newland et al. (2001) was only able to collect longitudinal data on 51 mother-infant dyads as some infants did not return at the 17 month mark because they were not asked to return to due incomplete data at 14 months or declining to return.

During each visit, the mother-infant dyads were videotaped in a playroom for ten minutes. Each child played on the floor with preselected toys while the mothers sat in a chair to complete a questionnaire (Newland et al., 2001). Unlike later studies discussed in this paper, Newland et al. (2001) allowed the mothers to respond to the child. To assess each child's language abilities, each child was administered the language items on the Bayley Mental Development Index, specifically all items in the set for each age period (Bayley, 1969). From the language scores, a Total Language Score was generated for each child at each age, which reflected the number of items passed on the Bayley (Bayley, 1969). To examine social play, Newland et al. (2001) looked at initiations, responses, manipulations/labels, coordinations, and directing during the free play sessions. Additionally, each social toy play was examined for the frequency of mutually

exclusive sequences of social toy play behaviors in 15-second intervals. The measures were then turned into composite scores where frequency and proportion measures were taken into account.

Newland et al. (2001) found that between 11 and 14 months of age, infants increased in the frequency of social toy play behaviors, specifically the frequency of initiations, responses, and manipulations/labels increased. Additionally, mother's increased their frequency of initiations and responses, but not maternal directing. Between 14 months of age and 17 months of age, Newland et al. (2001) found that both infants and mothers increased the frequency of initiations, responses, and manipulations/labels; however, these changes were not found to be statistically significant. Newland et al. (2001) also found a correlation between the frequency of maternal responses, manipulations/labels, and the proportions of maternal coordinations at 11 months were associated with infant language at the 14-month mark. Additionally, Newland et al. (2001) reported associations between mother and infant responses and manipulations/labels with infant language at 14 months, and also an association between maternal coordinations at 14 months and infant language at 17 months. At 17 months, Newland et al. (2001) found an association between maternal and infant initiations with infant language. Newland et al. (2001) also concluded that infants increased initiations in play while mothers increased turn taking by coordinating their interactions with their child. Newland et al. (2001) also pointed to the fact that infant language can be influenced immediately during play or at later points in time. A developmental shift toward more frequent infant initiation and increasingly reciprocal maternal responses was also noted, which appears to be related to language acquisition (Newland et al., 2001).

While Newland et al.'s (2001) results show a correlation between play and language, it is important to remember that the sample size was not large. Furthermore,

the longitudinal data was not available for all study participants, lowering the overall sample size. The sessions in which the infants played were also relatively short in length. However, Newland et al. (2001) did find that infant language is impacted by maternal interactions during play, which shows not only an effect on cognition, but also expressive language skills.

According to Vallotton and Ayoub (2011), self-regulation is impacted by language development, as vocabulary is a predictor of self-regulation abilities. They (2011) examined whether a child's expressive language skills influenced self-regulation and if language at the age of two years predicts the trajectory of self-regulation. Vallotton and Ayoub (2011) also examined the effect of gender on self-regulation and those gender differences as explained by language differences. Vallotton and Ayoub (2011) analyzed data collected by the National Early Head Start Evaluation Study (Administration for Children and Families, 2002). In particular, Vallotton and Ayoub (2011) examined talkativeness, the total number of word tokens a child speaks during a given time, and spoken vocabulary, the number of unique vocabulary words a child speaks during a given time.

The data used by Vallotton and Ayoub (2011) included 146 children and mothers from the Early Head Start (EHS) study conducted in 2002 (Administration for Children and Families, 2002). The data included baseline data from when the children entered the EHS study and when the children were 14, 24, and 36 months of age. The majority of the children in the study were White, followed by African American, Hispanic, and other. Furthermore, the majority of the children also spoke English as their first language and a large portion of the children came from low-income (below poverty level) homes. During the EHS study (Administration for Children and Families, 2002), the mother-

child dyads were videotaped in the home for ten minutes while interacting in a semi-structured play task, using toys from three bags of age-appropriate toys.

Vallotton and Ayoub (2011) measured the child's spoken vocabulary, as the number of unique vocabulary words used during the interactions, while the child's talkativeness was the total number of words spoken during the interactions. Self-regulation and cognition were both scored using the *Bayley MDI* (Bayley, 1993). Through examination and coding of the EHS study (Administration for Children and Families, 2002), Vallotton and Ayoub (2011) found that at the age of 14 months, boys and girls had the same level of self-regulation, but from 14 months to 24 months of age, girls' ability to self-regulate rises, while boys' declines until the age of 24 months. To examine whether or not language skills affected self-regulation, Vallotton and Ayoub (2011) examined the association between language and self-regulation development, specifically language skills at 24 months. Furthermore, talkativeness and vocabulary were both related to a child's self-regulation, but when tested together in the same model, vocabulary was only found to affect self-regulation. This shows that as a child's language skills increase, the effect of the vocabulary affects self-regulation (Vallotton & Ayoub, 2011).

Vallotton and Ayoub (2011) also wanted to determine whether or not vocabulary at 24 months of age predicted a rate of change in self-regulation, to which it was reported that there is an effect specific to gender. While Vallotton and Ayoub (2011) reported that girls have greater self-regulation skills along with a greater vocabulary, there was a negative impact on vocabulary and self-regulation skills for boys. At 24 months of age, vocabulary had a strong positive effect on self-regulation skills for girls, but this does not hold true for boys. Vallotton and Ayoub (2011) found that vocabulary at 24 months of age does not have a strong effect on self-regulation skills for boys; however, there is an

interaction between gender, age, and vocabulary at 24 months of age for boys, which predicts the difference between self-regulation skills in boys later in development.

While Vallotton and Ayoub (2011) found that language skills assist children in regulating behavior, it is important to recall that in comparison to other research discussed throughout this report, the authors used data from lower SES families, and while the population size was larger than others, this study differs in this aspect. On the same note, it is important to realize that Vallotton and Ayoub (2011) found that language does impact behavior regulation, even for children from a lower SES background, showing that this is likely to hold true for children not living at the level of poverty. Because Vallotton and Ayoub (2011) also found a difference between genders, speech-language pathologists need to be aware of possible gender differences when assessing and monitoring expressive language skills and behavior regulation in children, specifically that boys may have less ability to self-regulate themselves.

STAGES OF LANGUAGE COMPREHENSION DEVELOPMENT

Language comprehension refers to the understanding of language-based input from various speakers in the environment. Language comprehension is also referred to as an understanding of what is seen in the environment. Furthermore, receptive language, a child's ability to understand communication is classified as part of language comprehension (Guestaferro et al,, 2013; Wilks et al., 2010; Hagan et al., 2008).

During 12 and 18 months of age, infants begin to show an increase in comprehension skills, such as the command of, "say bye-bye," along with names of familiar people and objects. By 18 months of age, children understand simple questions (Hagan et al., 2008).

Bruner (1977) also accounts for coordinated actions with objects during familiar routines in assisting infants with establishing shared meanings, which in turn facilitate language learning. With the coordination of objects, when one person offers an object and the other takes it and returns it, the structure and function of a conversation is represented, although no language was used (Newland et al., 2001). These early interactions between infants and adults involve turn taking, looking, nonverbal vocalizing, expressions, and gestures (Newland et al., 2001). Together, specifically when objects are added into interactions between mother-infant dyads, infants begin to understand object labels during conversation (Newland et al., 2001).

Beuker et al. (2013) also reported that sharing attention at eight months showed a positive relationship with receptive vocabulary at 18 months. Additionally, following attention within the visual field at 10 and 11 months showed a positive relationship with receptive vocabulary at 18 months. Receptive language correlations were also found at 18 months when children showed following attention within the visual field at 10 and 11 months and when children showed following attention outside the visual field at 14 months. Furthermore, Beuker et al. (2013) concluded that the early a child showed sharing attention and following attention, inside and outside of the visual field, the larger a child's receptive vocabulary by 18 months. Additionally, a child who used declarative gestures without gaze alternation at 10 months showed a positive correlation with receptive vocabulary at 12 months. Beuker et al. (2013) also found a positive correlation between directing attention by the use of gestures with gaze alternation at nine months and receptive vocabulary at 12 and 18 months.

Benedict (1979) conducted a longitudinal study of eight children, four boys and four girls, examining the first words understood and produced. Each of the children was a first-born child from a middle-class white English speaking family from the New

Haven area. Each child had both parents living in the home who had received a minimum of a high school education, and had mothers who did not work more than ten hours per week outside of the home (Benedict, 1979).

In the first phase of the study, the children were visited in their homes bi-weekly for 45 to 90 minutes. All children at the beginning of the study were between 9 months of age and 10 months of age. During the first phase, three sessions focused on study procedures and a developmental examination, followed by 12 experimental visits, with six of the 12 sessions using commands to assess the child's comprehension, three of the 12 sessions were used for observation, and the remaining three of the 12 sessions were used for special procedures. A final session was conducted to administer the *Bayley Scales of Infant Development* (Bayley, 1969).

The second phase of the study began when the children were one year and five months of age and concluded when the children were one year and nine months of age, or had an MLU exceeding 1.10, or when the child reached two years of age. Benedict (1979) conducted two sessions each month, with the first session being an observation session, and the second a session to test comprehension. These sessions also lasted between 45 and 90 minutes in length. During this second phase, the sessions were conducted within five days of the child's monthly birthdate.

It is also important to note that Benedict (1979) conducted the sessions during the time of the day at which the child was most alert and rested. Each session began with a discussion with the mother and the mother submitted diary notes she had taken and reported anything out of the ordinary that had been going on in the child's environment. The diary entries from the mothers consisted of a record of the child's receptive and expressive language. Ad the children got older, the mothers filled out a word checklists consisting of only words the child understood. In order for a word to be classified as

understood, “the child had to show a clear, immediate and correct response to a given word, which must occur in the same word in more than one situation or occur to the word in a situation where the nonlinguistic information available did not duplicate the meaning of the word,” (Benedict, 1979, page 186). For example, if a child and mother were playing and the mother said, “Touch the block,” which was followed by the child touching the block, this showed that the child understood the word, “block.” The mothers also took note of the words their child produced, and words were considered as produced when the child used the word spontaneously with meaning, which was determined from the context of use (Benedict, 1979). After the first phase of the study, mothers began recording the comprehension of words on a checklist, while recording words produced in the diary until their child had an expressive vocabulary of 50 words.

Through the study, Benedict (1979) concluded that most children in the study understood 50 total words before producing 10 words, but ranged from 30 to 182 words understood at the 10 words produced mark. In addition, Benedict (1979) also found that there was a five-month gap between the time children understood 50 words and then produced 50 words, indicating that comprehension develops before production. Furthermore, the children comprehended an average of 22 to 23 new words each month (Benedict, 1979). In contrast, an average of only 9.09 new words were produced each month. Benedict (1979) concluded that these results indicate that language comprehension occurs prior to language production, and also occurs at a faster rate.

Benedict also compiled a system of categorization based upon the comprehension development of the words the understood and produced: nominal, action words, modifiers, and personal-social. From this classification system, it was found that 75% of the words comprehended and 69% of the words produced came from the general nominals and action word categories (Benedict, 1979). These word classes and the

number of words understood and comprehended can be found in Table 4.4 below. It is important to remember that while Benedict (1979) showed differences between language production and comprehension, the sample size was extremely small and all of the children came from middle-class families in which the mothers were home with the children and the fathers had well-paying jobs. Further information can be found in Tables 3.5 and 3.6 below.

Table 3.5. Definition of Semantic Categories.

Semantic Category	**Definition of Category**
Nominals	Words that refer to things
Nominals- Specific	Words that refer to only one exemplar category, and not limited to proper names (e.g. people, animals, objects).
Nominals- General	Words that refer to all members of a category.
Nominals- Animate	Words that refer to animate objects (people or animals).
Nominals- Inanimate	Words that refer to inanimate objects (e.g. toys, clothes, food).
Nominals- Pronouns	Pronouns (e.g. this, that, he, she).
Action Words	Words that elicit specific actions from the child or that accompany actions of the child.
Action Words- Social Action Games	Words that elicit one and only one action response involving no more than one specific object in a social game relationship (e.g. action games that involve motor responses such as clapping hands, or verbal games that involve a verbal response).
Action Words- Events	Words that elicit an action sequence or an activity (e.g. 'eat' with the response of getting into the high chair).

Table 3.5 (continued)

Action Words- Locatives	Words that require locating something or putting something in a specific location.
Action Words- General Action	Object-related (e.g. get, give, find); or non- object-related (e.g. dance, jump); or action inhibitors that are words that inhabit action (e.g. 'don't touch that').
Modifiers	Words that refer to properties or qualities or things or events.
Modifiers- States	States (e.g. all gone, hot).
Modifiers- Attributes	Attributes (e.g. big, pretty).
Modifiers- Locatives	Locatives (e.g. there, outside).
Modifiers- Possessives	Possessives (e.g. mine, hers).
Personal- Social Personal Social- Assertions	Words that express affective states and social relationships. Assertions (e.g. yes, no).
Personal Social- Social Expressive	Social expressive actions (e.g. bye-bye, hi).

Benedict, 1979.

Table 3.6. Overview of Words Comprehended and Words Produced Across Semantic Categories.

Semantic Category	**Number words Comprehended**	**Percentage Words Comprehended**	**Number Words Produced**	**Percentage Words Produced**
Nominals	221	56	248	61
Nominals-Specific	68	17	46	11
Nominals- General	153	39	202	50
Nominals- Animate	35	9	52	13

Table 3.6 (continued)

Nominals Inanimate	118	30	150	37
Nominals-Pronouns	3	1	8	2
Action words	144	36	75	19
Action words-Social action games	61	15	44	11
Action words-Events	3	1	Only occurred in comp.	Only occurred in comp.
Action words-Locatives	21	5	5	1
Action words-General action	59	15	26	6
Modifiers	12	3	40	10
Modifiers- States	9	2	18	4
Modifiers-Attributes	2	1	12	3
Modifiers-Locatives	0	0	7	2
Modifiers-Possessives	1	1	3	1
Personal-social	21	5	39	10
Personal-social-Assertions	8	2	36	9
Personal-social-Social Expressive	13	4	3	1

Benedict, 1979.

In order to examine the relationship between object reference type and lexical acquisition in children, Tomasello and Farrar (1986) conducted a lexical training study. To examine this relationship, Tomasello and Farrar (1986) examined ten middle-class children, six males and four females, between 14 months of age and 23 months of age, each producing at least several words.

To make the children comfortable with the researchers, initial warm-up visits took place at the children's daycare, which were followed by individual training and testing sessions. Each child participated in four training sessions, which were conducted two times per week for two weeks, followed by follow-up testing sessions two weeks following the last training session. Each session lasted between 15 and 20 minutes. For the training sessions, each child was assigned four unfamiliar objects for their age and matched phonological preferences as deemed by the parental interview. For example, a child may be trained and tested on a gauge, clip, bow, and wrench (Tomasello & Farrar, 1986).

Each of the four objects was assigned to one of the attentional strategy conditions, follow-in or direct; therefore, two objects were in each of the conditions. For the follow-in condition, the child engaged with the target object, with visual and tactile contact, and the experimenter talked to the child using a short sentence stressing the use of the object name (Tomasello & Farrar, 1986). In the direct condition, Tomasello and Farrar (1986) had the experimenter wait until the child was not engaging with any object so that the experimenter could hold up the target object and talk to the child in a sentence stressing the target object word. For each condition, the target word was used 50 percent of the time in the middle of the sentence and 50 percent of the time at the end of the sentence.

At the first session, the child was asked to name all four of the objects to ensure that the child did not know the target objects. Each session consisted of four trials of

each object, where the name of the object was modeled once, and the entire sequence was repeated an additional three times (Tomasello & Farrar, 1986). After the names of the objects had been modeled, the elicited production task was administered, in which the experimenter held up each object and asked what it was. If the child did not respond, the child was asked two more times. Next, the comprehension task was administered, in which the objects were placed side by side and the child was asked to give the experimenter each object as it was mentioned (Tomasello & Farrar, 1986).

Tomasello and Farrar (1986) found that there was no effect of the placement of the target word in the sentence in terms of the child's comprehension. While no difference was found for word placement at the sentence level, Tomasello and Farrar (1986) found that children comprehended the words better in the follow-in condition. At the follow-up tests, six of the seven children who returned for the follow-up testing had better comprehension scores, while the last child had the same score.

However, because the children in this study are relatively young, it is important to note that the children did not produce the words being taught, therefore, comprehension measures are only based upon the follow-in and direct conditions. It is also important to remember that Tomasello and Farrar (1986) used a very small sample size, which decreased in size at the follow-up testing. However, these findings show a child's ability to comprehend language, specifically their learning of new vocabulary words and the influence joint attention plays into that learning. Therefore, Tomasello and Farrar (1986) note that it is likely important for adults interacting with children to talk about the object the child is focused on, rather than attempting to redirect the child's attention.

STAGES OF COGNITIVE DEVELOPMENT

Cognition is referred to as a child's problem-solving abilities, such as learning to self-soothe or finding a hidden object. Play is also classified as part of cognition, which is the way a child interacts with the environment, and in turn, has an impact on a child's language development.

Crais et al. (2004), make note of Bruner's (1981) broad functions of communication that emerge during the first year of life, one of which is behavior regulation. Wilks et al. (2010) note that, "cognitive development is the foundation of intelligence," (pg. 364). Because there are no standardized tests to assess an infant's intelligence, assessing an infant's intelligence must be done through examining the child's problem-solving skills and language skills (Wilks et al., 2010).

Pragmatics

Pragmatics of language is described as an understanding of what is felt, said, and done, and what is unacceptable, not said or done (Greenspan & Shanker, 2007). Additionally, Bates et al. (1979) defines pragmatics as a tool used to accomplish certain social ends, which includes speech acts, acts of communication carried out when something is declared, commanded, questioned, cursed, or promised; presuppositions, the background information that is needed for a particular speech act to work; and conversational postulates, the principles governing conversations as a social activity. Throughout interactions with caregivers, children learn to read and respond to social and emotional cues of those in their environment and learn to communicate these on their own as well (Greenspan & Shanker, 2007). Children and caregivers interact through a back-and-forth reading and responding of social patterns, cultural norms, and rules and obligations, which all come together to teach a child about his or her family, community, and culture (Greenspan & Shanker, 2007).

Play

Bruner (1972) places great importance on early play in cognitive growth. Additionally, Belsky and Most (1981) believe that early individual differences in free play can be used to examine developmental status and predict later functioning. The authors also suggest that observing a child's free play can, in some instances, serve as a better assessment over standardized assessments as play involves motivation and cognitive skills as an "infant must define the problem, maintain a state of focused attention, and persist at the task," (PAGE 637).

Fenson, Kagan, Kearsley, and Zelazo (1976) examined the emergence of the ability to relate objects in play, when early symbolic play begins, and determine age differences in the sequence of behaviors. The authors examined 11 children at 7 months, 12 children at 9 months, 14 children at 13 months, and 20 children at 20 months of age; with close to or an equal distribution of boys and girls in each age group. Each child was observed in an interactive free-play session with the child's mother. The sessions took place in a clinic room and lasted 10 minutes in length for the children of 7 and 9 months of age and 20 minutes in length for children of 13 and 20 months of age.

At 7 and 9 months of age, the child played with a metal tea set, which included two cups, two saucers, two spoons, and a teapot (Fenson et al., 1976). At 13 and 20 months of age, the child played with the same tea set, but was also given a large bucket, two large dolls (one of each sex), a cowboy hat, five sponges, five wooden blocks in a can with a lid, and wooden rabbit in two pieces, a horseshoe magnet with a metal bar, and a broom (Fenson et al., 1976). During the session, the child's mother sat in a chair and read magazines, but was asked not to initiate interactions with the child, direct the child, and to minimize all responses to the child. It is important to note that the tea set was chosen for the play sessions because in pilot testing, the tea set elicited active interest in

children younger than one year of age and was easily manipulated by the children. Therefore, during the play sessions of the 13 and 20 months old children, only the segments involving the tea set were included in analyses.

Throughout the study, the authors examined three types of responses: relational acts, combining or relating of two objects, furthermore, relational acts were examined as acts involving appropriate relations between objects (accommodative relational acts), acts involving the relation between two objects in a not clearly appropriate manner (simple relational acts), and acts where two similar objects were combined (grouping); symbolic acts, actions such as eating, drinking, pouring, stirring, and spooning from one container to another; and sequential acts, when two or more successive responses occurred in a sequential order. Fenson et al. (1976) found the following trends when comparing means: children at 7 months of age banged objects together, but did not perform relational acts; children at 9 months of age engaged in simple relational acts and little accommodative relational acts; children at 13 months of age performed accommodative relational acts; children at 7 and 9 months of age did not exhibit symbolic acts, but were performed by nearly half of the children at 13 months of age, and all of the children at 20 months of age; and grouping and sequential acts were rarely seen through 13 months of age, but more commonly used at 20 months of age. Based on Fenson et al.'s (1976) results, it is believed that banging objects appears first in development, followed by simple acts, accommodative relational acts, symbolic acts, with behavior becoming more diverse and sequential. Further results can be found in Tables 3.7 and 3.8 below.

Table 3.7. Definitions of Common Play Milestones Seen in Typically Developing Children.

Milestone	Definition
Banging	Combining or relating two objects.
Simple Relational	Acts that involve associating two objects in another than clearly appropriate manner (e.g. touching the lid against the side of a cup).
Accommodative Relational	Acts that involve appropriate associations between objects (e.g. putting the lid on the pot).
Grouping	Combining two similar objects (e.g. two cups).
Symbolic Acts	Acts such as eating (not mouthing or chewing), drinking, pouring, stirring, and spooning from one container to another.
Sequential Acts	When two or more successive responses occurred in a sequential order.

Fenson et al., 1976.

Table 3.8. Age Range of Appearance of Play Milestones in Typically Developing Children.

Milestone	Age Range of Appearance
Banging	7 months to 20 months
Simple Relational	7 months to 20 months
Accommodative Relational	9 months to 20 months
Grouping	9 months to 20 months
Symbolic Acts	9 months to 20 months
Sequential Acts	7 months to 20 months

Fenson et al., 1976.

Belsky and Most (1981) examined 40 infants between the ages of 7.5 months and 21 months. Each group of children at 7.5, 9, 10.5, 12, 13.5, 15, 16.5, 18, 19.5 and 21 months contained four infants. Additionally, the children were equally split by gender, 20 males (9 firstborn and 11 later born) and 20 females (13 firstborn and 7 later born). The authors hypothesized a developmental sequence for exploration and play and chose to study this population. The sequence they proposed was that infants moved from mouthing, to simple manipulation, to functional, to relational, to functional-relational, to enactive naming, to pretend self, to pretend other, to substitution, to sequence pretend, to sequence pretend substitution, to double substitution.

All of the infants were visited in the home by the authors; one author narrated the child's activities and the other interacted with the mother to simulate an everyday life situation. After a brief warm-up period where the child played with warm-up toys, the child was provided with a set of toys which included a miniature baby bottle, a spoon, a hairbrush, two teacups, two saucers, a teapot, a female baby doll, four colored cylindrical sticks, a seashell, a rubber foam cube, two wooden clothespins, a wooden rattle, and a carnival-colored flatbed cart. While the toys were placed in front of the child, the mother was told to distract her child by ringing a small bell she was provided and at a given signal, the mother set the child on the floor to play with the toys. During this 15 minute time period, the child engaged in free play, the mother again distracted the child with the bell, while another set of toys was placed on the floor. The second set of toys included a miniature baby bottle, a female baby bottle, a car, a crib, a seashell, a male baby doll, an irregular shaped piece of green felt, a Fischer-Price Queen Buzzy Bee, a Fischer-Price Chatter-Telephone toy, and a large, handmade pegboard with three loose plastic donuts. Once the second set of toys was placed correctly, the mother set the child down on the floor where the child engaged in an additional 15-minute session of free play. During the

play sessions, the mother interacted with one of the authors and was told not to elaborate of initiate interaction with the child, but to respond to the child's bids.

In order to obtain credit for a play act, the child needed to perform a single instance of the act (Belsky and Most, 1981). Additionally, the authors determined that the sequence of play that was proposed for the study was valid and unidimensional, showing that through development, the levels of play proposed at the lower end of the scale occur before those at the higher end of the scale. Furthermore, they credited the errors in the proposed sequence to the fact that children may exhibit approximations of pretense play, which may disappear as other play routines are developed. Belsky and Most (1981) also concluded that the frequency of which mouthing and simple manipulation occurred declined across age groups, while all types of pretense play increased across age groups. It is important to note that in these findings, there was some variation among the children, which is to be expected; however, the data shows that some of the younger children in the study played at a higher level than some of the older infants. Additionally, it is important to take into account that the only sampled 40 children, with four children in each age group, from middle-class homes. Further results from Belsky and Most (1981) can be found below in Tables 3.9 and 3.10.

Table 3.9. Definitions of Play Milestones Seen in Typically Developing Children.

Milestone	**Definition**
Mouthing	Indiscriminate mouthing of materials.
Simple Manipulation	Visually guided manipulation lasting at least five seconds that cannot be coded for another category (e.g. touch and look at an object).
Functional	Visually guided manipulation that is appropriate for a specific object and involves the intentional extraction of some piece of information (e.g. spin wheels on cart).

Table 3.9 (continued)

Relational	Bringing together and integrating two or more materials in an appropriate manner (not a manner that is initially intended) (e.g. touch spoon to stick).
Functional-Relational	Bringing together and integrating two objects in an appropriate manner (a manner initially intended) (e.g. set cup on saucer).
Enactive Naming	Approximate pretense activity, but without confirming evidence of actual pretense behavior (e.g. touch cup to lip without making drinking sounds).
Pretend Self	Pretense behavior directed toward self in which pretense is apparent (e.g. raise cup to lip, followed by tilting cup to lip, followed by tilting the cup and making drinking sounds).
Pretend Other	Pretense behavior directed away from the child toward other (e.g. feed doll with spoon/bottle/cup).
Substitution	Using 'meaningless' object in a creative or imaginative manner (e.g. drink from seashell); using an object in a pretense act in a way that differs from how it was previously used by the child (e.g. use hairbrush to brush teeth after already having used it as a hairbrush on self or other).
Sequence Pretend	Repetition of single pretense act with minor variation (e.g. drink from bottle and give doll drink); linking together different pretense schemes (e.g. stir in cup then drink).
Sequence Pretend Substitution	Same as sequence pretend above, but using an object substitution within sequence (e.g. put doll in cradle then using green felt piece as 'blanket').
Double Substitution	Pretense play in which two materials are transformed, within a single act, into something they are not in reality (e.g. pretending stick is a person and seashell is cup and giving stick a drink).

Belsky and Most, 1981.

Table 3.10. Ages Play Milestones Reached for Typically Developing Children.

Milestone	Age of Highest Frequency	Age Range of Appearance
Mouthing	7 ½ months	7 ½ months to 21 months
Simple Manipulation	7 ½ months	7 ½ months to 21 months
Functional	13 ½ months	7 ½ months to 21 months
Relational	13 ½ months	7 ½ months to 21 months
Functional-Relational	15 months	9 months to 21 months
Enactive Naming	10 ½ months	9 months to 21 months
Pretend Self	21 months	12 months to 21 months
Pretend Other	21 months	13 ½ months to 21 months
Substitution	21 months	13 ½ months to 21 months
Sequence Pretend	21 months	13 ½ months to 21 months
Sequence Pretend Substitution	Not provided	15 months to 21 months
Double Substitution	Not provided	15 months to 21 months

Belsky and Most, 1981.

STAGES OF SOCIAL-EMOTIONAL DEVELOPMENT

Social-emotional development will be referred to as a child's ability to socialize with other children as well as a child's development of temperament. Furthermore, joint attention is classified as part of social-emotional development, which is when a child shares experiences about objects and events by directing and/or following the visual gaze of his or her social partners (Guestaferro et al., 2013; Mundy & Jarrold, 2010; Beuker et al., 2013).

As previously mentioned, Bruner's (1981) broad functions of communication are noted by Crais et al. (2004), one of which includes social interaction, such as acts used to gain or maintain the attention of another. Additionally, Bruner (1981) also identified joint attention, such as an act to direct another's attention to an object or event, as the last function of communication. Beuker et al. (2013) defines joint attention as the capacity to engage in coordinated interaction, including, sharing attention, following the attention of others, and directing the attention of another.

Infants interact differently with different people by the age of three months and show social referencing, such as looking to the mother and/or father in unfamiliar situations to figure our the appropriate response, by the age of eight months (Hagan et al., 2008). At eight months of age, an infant is also able to discriminate between familiar and unfamiliar people (Hagan et al., 2008). Additionally, it is noted that an infant's social awareness advances during the first 12 months, moving from crying when crying is heard to attempts to offer food, initiate games, and take turns.

Joint Attention

Carpenter, Nagell, and Tomasello's (1998) study provided a stable pattern of social-cognitive skills. Infants typically progress from sharing, to directing, to following another's attention and behavior. Furthermore, Tomasello (1995) reports that joint attention is considered to provide the foundation of shared experiences necessary for acquiring language. According to Bruner (1981), joint attention includes all acts used to direction another's attention with the purpose of sharing the focus on an object or event.

Beuker et al. (2013) conducted a study focuses on joint attention with the goal of establishing a developmental trajectory of joint attention skills, to investigate the developmental interrelations of joint attention skills and the size of receptive and

expressive vocabulary, and to assess whether infants who direct attention prior to following another's attention are engaging in a more communicative act and whether or not following or direction another's attention first affects vocabulary growth.

Beuker et al. (2013) examined 23 typically developing children in monthly intervals between the ages of 8 and 24 months. Specifically, the population consisted of 15 boys and 8 girls, whom were all 8 months old at the start of the study, with one child being 9 months old. Twenty-one of the children were Caucasian, with two children having a mixed families, representing African American and Asian. In addition, the majority of the children also came from a high socioeconomic family. All participants were chosen from the well-baby clinic based on a physician's input that they showed normal development in the areas of play, social behavior, communication, and did not present with a severe physical disability.

Throughout the study, home visits were conducted every month around the child's monthly "birthday." During these visits, standardized observation and a free-play session with the parent took place. The standardized observation consisted of a parent staying in the same room as the infant, but remaining out of sight of the child, and was used to study joint attention skills. The observation period took place with an experimenter sitting opposite of the child and sharing, following, and directing the attention of the child was provoked. Following attention consisted of following and point following inside and outside of a child's visual field. Directing attention consisted of a collection of imperative gestures and declarative gestures, with and without gaze alternation. The age of emergence (AOE) of specific skills was the age at which a child first showed the skill. To measure receptive and expressive vocabulary, Beuker et al. (2013) used the MacArthur Communicative Development Inventory: Words and Gestures, which was filled out by parents every four to six months.

Beuker et al. (2013) found the order of emergence from the entire sample population to be moving from checking behavior, to directing attention, to sharing attention, to following attention, to directing attention with gaze alternation, to following attention to outside the visual field, to using referential language. However, it is important to note that only 34.8% of individual infants, which indicates a large range of variability in developmental patterns of joint attention skills. Eighteen of the children in the sample population followed attention before directing attention with gaze alternation and the remaining five children showed the opposite pattern (Beuker et al., 2013).

Based on Beuker et al.'s, (2013) results, it is important to note that a large variation in the development of joint attention skills was found. However, the study revealed that between the ages of 9 and 15 months, is an important period for the emergence of early communicative skills. Beuker et al. (2013) also report that although children learn to use gestures early in life, children need additional time to coordinate gestures with gaze alternation, helping them to improve their communication skills. As mentioned in previous sections regarding language output and language comprehension, Beuker et al. (2013) found that early joint attention skills positively correlated with later language skills; however, early language skills did not in turn predict later joint attention development. Bruner (1983) reported that this advantage between early joint attention skills and later language development may be due to the fact that the infants with a greater ability to follow attention of a looker to an object may use the adult's gaze to identify an object and connect it with the language used by the adult.

It is important to take Beuker et al.'s, (2013) results with caution, as only 23 children were apart of the study. It is also important to note that Beuker et al. (2013) claimed to find an order of emergence from the entire sample population, but later stated that the pattern only emerged in 34.8% of the individual infants in the study.

Furthermore, the sample was not representative of infants being raised in lower socioeconomic households, or infants of various cultural backgrounds. Results from Beuker et al.'s, (2013) study can be found below in Tables 3.11 and 3.12.

Table 3.11. Overview of Joint Attention in Typically Developing Children.

Milestone	**Description**
Checking Behavior	Looking at adult without intention to share and/or not integrating object and other in one interaction.
Directing Attention Without Gaze Alternation	Attempting to direct attention of another to object without using gaze alternation between person and object.
Directing Attention Imperative	Attempting to direct behavior of another to object or situation without using gaze alternation between person and object.
Imperative Proximal (give)	Giving object to another.
Imperative Distal (point/reach)	Pointing or reaching for object in presence of another.
Directing Attention Declarative	Attempting to direct attention of another to object.
Declarative Proximal (show/give)	Attempting to direct attention of another to object by giving or showing.
Declarative Distal (point)	Attempting to direct attention of another to object by pointing.
Sharing Attention	Alternating gaze from adult to object and back to adult, or from an object to adult and back to object, with attention of share.
Following Attention	Not defined.

Table 3.11 (continued)

Gaze	Following gaze and correctly localizing objects gazed at within visual field.
Gesture	Following pointing gesture and correctly localizing objects pointed at within visual field.
Directing Attention With Gaze Alternation	Attempting to direct attention of another by alternating gaze between person and object.
Directing Attention Imperative With Gaze Alternation	Attempting to direct behavior of another to object or situation by alternating gaze between person and object.
Imperative Proximal (give) With Gaze Alternation	Attempting to direct behavior of another to object or situation by giving while using gaze alternation between person and object.
Imperative Distal (point/reach) With Gaze Alternation	Attempting to direct behavior or another to object or situation by pointing or reaching while using gaze alternation between person and object.
Directing Attention Declarative With Gaze Alternation	Attempting to direct attention of another to object using gaze alternation between object and person.
Declarative Proximal (show/give) With Gaze Alternation	Attempting to direct attention of another to object by showing or giving object to another while using gaze alternation between person and object.
Declarative Distal (point) With Gaze Alternation	Attempting to direct attention of another to object by pointing to object in presence of another while using gaze alternation between person and object.
Following Attention Behind	Not defined.
Gaze Behind	Following gaze and correctly localizing object gazed at outside visual field
Gesture Behind	Following pointing gesture and correctly localizing object pointed at outside visual field.

Table 3.11 (continued)

Referential Language	Production of spontaneous one or more referential words.

Beuker et al., 2013.

Table 3.12. Age Typically Developing Children Reached Joint Attention Milestones.

Milestone	**Average Age Emergence**	**Age Range Emergence**
Checking behavior	8.09 months	8 to 9 months
Directing attention without gaze alternation	8.43 months	8 to 10 months
Directing attention imperative	8.57 months	8 to 12 months
Imperative proximal (give)	12.26 months	9 to 15 months
Imperative distal (point/reach)	8.57 months	8 to 12 months
Directing attention declarative	10.74 months	8 to 13 months
Declarative proximal (show/give)	11.48 months	8 to 15 months
Declarative distal (point)	11.70 months	8 to 17 months
Sharing attention	8.48 months	8 to 10 months
Following attention	10.30 months	8 to 15 months
Gaze	13.17 months	11 to 18 months
Gesture	10.35 months	8 to 16 months
Directing attention with gaze alternation	11.57 months	8 to 20 months
Directing attention imperative with gaze alternation	12.17 months	8 to 20 months

Table 3.12 (continued)

Imperative proximal (give) with gaze alternation	13.57 months	9 to 20 months
Imperative distal (point/reach) with gaze alternation	13.13 months	8 to 21 months
Directing attention declarative with gaze alternation	13.00 months	10 to 19 months
Declarative proximal (show/give) with gaze alternation	14.26 months	10 to 19 months
Declarative distal (point) with gaze alternation	14.00 months	9 to 20 months
Following attention behind	13.09 months	12 to 16 months
Gaze behind	13.91 months	12 to 16 months
Gesture behind	13.39 months	12 to 17 months
Referential language	16.95 months	13 to 21 months

Beuker et al., 2013.

Tomasello and Farrar (1986) conducted a study observing 24, white, middle-class children between the ages of 12 months and 18 months, who were just beginning to learn and produce language. In particular, Tomasello and Farrar (1986) observed how children learned language during mother-child interactions when joint attention was a factor. The study also examined whether or not children would be encouraged to use longer sentences and if this correlated with mothers using shorter sentences. Additionally, Tomasello and Farrar (1986) examined whether or not joint attention and object naming were positively correlated, versus when object naming was used to redirect the child when distraction occurred.

The authors conducted two in-home, 15-minute sessions with each child at 15 months of age and 21 months of age. The sessions consisted of the mother-child dyads playing with a given set of toys. The mothers were also interviewed about their child's language use using the Bates et al. (1979) protocol. From the language interview, a list of vocabulary used by the child was created, which was computed as a measure of vocabulary size and how many object labels were in the child's vocabulary. Once the sessions were conducted, each session was coded for joint attention using the videotaped play session. They determined joint attention as the mother or child initiating interaction with the other, followed by the mother and child becoming visually focused on an object or activity for no less than three seconds, and at some point during the interaction, the child needed to direct an overt behavior toward their mother to ensure awareness of the interaction taking place.

In terms of language, Tomasello and Farrar (1986) examined the child's language use inside and outside of the joint attention episodes occurring during the 15-minute videoed play session, particularly, the number of utterances and the MLU for both the child and mother were coded. However, mothers' utterances were examined at an additional level based on the distribution of comments, questions, and directives used. For the children, total number of words and object labels per minute were also examined. At the mother-child dyad level, Tomasello and Farrar (1986) examined the number of conversations and the average number of turns the child took during the conversation. It is important to note that Tomasello and Farrar (1986) defined a conversation "as adjacent utterances on a common topic," (p. 1456).

To examine attention with association to maternal references to objects, Tomasello and Farrar (1986) defined a reference to an object as the object word receiving prosodic stress. Furthermore they were interested in whether or not the mother used the

object reference as a means to follow the child's focus versus attempting to redirect the child's focus. They also examined whether or not the mother used an accompanying gesture or nonverbal cue of her attention while using an object reference and also if the child focused on the object at the time of the object reference.

Tomasello and Farrar (1986) found that during the mother-child play sessions, two-thirds of their interaction time was spent inside joint attention, with the remaining one-third being spent outside joint attention. Furthermore, Tomasello and Farrar (1986) found that the average language measure, that is utterances per minute, MLU, words per minute, and object labels per minute for the children, where higher inside joint attention episodes at both 15 months of age and 21 months of age. The children also had a higher number of turns per conversation inside joint attention. Individually, 20 of the 24 children had more utterances and words per minute during joint attention, 16 children had more object labels, and 17 of 19 children had more conversations per minute as well as greater lengths of conversation while inside joint attention (Tomasello & Farrar, 1986).

Similarly, Tomasello and Farrar (1986) found that mother produced more utterances per minute inside joint attention, however had shorter MLUs inside those joint attention episodes. As a child moved from 15 months of age to 21 months of age, mothers used fewer comments and moved towards using more questions; however, the number of object references per minute mothers used showed no difference.

While Tomasello and Farrar (1986) report language effects during joint attention, they did not report a change in the time the mother-child dyads spent inside joint attention from the two age points. Therefore, it is concluded that joint attention scaffolds the child from the prelinguistic stage of language into using language. Additionally, the object references used in joint attention by the mothers were found to correspond with the child's language development, the authors hypothesized was due to the child's

heightened level of awareness while interacting in joint attention, as opposed to not partaking in joint attention when an object reference was made. Further results can be found in Tables 3.13 and 3.14 below.

Table 3.13. Child Language Measures Inside and Outside Joint Attentional Episodes at 15 Months.

Language Measure	**Inside Joint Attention**	**Outside Joint Attention**
Utterances Per Minute	1.0	0.6
MLU	1.2	0.9
Words Per Minute	1.2	0.8
Object Labels Per Minute	0.6	0.5

Tomasello & Farrar, 1986.

Table 3.14. Child Language Measures Inside and Outside Joint Attentional Episodes at 21 Months.

Language Measure	**Inside Joint Attention**	**Outside Joint Attention**
Utterances Per Minute	3.7	1.6
MLU	1.3	1.1
Words Per Minute	4.9	2.0
Object Labels Per Minute	1.8	0.8

Tomasello & Farrar, 1986.

Empathy

Empathy is defined as "a socio-emotional response that is induced by the perception of another individual's affective state…[entailing] feeling an emotion that is similar to the one likely experience by the other person," (Roth-Hanania, Davidov, & Zahn-Waxler, 2011, p. 448; Batson, 2009; Thompson, 1987). Within empathy, an individual may feel empathetic distress, which is when an individual feels discomfort similar to what the other person feels. From empathetic distress, empathetic concern may arise. Empathetic concern is also known as sympathy and can be defined as when a person remains focused on the distress of another and feels for him or her (Roth-Hanania, et al., 2011).

In order to examine the development of responses to distress, Roth-Hanania et al. (2011) examined children from 8 months of age to 16 months of age. Specifically, Roth-Hanania et al. (2011) wanted to know if sympathy, hypothesis testing, and prosocial behavior were absent during the first year, and if so, if they emerged shortly after the 24 month mark; if infants exhibit a self-distress reaction in response to distress stimuli, and if this self-distress response changes during after the 24 month mark; if there is variability in empathetic responses between children and if differences were present, did they predict later prosocial behavior later in life; and if gender differences are observed before the 24 month mark.

To answer the posed research questions, Roth-Hanania et al. (2011) examined 37 infants, 21 girls and 16 boys, and their mothers, from middle to upper socio-economic status. To assess the children, Roth-Hanania et al. (2011) used an accelerated-longitudinal design, splitting the children into three groups, of which were 8 months of age, 10 months of age, or 12 months of age at the beginning of the study. Each group was assessed at the beginning of the study and again at two and four months later.

Roth-Hanania et al. (2011) conducted each assessment in the child's home by a trained experimenter. During each visit, three episodes of distress were assessed. For the first episode of distress, the mother was told to pretend to hit her finger with a toy hammer and simulate distress for one minute. For the second episode of distress, the mother was told to walk towards the child and pretend to bump her knee into a piece of furniture and simulate distress for one minute. To simulate distress in each episode, the mothers were instructed to use a facial expression of distress, use vocal expressions of pain, such as crying, and rub the hurt area for at least 30 seconds, while avoiding eye contact with the child. For the remaining 30 seconds of the episode, the mothers were signaled to slowly stop their crying. When each episode was complete, the mothers were instructed to show the child that they were no longer hurting The two episodes were separated by 20 minutes, in which the infants engaged in other activities. Additionally, a third episode of distress took place when the child watched a one-minute video of an unfamiliar child crying. To watch the video, the child was situated in front of the family's television and free to move around.

Each assessment was videotaped and scored for concerned affect (e.g. facial, vocal, or gestural-postural manifestations), hypothesis testing (e.g. attempts to explore the distress and/or comprehend what is happening to the other person), distress (e.g. fear present for several seconds, facial grimacing with eyes wide and teeth barred, whimpering, or crying), and prosocial behavior (e.g. attempts to help or comfort the other person) (Roth-Hanania et al., 2011). Roth-Hanania et al. (2011) found that empathy was present before 24 months of age, showing that children were able to express empathy through facial expressions, vocalizations, gestures, demonstrate inquiring behavior, and attempts to comprehend the other person's state. However, at 8 months of age and 10 months of age, children did not demonstrate attempts to comfort or help the other person.

Roth-Hanania et al. (2011) did find that attempts to comfort the other person increased after 24 months of age, but this action was less frequent when the child in the video simulated distress.

It is important to remember that Roth-Hanania et al. (2011) sampled a small population of children all from middle to upper socio-economic backgrounds. Furthermore, while prosocial behavior was found occur less during the first 12 months, it increased during the second 12 months of life, and became more prominent at 16 months of age. With this finding Roth-Hanania et al. (2011) believe that prosocial behavior involves more advanced self-regulation, which as discussed earlier, corresponds with vocabulary development. Furthermore, prosocial behavior also requires motor skills, which may not be present until after 12 months of age. In regards to empathetic self-distress Roth-Hanania et al. (2011) found that children did not respond with self-distress to the distress of another, especially at 8 months of age and 10 months of age. Additionally, Roth-Hanania et al. (2011) did not find significant gender differences within their sample. Further results are shown below in Tables 3.15 and 3.16.

Table 3.15. Average Infant Responses to Distress for Maternal Simulations Across Ages.

Distress Simulation	**8 Months**	**10 Months**	**12 Months**	**14 Months**	**16 Months**
Concerned Affect	2.25	2.50	2.62	2.72	2.96
Hypothesis Testing	2.04	2.31	2.50	2.41	2.96
Prosocial Behavior	1.12	1.29	1.50	1.65	2.29

Roth-Hanania et al., 2011.

Table 3.16. Average Infant Responses to Distress for Distressed Peer Video Across Ages.

Distress Simulation	8 Months	10 Months	12 Months	14 Months	16 Months
Concerned Affect	2.17	2.29	2.32	2.59	2.67
Hypothesis Testing	2.00	2.25	2.28	2.54	2.50
Prosocial Behavior	1.00	1.08	1.20	1.23	1.25

Roth-Hanania et al., 2011.

STAGES OF MOTOR DEVELOPMENT

Motor development involves a child's physical development including both gross motor and fine motor movements (Guestaferro et al., 2013).

During the first three months of an infant's life, the infant interacts with his or her caregivers, whom provide opportunities for progressively more complex emotional interactions (Greenspan & Shanker, 2007). Along with these interactions, infants also acquire some motor control. Combining an infant's motor control with positive experiences created by caregivers, an infant begins to respond with actions, such as reaching towards a pleasurable touch and turning away from an unpleasant one (Greenspan & Shanker, 2007). As an infant continues to grow, reflexes move to become part of a sensory-affect-motor pattern, which is further strengthened by infant-caregiver interactions (Greenspan & Shanker, 2007). Specifically, Gerber et al. (2010) remarks that motor skills progress from cephalic to caudal, proximal to distal, and stimulus-based reflexes to goal-oriented reactions.

During the first year of life, an infant's gross motor skills change significantly with the ultimate goal of independent and volitional movement (Hagan et al., 2008;

Gerber et al., 2010). By 12 months, an infant gains head control, can roll, sit, crawl, push to a stand, cruise, and may walk (Hagan et al., 2008). Along with gross motor skills, fine motor skills are change dramatically during this time. Additionally, it is mentioned that hand-eye coordination, voluntary grasp and release, mid-line play, transferring an object from one hand to the other, shaping the hand to an object, inferior and superior pincer grasp, using fingers to point, self-feeding, and marking with a crayon are all skills attainable during the first 12 months of an infant's life (Hagan et al., 2008; Johnson & Blasco, 1997; Erhardt, 1994). Furthermore, fine motor skills are those that use the upper extremities to engage and manipulate the environment (Gerber et al., 2010).

Additionally, Iverson (2010) & Gerber et al. (2010) claim that changes in motor skills provide children with a larger and more diverse range of opportunities for acting in the world, which provide contexts for acquiring, practicing, and refining skills contributing to the development of communication and language.

Gerber et al. (2010) reports information on gross and fine motor skills. Gerber et al. (2010) also states that primitive reflexes develop during gestation and persist for a few months after birth, but as development progresses, the primitive reflexes are inhibited, allowing for purposeful movements. Furthermore, postural reactions also develop after birth, which lead to the development of protective extension after the child develops from lying prone, to rolling over, to getting on hands and knees, and sitting in the seated position. Close to the age of 12 months of age, children pull to stand and begin walking. It is important to note that Gerber et al. (2010) mention that puling to a stand must develop prior to walking. It is after 12 months of age that children learn to move backward, run, and jump. Around 24 months of age, children learn to kick balls, jump with two feet leaving the floor at the same time, and throw a large ball overhand.

Gerber et al. (2010) states that fine motor skills depend on the development of gross motor skills, cognition, and visual perceptual skills. With that being said, infants do not have voluntary use of their hands, as infants' hands open and close due to the primitive grasp reflex. While the reflex decreases, infants release objects voluntarily and learn to transfer objects from one hand to the other, stopping at the mouth before going directly from hand to hand. As an infant's fine motor skills increase, infants are able to play with objects of various shapes or sizes and the thumb is used to assist in grasping objects (Gerber et al., 2010). Building upon voluntary release of objects, a child begins to have the ability to stack blocks around the age of 15 months. Following this developmental milestone, a child can scribble with a crayon and use a spoon for eating. Around 24 months of age, a child has the fine motor skills necessary to remove clothing, grasp and turn a doorknob, rotate objects, and wash and dry their hands.

Johnson & Blasco (1997) states that the developmental progression of an independent goes from dependence to independence, as mobility and manipulative skills allow a child to explore his or her environment. To help the reader understand gross and fine motor milestones, Johnson and Blasco (1997) used an adapted model of the Erhardt Developmental Prehension Assessment (1994), which can be found in Table 3.17 below.

Table 3.17. Gross and Fine Motor Skills for Children Birth to 24 Months as Adapted by the Edhardt Developmental Prehension Assessment.

Age in Months	Gross Motor Milestones	Fine Motor Milestones
1	Head in prone position	Hands tightly fisted
2	Chest in prone position; head bobs erect if held sitting	Briefly retains rattle when placed in hand; hands unfisted half of time

Table 3.17 (continued)

3	Some head lag; rests on forearms in prone position	Hands unfisted most of time; bats at objects; sustained voluntary grasp if object placed in hand
4	Up on hands in prone position; rolls front to back; no head lag	Obtains/retains rattle; reaches/engages hands; clutches at objects
5	Rolls back to front; lifts head when pulled to sit; sits with support; anterior protection	Transfers objects hand-mouth-hand; palmar grasp with abducted thumb
6	Sits propped on hands	Transfers objects hand to hand; immature rake of pellet
7	Sits without support; supports weight and bounces while standing; army crawls; pulls feet to mouth; lateral protection	Radial-palmar grasp of cube; pulls round peg out; inferior scissors grasp of pellet; rakes objects into hands
8	Gets self into sitting position; reaches with one hand while on all fours	Scissor grasp of pellet between thumb and side of index finger; holds one block in each hand
9	Pulls to stand; creeps on hands and knees	Radial-digital grasp of cube held with thumb and finger tips; inferior pincer grasp with surface of thumb and index finger
10	Cruises; walks with both hands held	Isolates index finger and pokes; clumsy release of cube into box while resting hand on edge; pincer grasp with pads of thumb and index finger
11	Stands alone; walks with one hand held	None listed

Table 3.17 (continued)

12	Takes independent steps; posterior protection	Fine pincer grasp; marks with crayons; attempts to build tower with two blocks; precise release of blocks; attempts release of pellet into bottle
14	Walks independently	Stacks two blocks; attains third block
16	Creeps up stairs; runs with stiff legs; climbs on furniture; walks backwards; stoops and recovers	Precise release of pellet into small container; stacks three blocks; imitates scribble
18	Pushes and pulls large objects; throws ball while standing; seats self in small chair	Stacks four blocks; imitates single stroke; scribbles spontaneously
20	Walks up stairs with hand held	Completes square pegboard
22	Walks up stairs with rail; squats while playing	Stacks six cubes
24	Jumps in play; kicks balls; walks down stairs with rail; throws overhand	Puts blocks into train; imitates vertical strokes

Johnson & Blasco, 1997; Erhardt, 1994.

Chapter 4: Developmental Milestone Checklists

This report sought to accomplish two goals. First, through a review of literature across the developmental areas of communication output, language comprehension, cognition, social-emotional, and motor domains, developmental milestone information was reported to the reader. Secondly, the information gathered through this literature review was compiled to create new developmental milestone checklists across domains for children ages birth to 24 months. These new developmental milestone checklists are presented for the reader in appendix B. Speech-language pathologists can easily access and provide the resources to parents of children with developmental delays/disabilities.

While the developmental milestone checklists provide guidance for parents, it is important to remember that research does not provide exact ages at which milestones occur, rather authors report information based on the average performance of the children in a given study, the range, or by the number of children at each age a milestone occurred. Therefore, the checklists are not intended for use for diagnosing a developmental disability or delay, but simply as a point of reference for parents to have a better understanding as to what kinds of behaviors they can observe in their child at various ages. This type of information can help parents to understand the typical acquisition order in different areas of development so as to compare the trajectory of development for their child compared to typically developing children. Parents will also be able to understand areas of strength in their child's development as well as areas that may need clinical observation.

CLINICAL IMPLICATIONS

Parents of children who have developmental delays in one or more of the developmental areas of communication output, language comprehension, cognition,

social-emotional, and motor, often need guidance as to what a typically developing child of the same chronological age as their child is doing. When early intervention begins, it is important to supply parents with a point of reference of developmental norms. Developmental milestone checklists based on research can be one avenue for speech-language pathologists to communicate this information to parents. Speech-language pathologists can discuss these developmental milestone checklists with the parents to help them understand their child's assessment results and to illuminate the need for early intervention.

The developmental milestone checklists created through this report will serve speech-language pathologists as a way to provide parents a point of reference during the assessment and early intervention stages. Furthermore, the checklists may be found useful for parents with children who are at a lower developmental age than that of their chronological age. A speech-language pathologist can also adapt these milestone checklists to best suit the needs of the family he or she is working with. For example, if a child is developmentally delayed in the area of communication output, but no other developmental domain, it is not necessary for the parents to be given the checklists in all domains. The format of the checklists is in three-month increments. This type of division also provides a unique format as speech-language pathologists can narrow down the age range for each specific client. Furthermore, speech-language pathologists can also use the checklists as reference for themselves, as speech-language pathologists are typically around children with developmental disabilities or delays, which can make it difficult at times to consider what milestones are to be met at what ages in young children who are developing typically.

While development from birth to 24 months of age occurs in a somewhat hierarchical manner, it is important to remember that each child develops at his or her

own pace. Therefore, variations in development across all of the developmental domains discussed in this report are to be expected. Within those variations, a child may have mastered more developmental milestones in one domain than in another. It is also important to remember that all of the developmental domains interact with one another. As previously mentioned, Iverson (2010) suggests that when a child gains more motor control to explore his or her environment, the child's vocabulary will increase due to the increase in exploration. Another example is how joint attention and mother-infant interaction affects a child's language comprehension and language output (Mundy & Jarrold, 2010).

Overview of New Developmental Checklists

The developmental checklists created during this report can be found in appendix X. The checklists are intended for use by practicing speech-language pathologists working in early intervention and with parents of children who are developmentally disabled or delayed. The checklists are separated into developmental domains for language output ("Look at me make noises and talk!"), language comprehension ("Look what I can understand!"), motor ("Look at me move!"), social-emotional ("Look at me play and interact with others!"), and cognition ("Look at me learn!"). Each developmental domain is covered for the ages of birth to 24 months and separated into three to six-month increments. The increments vary depending on the number of milestones occurring in a typically developing child at the given time.

Additionally, the checklists are meant to be parent friendly. Each checklist is written as if a child is speaking to his or her parents, telling them what they can and are learning to do for a specific age range. The checklists were given a child-friendly appearance as their purpose is to be used with parents of young children. The checklists

can easily be placed on the refrigerator in the home for quick reference and note taking. Each milestone also has a colorful circle next to it, which is intended to be checked off or colored in when the milestone is reached.

Speech-language pathologists should use the checklists to provide parents of children with developmental disabilities or delays with an understanding of where the child is expected to be in relation to typically developing children at a given age range. The checklists can also be used to assist parents in understanding the typical progression of development. While the checklists can be distributed as a whole, the checklists can also be distributed in pieces, with only one domain or one age range provided to a parent. It is important for clinicians not to overwhelm parents with the information on the checklists, but to assist parents in understanding what is occurring, or what should be occurring, in their child's development.

For clinicians who choose to use these checklists with their clients, it is important to remember that the checklists serve as a point of reference and should not be used for diagnostic purposes. Additionally, each child develops with some variation, so some milestones may be reached earlier or later than stated in the checklists.

FUTURE RESEARCH

While this report compiled data on developmental milestones from the ages of birth to 24 months, future research could look to expand the age range of the checklists. Additionally, this report looked at a handful of previous research compiled on developmental milestones in typically developing children; however, there are many more studies beyond the depth of this paper to be examined for further results on the ages, average ages, and age ranges at which typically developing children reach developmental milestones that would add to the checklists created for this report.

Appendix A

Table A1.

Age (months)	Milestones
3-6	• Follow moving toys or faces with their eyes • Startle at loud or new sounds • Wiggle and kick with legs and arms • Lift head and shoulders while on stomach • Smile back at parents or other family members • Make sounds, like gurgling, cooing, or sucking sounds
6-9	• Explore toys with hands and mouth • Roll over front-to-back and back-to-front • Squeal and babble different sounds • Sit by leaning on their hands • Turn their heads to voices and respond to their names • Know family members and seek their attention • Enjoy playing “peek-a-boo”
9-12	• Copy hand movements like “patty cake,” or “bye-bye” • Pick up crumbs or other small things with their thumb and a finger • Move toys from one hand to the other hand • Crawl on hands and knees • Sit without help • Repeat sounds like “baba,” “dada,” and “mama” • Cry with mother or father leaves
12-15	• Pull themselves up to a standing position • Walk by holding onto furniture • Drink from a cup with your help • Wave bye-bye • Say “mama” and “dada” and one other word • Point to objects they want • Can find a toy hidden under a cloth
15-18	• Use at least three words besides “mama” and “dada” • Like to look at pictures in a book • Hold a crayon in a fist • Hand toys to you when asked • Point to pictures or objects you name • Walk without help

	• Dump contents out of a box
18-21	• Like to pull and push things while walking • Use pointing and words together to tell what they want • Pull off shoes and socks • Feed themselves with their fingers • Can point to one body part when asked • Use at least 10 words and repeat words you say
21-24	• Point and use words to get your attention • Like to pretend-play (talk on toy phone) • Put together a 2 or 3 piece picture puzzle • Like to throw balls • Like to play alone with toys for a short time • Say “no” a lot • Like to copy what others do

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