ABSTRACT

Title of Thesis:	THE IMPACT OF MATERNAL NEGATIVE LANGUAGE ON CHILDREN'S LANGUAGE DEVELOPMENT
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Various features of infant- and child-directed speech (IDS/CDS) are known to have a positive impact on children's language development. Some, such as directive language, appear to be less facilitating. We investigated whether mothers' usage of negative language impacts children's language development. Thirty-three mothers' language samples at 30 months and children's conversational language samples at 66 months were analyzed to locate operationally defined negative language and imperatives. Five language sample analysis measures were utilized to assess children's expressive language abilities. Inverse relationships between maternal use of negative language and children's language outcome measures were found. This preliminary result suggests that the more children hear negative language at an earlier age, the lower their language outcomes are at a later age. This study was exploratory in nature, and various limitations and implications for future studies are outlined in the paper.

THE IMPACT OF MATERNAL NEGATIVE LANGUAGE ON CHILDREN'S LANGUAGE DEVELOPMENT

by

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List of Abbreviations

IDS/CDS: Infant/Child-Directed Speech

DLPFC: Dorsolateral Prefrontal Cortex

IPG: Inferior Parietal Gyri

CHILDES: Child Language Data Exchange System

TD Children: Typically Developing Children

LT: Late Talkers

EC: Examiner-Child

PC: Parent-Child

LSA: Language Sample Analysis

CLAN: Computerized Language ANalysis

MLU-m: Mean-Length of Utterance in Morphemes

MLU-w: Mean-Length of Utterance in Morphemes

IPSyn-R: Revised Index of Productive Syntax

DSS: Developmental Sentence Scoring

VocD: Vocabulary Diversity

MLT: Mean Length of Turn

TTR: Type-Token Ratio

NDW: Number of Different Words

PMN: Percent of the Mother's Negative Language

Chapter 1: Introduction

There are various factors that explain the different rates at which individual children acquire language, such as genetics (Stromswold, 2001) and environmental factors (Hoff, 2006). Studies have shown the heritability of language skills to be between 1 and 82%, depending on the study methodology, language aspect (e.g., syntax vs. vocabulary), and the participants' age (Dale et al., 2000; Ganger et al., 2002; Reznick et al., 1997; Stromswold, 2001). This statistic also suggests that environmental factors can contribute to individual differences in language acquisition.

As with other environmental factors, such as socioeconomic status (SES) (Hart & Risley, 1995), parental input also influences children's language development (Huttenlocher, 1998). It is found that children from lower-SES families, compared to their high-SES peers, exhibit a slower vocabulary growth rate (Arriaga et al., 1998), which persists throughout the school years (Morgan et al., 2015). Known as the '30 million word gap,' Hart & Risley's (1995) findings demonstrated a stark difference in parental language input to children in professional families and those living in poverty. The former group hears 45 million words on average, while the latter hears 13 million words.

Qualitatively, low-SES families utilize less infant- and child-directed speech (IDS/CDS), which has been shown proven to predict certain linguistic aspects of children's language development (e.g., vocabulary growth rate, speed in processing familiar words) (Hart & Risley, 1995; Weisleder & Fernald, 2013). IDS/CDS is characterized by numerous potentially facilitating linguistic features (Bernstein Ratner,

2013; Spinelli et al., 2017). For example, the quantity of IDS/CDS is a strong predictor of child language learning outcomes (Huttenlocher, 1998; Rowe, 2012). Higher pitch in IDS/CDS facilitates word-learning (Golinkoff & Alioto, 1995), and positive tone in IDS/CDS positively impacts gaining and sustaining infants' attention (Singh et al., 2002).

Aspects of parents' syntactic input assist children's grammatical development (Furrow et al., 1979; Hadley et al., 2011). For example, mothers' frequent use of reflective questions (e.g., wh- questions) compared to declaratives reflect positive growth of children's usage of auxiliary forms (Hoff-Ginsberg, 1986).

However, not all language input positively correlates with children's language development. For example, certain types of directive language that change children's attention or behaviors negatively correlate with child language development. Specifically, mothers' use of imperatives, a directive language form that deletes initial subject-noun phrases, is negatively associated with children's later use of subject-noun phrases (Newport et al., 1977). Typically, the more that caregivers talk to children, the better it is for nurturing their relationship and children's language outcomes. However, research demonstrates otherwise: certain speech patterns are sometimes better avoided than overused. As such, we became curious as to what other factors other than imperatives could have a negative impact on children's language development.

Interestingly, while a large amount of research has been conducted on the impact of negative language on children's psychological or behavioral behavior, very little research has been conducted on its influence on language acquisition/development. For instance, studies show that parental negative language adversely impacts teenagers

emotionally and behaviorally (Wang & Kenny, 2014). Negative valence words may even have an adverse physiological effect on adults, as they trigger the release of stress and anxiety-inducing hormones (Richter et al., 2010). In psychology, the term "valence" refers to a static and affective quality that possesses intrinsic attractiveness (i.e., positive valence) or aversiveness (i.e., negative valence) of an event, object, or situation (Frijda, 1986).

Thus, given that children's language development profiles appear influenced by the input they receive, this paper will examine associations between negative maternal language and children's subsequent language development. The following sections will first explore types of speech that positively impact children's language growth and those that negatively impact children's language development.

Chapter 2: Literature Review

Infant/Child-directed speech (IDS/CDS)

Infant- and child-directed speech (IDS/CDS), also known as motherese, is a specialized speech register typically used by caregivers and adults when communicating with babies and young children. Its prosody is one of the most readily recognized features, characterized by a higher mean fundamental frequency (e.g., McRoberts & Best, 1997; Papoušek et al., 1991; Van de Weijer, 1997), exaggerated intonation patterns (Fernald & Simon, 1984), expanded pitch range (e.g., Jacobson et al., 1983; Warren-Leubecker & Bohannon, 1984) and a deliberately slower rate of speech (Bernstein Ratner, 1986). Furthermore, other prominent feature includes increased prolonged vowels and pauses for more apparent division of syntactic units (Albin & Echols, 1996; Andruski & Kuhl, 1996; Bernstein Ratner & Luberoff, 1984). When using IDS/CDS, caregivers tend to ask more questions (Newport et al., 1977; Soderstrom et al., 2008) with increased repetition (Fernald & Simon, 1984). Other linguistic feature includes simplified vocabulary (Bernstein Ratner, 1988; Mervis & Mervis, 1982).

These features of IDS/CDS are known to promote language development (Spinelli et al., 2017). For example, higher pitch in IDS/CDS facilitates word-learning (Golinkoff & Alioto, 1995), and research has even found that both adults and toddlers (Ma et al., 2011) benefit from IDS properties when learning new words. Primarily, the purpose of IDS/CDS is to attract and maintain children's attention (Soderstrom, 2007) and facilitate expressing positive emotions within parent-child interaction. Given that

it is found that children learn the best through joint attention to objects or activities, a positive tone in IDS/CDS is beneficial in gaining and sustaining infants' attention (Singh et al., 2002),

Certain aspects of parents' syntactic input also assist children's grammatical development (Furrow et al., 1979; Hadley et al., 2011). For instance, mothers' speech to children tends to be shorter and repetitive (Hurtado et al., 2008; Snow, 1972; Soderstrom, 2007). This repetition helps gain and maintain an infant's attention (Cooper & Aslin, 1990) and provides more opportunities to process speech signals (McRoberts & Best, 1997; Snow, 1972). Shorter utterances and repetitions support infants to better segment, recognize and identify syntactic units than longer utterances (Bernstein Ratner & Rooney, 2001; Snow, 1972).

Moreover, the quantity and quality of IDS/CDS are strong predictors of child language learning outcomes. It has been widely accepted that a larger quantity of IDS/CDS predicts greater vocabulary scores and speed in processing familiar words (Hart & Risley, 1995; Huttenlocher et al., 1991; Rowe, 2012; Weisleder & Fernald, 2013). Moreover, other evidence has been found that the quality of IDS/CDS (e.g., vocabulary diversity and complexity) positively impacts later child language development (Hurtado et al., 2008; Rowe, 2012). Thus, it is clear that the quantity, quality, and complexity of language input impact children's language development.

Responsive speech

There are various ways to categorize the quality of caregivers' speech. One way is classifying it as to how responsive or directive their speech is. Operationally, responsiveness is defined as whether the caregiver responds to the action or speech of

the child in a prompt, contingent, and meaningful manner (Ainsworth et al., 1974; Bornstein et al., 2008; Bornstein & Tamis-LeMonda, 1989; Landry et al., 2001). Contingency depends on whether the response is conceptually related to the child's actions or speech. For example, if a child is playing with a toy, responsive speech is related to that toy or what the child is saying.

The importance of parental responsiveness may be deeply rooted within attachment theory, where such interactions provide a secure foundation from which infants can explore (Ainsworth et al., 1974). The transactional model of development emphasizes the role of reciprocal and bidirectional exchanges between children and the environment in acquiring language, social and cognitive skills (Sameroff & Chandler, 1975). Furthermore, parents working within the child's zone of proximal development and building upon the skills that the children already possess and situations of interest to them create more opportunities for joint attention (McCafferty, 2002; Wade et al., 2014). As it is widely known, much research has been conducted on how joint attention establishes the base for language learning since it engages children (e.g., Dunham & Dunham, 1992; Tomasello & Farrar, 1986).

In addition, maternal responsiveness has been positively associated with children's vocabulary growth at around the age of one (McGillion et al., 2013; Paavola-Ruotsalainen et al., 2018; Rollins, 2003; Trautman & Rollins, 2006). It is also correlated with earlier acquisition of language milestones in terms of vocabulary, expressive and receptive language, and grammatical abilities (Camp et al., 2010; Hoff, 2006; Karrass & Braungart-Rieker, 2003; Roberts & Kaiser, 2011; Tamis-LeMonda et

al., 2001) for both typically developing children and children with developmental delays (Brady et al., 2004; Mahoney et al., 1998; McDuffie & Yoder, 2010).

A meta-analysis conducted by Madigan et al. (2019) examined parenting behaviors and early childhood language in typically developing children. They observed a medium effect size for maternal sensitive-responsiveness and expressive and receptive language for children between ages 17 months and 5 years 9 months. The only significant moderator of the link between sensitive-responsiveness and children's language included the SES of the family. The effect size was more significant in low and diverse SES families than in the middle to upper SES families. This demonstrates that parents' input is especially crucial in children's language development in underprivileged communities.

Interestingly, researchers also observed the relationship between parental warmth and child language. Parental warmth refers to parents showing physical affection or positive affect during interaction with the child (Madigan et al., 2019), while sensitive-responsiveness refers to a parent's ability to recognize and understand the child's signals and cues and react appropriately and promptly (Ainsworth et al., 1974). Researchers have found that the association was higher between sensitive-responsiveness and child language than warmth and child language (Madigan et al., 2019). While warmth can be conveyed non-verbally, responsiveness requires verbal reciprocity that is more attuned to the child's present situation. This finding underscores the idea that it is not only positive affect but joint attention and shared experiences that have the most significant impact on child language development.

Behaviorally, children of responsive parents have been found to be more social and proactive in approaching others and more motivated and willing to explore (Kochanska, 1997). Through this exploration and stimulation, children can advance their language (Tamis-LeMonda & Bornstein, 2002). This, in turn, suggests that children with less responsive parents may have fewer opportunities to expand their language.

Directive Speech

In contrast, directiveness is a speech style that utilizes commands, suggestions, or requests to direct the child's behaviors or verbalizations (Akhtar et al., 1991; McCathren et al., 1995; Murray & Hornbaker, 1997). For example, utterances such as "*the toy goes in the box,*" "*where do you think this toy goes?*" or "*want a toy?*" are all examples of directive language (Newport et al., 1977). Unlike responsive speech styles, children of parents who use more directive language are found to be passive and take less initiative in interactions (Prizant et al., 1993). Furthermore, the long-term adverse impact of interfering parenting style is observed in the child's emotional, social, and academic outcomes during early school years (Ainsworth et al., 1978; Morgan et al., 2015).

Imperatives are a form of directive language, and a large amount of research demonstrates that maternal use of imperatives is negatively associated with children's language development (Akhtar et al., 1991; Della Corte et al., 1983; Harris et al., 1986; Jones & Adamson, 1987; Nelson, 1973; Newport et al., 1977; Tomasello et al., 1986; Tomasello & Todd, 1983). Specifically, it is negatively associated with children's development of subject-noun phrases (Newport et al., 1977). Since imperatives imply

and thus, delete the subject, this phenomenon is natural in that children who are not as exposed to the use of subject nouns will have slower development of that syntactic feature.

In addition, parental imperatives have a poor pragmatic function since they can hinder a conversation from moving forward. Typically, people take turns talking in a conversation. However, when a mother or a teacher orders a child to do something (e.g., *clean up*, *put the block away*), there is not much room for the child to respond contingently to continue the conversation (Bernstein Ratner, 2013).

However, researchers have found that not all directives have negative associations with child language development (Akhtar et al., 1991; Flynn & Masur, 2007; Pine, 1992). A directive can be primarily categorized into whether it is supportive or intrusive. While a supportive directive would follow the child's lead and attention, an intrusive directive would redirect the child's attention to new behavior. For example, if a child is playing with a shape sorter, a mother saying, "*put the square one in there*," would be considered a supportive directive. However, in the same scenario, it would be considered an intrusive directive if the mother said, "*look at the duck,"* to direct the child's attention away from their current action or object of their interest. Research has shown that supportive directives are positively associated with language outcomes (Akhtar et al., 1991), while intrusive directives are negatively associated with language outcomes (McCathren et al., 1995; Murray & Hornbaker, 1997). As such, it is apparent that whether the caregiver is following or leading the child's attention has a disparate impact on the child's language (Flynn & Masur, 2007; Paavola-Ruotsalainen et al., 2018).

Negative Language

The impact of negative language on adults

Research also demonstrates that words differing in emotional valence have a contrasting impact in various ways, neurologically, psychologically, and behaviorally. Maddock and Buonocore (1997) found that given threat-related words (e.g., *terror*, *victim, cancer*), the posterior cingulate cortex of adults whose ages ranged from 23 to 58 years was consistently and strongly activated. This area is well known to be associated with not only emotional stimuli but also episodic memory (Maddock, 1999; Maddock & Buonocore, 1997). In real-life scenarios, we recall things better when emotions are associated with them (Bradley et al., 1992; Ochsner, 2000).

Another study by Richter et al. (2010) studied the impact of pain-related words on adults ages between 20 and 25.6 years. The researchers found that when processing pain-related words in relation to other types of words (e.g., positive, neutral), there was increased activity in the dorsolateral prefrontal cortex (DLPFC), inferior parietal gyri (IPG), and precuneus. Furthermore, it has been shown that the amygdala, a region that drives "fight or flight" emotions, is also activated when negatively valenced words are presented compared to positively valenced words (Isenberg et al., 1999; Strange et al., 2000; Tabert et al., 2001). All these activated brain regions are associated with perceiving, encoding, and processing pain-related stimuli. Thus, it is evident that negative valence words have a different neurological impact on the brain than non-negative valence words.

The impact of negative language on children

Psychologically and behaviorally, harsh-negative (i.e., hostile, critical) parenting behaviors, compared to supportive-positive (i.e., warm, responsive), have been associated with high rates of depressive symptoms in children (Eisenberg et al., 2001, Harrist et al., 1994; Kim et al., 2003). It is also found that parents' harsh verbal discipline at age 13 predicted increased adolescent behavioral and depressive symptoms between ages 13 and 14 (Wang & Kenny, 2014). Since various contributing factors can be used to describe parenting behaviors (e.g., degree of physical interaction, depth of emotional support), it is difficult to solely extract a direct relationship between negative valence word usage and children's depression. However, given these findings, it can be inferred that more negative valence words are likely to be used when parents are hostile and critical rather than warm and responsive.

Notably, evidence has been found how the emotional content of parental discourse is a significant predictor of children's socio-emotional cognition and functioning (e.g., Denham et al., 1994; Dunn et al., 1987; Taumoepeau & Ruffman, 2008). This is further supported by other research that found a stronger association with the way parents talk than their behavior (e.g., attachment, warmth) on children's socio-emotional outcomes (Raikes & Thompson, 2006; Ruffman et al., 2006).

Linguistically, while emotion is a complex concept, children understand emotion words and develop skills to represent their feelings early on. Children begin producing basic feeling state words between 18 and 20 months (e.g., *happy, cry, mad*; Lagattuta & Wellman, 2002). Between ages 2 and 5 years, as their emotional competence and language skills grow, they develop skills to explain their emotional

experiences. This implies that by age 5, they should have a grasp of primary emotion categories, such as joy, fear, anger, and sadness. These findings suggest that children can understand, produce, and differentiate between positive and negative language. Thus, while they may not fully grasp slight nuances of words, by age 5, they will have the ability to process and classify their parents' utterances as positive or negative.

Chapter 3: Research Questions & Hypothesis

The proposed study will examine the relationship between negative maternal language and children's subsequent language development. Since the perception of "negativity" varies by individual, one needs to define a measuring system for each collected data set. This paper will focus on two different methods of observing the impact of mothers' language at 30 months on children's language development at 66 months. First, we will analyze mothers' use of "negative language" in terms of their use of negative particles (e.g., *don't, can't, won't*) and overtly negative words (e.g., *no, never, wrong*). Not all utterances containing these negative particles or overtly negative words will be considered negative. They will only be considered negative if it is either a negation, denial, refusal or prohibition (adapted from Murray et al., (1993)'s definition of "negative affect"). Second, mothers' usage of imperatives (e.g., *stop, wait*) will be observed. The ensuing section in Methods will discuss more details about the operational definition of "negative language."

The following research questions will be addressed:

1. Is there a correlation between maternal usage of negative language at 30 months and children's language development at 66 months? It is hypothesized that children whose mothers use more negative language at 30 months will have lower language outcome measures at 66 months. This is based on findings demonstrating the positive influence of warm and bidirectional interactions with caregivers on children's language development (Madigan et al., 2019). Negative language tends not only to dissuade the continuation of the conversation on the topic at hand but also redirect the child's attention (e.g.,

Della Corte et al., 1983; Paavola-Ruotsalainen et al., 2018), which have all been shown to have an unfavorable effect on children's language development.

2. Can mothers' frequency of negative language usage at 30 months predict children's frequency of negative language usage at 66 months? Studies have found that mothers' production of emotion words predicted children's production of emotion words (Ogren & Sandhofer, 2021). Given these findings, it is hypothesized that mothers' frequency of negative language will predict children's frequency of negative language.

Chapter 4: Methods

Participants

The participants were 33 mother-child dyads (22 male and 11 female). The data from these children were publicly available at the Child Language Data Exchange System (CHILDES, Moyle et al., 2007). The data came from a larger five-year longitudinal study (Ellis Weismer et al., 2013) investigating specific language delays in children from 30 to 66 months. In this study, language samples were collected yearly at 30, 42, 54, and 66 months. Originally, a total of 112 children participated in this study, including 56 late talkers (LT) and 56 typically developing (TD) children. The LT children were matched with their TD peers on age, nonverbal cognition, and SES. Ethnicity was primarily Caucasian, and SES was indexed by years of maternal education, which averaged approximately 15.5 years of schooling (Ellis Weismer et al., 2013).

Typically, children are identified as LTs at two years of age based on a delayed onset and progression of expressive language along with otherwise appropriate development (Roos & Weismer, 2008). Approximately 50 – 70% of the LTs have been reported to catch up by the age of five (Dale et al., 2003; Paul et al., 1996). For this data set, researchers from the original study observed that standardized language testing results of children at 66 months demonstrated that the majority of LTs had moved into the normal range of expected language (Moyle et al., 2007). However, it was noted that LTs' average scores were significantly lower than their TD peers' scores. Given this finding, it was hypothesized that a more significant impact might be observed within

the LT population than just the TD or combined populations. Thus, only LT children were examined for this study.

Furthermore, we chose to observe those at 30 and 66 months, given that children's language was sparse at 42 and 54 months of age. Additionally, as we observed the impact of mothers' negative language at 30 months on 66 months old children, only those who had records at 30 and 66 months were included in this analysis. Two dyads were further excluded from the final participant list since the interaction was with fathers.

Language sample elicitation

Various methods were utilized to collect language samples. For children ages 30 months, researchers have collected examiner-child (EC) and parent-child (PC) play-based language samples employing a standard set of toys (e.g., Fisher Price Farm set, Doll House with people and furniture). PC language samples were selected to observe mothers' language input at 30 months. Those at 66 months were collected during conversational speech between the child and the examiner, rather than the mother. This served as an independent assessment of the child's conversational language skills, as one can observe the child's oral language skills while talking to an unfamiliar communication partner.

Language Sample Analysis (LSA)

Using Computerized Language ANalysis (CLAN), the audio recordings of the language samples were transcribed in the CHAT format using TalkBank utilities (MacWhinney, 2000). CHAT is a software program that transcribes language samples

employing a set of rules, and CLAN is a data analysis program that analyzes transcripts transcribed by CHAT. Initial language samples were transcribed at Dr. Weismer's lab. Research assistants from the Language Fluency lab at the University of Maryland – College Park checked the transcriptions for reliability.

Operational definition of negative language

Since the definition of "negative language" is subjective, an operational definition specifically constructed for this data set was determined. Each word was assessed to determine whether it was used in a negative context. The word was only counted as negative language use if it indicated negation (e.g., you are *not* tired), denial (e.g., I *don't* want it), refusal (e.g., you *can't* play with it), or prohibition (e.g., *don't* throw it), as adapted from Murray et al., (1993)'s definition of "negative affect." This process was essential since not all words under the criteria were perceived as negative to listeners.

Criteria of negative language	Examples
Negative particle (i.e., the word *not*), whose reduced form is -n't	Can't, don't, won't
Overtly negative words	uhuh

Table 1: Examples of negative language use

Mothers' negative language

Using the CLAN FREQ function, all words used by mothers were selected (n=1,233). These words included the root word and its variations (e.g., *no, nope)*. First, all words containing negative particles were chosen, and the investigator manually searched the list for overtly negative words, such as *bad, wrong,* and *never*. After this, all words were initially screened through CLAN KWAL utility to observe whether they

were used negatively. Some words were eliminated even if they contained negative particles or were overtly negative since they did not fit the four criteria (negation, denial, refusal, or prohibition). For example, the word *bad* was not included in the mothers' negative word list since it was only used once as "*do you have a bad cough?"* A list of negative words used for analysis is in Appendix A.

Then, each of the words in the negative word list was pulled up using the CLAN KWAL utility to assess whether they were used negatively or not. These utterances were coded with a postcode, [+ neg], if they fell under one of the four criteria (negation, denial, refusal, prohibition).

An utterance was regarded as negation if it was an emotionally discordant response to the child's behavior or expressions. An utterance was regarded as a prohibition if the mother forbade the child from taking action. An utterance was regarded as refusal if the mother refused a request made by the child. For prohibition, while the primary person taking action is the child, for refusal, the primary person taking action is the mother. Lastly, an utterance was considered denial if the mother did not accept the child's opinion on matter-of-fact information. Examples of these four criteria are in Table 2.

Negative language		
Criteria	Operational definition	Example utterances
Negation	Emotionally discordant response to the child's behavior or expressions.	MOT: well maybe his tongue *shouldn't* be there. Situation: The child was trying to put the toy tongue somewhere inappropriate.
Denial	Not accepting an opinion or information (more factual based than negation).	MOT: yeah those glasses *aren't* gonna fit you… *No* that's your ear. Situation: The child is playing with toy glasses.
Refusal	When the child asks for a favor or requests something, the mother rejects it.	CHI: open. MOT: *nope* that one doesn't come off. Situation: The child wants the mother to open something.
Prohibition	When the mother forbids the child from doing something.	MOT: oh *don't* do that. Situation: The child is trying to do something inappropriate with a toy.
Others		
Tag Question	A question converted from a statement using the same modal verb.	They're all in there *aren't* they? That's sort of silly *isn't* it?

Table 2. Examples of negative language utterances. CHI stands for a child, and MOT stands for mother.

Through the process, another category was observed, namely the "tag question," to categorize utterances containing negative particles in a question form. These questions were normally followed by using the same modal verb earlier in the sentence (e.g., *that will work okay, won't it?*). More examples are provided in Table 2. Some other instances included self-talk statements, where the mother was uncertain about something in the situation. For example, some mothers said, "*I'm not sure what that is*," or "*now mommy's not quite sure how this works*." There were not enough utterances like this to create a category of its own.

After the primary investigator checked all the utterances and coded them according to the negative language criteria, a secondary coder checked them. All discrepancies were resolved after discussion.

Children's negative language

A similar process of selecting mothers' negative word list was completed to answer the second research question on children's usage of negative words at 66 months. All words containing negative particles were selected, and the primary investigator manually chose the list of overtly negative words. A preliminary negative words list was generated using CLAN KWAL utility and judged whether they function as a negation, prohibition, refusal, or denial. The final negative word list utilized by children is in Appendix B. When the primary investigator finished checking the transcripts, a secondary coder rechecked them. Any inconsistencies in coding were settled by consensus.

Imperatives

Imperatives are a form of directive language that commands, suggests, or requests to change the child's behaviors or verbalizations. Typically, the subject of an imperative sentence is assumed and is not stated (e.g., *look at this*). However, there are various instances where the subject is mentioned but fulfills the purpose of imperative (e.g., *let's play with these toys, you should eat your food, you've gotta save the lady on top of the barn).* Since there are variations as to how an imperative might start, these imperatives were manually checked and coded with a postcode, [+ imp].

After the primary investigator finished coding the imperatives, a secondary coder independently examined the transcripts. When a difference in coding was observed, it was resolved through discussion.

Language sample analysis (LSA) outcome measures

Five LSA outcome measures were assessed in children's speech at 66 months. To appraise utterance length and (morpho-)syntactic development, the mean length of utterance in morphemes (MLU-m; Brown, 1973) was used. A modified version of the revised index of productive syntax (IPSyn-R; Altenberg et al., 2018), namely the IPSyn-C (Yang et al., 2021) and developmental sentence scoring (DSS; Lee & Canter, 1971), were employed to evaluate children's grammatical complexity. Vocabulary diversity (VocD; McKee et al., 2000) was utilized to measure lexical diversity. To examine the interactional behavior of children, mean length of turn (MLT) was used.

Utterance length and (morpho-)syntactic development

MLU is a well-known index for measuring language development in children and a helpful marker for language impairment. Utterance length is an important component in observing children's language development since increased word length could generally demonstrate children's improving ability to communicate and convey information (Piantadosi et al., 2011). It measures the number of words or morphemes in spontaneous utterances. However, it only observes the length of utterance and does not provide information regarding a child's grammar. It is recommended to be used for children with MLU below 4.0 since the accuracy of MLU in identifying children with atypical development decreases as children grow older, and their language production becomes more complex (Crystal, 1974; Gleason & Bernstein Ratner, 2016; Klee & Fitzgerald, 1985).

MLU-m is more detailed than the mean length of utterance in words (MLU-w) since it accounts for each morpheme. For example, if a child says, "*I like apple*" or "*I*

like apples," the latter example demonstrates higher linguistic complexity since the child can utilize regular plural -s. In this example, MLU-m would be higher for the latter child while MLU-w would be the same. Given that there is an almost perfect correlation between MLU-w and MLU-m (Parker & Brorson, 2005) and MLU-m is a more comprehensive measure, MLU-m was chosen to be observed.

Syntactic complexity

Beyond an MLU of 4.0, measures such as IPSyn (Scarborough, 1990) and DSS (Lee & Canter, 1971) become more valuable in assessing children's syntax production. Altenberg et al. (2018) produced a revised version of IPSyn (i.e., IPSyn-R) to improve its ease of scoring for clinicians and researchers. For both the original and IPSyn-R, points are systematically scored according to four categories: Noun Phrase (NP), Verb Phrase (VP), Questions/Negation (Q/N), and Sentence Structures (SS). It has a high correlation with MLU, justifying its validity as a measure of syntactic development.

However, it was recently found that not all IPSyn categories are equally important or effective in measuring children's grammatical development. According to Yang et al. (2021), the VP subscale is the most stable, followed by the SS subscale. These two categories are most challenging to a broad group of children and, thus, more effective in recognizing language delay. The NP subscale is found to be less informative than the VP and SS subscales as children "top out" early on those items. Pragmatically, the results of the Q/N subscale are also inconsistent as they are highly dependent on various factors other than children's linguistic abilities, such as the context of the adult-child interaction, the setting of the language sample analysis, and even the child's personality. Furthermore, IPSyn-R normally requires a minimum of

100 eligible utterances for analysis. However, researchers have found that it can be reduced to 50 eligible utterances as languages samples with either utterance length have similar psychometric values (Yang et al., 2021).

Thus, the authors propose a modified version of IPSyn-R, the IPSyn-C, that requires a shorter language sample (i.e., 50 utterances) with fewer subscale items by eliminating subitems that do not add value to analyzing a child's expressive language. Given that the VP subscale appears to be most discriminating in identifying a language delay, it was also separately analyzed to measure children's syntactic complexity.

DSS is another measure that assesses a child's syntactic complexity by giving scores to various syntactic, morphological, and lexical structures across eight grammatical categories, based on a corpus of 50 complete sentences (e.g., a noun and a verb in the subject-predicate relationship). In CLAN, the DSS program examines the first 50 consecutive sentences in the transcript, and it awards points if it meets all the adult standard rules (Lee & Canter, 1971). A detailed analysis of DSS can inform a clinician of what a child can and cannot use in their sentence and set tangible treatment goals.

Both DSS and IPSyn-C were used in this paper since they serve different purposes. While IPSyn-C observes whether the child possesses general knowledge of certain phrase structures, DSS awards point based on more specifically itemized lexical criteria and grammaticality. For example, IPSyn-C gives points for the usage of any conjunction, but DSS has a hierarchical point system for conjunctions of varying complexity of usage (e.g., and vs. because).

Lexical diversity

There are various ways one can measure lexical diversity, such as type-token ratio (TTR; Templin, 1957), number of different words (NDW; Miller, 1981), and VocD. TTR, ranging from 0.001 to 1.000, is the total number of unique words (type) divided by the total number of words (token) in a language sample. The lower the value, the more repetitive the language sample is. NDW roughly shows lexical diversity as it takes the number of different words in the first 100 words in the sample. TTR is the weakest among these three measures as the finding can be distorted with a larger language sample (MacWhinney, 2000). Given its formula, the larger the language sample (i.e., larger token value or the denominator), the lower the TTR value.

VocD is a more recently developed method used to measure vocabulary diversity. Rather than focusing on raw TTR, VocD randomly samples words from the entire language sample to generate a curve of the TTR and compares it with empirical data in a transcript. Thus, this mathematical model compensates for the flaw in TTR that varies as a function of text length. As it utilizes varying sample sizes and accounts for various language learners and users, VocD has been shown to be superior to other lexical diversity measures (Malvern et al., 2004). Thus, VocD was utilized to measure vocabulary diversity for this paper.

Interactional behavior

MLT is the ratio of child's words/turn over examiner's words/turn (MacWhinney, 2000). As the child assumes equal responsibility for the conversation, the ratio should approach 1.00. Since turn-taking is a vital discourse skill, comparing the MLT values between children of mothers who are most and least negative will show

whether there is any statistical difference in the children's general conversational participation.

Coding and data analysis

Data preprocessing

To calculate the growth of MLU-m for children, MLU-m values at 66 months were subtracted by MLU-m values at 30 months, and the resulting difference was divided by their MLU-m at 30 months:

$$MLU\text{-}m_{growth} = \frac{MLU\text{-}m_{66} - MLU\text{-}m_{30}}{MLU\text{-}m_{30}}.$$

The obtained value was converted to represent the growth rate in percentages.

For DSS and IPSyn-C, manual data cleaning was necessary since some of the children did not produce enough eligible utterances. DSS requires 50 fully intelligible, consecutive utterances, excluding repetitions or imitations. Since the lowest eligible utterance length for children at 66 months was 18, all children's DSS was calculated according to this length for comparative analysis. The below CLAN command was used to calculate children's DSS values:

$$dss + t * CHI + leng + c18,$$

where *dss*, *t*CHI*, *leng*, and *c18* represent Developmental Sentence Score, child's tier, the English language, and 18 sentences to be included in the analysis, respectively. This command calculates a child's DSS score based on a corpus of a designated number of sentences, using English-based DSS rules.

Similarly, IPSyn-C requires the first 50 acceptable sentences. Since the lowest eligible utterance length was 46, all children's IPSyn-C values were calculated using

this modified utterance length. The below CLAN command was used to calculate children's IPSyn-C values:

$$IPSyn\ +t*CHI\ +leng\ +c46,$$

where *IPSyn* and *c46* are Index of Productive Syntax and 46 sentences to be included in the analysis, respectively. This command calculates a child's IPSyn-C score based on a corpus of 46 sentences, using English-based IPSyn rules.

To observe the true impact of maternal negative language on children's language development, it is most accurate to observe the growth of children's LSA measures between 30 and 66 months rather than their raw values at 66 months, as they only serve as a snapshot. Only MLU-m was considered eligible for the growth analysis since all other qualifying LSA measures, such as DSS, IPSyn-C, and VocD, lacked the number of eligible sentences at 30 months for comparable data analysis at 66 months. For example, at 30 months, children's eligible DSS sentence lengths ranged from zero to 37. For a comparable DSS analysis, the sentence length at 66 months must have matched the lowest eligible utterance length at 30 months, which is zero. A growth analysis for DSS would have been impossible. For VocD, three children lacked the eligible number of utterances to generate a value at 30 months.

Since MLT is observing children's conversational skills in turn-taking, it was deemed appropriate to examine its raw values at 66 months rather than its growth value.

Chapter 5: Results

Hypothesis one

The first hypothesis predicted that children of mothers who use more negative language at 30 months would show a difference in their later language outcomes. Table 3 lists the mean and standard deviation (SD) values for all child language outcome measures.

	MLU-m Growth	DSS	IPSyn-C	IPSyn-C (VP)	VocD	MLT
Mean	244.35%	10.76	58.27	19.70	54.09	0.90
SD	122.70%	2.33	7.23	3.45	8.68	0.49

Table 3. Means and standard deviations of LSA outcome measures
Note. SD = Standard deviation

It is also important to note the skewed distribution of parents' use of negative language. Figure 1 exhibits the distribution of children by the proportions of their mothers' usage of negative language at 30 months. The majority of data points are clustered on the left side of the graph, where mothers utilized 2.0 to 23.0% of negative language in their utterances at 30 months.

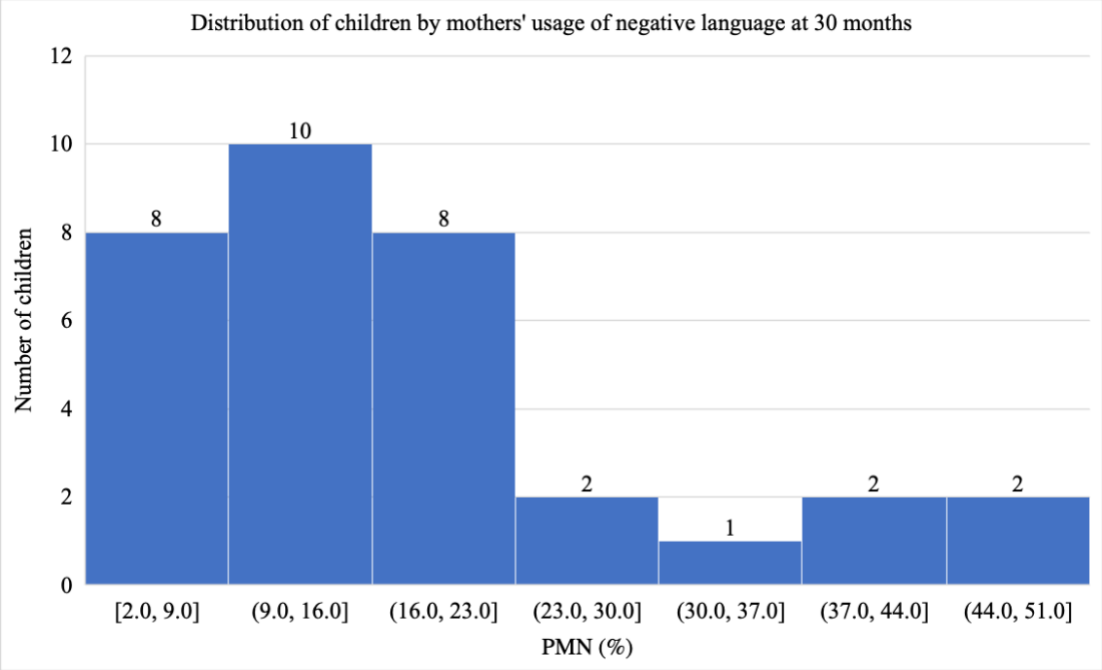


Figure 1. Distribution of children by mothers' usage of negative language at 30 months

Pearson correlation values were calculated for all language outcome measures compared to PMN values at 30 months, shown in Table 4. The inverse relationship between maternal negative language and language outcome measures was strongest for DSS (r=-0.50, p=0.0033), IPSyn-C (r=-0.44, p=0.011), VocD (r=-0.43, p=0.012), IPSyn-C (VP) (r=-0.42, p=0.015), followed by MLT (r=-0.24, p=0.17), listed in descending order of correlation values. Growth of MLU-m (r=-0.0023, p=0.99) had the weakest correlation with PMN at 30 months. Bonferroni correction was utilized for syntactic measures (α=0.05/3), lowering the alpha to α=0.017. DSS, IPSyn-C, and IPSyn-C (VP) values were significant even after the adjustment. MLU-m growth and MLT reached significance before applying the Bonferroni adjustment.

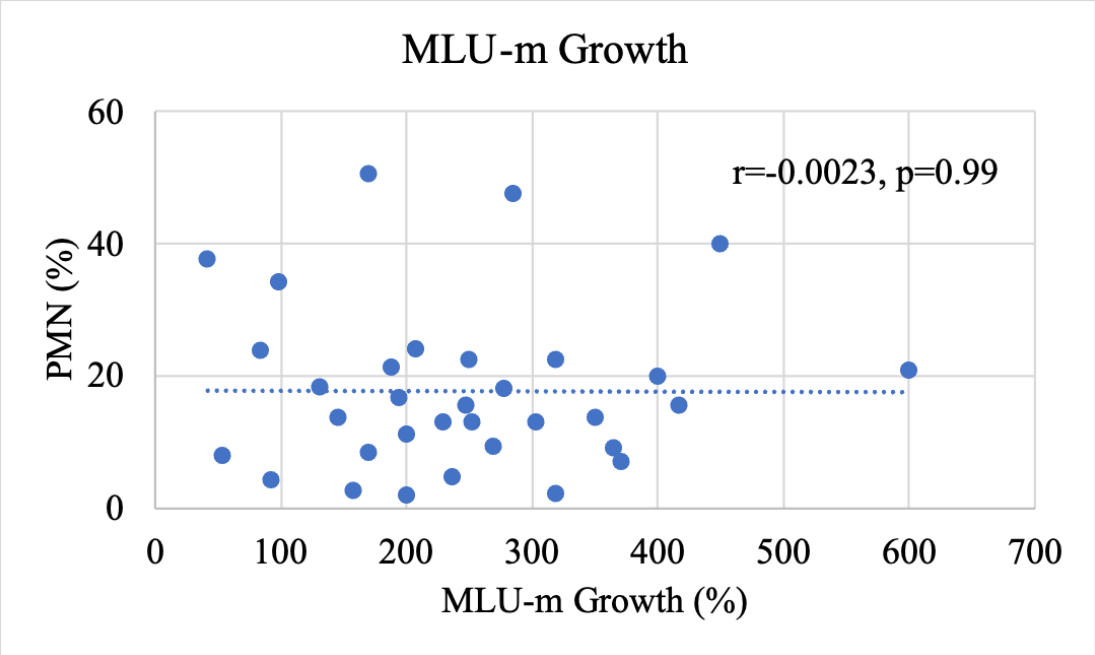
	MLU-m Growth	DSS	IPSyn-C	IPSyn-C (VP)	VocD	MLT
Pearson Correlation	-0.0023	-0.50	-0.44	-0.42	-0.43	-0.24
P-value	0.99	0.0033**	0.011**	0.015**	0.012*	0.17

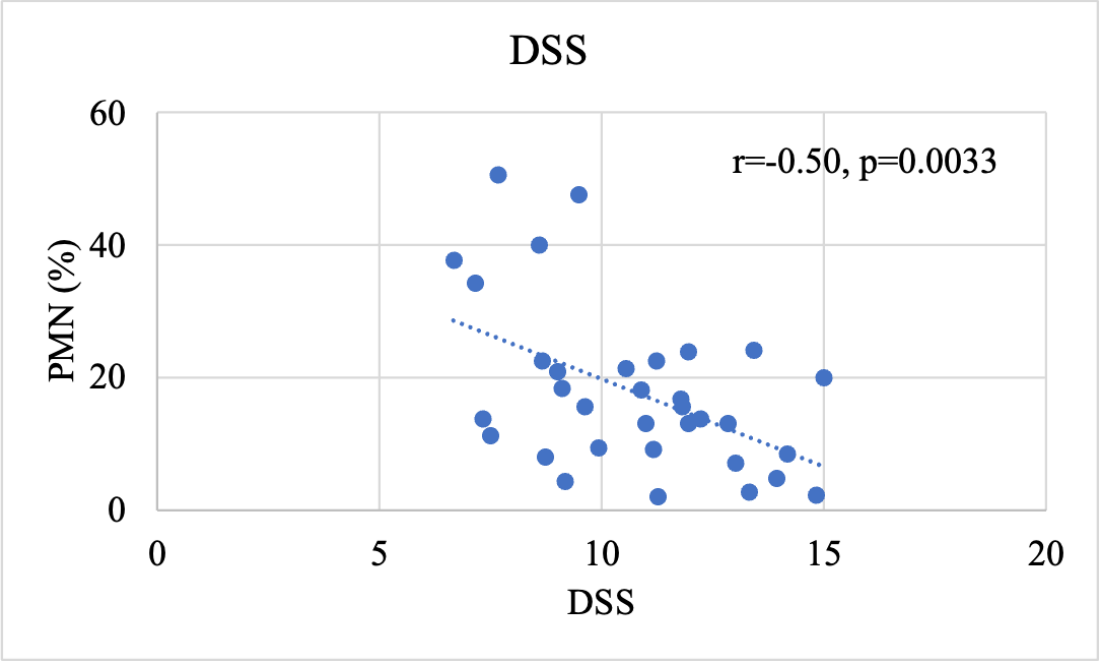
Table 4. Pearson correlation and p-values of LSA measures compared to PMN values
** Significant if $\alpha \leq 0.017$, * Significant if $\alpha \leq 0.05$

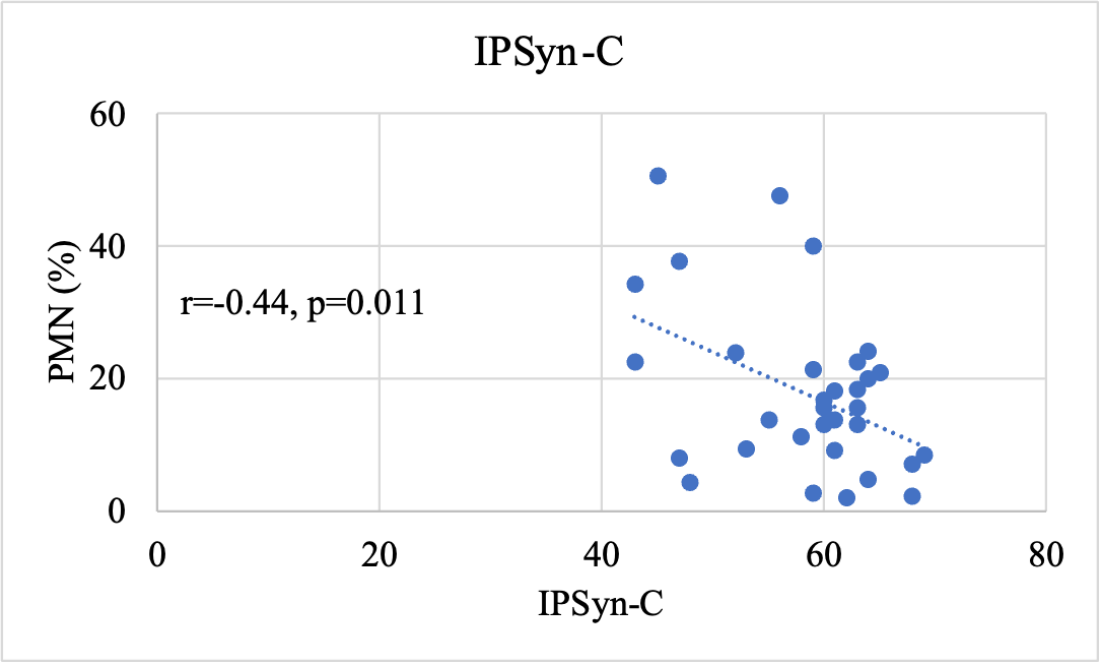
The relationship between the PMN at 30 months and children's language outcomes at 66 months is plotted in Figure 2. The PMN at 30 months was the dependent variable, while the five language outcomes, MLU-m growth, DSS, IPSyn-C, VocD, and MLT, served as independent variables.

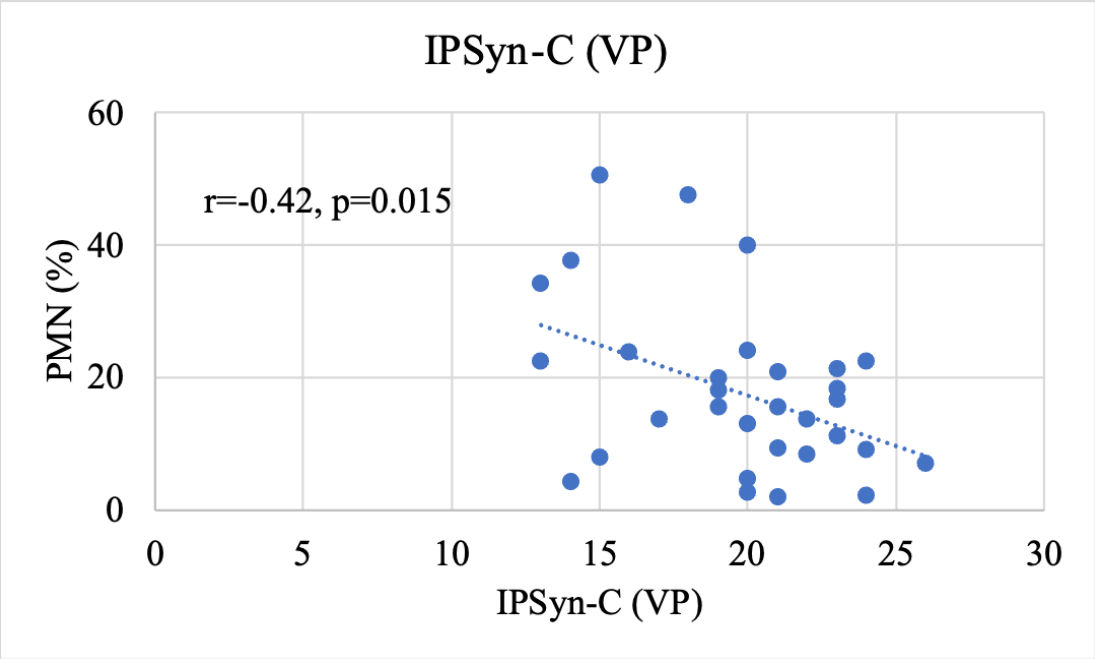
Figure 2. Scatter plots showing the relationship between the proportion of maternal negative language at 30 months and the children's language outcomes at 66 months

a. Syntactic measures (MLU-m growth, DSS, and IPSyn-C)

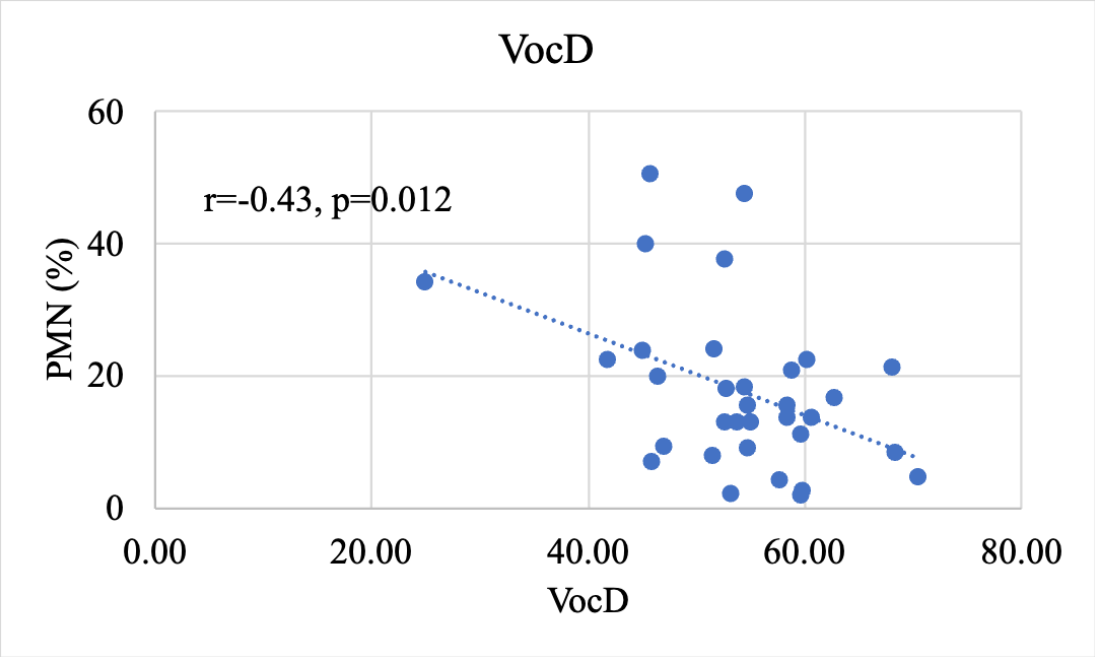



DSS
r=-0.50, p=0.0033
PMN (%)
60
40
20
0
0
5
10
15
20
DSS

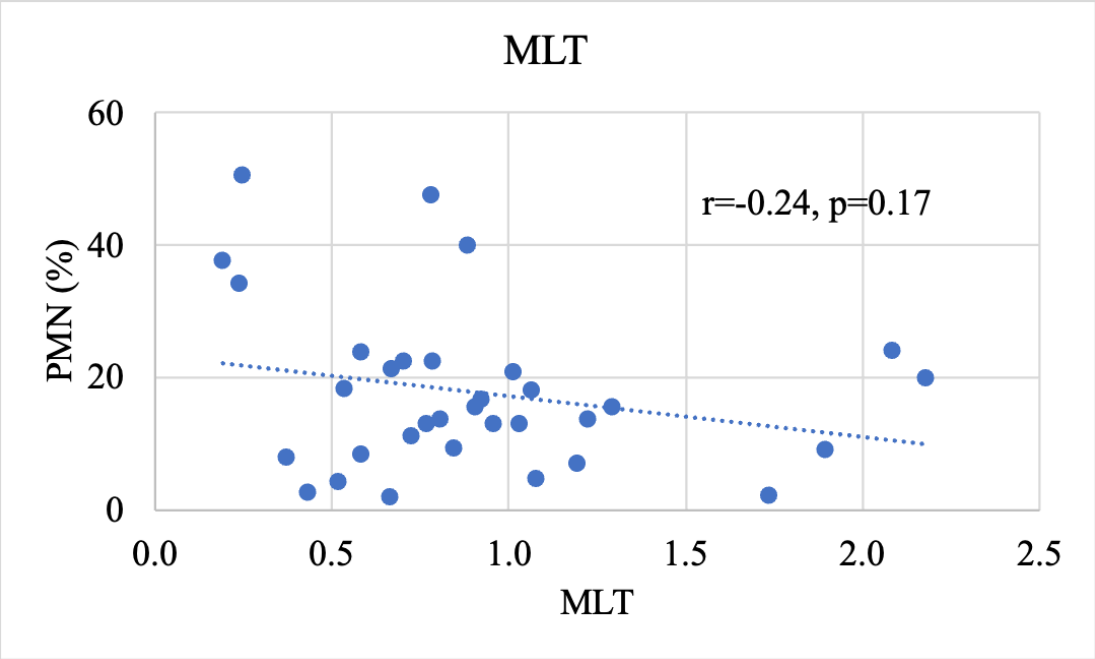

IPSyn-C
r=-0.44, p=0.011
PMN (%)
60
40
20
0
0
20
40
60
80
IPSyn-C



b. Lexical measure (VocD)



c. Interactional behavior measure (MLT)



Hypothesis two

It was hypothesized that mothers' frequency of negative language usage at 30 months would predict children's frequency of negative language usage at 66 months due to children's vulnerability and sensitivity to the input they receive in their early childhood. A nonparametric correlation (Spearman's rho) was calculated between the percentage of children's negative language (PCN) at 66 months and PMN at 30 months. Unlike the hypothesis that posited these two variables would have a close to one-to-one correlation, a negative correlation was observed (r_s=-0.29, p=0.11), and it did not reach significance at α=0.05.

There was a total of 4,231 utterances from children at 66 months, and only 14 utterances met the negative language criteria. Among 33 children, 23 children did not

produce any utterances considered “negative.” Thus, weak significance in the analysis is likely due to low statistical power given the lack of data.

Post-hoc analysis

As a post-hoc analysis, we also computed associations between mothers’ negative particles usage at 30 months and children’s use of negative particles at 66 months. For this data set, the word “*not*” was never used as a contraction but served as an adverb (e.g., *that's not a nose*). Thus, only contracted negative words (e.g., *can’t, don’t, won’t*) were utilized for the analysis. A full list of the negative particle words is provided in Appendix C. A nonparametric correlation (Spearman’s rho) was calculated between the percentage of mothers’ negative particles usage at 30 months and children’s percentage of negative particles usage at 66 months. A positive correlation (r_s=0.42, p=0.014) was found, and it reached significance at α=0.05. However, it is important to note the lack of availability of meaningful data samples. Only about 4% of mothers’ utterances at 30 months consisted of negative particles, and mothers’ percentage of negative particle usage in their language samples ranged from 0 to 9%. Children at 66 months utilized negative particles approximately 7% within their utterances, and their negative particle usage ranged from 0 to 4%.

Chapter 6: Discussion

This exploratory study aimed to observe the impact of maternal negative language in early childhood on children's later language development and their usage of negative language. This section will discuss our findings in greater detail and possible reasons for the results. Various limitations of the paper will also be discussed.

Hypothesis one

All LSA measures had a negative correlation with maternal negative language usage. However, given the extremely weak correlation for MLU-m growth, this result indicates that the more children heard negative language at 30 months, the lower their grammatical and lexical outcome measures, without significant difference in their utterance lengths. This suggests that children who were less exposed to mothers using fewer negative elements in their speech produced more syntactically and semantically complex utterances than children who heard more frequent negative maternal language input. However, while most of the syntactic measures (i.e., DSS, IPSyn-C, IPSyn-C (VP)) remained significant following a Bonferroni adjustment, it is essential to recognize that this result may not be generalizable, given the small amount of data and skewed distribution of PMN.

The following are various possible factors that may have impacted the outcome. First, the children's language samples at 66 months were between children and the investigator, not with their parents. While this provided a great opportunity to observe children's typical language usage as they communicated with an unfamiliar speaker, the study setup was not ideally arranged to gather children's usage of negative language

and imperatives. In the original experiment, children were asked to explain or narrate a story, such as their kindergarten or whether they like to play with their siblings. Suppose they had been talking with their parents or familiar communication partners, especially their siblings, in a situation with more conflicts or emotions. In that case, the quality and quantity of language samples might have been different. Sometimes, investigators feigned their surprise or said wrong things to engage children by giving them chances to correct the wrong information. The word *no* was mostly used as an informational answer when the investigator asked yes or no questions. Thus, the experiment setup at 66 months was structured so that the outcome of the data analysis heavily depended more on how much the child was interested in engaging with the investigator rather than their real language growth. The nature of children's language samples at 30 and 66 months was so different that the current research question was ill-posed for the observed data set.

Observation of the negative language used by the two excluded father-child dyads was interesting as one father used approximately 8% PMN and the other utilized approximately 39% PMN. No further analysis was conducted, but future studies may want to study fathers.

Hypothesis two

A negative correlation was unexpectedly observed between the frequency of mothers' use of negative language at 30 months and that of their children at 66 months. While it was hypothesized that the more children hear negative language, the more they would produce negative language in their later childhood, the result indicated otherwise.

However, given a weak and non-significant correlation, this hypothesis was not supported.

Limitations

Selecting data set

Several limitations regarding the data set used for this paper must be noted. Since we used existing data, the experiment setup could not be manipulated. For example, mothers and children at 30 months were given a standard set of toys (i.e., Fisher Price Farm set and Doll House with people and furniture). In addition, as with other experimental limitations for mother-child interaction studies, mothers' speech may not have been a complete representation of their everyday speech. These disadvantages may have limited the data analysis.

In addition, the observed age of the children in the data set may have limited results. We examined children's utterances at 30 and 66 months. Many of the children's utterances were unintelligible or were disqualified from being counted as eligible utterances in both age groups. Since children are just beginning to acquire skills in talking and expanding their utterances, many of their words were fabricated and consisted of onomatopoeia (e.g., animal sounds) and song lyrics. Utterances marked with the [*] code, indicating errors (e.g., I *goed* to the park), were also withheld from being counted as eligible utterances for the analysis. Many of these utterances were excluded when calculating language outcome measures. Additionally, even if they produced a perfect sentence, if a word or a phrase was unintelligible, these utterances were also not counted for utterance calculation. Thus, the limited number of eligible

utterances available for data analysis may have adversely impacted the results of the study.

Another limitation is that we only chose to observe LT children. In this data set, most LT children at 66 months caught up to their TD peers in standardized testing outcomes. However, given that the mean of these LT children was lower than that of their TD peers, it was hypothesized that if there is a significant effect of negative maternal language on children's language development, a greater impact would be observed in those of LT children. While a greater impact could have been expected, this decision curtailed the number of participants available for analysis in half, from 66 to 33 mother-child dyads.

Defining negative language

Various sources of ambiguity in defining negative language have been identified. Operationally, it was defined as those containing negative particles or overtly negative words that meet the criteria of the four categories, negation, denial, refusal, or prohibition. While tremendous effort has been put in to make the definition as all-encompassing as possible, this was a simplified definition, and there may have been other elements of mothers' language that may have been negative.

Furthermore, judging a person's speech as positive or negative is a task that is even difficult for adults, let alone children. It requires consideration of a large number of vocabulary items and abilities to read communication partners' facial expressions, their tone of voice, and even body posture, among various other factors that affect one's judgment. In that sense, this paper is limited since it only evaluates one aspect of mothers' expressive style. Even within spoken language, various dimensions, other

than using negative particles, overtly negative words, or imperatives, could be observed to analyze mothers' speech (e.g., acoustical properties). For example, in one situation, a child tried to put earrings on his nose. A mother commented, "*oh it's not a nose ring,*" when the child tried to put it on his nose. Just analyzing the utterance, it was coded as negative but listening to the audio file, her voice was warm and kind, and it would have been difficult to judge this utterance as negative overall. As such, some mothers' utterances may have been interpreted differently by the children. Furthermore, since there was no access to the videotaped materials, behavioral or nonverbal acts of the mother-child interaction were not evaluated.

Defining imperatives

For this paper, imperative utterances were those that commanded, suggested, or requested to redirect the child's behaviors or verbalizations. There are different types of imperatives, and not all imperatives are known to have an adverse impact on children's language development. For example, directives that follow children's lead and attention have a positive impact on language outcomes, while imperatives that redirect the child's attention to new behavior do not. Since there was no access to the video footage of mother-child dyads' interaction, the imperatives that redirected children's attention were coded to our best ability. However, the accuracy could have been improved by availability of video materials.

Transcribing and coding utterances

In terms of transcribing and coding, an inevitable bias in accepting or rejecting an utterance as negative or imperative existed. Even though two coders independently

rated these utterances and resolved any discrepancies in opinions, it is important to note that our perspectives are limited.

Additionally, while there is a set criterion for what is considered an utterance in CLAN, variability may also exist in each coder. Thus, when some people utilized multiple negative elements within a short period of time, a mother may have been regarded as more or less negative depending on how they were coded. For example, a mother saying, "*no don't touch that*," could have been divided into one or two utterances depending on the length of the pause in between the words "*no*" and "*don't*." If there were a long pause, this sentence would have been regarded as two utterances, but if it were shorter, then it would have been considered as one utterance. While the transcripts have been checked three times for consistency, and while this source of ambiguity may be inconsequential due to limited data, it could have contributed to the result.

Chapter 7: Conclusion

Mothers are often known as the best language teachers to their children, and clinicians encourage and emphasize their powerful impact on their children's language growth. Through this exploratory study, it was hoped that we would gain better insight into parental linguistic input and further provide guidance to speech-language pathologists in counseling and teaching strategies for evidence-based practice that most facilitate children's language development. The preliminary outcomes of the study demonstrated that maternal negative language at 30 months might have an impact on several aspects of children's language development at 66 months. In this section, ideas for future research are discussed.

Implications for future research

Given that this study was only exploratory in nature, it provides various opportunities for future research. In the future, an experiment could be intentionally set up so that language samples can more fully represent mothers' speech. Given the original experimental situation, the mothers were more limited to pleasant interactions with their children. However, the language used in conflict could engender a different type of language. For example, deliberately placing a missing puzzle piece or broken toy could help researchers obtain a more comprehensive language profile of the mother and child. Better yet, it would be informative to auditorily record the dyad's natural conversational language at their home settings (e.g., dinner time) using the Language ENvironment Analysis System (LENA) to validate the natural mothers' language in research settings. Video recordings would also help observe non-verbal and

interactional behaviors between mothers and their children. If we were to use existing data, language samples from HomeBank might be more suitable for the research questions posed in this project. This platform shares daylong, real-world recordings of children's everyday experiences.

For a more advanced analysis of the impact of negative language on children's language development, various other dimensions of linguistic properties must be analyzed. Observing acoustic properties (e.g., loudness, pitch) of the utterances would be recommended, such as using Praat, a program that analyzes sound properties. For example, the same utterances with different frequency ranges (i.e., pitch) or amplitudes (i.e., loudness) could result in different findings.

The impact of maternal language can also be observed not only in terms of children's language development but in various other areas. For example, since maternal language is an aspect of parenting, one could explore the concept from diverse interdisciplinary perspectives, such as psychology or human development. A more rigorous literature review from a different branch of knowledge could undoubtedly enrich and expand one's questions regarding the impact of maternal language on children's language development. Since there are so many factors even within a mother-child relationship that affect children's language development, incorporating studies from other disciplines would be helpful.

Ideally, it would be recommended to collect or combine various data sets with similar language profiles to conduct sentiment analysis, a method used to systematically identify, extract, quantify, and study affective states and subjective information. It is widely used in the field of natural language processing, computational

linguistics, and even in businesses to assess customers' overall satisfaction with their products based on reviews. This analysis could provide a more comprehensive and accurate depiction of the effect of mothers' negative language on children's language development.

Appendices

Appendix A. Negative words used by mothers

For this study, negative language was operationally defined as utterances consisting of negative particles or overtly negative language that conveyed the meaning of negation, denial, refusal, or prohibition. This list shows negative words used by mothers at 30 months, excluding those that did not fit the criteria.

1. no
2. don't
3. not
4. doesn't
5. can't
6. isn't
7. nope
8. didn't
9. aren't
10. won't
11. uhuh
12. haven't
13. wasn't
14. never
15. shouldn't
16. wouldn't

Appendix B. Negative words used by children

This list shows negative words used by children at 66 months, excluding those not used negatively as per the operational definition of negative language.

1. No
2. uhuh
3. Nope

Appendix C. Negative particle words used by mothers and children

This list shows negative particle words used by mothers when children are 30 months and children at 66 months.

1. ain't
2. aren't
3. can't
4. couldn't
5. didn't
6. doesn't
7. don't
8. hasn't
9. haven't
10. isn't
11. shouldn't
12. wasn't
13. weren't
14. won't
15. wouldn't

Bibliography

Ainsworth, M. D. S., Bell, S. M., & Stayton, D. F. (1974). *Infant-mother attachment and social development: Socialization as a product of reciprocal responsiveness to signals.*

Ainsworth, M. D. S., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment*. Hillsdale, nj: erlbaum.

Akhtar, N., Dunham, F., & Dunham, P. J. (1991). Directive interactions and early vocabulary development: The role of joint attentional focus. *Journal of Child Language*, *18*(1), 41–49. https://doi.org/10.1017/s0305000900013283

Albin, D. D., & Echols, C. H. (1996). Stressed and word-final syllables in infant-directed speech. *Infant Behavior & Development*, *19*(4), 401–418. https://doi.org/10.1016/S0163-6383(96)90002-8

Altenberg, E. P., Roberts, J. A., & Scarborough, H. S. (2018). Young Children's Structure Production: A Revision of the Index of Productive Syntax. *Language, Speech, and Hearing Services in Schools*, *49*(4), 995–1008. https://doi.org/10.1044/2018_LSHSS-17-0092

Andruski, J. E., & Kuhl, P. K. (1996). The acoustic structure of vowels in mothers' speech to infants and adults. *Proceeding of Fourth International Conference on Spoken Language Processing. ICSLP'96*, *3*, 1545–1548.

Arriaga, R. I., Fenson, L., Cronan, T., & Pethick, S. J. (1998). Scores on the MacArthur Communicative Development Inventory of children from low and middle-income families. *Applied Psycholinguistics*, *19*(2), 209–223.

Bernstein Ratner, N. (1986). Durational cues which mark clause boundaries in mother–child speech**Paper presented at 1985 American Speech-Language Hearing Association Annual convention, Washington, D.C., U.S.A. *Journal of Phonetics*, *14*(2), 303–309. https://doi.org/10.1016/S0095-4470(19)30670-9

Bernstein Ratner, N. (1988). Patterns of parental vocabulary selection in speech to very young children. *Journal of Child Language*, *15*(3), 481–492. https://doi.org/10.1017/s0305000900012514

Bernstein Ratner, N. (2013). Why talk with children matters: Clinical implications of infant- and child-directed speech research. *Seminars in Speech and Language*, *34 4*, 203–214; quiz C1.

Bernstein Ratner, N., & Luberoff, A. (1984). Cues to post-vocalic voicing in mother-child speech. *Journal of Phonetics*, *12*(3), 285–289.

Bernstein Ratner, N., & Rooney, B. (2001). How accessible is the lexicon in Motherese? *Language Acquisition and Language Disorders*, *23*, 71–78.

Bornstein, M. H., & Tamis-LeMonda, C. S. (1989). Maternal responsiveness and cognitive development in children. *New Directions for Child and Adolescent Development*, *1989*(43), 49–61.

Bornstein, M. H., Tamis-LeMonda, C. S., Hahn, C.-S., & Haynes, O. M. (2008). Maternal responsiveness to young children at three ages: Longitudinal analysis of a multidimensional, modular, and specific parenting construct. *Developmental Psychology*, *44*(3), 867.

Bradley, M. M., Greenwald, M. K., Petry, M. C., & Lang, P. J. (1992). Remembering pictures: Pleasure and arousal in memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *18*(2), 379.

Brady, N. C., Marquis, J., Fleming, K., & McLean, L. (2004). *Prelinguistic predictors of language growth in children with developmental disabilities*.

Camp, B. W., Cunningham, M., & Berman, S. (2010). Relationship between the cognitive environment and vocabulary development during the second year of life. *Archives of Pediatrics & Adolescent Medicine*, *164*(10), 950–956.

Cooper, R. P., & Aslin, R. N. (1990). Preference for infant-directed speech in the first month after birth. *Child Development*, *61*(5), 1584–1595.

Crystal, D. (1974). Roger Brown, A first language: The early stages. Cambridge, Mass.: Harvard University Press, 1973. Pp. Xi+ 437. *Journal of Child Language*, *1*(2), 289–307.

Dale, P. S., Dionne, G., Eley, T. C., & Plomin, R. (2000). Lexical and grammatical development: A behavioural genetic perspective. *Journal of Child Language*, *27*(3), 619–642. https://doi.org/10.1017/S0305000900004281

Dale, P. S., Price, T. S., Bishop, D. V., & Plomin, R. (2003). *Outcomes of early language delay*.

Della Corte, M., Benedict, H., & Klein, D. (1983). The relationship of pragmatic dimensions of mothers' speech to the referential-expressive distinction. *Journal of Child Language*, *10*(1), 35–43.

Denham, S., Zoller, D., & Couchoud, E. (1994). Preschoolers' causal understanding of emotion and its socialization. *Developmental Psychology*, *30*(6), 928–936.

Dunham, P., & Dunham, F. (1992). Lexical development during middle infancy: A mutually driven infant-caregiver process. *Developmental Psychology*, *28*(3), 414.

Dunn, J., Bretherton, I., & Munn, P. (1987). Conversations about feeling states between mothers and their young children. *Developmental Psychology*, *23*(1), 132.

Ellis Weismer, S., Venker, C. E., Evans, J. L., & Moyle, M. J. (2013). Fast mapping in late-talking toddlers. *Applied Psycholinguistics*, *34*(1), 69–89. https://doi.org/10.1017/S0142716411000610

Fernald, A., & Simon, T. (1984). Expanded intonation contours in mothers' speech to newborns. *Developmental Psychology*, *20*(1), 104–113. https://doi.org/10.1037/0012-1649.20.1.104

Flynn, V., & Masur, E. F. (2007). Characteristics of maternal verbal style: Responsiveness and directiveness in two natural contexts. *Journal of Child Language*, *34*(3), 519–543.

Frijda, N. H. (1986). *The emotions*. Cambridge University Press ; Editions de la Maison des sciences de l'homme.

Furrow, D., Nelson, K., & Benedict, H. (1979). Mothers' speech to children and syntactic development: Some simple relationships. *Journal of Child Language*, *6*(3), 423–442.

Ganger, J., Pinker, S., Chawla, S., & Baker, A. (2002). Heritability of early milestones of vocabulary and grammar: A twin study. *Unpublished Manuscript*.

Gleason, J. B., & Bernstein Ratner, N. (2016). *The development of language*. Pearson.

Golinkoff, R. M., & Alioto, A. (1995). Infant-directed speech facilitates lexical learning in adults hearing Chinese: Implications for language acquisition. *Journal of Child Language*, *22*(3), 703–726.

Hadley, P. A., Rispoli, M., Fitzgerald, C., & Bahnsen, A. (2011). *Predictors of morphosyntactic growth in typically developing toddlers: Contributions of parent input and child sex*.

Harris, M., Jones, D., Brookes, S., & Grant, J. (1986). Relations between the non-verbal context of maternal speech and rate of language development. *British Journal of Developmental Psychology*, *4*(3), 261–268. https://doi.org/10.1111/j.2044-835X.1986.tb01017.x

Harrist, A. W., Pettit, G. S., Dodge, K. A., & Bates, J. E. (1994). Dyadic synchrony in mother-child interaction: Relation with children's subsequent kindergarten adjustment. *Family Relations*, 417–424.

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children.* Paul H Brookes Publishing.

Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review*, *26*(1), 55–88. https://doi.org/10.1016/j.dr.2005.11.002

Hoff-Ginsberg, E. (1986). Function and structure in maternal speech: Their relation to the child's development of syntax. *Developmental Psychology*, *22*(2), 155.

Hurtado, N., Marchman, V. A., & Fernald, A. (2008). Does input influence uptake? Links between maternal talk, processing speed and vocabulary size in Spanish-learning children. *Developmental Science*, *11*(6), F31–F39.

Huttenlocher, J. (1998). Language input and language growth. *Preventive Medicine*, *27*(2), 195–199.

Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M., & Lyons, T. (1991). Early vocabulary growth: Relation to language input and gender. *Developmental Psychology*, *27*(2), 236.

Isenberg, N., Silbersweig, D., Engelien, A., Emmerich, S., Malavade, K., Beattie, B. al, Leon, A. C., & Stern, E. (1999). Linguistic threat activates the human amygdala. *Proceedings of the National Academy of Sciences*, *96*(18), 10456–10459.

Jacobson, J. L., Boersma, D. C., Fields, R. B., & Olson, K. L. (1983). Paralinguistic features of adult speech to infants and small children. *Child Development*, *54*(2), 436–442. https://doi.org/10.2307/1129704

Jones, C. P., & Adamson, L. B. (1987). Language use in mother-child and mother-child-sibling interactions. *Child Development*, 356–366.

Karrass, J., & Braungart-Rieker, J. M. (2003). Parenting and temperament as interacting agents in early language development. *Parenting: Science and Practice*, *3*(3), 235–259.

Kim, I. J., Ge, X., Brody, G. H., Conger, R. D., Gibbons, F. X., & Simons, R. L. (2003). Parenting behaviors and the occurrence and co-occurrence of depressive symptoms and conduct problems among African American children. *Journal of Family Psychology*, *17*(4), 571.

Klee, T., & Fitzgerald, M. D. (1985). The relation between grammatical development and mean length of utterance in morphemes. *Journal of Child Language*, *12*(2), 251–269.

Kochanska, G. (1997). Multiple pathways to conscience for children with different temperaments: From toddlerhood to age 5. *Developmental Psychology*, *33*(2), 228–240. https://doi.org/10.1037//0012-1649.33.2.228

Lagattuta, K. H., & Wellman, H. M. (2002). *Differences in Early Parent-Child Conversations About Negative Versus Positive Emotions: Implications for the Development of Psychological Understanding*. 18.

Landry, S. H., Smith, K. E., Swank, P. R., Assel, M. A., & Vellet, S. (2001). Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? *Developmental Psychology*, *37*(3), 387.

Lee, L. L., & Canter, S. M. (1971). Developmental sentence scoring: A clinical procedure for estimating syntactic development in children's spontaneous speech. *Journal of Speech and Hearing Disorders*, *36*(3), 315–340.

Ma, W., Golinkoff, R. M., Houston, D. M., & Hirsh-Pasek, K. (2011). Word learning in infant-and adult-directed speech. *Language Learning and Development*, *7*(3), 185–201.

MacWhinney, B. (2000). *The CHILDES Project: Tools for analyzing talk. Transcription format and programs* (Vol. 1). Psychology Press.

Maddock, R. J. (1999). The retrosplenial cortex and emotion: New insights from functional neuroimaging of the human brain. *Trends in Neurosciences*, *22*(7), 310–316.

Maddock, R. J., & Buonocore, M. H. (1997). Activation of left posterior cingulate gyrus by the auditory presentation of threat-related words: An fMRI study. *Psychiatry Research: Neuroimaging*, *75*(1), 1–14.

Madigan, S., Prime, H., Graham, S. A., Rodrigues, M., Anderson, N., Khoury, J., & Jenkins, J. M. (2019). Parenting behavior and child language: A meta-analysis. *Pediatrics*, *144*(4).

Mahoney, G., Boyce, G., Fewell, R. R., Spiker, D., & Wheeden, C. A. (1998). The relationship of parent-child interaction to the effectiveness of early intervention services for at-risk children and children with disabilities. *Topics in Early Childhood Special Education*, *18*(1), 5–17.

Malvern, D., Richards, B., Chipere, N., & Durán, P. (2004). *Lexical diversity and language development*. Springer.

McCafferty, S. G. (2002). Gesture and creating zones of proximal development for second language learning. *The Modern Language Journal*, *86*(2), 192–203.

McCathren, R. B., Yoder, P. J., & Warren, S. F. (1995). The role of directives in early language intervention. *Journal of Early Intervention*, *19*(2), 91–101.

McDuffie, A., & Yoder, P. (2010). *Types of parent verbal responsiveness that predict language in young children with autism spectrum disorder*.

McGillion, M. L., Herbert, J. S., Pine, J. M., Keren-Portnoy, T., Vihman, M. M., & Matthews, D. E. (2013). Supporting early vocabulary development: What sort

of responsiveness matters? *IEEE Transactions on Autonomous Mental Development, 5*(3), 240–248.

McKee, G., Malvern, D., & Richards, B. (2000). Measuring vocabulary diversity using dedicated software. *Literary and Linguistic Computing*, *15*(3), 323–338.

McRoberts, G. W., & Best, C. T. (1997). Accommodation on mean f_0 during mother–infant and father–infant vocal interactions: A longitudinal case study. *Journal of Child Language, 24*(3), 719–736. https://doi.org/10.1017/S030500099700322X

Mervis, C. B., & Mervis, C. A. (1982). Leopards are kitty-cats: Object labeling by mothers for their thirteen-month-olds. *Child Development, 53*(1), 267–273. https://doi.org/10.2307/1129661

Miller, J. F. (1981). *Assessing language production in children: Experimental procedures* (Vol. 1). University Park Press.

Morgan, P. L., Farkas, G., Hillemeier, M. M., Hammer, C. S., & Maczuga, S. (2015). 24-month-old children with larger oral vocabularies display greater academic and behavioral functioning at kindergarten entry. *Child Development, 86*(5), 1351–1370.

Moyle, M. J., Weismer, S. E., Evans, J. L., & Lindstrom, M. J. (2007). *Longitudinal relationships between lexical and grammatical development in typical and late-talking children.*

Murray, A. D., & Hornbaker, A. V. (1997). Maternal directive and facilitative interaction styles: Associations with language and cognitive development of

low risk and high risk toddlers. *Development and Psychopathology*, *9*(3), 507–516.

Nelson, K. (1973). Structure and strategy in learning to talk. *Monographs of the Society for Research in Child Development*, 1–135.

Newport, E., Gleitman, H., & Gleitman, L. (1977). Mother, Id rather do it myself: Some effects and non-effects of maternal speech style. In C. E. Snow & C. A. Ferguson (Eds.), *Talking to Children* (pp. 109--149). Cambridge University Press.

Ochsner, K. N. (2000). Are affective events richly recollected or simply familiar? The experience and process of recognizing feelings past. *Journal of Experimental Psychology: General*, *129*(2), 242.

Ogren, M., & Sandhofer, C. M. (2021). Emotion words in early childhood: A language transcript analysis. *Cognitive Development*, *60*, 101122.

Paavola-Ruotsalainen, L., Lehtosaari, J., Palomäki, J., & Tervo, I. (2018). Maternal verbal responsiveness and directiveness: Consistency, stability, and relations to child early linguistic development. *Journal of Child Language*, *45*(2), 319–339.

Papoušek, M., Papoušek, H., & Symmes, D. (1991). The meanings of melodies in motherese in tone and stress languages. *Infant Behavior and Development*, *14*(4), 415–440. https://doi.org/10.1016/0163-6383(91)90031-M

Parker, M. D., & Brorson, K. (2005). A comparative study between mean length of utterance in morphemes (MLUm) and mean length of utterance in

words (MLUw). *First Language*, *25*(3), 365–376. https://doi.org/10.1177/0142723705059114

Paul, R., Hernandez, R., Taylor, L., & Johnson, K. (1996). Narrative development in late talkers: Early school age. *Journal of Speech, Language, and Hearing Research*, *39*(6), 1295–1303.

Piantadosi, S. T., Tily, H., & Gibson, E. (2011). Word lengths are optimized for efficient communication. *Proceedings of the National Academy of Sciences*, *108*(9), 3526–3529. https://doi.org/10.1073/pnas.1012551108

Pine, J. M. (1992). Maternal style at the early one-word stage: Re-evaluating the stereotype of the directive mother. *First Language*, *12*(35), 169–186.

Prizant, B. M., Wetherby, A. M., Roberts, J. E., & Zeanah, C. (1993). Communication disorders in infants and toddlers. *Handbook of Infant Mental Health*, 260–279.

Raikes, H. A., & Thompson, R. A. (2006). Family emotional climate, attachment security and young children's emotion knowledge in a high risk sample. *British Journal of Developmental Psychology*, *24*(1), 89–104. https://doi.org/10.1348/026151005X70427

Reznick, J. S., Corley, R., Robinson, J., & Matheny Jr, A. P. (1997). A longitudinal twin study of intelligence in the second year. *Monographs of the Society for Research in Child Development*, i–160.

Richter, M., Eck, J., Straube, T., Miltner, W. H., & Weiss, T. (2010). Do words hurt? Brain activation during the processing of pain-related words. *Pain*, *148*(2), 198–205.

Roberts, M. Y., & Kaiser, A. P. (2011). *The effectiveness of parent-implemented language interventions: A meta-analysis*.

Rollins, P. R. (2003). Caregivers' contingent comments to 9-month-old infants: Relationships with later language. *Applied Psycholinguistics*, *24*(2), 221–234.

Roos, E. M., & Weismer, S. E. (2008). Language Outcomes of Late Talking Toddlers at Preschool and Beyond. *Perspectives on Language Learning and Education*, *15*(3), 119–126. PubMed. https://doi.org/10.1044/lle15.3.119

Rowe, M. L. (2012). A longitudinal investigation of the role of quantity and quality of child-directed speech in vocabulary development. *Child Development*, *83*(5), 1762–1774.

Ruffman, T., Slade, L., Devitt, K., & Crowe, E. (2006). What mothers say and what they do: The relation between parenting, theory of mind, language and conflict/cooperation. *British Journal of Developmental Psychology*, *24*(1), 105–124. https://doi.org/10.1348/026151005X82848

Sameroff, A. J., & Chandler, M. J. (1975). Reproductive risk and the continuum of caretaking casualty. *Review of Child Development Research*, *4*, 187–244.

Scarborough, H. S. (1990). Index of productive syntax. *Applied Psycholinguistics*, *11*(1), 1–22.

Singh, L., Morgan, J. L., & Best, C. T. (2002). Infants' listening preferences: Baby talk or happy talk? *Infancy*, *3*(3), 365–394.

Snow, C. E. (1972). Mothers' speech to children learning language. *Child Development*, 549–565.

Soderstrom, M. (2007). Beyond babytalk: Re-evaluating the nature and content of speech input to preverbal infants. *Developmental Review*, *27*(4), 501–532.

Soderstrom, M., Blossom, M., Foygel, R., & Morgan, J. L. (2008). Acoustical cues and grammatical units in speech to two preverbal infants. *Journal of Child Language*, *35*(4), 869–902. https://doi.org/10.1017/S0305000908008763

Spinelli, M., Fasolo, M., & Mesman, J. (2017). Does prosody make the difference? A meta-analysis on relations between prosodic aspects of infant-directed speech and infant outcomes. *Developmental Review*, *44*, 1–18.

Strange, B., Henson, R., Friston, K., & Dolan, R. J. (2000). Brain mechanisms for detecting perceptual, semantic, and emotional deviance. *Neuroimage*, *12*(4), 425–433.

Stromswold, K. (2001). The heritability of language: A review and metaanalysis of twin, adoption and linkage studies. *Language*, *77*(4), 647–723. JSTOR.

Tabert, M. H., Borod, J. C., Tang, C. Y., Lange, G., Wei, T. C., Johnson, R., Nusbaum, A. O., & Buchsbaum, M. S. (2001). Differential amygdala activation during emotional decision and recognition memory tasks using unpleasant words: An fMRI study. *Neuropsychologia*, *39*(6), 556–573.

Tamis-LeMonda, C. S., & Bornstein, M. H. (2002). Maternal responsiveness and early language acquisition. In *Advances in child development and behavior* (Vol. 29, pp. 89–127). Elsevier.

Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development*, *72*(3), 748–767.

Taumoepeau, M., & Ruffman, T. (2008). Stepping Stones to Others' Minds: Maternal Talk Relates to Child Mental State Language and Emotion Understanding at 15, 24, and 33 Months. *Child Development*, *79*(2), 284–302. https://doi.org/10.1111/j.1467-8624.2007.01126.x

Templin, M. C. (1957). Certain language skills in children. *Minneapolis: University of Minnesota, The Institute of Child Welfare*.

Tomasello, M., & Farrar, M. J. (1986). Joint attention and early language. *Child Development*, 1454–1463.

Tomasello, M., Mannle, S., & Kruger, A. C. (1986). Linguistic environment of 1-to 2-year-old twins. *Developmental Psychology*, *22*(2), 169.

Tomasello, M., & Todd, J. (1983). Joint attention and lexical acquisition style. *First Language*, *4*(12), 197–211.

Trautman, C. H., & Rollins, P. R. (2006). Child-centered behaviors of caregivers with 12-month-old infants: Associations with passive joint engagement and later language. *Applied Psycholinguistics*, *27*(3), 447–463.

Van de Weijer, J. (1997). Language input to a prelingual infant. *The GALA'97 Conference on Language Acquisition*, 290–293.

Wade, M., Browne, D. T., Madigan, S., Plamondon, A., & Jenkins, J. M. (2014). Normal birth weight variation and children's neuropsychological functioning: Links between language, executive functioning, and theory of mind. *Journal of the International Neuropsychological Society*, *20*(9), 909–919.

Wang, M.-T., & Kenny, S. (2014). Longitudinal links between fathers' and mothers' harsh verbal discipline and adolescents' conduct problems and depressive

symptoms. *Child Development*, *85*(3), 908–923. PubMed. https://doi.org/10.1111/cdev.12143

Warren-Leubecker, A., & Bohannon, J. N. (1984). Intonation patterns in child-directed speech: Mother–father differences. *Child Development*, *55*(4), 1379–1385. https://doi.org/10.2307/1130007

Weisleder, A., & Fernald, A. (2013). Talking to children matters: Early language experience strengthens processing and builds vocabulary. *Psychological Science*, *24*(11), 2143–2152.

Yang, J. S., MacWhinney, B., & Bernstein Ratner, N. (2021). The Index of Productive Syntax: Psychometric Properties and Suggested Modifications. *American Journal of Speech-Language Pathology*. https://doi.org/10.1044/2021_AJSLP-21-00084