

A COMPARISON OF PARENT LANGUAGE  
QUANTITY AND QUALITY ACROSS PLAY CONDITIONS:  
IMPLICATIONS FOR EARLY LANGUAGE DEVELOPMENT

by

MADISON STATHAM

(Under the Direction of Jennifer Brown)

ABSTRACT

Given the influential nature of a child's early language environment on their future language outcomes, it is important to explore the specific linguistic features, contexts, and materials that contribute to diverse and meaningful language exposure. This within-subjects experimental study explored how play condition influences parent language input during parent-child play interactions. Play conditions included (1) traditional toys, (2) electronic toys, (3) picture books, and (4) functional and emerging pretend play. Parent language quantity and lexical diversity were highest in the picture book condition, followed by the traditional toy condition, the functional and emerging pretend play condition, and the electronic toy condition. Referential language was the most frequently used pragmatic function across all conditions, with the highest proportion in the picture book condition. Findings suggest that books and traditional toys foster richer language interactions, highlighting the importance of play materials in shaping children's language exposure and supporting early language development.

INDEX WORDS: Parent-child communication, Language input, Early language  
development

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MADISON STATHAM

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MADISON STATHAM

|                  |                |
|------------------|----------------|
| Major Professor: | Jennifer Brown |
| Committee:       | Hannah Krimm   |
|                  | Javad Anjum    |

Electronic Version Approved:

Ron Walcott  
Vice Provost for Graduate Education and Dean of the Graduate School  
The University of Georgia  
May 2025

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## TABLE OF CONTENTS

|                           | Page  |
|---------------------------|-------|
| ACKNOWLEDGEMENTS .....    | iv    |
| LIST OF TABLES .....      | vi    |
| LIST OF FIGURES .....     | vii   |
| CHAPTER                   |       |
| 1 Introduction .....      | 1     |
| 2 Method.....             | 10    |
| 3 Results .....           | 20    |
| 4 Discussion.....         | 29    |
| REFERENCES .....          | 40    |
| APPENDICES                |       |
| A Photos of Toy Sets..... | 47-48 |

## LIST OF TABLES

|                                                                                            | Page |
|--------------------------------------------------------------------------------------------|------|
| Table 1: Parent Participant Characteristics.....                                           | 11   |
| Table 2: Child Participant Characteristics.....                                            | 12   |
| Table 3: Pragmatic Functions of Language: Coding Scheme .....                              | 15   |
| Table 4: Descriptive Statistics for Words per Minute Across Play Conditions .....          | 21   |
| Table 5: Descriptive Statistics for Number of Different Words Across Play Conditions ..... | 22   |
| Table 6: Pragmatic Functions of Language: Percentage Use Across Play Conditions .....      | 26   |

## LIST OF FIGURES

|                                                                                            | Page |
|--------------------------------------------------------------------------------------------|------|
| Figure 1: Parental Number of Different Words & Words per Minute Across Play Conditions.... | 23   |
| Figure 2: Pragmatic Functions Percentage of Use Across Play Conditions.....                | 24   |



## **CHAPTER 1**

### **INTRODUCTION**

Previous research has established the relationship between a child's language environment, or the language input they receive, and their future language outcomes. A child's language environment, beginning in the first few years, can have lasting impacts on their language development and their later success in academic, social, and vocational settings (Cartmill et al., 2013; Golinkoff et al., 2019; Huttenlocher et al., 2010; Masek et al., 2021; Newman et al., 2016). Given the influential nature of a child's early language environment, it is important to explore the specific linguistic features, contextual factors, and materials that contribute to diverse and meaningful language exposure. The two primary ways of examining language input include quantity and quality.

#### **Parental Language Input: Quantity and Quality**

Linguistic quantity refers to the measurable aspects of language productivity, such as the number of words and utterances used. Linguistic quality encompasses the depth and intricacy of language, including measures of lexical diversity, syntactic complexity, and interactive and contextual features. One of the most well-known studies to examine language quantity is Hart and Risley (1995). This longitudinal study, which examined children and families within the contexts of their homes, emphasized the differences in the amount of language input children receive and its impact on their developmental trajectories (Hart & Risley, 1995). Their findings underscored the importance of language exposure for early language learning, and their work contributed to a growing focus on parent language input in early childhood.

This research has sparked widespread interest, replication efforts, and debate. Some have critiqued the study's methods (Dudley-Marling & Lucas, 2009; Sperry et al., 2019), while others have pointed to the need to consider the variability of language input within the broader context of culture (Kuchirko, 2019). While Hart and Risley's findings remain influential, more recent research highlights the importance of examining both the quantity *and* quality of parent language input to fully understand its impact on child language development (Golinkoff et al., 2019).

This shift toward greater focus on quality of parent language input can be found throughout more current literature examining the impacts of children's language environments on their overall language outcomes. Rowe (2012) examined the effects of quantity and quality of child-directed speech on later vocabulary development. For the purposes of the study, quantity was measured by the total number of words spoken (i.e., tokens). Quality was measured by (a) the number of different words spoken (i.e., vocabulary diversity), (b) number of different rare words (i.e., vocabulary sophistication), and (c) decontextualized utterances. Results indicated that quality and quantity both play vital roles in later language outcomes; quantity may be most important in early development, and quality may be more important in later years.

Hirsh-Pasek et al. (2015) also investigated the influence of parent language input quality and quantity on children's later language success. For this study, measurements of quality were based upon (a) symbol-infused joint engagement, (b) fluency and connectedness, and (c) routines and rituals. Quantity was measured by words per minute. The authors reported that quality had greater predictive ability for future language outcomes than quantity (Hirsh-Pasek et al., 2015). Similarly, in a meta-analysis investigating the effects of quantity and quality of parental linguistic input on language outcomes, Anderson et al. (2021) reported that quality of language input had a greater overall association with language outcomes than quantity, especially as

children age. Despite the relative importance of quality, they documented that both quantity (measured by the number of words, tokens, or utterances) and quality (measured by lexical diversity and syntactic complexity) play an important role in language outcomes.

Various operational definitions are used when assessing language quality. Despite this variation in the definition and measurement of quality, there is a general consensus that quality of parent language input is of equal, if not greater, importance than quantity when determining how a child's language environment can contribute to their later language abilities. The wide array of conceptualizations of the quality of parent language input has been highlighted by researchers (Hirsh-Pasek et al., 2015; Rowe & Snow, 2020), and some have sought to clarify the ways in which parent language input is described and analyzed.

Rowe and Snow (2020) reviewed the literature on parental language input to clarify the dimensions that influence language quality for the purposes of measurement, data analysis, and comparison of findings. They asserted three dimensions that influence language quality: conceptual, linguistic, and interactive features. The authors provided detailed descriptions of the features of language quality associated with each of these three dimensions at varying developmental levels (e.g., infancy, toddlerhood, and preschool age). They also described how the three dimensions of language quality may vary in effect on children's later language abilities depending on the age and developmental level at which the feature is utilized. Overall, they emphasized the importance of separately evaluating each of the three dimensions of parent language quality: conceptual, linguistic, and interactional, when examining the relationship between parent language quality and a child's language development (Rowe & Snow, 2020).

Similarly, Masek et al. (2021) conceptualized the features of parent language input to further clarify the way in which it is evaluated and described. Masek and colleagues suggest

language input be divided into two broad categories: (1) content of talk and (2) communicative style of talk. Content of talk includes lexical diversity (number of different words) and whether language is contextualized or decontextualized. The communicative style of talk encompasses prosody, pragmatics, and gestures related to speech, as well as the interaction style used during the communication exchange. This interaction style is established through joint attention, contingency of caregiver responses, and routines (Masek et al., 2021). The authors posited that evaluating what is being said as well as the context and mechanisms through which the message is conveyed will lead to a greater understanding of the many features of a child's language environment and how those features may impact future language outcomes (Masek et al., 2021).

Both Rowe and Snow (2020) and Masek et al. (2021) recognize the need to investigate *what* is being said, as well as *how* and *why* it is being said, which can be described as the language function. Kuchirko et al. (2020) examined the functions of language input, specifically maternal language input across ethnically diverse populations. In their framework, the authors evaluate language across three main functions: referential language, regulatory language, and vocalization prompts. Referential language can be further divided into (a) labels/descriptions of objects or events and (b) labels of emotions and internal/external states of being. Regulatory language can be further divided into (a) attention directives, (b) action directives, and (c) prohibitions. Vocalization prompts can be divided into (a) questions directed toward the child and (b) elicitation prompts directed toward the child (Kuchirko et al., 2020). Investigating parent language input across these functions allows for a more in-depth analysis of the pragmatic functions of language, a key component of broader language quality, and their potential effects on the language development of children. However, despite the importance of examining this

dimension of language quality, relatively few studies have examined how the pragmatic functions of language vary across different activity contexts.

### **Play as a Context for Communication**

When analyzing parent language input, it is important to consider the context in which the communication exchange is taking place. Lev Vygotsky (1978) proposed the sociocultural theory of cognitive development, which asserted that learning occurs within social contexts and through responsive communication. Vygotsky's work served as a foundation for the social interactionist theory, which specifically emphasizes how language learning and development are enhanced through social interactions, particularly those between children and their caregivers. Contemporary research further supports the theory that language learning is most effective when it occurs within a social context, where parents use child-directed speech and engage in responsive interactions (Golinkoff et al., 2019; Kuhl, 2007; Kuhl, 2010; Shneidman et al., 2013; Weisleder & Fernald, 2013).

While social interaction provides the basis for language development, the specific activities in which these interactions occur can also influence parent language input. Different activity contexts provide varying opportunities for language exchanges, impacting both the quantity and the quality of language children hear. In their scoping review, Holme et al. (2022) assert that activity context plays an important role in shaping parent-child interactions and, thus, influences language learning. One activity context that has garnered considerable attention in research is play, particularly play involving toys, as it serves as a natural setting for rich, interactive communication between children and their parents (Weisberg et al., 2013).

Vygotsky (1967) outlines how play is essential for both cognitive and linguistic development, as it allows for practice and reinforcement of skills within the context of symbolic

and imaginative activities. Play also creates a zone of proximal development, enabling children to acquire higher-level skills with the support and models of a “more knowledgeable other” (Vygotsky, 1967). Piaget (1962) similarly highlighted the importance of play, describing how children progress through stages of play as their cognitive abilities develop. Development begins with functional (or sensorimotor) play, moves to symbolic (or pretend) play, and eventually leads to games with rules. This progression of play mirrors Piaget’s stages of cognitive development: sensorimotor, preoperational, concrete operational, and formal operational (Piaget, 1962; Nicolopoulou, 1993).

Play also serves as a fundamental context for children to engage with others. Parten (1932) emphasized the social nature of play, describing six levels of interactive play, ranging from unoccupied and solitary play, where children engage with objects independently, to cooperative play, where children interact, communicate, and cooperate with others to achieve desired outcomes. As children transition into more social forms of play, their opportunities for social communication increase. Play can serve as a context that fosters turn-taking and joint attention, which are crucial for language development (Bruner, 1985; Vygotsky, 1966).

Furthermore, functional play, such as bringing a spoon to mouth, and pretend play, such as pretend to make and eat food, provide contexts for language learning that align with and extend everyday experiences (Weisberg et al., 2013). The objects may start off with high resemblance to real objects (e.g., a play spoon representing a real spoon) and expand to an object representing something else (e.g., a stick representing a real spoon). Both the everyday experiences and symbolic representation provide meaningful opportunities for language learning, especially as play can encourage play partners to use child-directed speech (Snow, 1977). Overall, play-based interactions provide a unique context for engagement that leads to more meaningful and rich

language exchanges, enhancing both the quantity and quality of parent language input (Golinkoff et al., 2019).

## **Play Conditions**

Current research indicates that play condition, defined by toy type, can have a substantial impact on the quantity and quality of language input children receive during play interactions with their parents. Multiple studies have found that play with electronic, or responsive, toys leads to reduced parent engagement and less complex language use when compared to traditional toys (Miller et al., 2017; Sosa, 2016; Wooldridge & Shapka, 2012). Additionally, research suggests that books encourage more rich, novel, and complex language input, while traditional toys encourage greater parent-child engagement (Holme et al., 2022; Masek et al., 2021). Similarly, symbolic play, or pretend play, has been found to encourage decontextualized talk, foster joint attention, and support child language development in a more robust way when compared to functional play, which emerges earlier in development (Masek et al., 2021; Tamis-LeMonda & Bornstein, 1994; Quinn and Kidd; 2019). These findings highlight the importance of toy type in shaping interactions to support language development, emphasizing how parents can enhance language learning through both toy selection and level of engagement. Given the role of play in language development, continued investigation into how specific play conditions influence the quantity and quality of language input is essential.

Sosa (2016) investigated the influence of toy type on the quantity and quality of parent language input during play. The research team analyzed parent-infant dyads communicating during play across three toy sets: traditional toys, books, and electronic toys. Communicative interactions were recorded using a Language ENvironment Analysis (LENA) device, which is a small piece of wearable technology that allows interactions to be recorded within natural

contexts and without disruption to communicative exchanges. After extracting 15-minute parent-child interactions across the toy sets from full day LENA recordings, audio files were transcribed and coded to determine the number of adult words per minute, child vocalizations per minute, conversational turns taken by the dyad per minute, parent responses to the child per minute, and the number of content-specific words produced by parents per minute (Sosa, 2016). Results indicated that electronic toys resulted in decreased quantity and quality of parent language input in comparison to the traditional toys and books, demonstrating how play context (i.e., toy type) is associated with both quantity and quality of parent language input.

As a replication and extension of Sosa's study, Brown (under review) examined the association between toy type and communication of 30 parent-child dyads in a counterbalanced repeated measures study. Participants were children between 10 – 18 months of age (mean age = 13.2 months) who wore a LENA device for two full days, along with their parents. Similar to Sosa's study (2016), electronic toys, traditional toys, and picture books were included as play conditions in Brown's study. Brown also included a functional and emerging pretend play category, for a total of four play conditions. Functional and emerging pretend play was added as a play condition for two primary reasons: (1) to extend the examination of play categories to include results to another commonly used type of toys; and (2) because of the relationship between functional and emerging pretend play to everyday experiences and symbolic use. Parents were instructed to play with their child using each toy set for 15 minutes in a pre-assigned, counterbalanced order. The middle five minutes of each 15-minute play session were used for analysis. Parent-child communication was measured across three outcome variables from the LENA automated analyses: number of caregiver words, number of child vocalizations, and number of conversational turns. Results indicated statistically significant differences across



toy sets for number of caregiver words and for number of conversational turns. There were no statistically significant differences in the number of child vocalizations across toy sets.

### **Purpose of the Study**

This study extends Brown (under review) by analyzing parent language beyond the LENA automated analyses by examining transcribed audio samples. The purpose of this within-subjects experimental study is to examine the influence of play condition, defined by toy type, on the quantity and quality of parent language input during five-minute interactions between parent-child dyads. The play conditions investigated in this study include (1) traditional toys, (2) electronic toys, (3) picture books, and (4) functional and emerging pretend play.

### **Research Questions**

- 1) Does the quantity of parent language input, in terms of words per minute, differ across play conditions (i.e., traditional toys, electronic toys, picture books, and functional and emerging pretend play)?
- 2) Does the quality of parent language input, in terms of lexical diversity and pragmatic functions, differ across play conditions (i.e., traditional toys, electronic toys, picture books, and functional and emerging pretend play)?

## **CHAPTER 2**

### **METHOD**

#### **Research Design**

The procedures in this study were conducted as an extension of a larger investigation examining the effect of play condition on the communicative interactions of parent-child dyads during play (Brown, under review). The larger investigation will be referred to as the parent study. All audio recordings analyzed in the present study were obtained by the procedures outlined in the parent study. The parent study and the extended analyses in this study were approved by the Institutional Review Board.

The present study was conducted as a within-subjects experimental study. The independent variables were the four play conditions: traditional toys, electronic toys, picture books, and functional and emerging pretend play. The dependent variables were the number of different words used by parents, the number of words per minute used by parents, and the pragmatic functions used by parents.

#### **Participants**

Participants in the present study were ten dyads consisting of parents and their children (mean child age = 13.1 months), recruited as part of the parent study (Brown, under review). Participants were primarily recruited through flyers and emails distributed in community settings frequented by families with young children (e.g., libraries, restaurants, community centers). Additionally, participants were also encouraged to share the study information with other families. For the current study, the first ten dyads with complete audio samples across all play

conditions were included. Parents were considered the primary participants in this study, as their utterances were the focus of the analysis. For each dyad, English was reported as one of the family's home languages. Per parent report, no children had developmental disorders or language delay. Parent demographics are reported in Table 1 and child demographics are reported in Table 2.

**Table 1**

*Parent Participant Characteristics*

| <b>Characteristic</b>         | <b>n (%)</b> |
|-------------------------------|--------------|
| Age in years, mean (SD)       | 30 (2.83)    |
| Male                          | 1 (10%)      |
| Female                        | 9 (90%)      |
| Race and ethnicity            |              |
| White                         | 9 (90%)      |
| Black                         | 0 (0%)       |
| More than one race            | 1 (0%)       |
| Hispanic                      | 0 (0%)       |
| Education                     |              |
| Bachelor's degree             | 3 (30%)      |
| Graduate degree               | 6 (60%)      |
| High School diploma           | 1 (10%)      |
| GED or Some High School       | 0 (0%)       |
| Employment                    |              |
| Full-time employment          | 8 (80%)      |
| Part-time employment          | 0 (0%)       |
| Not employed outside the home | 2 (20%)      |

**Table 2***Child Participant Characteristics*

| <b>Characteristic</b>    | <b>n (%)</b> |
|--------------------------|--------------|
| Age in months, mean (SD) | 13.1 (3.4)   |
| Male                     | 4 (40%)      |
| Female                   | 6 (60%)      |
| Race and ethnicity       |              |
| White                    | 7 (70%)      |
| Black                    | 0 (0%)       |
| More than one race       | 1 (10%)      |
| Hispanic                 | 2 (20%)      |
| Home Language            |              |
| English only             | 8 (80%)      |
| Spanish & English        | 2 (20%)      |
| French & English         | 0 (0%)       |
| Arabic & English         | 0 (0%)       |

**Materials**

Materials used during data collection included the LENA Device, which served as the mechanism for recording audio of parent-child communication, and the four unique toy sets, which served as the independent variables.

***LENA***

Communicative exchanges during elicited play were recorded using a LENA device. LENA devices are digital language processors (DLPs) that can be worn by children throughout their day, typically in a specially designed vest. This wearable technology allows researchers to record a child's natural language environment throughout the day without significant disruption to communication. The LENA device has the capacity to record up to 16 hours of a child's day. These recordings can be analyzed using the LENA software and exported for further analysis.

### ***Independent Variables: Play Conditions***

**Picture Books.** The first toy set included the following board books: *Baby's Shapes* by Karen Katz, *Big Red Barn* by Margret Wise Brown, *Farm Peekaboo* by DK, and *Flaptastic Colors* by DK.

**Traditional Toys.** The second toy set consisted of traditional toys, including a Fisher-Price Brilliant Basics - Baby's First Blocks Shape Sorter, a Melissa and Doug Farm Animal Chunky Puzzle, and Infantino Squeeze and Stack Blocks.

**Electronic Toys.** The third toy set contained electronic toys, including the Leap Frog Sing and Play Farm, the Vtech Touch & Swipe Baby Phone, and the Leap Frog My Own Leaptop.

**Functional and Emerging Pretend Play.** The fourth toy set included toys that encourage functional and pretend play, including the Kidzlane Play Tea Set, the Green Toys Dumper Construction Truck (with an animal figurine driver), and the Green Toys Mini Vehicle Set (including blue, yellow, red, and white colored cars). Photos of each toy set can be found in Appendix A.

### **Dependent Variables**

#### ***Linguistic Quantity***

**Words Per Minute (WPM).** The transcribed audio files were analyzed using the CLAN program, which allows for analysis and computation of language indices for transcribed utterances. For each transcript, the "FREQ" command within CLAN was applied specifically to the parent tier (either mother or father) to generate a list of all parent words (tokens) within a transcript and their frequency of use. Each word list output from the "FREQ" command was manually screened by the primary researcher to identify and correct any misspellings, repeated

words, capitalization errors, or non-word forms. Any errors found were corrected directly within the transcript to ensure accurate frequency counts. After corrections were made, the “FREQ” command was rerun to generate the final total number of items (tokens) spoken by the parent. To calculate the words per minute measure for each transcript, the total number of items (from the CLAN output) was divided by the total duration of the audio samples (five minutes).

### ***Linguistic Quality***

**Number of Different Words (NDW).** The “FREQ” command in CLAN was also used to generate the total number of different item types used, or the number of different words spoken by the parent within each five-minute sample.

**Pragmatic Functions of Language.** Pragmatic functions of language, the second measure of linguistic quality, was adapted from the Kuchirko et al. (2020) coding scheme. According to Kuchirko et al. (2020), language directed toward children can fall into three broad functions: (a) referential language, (b) regulatory language, and (c) vocalization prompts. Among these three broad functions, there are seven granular functions. Referential language includes the label/description function and the emotion/state function. Regulatory language includes the attention directive function, the action directive function, and the prohibition function. Vocalization prompts include the question function and the elicitation function. A detailed depiction of the coding scheme used in this study can be found in Table 3 below. Although the three broad functions—referential language, regulatory language, and vocalization prompts—served as the primary dependent variables for this study, differences across the seven granular pragmatic functions of language were also investigated. The Kuchirko et al. (2020) coding scheme excludes any utterances containing affirmations (e.g., “great job!”) and conversational fillers (e.g., “hello.”).

**Table 3***Pragmatic Functions of Language: Coding Scheme*

| <b>Language Function</b>    | <b>Definition</b>                                                                                                                 | <b>Example</b>                     |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------|
| <i>Referential Language</i> |                                                                                                                                   |                                    |
| Label/Description           | Occurs when the parental utterance is used to label and/or describe objects or events.                                            | “That is a big cow.”               |
| Emotion/State               | Occurs when the parental utterance is used to label or describe someone’s state, emotions, or thoughts.                           | “Oh no, the frog is sad.”          |
| <i>Regulatory Language</i>  |                                                                                                                                   |                                    |
| Attention Directives        | Occurs when the parental utterance’s primary function is to gain the child’s attention.                                           | “Look at this one over here!”      |
| Action Directives           | Occurs when the parental utterance’s primary function is to regulate the child’s behavior.                                        | “Put that triangle in the bucket.” |
| Prohibitions                | Occurs when the parental utterance’s primary function is to stop a child’s behavior.                                              | “Stop, we don’t throw toys.”       |
| <i>Vocalization Prompts</i> |                                                                                                                                   |                                    |
| Questions                   | Occurs when the parental utterance is used to ask, or elicit information, about the child’s environment, behavior, or intentions. | “What’s on top?”                   |
| Elicitations                | Occurs when the parental utterance is used to encourage the child to repeat what they have said.                                  | “Say blue car!”                    |

*Note.* Adapted from Kuchirko et al. (2020)

## **Procedures**

This study is an extended analysis of data originally collected in the parent study (Brown, under review). Children wore a LENA device for two consecutive days and parents were instructed to play with each of the four toy sets in an assigned counterbalanced order for 15 minutes each. Toy sets were used to elicit play between the parent-child dyads. The middle five minutes of recorded play were used for analysis to allow for slight differences in the start and end times reported by the parents and the device software. Further details regarding participant activities and initial data collection procedures are described in Brown (under review).

The measures of (a) total number of words per minute and (b) total number of different words were analyzed using the CLAN software following transcription. Transcripts were then evaluated using the coding scheme above, adapted from Kurchirko et al. (2020). Together, these analyses provided measures for the comparison of quantity and quality of parent language input across the four toy sets.

The first author, a master's student studying speech-language pathology, was the primary researcher for the present study. The primary researcher completed transcription of the audio files and was responsible for the coding and analysis of the transcripts.

### ***Preparation of Audio Recordings***

The 15-minute play sessions were trimmed to five-minute audio recordings consisting of the middle five minutes of the play session times, which were recorded by parents. For each dyad, there were four five-minute audio samples – one per toy set: (1) traditional toys, (2) electronic toys, (3) picture books, and (4) functional and emerging pretend play.



## ***Transcription***

All audio recordings were transcribed using the CHAT transcription format and analyzed using the Computerized Language ANalysis (CLAN) program. All relevant utterances (excluding background noise) from parents, children, siblings, and other adults present were transcribed to provide context for analyses, despite parent utterances being the target of investigation for this study. The CHAT manual was used to establish transcription conventions, including utterance segmentation (MacWhinney, 2000). Utterances were segmented into their own lines according to the following guidelines: (1) is followed by a pause of 1 second or more, (2) ends with a terminal intonation contour, or (3) has a complete grammatical structure (Bernstein Ratner et al., 2023). All discrepancies that occurred during reliability training were addressed using the CLAN and CHAT manuals (MacWhinney, 2000). Transcribers were provided with a unique transcription manual detailing instructions for using the CLAN program and highlighting conventions of importance (e.g., how to denote parental talk as a repetition of child babbling).

The secondary transcribers, undergraduate research assistants, were trained in transcription and conventions until they achieved a minimum of 80% reliability in percent agreement with the primary transcriber at the word level for the parent utterances. Once they reached at least 80% reliability on at least three transcripts, they transcribed 40% of the remaining transcripts for reliability assessment. Due to the nature of play conditions and toy types in this investigation, masking conditions for transcribers was not feasible. Average inter-rater reliability was 85.9% agreement at the word level for parent utterances.

The finalized transcripts were then used to calculate the words per minute and number of different words for each audio sample by using the “FREQ” command in CLAN, as outlined above.

### ***Coding***

Following the transcription process, all transcripts were inserted into an Excel sheet with each utterance receiving its own line. Though only parental utterances were coded, all utterances from the transcript, including those of children and siblings, were included to allow coders to gain understanding of the context of communication. Each intelligible utterance was coded with a 1 for its primary function out of the seven possible pragmatic functions and a 0 for all other functions. Utterances that did not align with any pragmatic functions of language were coded with 0s for all categories. The number of occurrences for each individual function were calculated by totaling the number of 1s in each language function column. This number was divided by the total number of parental utterances in the audio recording and was multiplied by 100 to obtain the percentage of all utterances for each function. Using the totals for each language function, the total number of occurrences of referential language, regulatory language, and vocalization prompts, along with percentage of utterances in each of these categories, were also determined.

All transcribed files were coded by the first author of this study. The secondary coder, a researcher with a PhD and over 15 years of early communication research experience, was trained in the coding framework until she achieved a minimum of 80% reliability in percent agreement with the primary coder for total utterances across referential language, regulatory language, and vocalization prompts. Following training, the secondary coder coded 20% of transcripts for reliability. Inter-rater reliability was 87.8%.

## **Data Analysis**

Data were summarized using descriptive statistics (e.g., frequency counts, means, and standard deviations). Inferential analyses were conducted using SPSS to examine differences across play conditions. Two one-way repeated measures analyses of variance (ANOVAs) were used to examine differences across play conditions. The independent variables were the four play conditions: traditional toys, electronic toys, picture books, and functional and emerging pretend play. The dependent variables were words per minute and number of different words for all parent utterances. Two one-way repeated measures multivariate analyses of variance (MANOVAs) were used to examine differences across play conditions for the three broad pragmatic functions of language, along with the seven granular pragmatic functions of language. The independent variables were the four play conditions. The dependent variables were the three broad pragmatic functions of language: referential language, regulatory language, and vocalization prompts, and the seven granular pragmatic functions: label/description, emotion/state, attention directive, action directive, prohibition, question, and elicitation.

## CHAPTER 3

### RESULTS

The purpose of this study was to analyze the effect of play condition, defined by toy type, on quantity and quality of parent language input. For the purposes of this study, quantity of parent language input was measured by words per minute spoken by the parent within the five-minute audio sample. The quality of parent language input was measured by lexical diversity (number of different words) and pragmatic functions of language used by the parent within the five-minute audio sample.

#### Words Per Minute (WPM)

Descriptive statistics can be found in Table 4. The play condition that elicited the highest average number of parent words per minute was picture books, followed by traditional toys, functional and emerging pretend play, and electronic toys.

A one-way repeated measures analysis of variance (ANOVA) was conducted to examine the effect of play condition on the total number of words per minute. Results indicated a statistically significant difference across play conditions,  $F(3, 27) = 9.034$ ,  $p < .001$ , partial  $\eta^2 = .501$ , suggesting that quantity of parent language, measured by words per minute, varied across play conditions.

Where significant main effects were found, post hoc comparisons were conducted using a Bonferroni adjustment including all possible pairwise comparisons. SPSS provided Bonferroni-corrected  $p$ -values, which were evaluated against a significance level of  $\alpha = .05$ . For the measure of words per minute, post hoc comparisons revealed statistically significant differences in parent

words per minute between picture books and electronic toys,  $p = .009$ . Additionally, statistically significant differences were found in parent words per minute between traditional toys and electronic toys,  $p = 0.027$ , and between traditional toys and functional and emerging pretend play,  $p = .016$ . No statistically significant differences were found in words per minute between traditional toys and picture books ( $p = 1.000$ ), between functional and emerging pretend play and electronic toys ( $p = 1.000$ ), or between picture books and functional and emerging pretend play ( $p = .093$ ).

**Table 4**

*Descriptive Statistics for Words per Minute Across Play Conditions*

| <b>Play Condition</b>                | <b>M</b> | <b>SD</b> |
|--------------------------------------|----------|-----------|
| Traditional Toys                     | 57.1     | 14.23     |
| Electronic Toys                      | 37.3     | 12.91     |
| Picture Books                        | 62.7     | 21.96     |
| Functional and Emerging Pretend Play | 42.8     | 16.93     |

### **Number of Different Words (NDW)**

Descriptive statistics can be found in Table 5. The play condition that elicited the highest number of different words on average was picture books, followed by traditional toys, functional and emerging pretend play, and electronic toys.

A one-way repeated measures ANOVA was conducted to examine the effect of play condition on number of different words spoken by parents. Results showed a statistically significant effect of play condition on number of different words,  $F(3, 27) = 6.923$ ,  $p = .001$ , partial  $\eta^2 = .435$ , indicating that quality of parent language, measured by lexical diversity (number of different words), varied across play conditions.

Post hoc comparisons revealed a statistically significant difference in the number of different words spoken by parents when playing with picture books compared to functional and emerging pretend play,  $p = 0.009$ . Similarly, statistically significant differences in number of different words were found between traditional toys and functional and emerging pretend play,  $p = .024$ . No statistically significant differences were found between traditional toys and electronic toys ( $p = .695$ ), between traditional toys and picture books ( $p = .403$ ), between picture books and electronic toys ( $p = .068$ ), or between electronic toys and functional and emerging pretend play ( $p = 1.000$ ).

Figure 1 displays the mean number of different words and the mean words per minute produced by parents across the four play conditions.

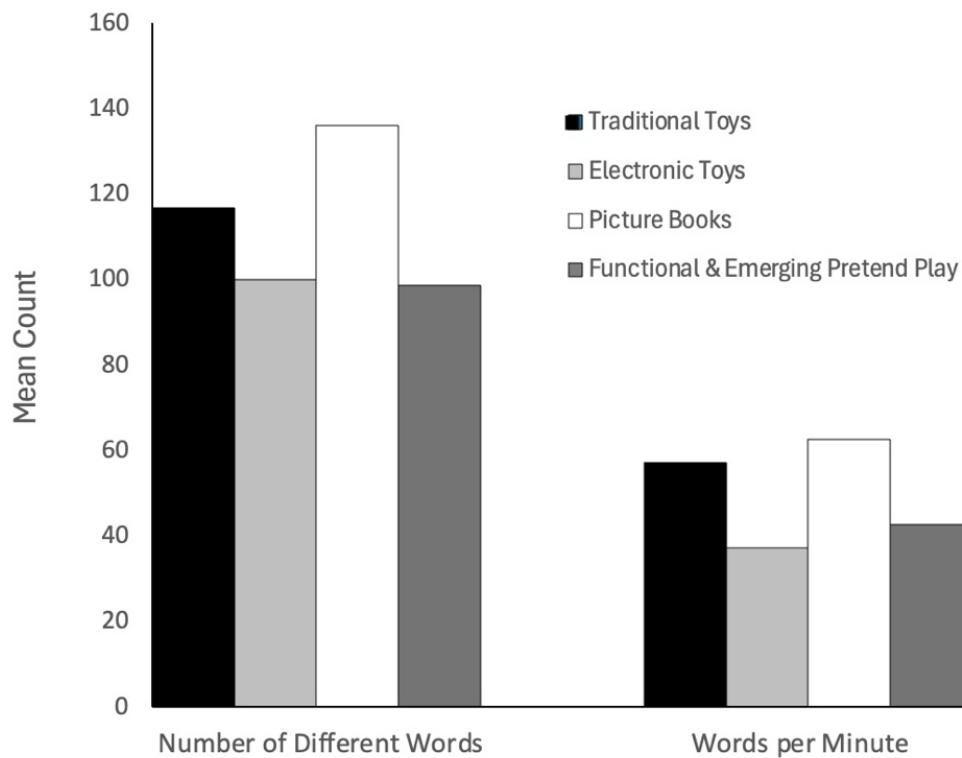
**Table 5**

*Descriptive Statistics for Number of Different Words Across Play Conditions*

| <b>Play Condition</b>                | <b>M</b> | <b>SD</b> |
|--------------------------------------|----------|-----------|
| Traditional Toys                     | 116.7    | 21.90     |
| Electronic Toys                      | 96.9     | 38.48     |
| Picture Books                        | 139.1    | 35.63     |
| Functional and Emerging Pretend Play | 98.6     | 26.45     |

**Figure 1**

*Parental Number of Different Words & Words per Minute Across Play Conditions*



## **Pragmatic Functions of Language**

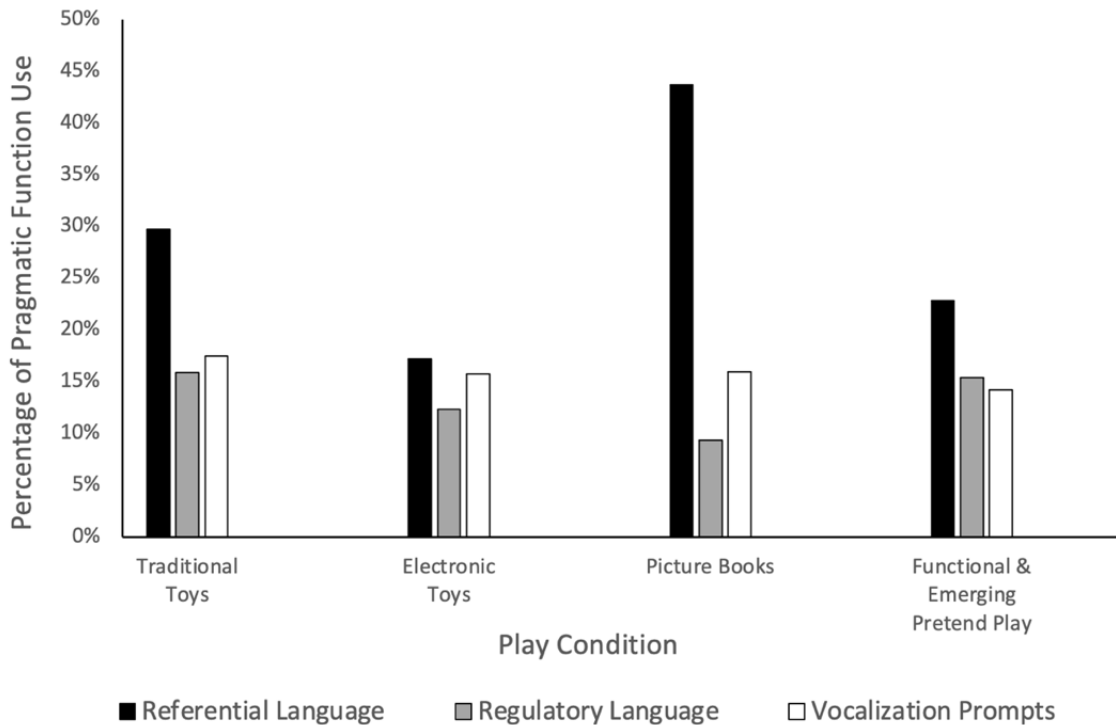
### ***Comparisons of Referential Language, Regulatory Language, and Vocalization Prompts***

A one-way repeated measures MANOVA was used to examine differences in the three broad pragmatic functions of language (referential language, regulatory language, and vocalization prompts) across the four play conditions (traditional toys, electronic toys, picture books, and functional and emerging pretend play). There was a statistically significant difference in the frequency of pragmatic function use across play conditions, Wilks' Lambda = 0.353,  $F(9, 60.994) = 3.622$ ,  $p = .001$ . Thus, a one-way repeated measures ANOVA was conducted for each of the three pragmatic functions across play conditions. Statistically significant differences were

found for referential language use across play conditions but not for regulatory language or vocalization prompts. Figure 2 displays the mean percentage of pragmatic function use across the four play conditions.

**Figure 2**

*Pragmatic Functions Percentage of Use Across Play Conditions*



**Referential Language.** The play condition that elicited the highest frequency of referential language on average was picture books, followed by traditional toys, functional and emerging pretend play, and electronic toys. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of referential language use across play conditions. Results showed a statistically significant effect of play condition on referential language use,  $F(3, 27) = 9.493, p < .001$ , partial  $\eta^2 = .513$ , indicating that the frequency of



referential language varied across play conditions. Post hoc comparisons revealed statistically significant differences in parents' use of referential language when playing with picture books compared to functional and emerging pretend play,  $p = 0.023$ , and electronic toys,  $p = .010$ . No statistically significant differences were found between traditional toys and electronic toys ( $p = .102$ ), between traditional toys and picture books ( $p = .312$ ), between traditional toys and functional and emerging pretend play ( $p = 1.000$ ), or between electronic toys and functional and emerging pretend play ( $p = .606$ ).

**Regulatory Language.** The play condition that elicited the highest frequency of regulatory language on average was traditional toys, followed by functional and emerging pretend play, electronic toys, and picture books. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of regulatory language use across play conditions. Results revealed that differences in parental use of regulatory language were not statistically significant across play conditions,  $F(3, 27) = 1.758$ ,  $p = .179$ , partial  $\eta^2 = .163$ .

**Vocalization Prompts.** The play condition that elicited the highest frequency of vocalization prompts on average was traditional toys, followed by picture books, electronic toys, and functional and emerging pretend play. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of vocalization prompt use across play conditions. Results revealed that differences in parental use of vocalization prompts were not statistically significant across play conditions,  $F(3, 27) = .516$ ,  $p = .674$ , partial  $\eta^2 = .054$ .

### ***Comparisons of the Seven Pragmatic Functions of Language***

A one-way repeated measures MANOVA was used to examine the differences in the seven granular pragmatic functions of language across the four play conditions (traditional toys, electronic toys, picture books, and functional and emerging pretend play). Analysis revealed a

statically significant difference in the frequency of pragmatic function use across play conditions, Wilks' Lambda = 0.129,  $F(21, 60.851) = 3.015$ ,  $p < .001$ . Thus, a one-way repeated measures ANOVA was conducted for each of the seven pragmatic functions across play conditions. Statistically significant differences were found for label/description use across play conditions but not for the remaining six pragmatic functions of language. Table 6 includes the mean percentage of pragmatic function use across the four play conditions.

**Table 6**

*Pragmatic Functions of Language: Percentage Use Across Play Conditions*

|                                          | Label/Description<br>M (SD) | Emotion/State<br>M (SD) | Attention<br>Directive<br>M (SD) | Action<br>Directive<br>M (SD) | Prohibition<br>M (SD) | Question<br>M (SD) | Elicitation<br>M (SD) |
|------------------------------------------|-----------------------------|-------------------------|----------------------------------|-------------------------------|-----------------------|--------------------|-----------------------|
| Traditional<br>Toys                      | 25.91 (10.52)               | 3.79 (3.50)             | 5.93 (3.80)                      | 9.64 (5.69)                   | 0.33 (0.69)           | 16.66 (6.15)       | 0.86 (1.56)           |
| Electronic<br>Toys                       | 13.41 (10.56)               | 3.78 (3.97)             | 5.21 (3.77)                      | 7.05 (6.34)                   | 0.13 (0.40)           | 14.95 (9.75)       | 0.81 (2.00)           |
| Picture<br>Books                         | 42.59 (14.24)               | 1.14 (1.33)             | 5.46 (6.51)                      | 3.52 (2.35)                   | 0.41 (0.70)           | 14.63 (4.84)       | 1.33 (1.97)           |
| Functional<br>& Emerging<br>Pretend Play | 19.93 (10.54)               | 2.95 (2.78)             | 7.77 (5.75)                      | 6.64 (4.71)                   | 1.02 (1.94)           | 13.87 (7.21)       | 0.36 (0.77)           |

**Label/Description.** The play condition that elicited the highest frequency of label/description use on average was picture books, followed by traditional toys, functional and emerging pretend play, and electronic toys. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of label/description use across play conditions. Results showed a statistically significant effect of play condition on labels/descriptions use,  $F(3, 27) = 12.283$ ,  $p < .001$ , partial  $\eta^2 = .577$ , indicating that the frequency of label/description use varied across play conditions. Post hoc comparisons revealed statistically significant differences in the frequency of label/description use between picture

books and functional and emerging pretend play,  $p = 0.016$ , and between picture books and electronic toys,  $p = .006$ . No statistically significant differences were found between traditional toys and electronic toys ( $p = .056$ ), between traditional toys and picture books ( $p = .137$ ), between traditional toys and functional and emerging pretend play ( $p = 1.000$ ), or between electronic toys and functional and emerging pretend play ( $p = .181$ ).

**Emotion/State.** The play condition that elicited the highest frequency of emotion/state use on average was traditional toys, followed by electronic toys, functional and emerging pretend play, and picture books. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of emotion/state use across play conditions. Results revealed that differences in parental use of the emotion/state function of language were not statistically significant across play conditions,  $F(3, 27) = 2.415$ ,  $p = .088$ , partial  $\eta^2 = .212$ .

**Attention Directive.** The play condition that elicited the highest frequency of attention directive use on average was functional and emerging pretend play, followed by traditional toys, picture books, and electronic toys. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of attention directive use across play conditions. Results revealed that differences in parental use of action directives were not statistically significant across play conditions,  $F(3, 27) = 1.009$ ,  $p = .404$ , partial  $\eta^2 = .101$ .

**Action Directive.** The play condition that elicited the highest frequency of action directive use on average was traditional toys, followed by electronic toys, functional and emerging pretend play, and picture books. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of action directive use across play conditions. Results revealed that differences in parental use of action directives were not statistically significant across play conditions,  $F(3, 27) = 2.199$ ,  $p = .111$ , partial  $\eta^2 = .196$ .

**Prohibition.** The play condition that elicited the highest frequency of prohibition use on average was functional and emerging pretend play, followed by picture books, traditional toys, and electronic toys. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of prohibition use across play conditions. Results revealed that differences in parental use of prohibitions were not statistically significant across play conditions,  $F(3, 27) = 1.221, p = .321$ , partial  $\eta^2 = .120$ .

**Question.** The play condition that elicited the highest frequency of question use on average was traditional toys, followed by electronic toys, picture books, and functional and emerging pretend play. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of question use across play conditions. Results revealed that differences in parental use of questions were not statistically significant across play conditions,  $F(3, 27) = .353, p = .787$ , partial  $\eta^2 = .038$ .

**Elicitation.** The play condition that elicited the highest frequency of elicitation use on average was picture books, followed by traditional toys, electronic toys, and functional and emerging pretend play. A one-way repeated measures ANOVA was conducted to examine differences in the frequency of elicitation use across play conditions. Results revealed that differences in parental use of elicitations were not statistically significant across play conditions,  $F(3, 27) = .636, p = .598$ , partial  $\eta^2 = .066$ .

## **CHAPTER 4**

### **DISCUSSION**

Parent-child interactions during play serve as a crucial context for early language development. Thus, it is important to examine how specific play conditions influence parent language input. This study aimed to explore differences in the quantity and quality of parent language input across four play conditions—traditional toys, electronic toys, picture books, and functional and emerging pretend play—to gain insight into how play materials may shape language interactions in meaningful ways. Understanding these differences can inform recommendations for caregivers, clinicians, and educators, supporting more rich language environments for children.

Overall, quantity and quality of parent language were influenced by the play conditions in which the interactions took place. The picture book play condition elicited the highest number of words per minute, followed by traditional toys, functional and emerging pretend play, and electronic toys. Similarly, the picture book play condition resulted in the highest number of different words, followed by traditional toys, functional and emerging pretend play, and electronic toys. Among the three broad categories of pragmatic functions of language—referential language, regulatory language, and vocalization prompts—referential language was used most frequently across all four play conditions. The play condition that elicited the highest frequency of referential language on average was picture books, followed by traditional toys, functional and emerging pretend play, and electronic toys. These findings suggest that play condition has a role in shaping the linguistic environment children are exposed to, with certain

conditions leading to greater opportunities for complex and diverse language input. Such findings underscore the importance of considering toy selection and play context in fostering language development.

### **Research Question 1**

The first research question examined the quantity of parent language input, measured by total number of words per minute, across four play conditions: traditional toys, electronic toys, picture books, and functional and emerging pretend play. Results indicated that play condition had a statistically significant effect on parent language input, with picture books eliciting the highest number of words per minute on average, followed by traditional toys, functional and emerging pretend play, and electronic toys. Pairwise comparisons revealed statistically significant differences between picture books and electronic toys, between traditional toys and electronic toys, and between traditional toys and functional and emerging pretend play.

These findings align with previous research demonstrating that book reading elicits a higher quantity of language input from parents when compared to other play conditions (Hoff, 2006; Hoff-Ginsberg, 1991; Jones & Adamson, 1987; Sosa, 2016). Unlike Sosa (2016), the present study did not find a statistically significant difference in quantity of parent language input between the traditional toy and picture book play conditions. Among the four play conditions examined, electronic toys elicited the lowest quantity of parent language. This finding is consistent with previous research suggesting electronic toys may limit parent engagement and reduce opportunities for language exchanges (Miller et al., 2017; Sosa, 2016; Wooldridge & Shapka, 2012). Building on previous research, the findings of this study underscore the impact of play condition on the quantity of parent language input, reinforcing the role of picture books and traditional toys in promoting a higher quantity of parental language use during play interactions.

## **Research Question 2**

The second research question investigated the quality of parent language input across four play conditions: traditional toys, electronic toys, picture books, and functional and emerging pretend play. Language quality was assessed using two measures: the total number of different words spoken by parents and the frequency of pragmatic functions of language, categorized into referential language, regulatory language, and vocalization prompts. Additionally, individual pragmatic functions within these broad categories were analyzed to provide a more detailed understanding of language usage across play conditions.

### ***Number of Different Words***

A statistically significant effect of play condition was found on the number of different words spoken by parents during play interactions. On average, picture books elicited the highest lexical diversity, followed by traditional toys, functional and emerging pretend play, and electronic toys. Pairwise comparisons indicated statistically significant differences between picture books and functional and emerging pretend play, as well as between traditional toys and functional and emerging pretend play. However, no statistically significant differences were observed between picture books and traditional toys, between picture books and electronic toys, between traditional toys and electronic toys, or between electronic toys and functional and emerging pretend play.

Prior research has demonstrated that book reading promotes more complex and diverse linguistic input when compared to other communication contexts (Hoff, 2006; Hoff-Ginsberg 1991; Snow et al., 1976). Although the results of this study support book reading as a context for rich linguistic input, the lack of statistically significant differences in the number of different words spoken by parents across the picture book, traditional toy, and electronic toy conditions

warrants further consideration. Stich et al. (2015) similarly found that differences in maternal type-token ratio were not statistically significant between toy play and book reading. These results suggest that the number of different words spoken by parents is not solely determined by play condition but is also influenced by complexity of the play and the specific play materials used. In the context of book reading, factors such as text density, linguistic complexity, and overall text structure likely shape parent language input (Kuchirko et al., 2020; Montag et al., 2015; Petrie et al., 2023). These findings underscore the need for further research to examine how specific characteristics of physical play and reading materials may contribute to variations in lexical diversity and overall language quality during parent-child interactions.

### ***Pragmatic Functions of Language***

Results revealed a statistically significant effect of play condition on the frequency of parents' use of pragmatic functions of language. The primary analysis examined pragmatic functions within three broad categories: referential language (label/description and emotion/state), regulatory language (attention directives, action directives, and prohibitions), and vocalization prompts (questions and elicitations). Across all play conditions, referential language was the most frequently used language function. In the traditional toy, electronic toy, and picture book conditions, referential language was followed by vocalization prompts and then regulatory language. However, in the functional and emerging pretend play condition, regulatory language occurred more frequently than vocalization prompts. This predominance of referential language aligns with prior research indicating that parents, particularly those situated in Western cultures, often exhibit a higher level of referential language during play than those from other cultural backgrounds, who may emphasize regulatory language or vocalization prompts (Kuchirko et al., 2020; Tamis-LeMonda et al., 2019).



To further examine how play condition influenced the three broad pragmatic language categories, each individual function was analyzed across the four play conditions. Statistical analyses indicated regulatory language and vocalization prompts did not differ significantly across the four play conditions. There was a statistically significant increase in referential language use in the picture book condition compared to both the electronic toy and functional and emerging pretend play conditions. No statistically significant differences emerged between picture books and traditional toys, or among traditional toys, electronic toys, and functional and emerging pretend play.

Pragmatic functions of language were also examined across the seven granular functions: label/description, emotion/state, attention directives, action directives, prohibitions, questions, and elicitations. A statistically significant effect of play condition was observed when comparing the seven functions. When the seven pragmatic functions were analyzed separately, statistically significant differences across play condition were found only for the label/description function. Picture books elicited the highest frequency of label/description use, followed by traditional toys, functional and emerging pretend play, and electronic toys. Among the four play conditions, statistically significant differences in label/description use were found, with the picture book condition eliciting a higher frequency label/description than both the electronic toy condition and the functional and emerging pretend play condition. Similar to previously discussed measures in the present study, no statistically significant differences were found between picture books and traditional toys. These results mirror the outcomes for referential language use across play conditions, suggesting that the results observed in the broad category of referential language—encompassing both label/description and emotion/state—were primarily driven by the granular label/description category.

These findings are consistent with previous research demonstrating that book reading facilitates high levels of referential language use, specifically labeling, as parents naturally describe and name objects and events depicted in books (Fletcher & Reese, 2005; Goddard et al., 1985; Hoff, 2006; Ninio & Bruner, 1978; Tamis-LeMonda et al., 2019). Yet, the lack of statistically significant differences between picture books and traditional toys suggests that traditional toy play may also provide rich opportunities for referential language, particularly when the specific play materials encourage labeling and description. The shift toward greater use of regulatory language in the functional and emerging pretend play condition can likely be attributed to parents using language specifically to guide children through play with functional objects and within pretend play scenarios.

Overall, findings suggest that play condition influences the quality of parent language input, particularly in the context of book reading. Picture books consistently elicited a higher number of different words and greater use of referential language, suggesting that book reading fosters diverse and complex parent language input (Holme et al., 2022; Masek et al., 2021; Sosa, 2016). However, differences across play conditions were not as pronounced as initially expected. Notably, play with traditional toys elicited similar levels of lexical diversity and pragmatic function use when compared to book reading, suggesting these play materials may also encourage high-quality language input. The absence of statistically significant differences between the picture book and traditional toy conditions aligns with Sosa's (2016) general findings, which indicate that differences across measures were smallest between book reading and traditional toy contexts.

Functional and emerging pretend play was associated with reduced referential language use and lexical diversity, despite research suggesting the benefits of parent-child engagement in

pretend play for language development (Tamis-LeMonda & Bornstein, 1994; Weisberg et al., 2013). One possible explanation for this finding is the younger age of child participants (mean age = 13.1 months), as their developmental and engagement level may not yet support the more advanced skills involved in the functional and emerging pretend play condition. Kuchirko et al. (2020) found that parents' use of the pragmatic functions of language varied across their children's developmental level, suggesting that parents adjust their language to support the developmental needs of the child. Thus, findings from the present study must be interpreted in the context of the relatively young age of participants. Additionally, as previously noted, the specific characteristics of the physical play materials, such as the complexity of books, the interactive and open-ended nature of traditional and electronic toys, and the familiarity and developmental appropriateness of functional and pretend play toys, likely contributed to variations in parent language use. Future research should explore how child age and language development interact with the distinct features of play materials to shape the quality of language input during parent-child interactions.

## **Limitations and Future Directions**

### ***Sample Characteristics***

Sample size and participant characteristics are considered limitations of the current study. Of the original sample of 30 parent-child dyads in the parent study (Brown, under review), only ten were analyzed. Among these ten dyads, parent characteristics were relatively homogenous; most participants identified as white, middle- to upper-class, highly educated individuals. Further, out of the ten dyads, only one father participated, preventing any analysis of the potential of gender-based differences in language use across play conditions. Child participants also shared similar demographic characteristics to the parents included in the study. The majority

of children were white and from English-speaking homes, though there was a more balanced distribution between male ( $n=4$ ) and female ( $n=6$ ) children than among the parents.

Future research should aim to include a larger and more diverse sample of parent-child dyads, with greater representation across racial, ethnic, linguistic, and socioeconomic backgrounds, as well as a more balanced inclusion of both fathers and mothers. Examining language use across different culturally and linguistically diverse groups could provide valuable insights into the variations in language usage during play interactions, and a more balanced sample of father and mother participants would allow for evaluation of gender-based influences on parent language input.

Another limitation related to sample characteristics was the age range of child participants (mean age = 13.1 months). Results from Kuchirko et al. (2020) demonstrated differences in parents' use of the pragmatic functions of language when interacting with children aged 14 and children aged 24 months, suggesting that parent language input adapts to children's linguistic growth. Children included in the study were in the early stages of language development; thus, parent language input was likely structured to meet their developmental needs. Given the younger age range of participants included in this study, present findings related to parent language input may not generalize to linguistic interactions between parents and older children. Further, the parent study replicated and extended Sosa (2016) by incorporating functional and emerging pretend play as an additional play condition. Although this condition resulted in lower quantity and quality of language input when compared to picture books and traditional toys, these findings may be attributable to the developmental level of the child participants. In light of this, future research should incorporate longitudinal designs or compare parent-child interactions across different age groups to provide insight into how the quantity and

quality of parent language input, particularly the use of pragmatic functions of language, vary over time and in response to different play conditions. Specific investigation of the functional and emerging pretend play condition may also be warranted to gain further understanding of how this play condition impacts parent language throughout language development.

### ***Transcription and Coding***

Though all utterances within an audio file were transcribed, only parent utterances directed toward the child were coded and analyzed. As a result, a substantial portion of the transcribed audio file, including language input from siblings and other adult family members, was excluded from analysis, despite many of these utterances being directed toward the child. For example, some siblings read to the child participant while the parents remained nearby to answer questions and comment on the material. Although such interactions likely contributed valuable language input, they were not included in coding. Future research examining all language input directed toward the child participant, not just that of the parent, may be beneficial to fully capture children's naturalistic language environments during play.

Parent utterances directed toward siblings or other adults were also excluded from coding and analysis, even if the child participant was situated within the immediate context of the language exchange. Though child-directed speech during periods of joint-attention is considered highly salient for language learning, research suggests that overheard speech may also contribute to language development (Akhtar et al., 2019; Shneidman et al., 2013; Weisleder & Fernald, 2013). Therefore, analyzing overheard speech alongside child-directed speech in future studies could offer a more comprehensive understanding of how different types of language input vary across play conditions and contribute to the overall language environment of the child.

Parent utterances that included laughs, gasps, vocalizations, singing, and onomatopoeias (e.g., "vroom vroom") were transcribed but excluded from coding analysis. As previously stated, many parent utterances were also omitted from coding analysis because they were directed toward siblings or other adults rather than the child participant. These exclusions resulted in an average of 58% of parent utterances being coded across all play conditions. This proportion is substantially lower than the proportion of parent utterances coded by Kuchirko et al. (2020), who coded 83% of all parent utterances at the 14-month assessment and 85% of all parent utterances at 24-month assessment. Future research could aim to refine transcription conventions and the coding scheme to capture interactional context while minimizing the inclusion of irrelevant verbalizations and non-verbal acts.

### ***Play Materials***

As previously stated, the specific characteristics of play materials within each play condition may influence the quantity and quality of parent language input as well as child engagement. For example, books with more complex text and detailed illustrations may elicit higher lexical diversity and more referential language from parents, while electronic toys with high-volume output may reduce parent-child interactions and limit opportunities for parental input. Similarly, variations in the types, colors, content, and functions of traditional toys and toys that encourage functional and emerging pretend play may influence language exchanges during play. Given these potential differences within each play condition, future research should examine the specific features of play materials that contribute to greater quantity and quality of parent language input.

## **Summary and Implications**

The results from this study highlight differences in both the quantity and quality of parent language input across play conditions. This work, along with broader research on parent language input across activity contexts, underscores that certain activities, or play conditions, are better suited for specific types of language input. These findings could inform recommendations for parents who aim to foster rich language environments, as well as for early interventionists seeking to support language development in young children. The higher rates of parent words per minute, number of different words, and referential language in books and traditional toys compared to electronic toys suggest that books and non-electronic toys may provide more robust opportunities for language learning.

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## Appendix A

### Photos of Toy Sets

#### Traditional Toys



#### Electronic Toys



## Picture Books



## Functional and Emerging Pretend Play

