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Letter Teaching in Parent–Child Conversations

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Chapter 1: Introduction

Societies engage in cross-generational transfers of information, enabling cultural transmission of skills such as tool use and language (Tomasello, 2001). Reading and spelling are two of the most important cultural tools that are transferred to children in modern societies. This transfer begins with informal experiences in the home and continues with formal teaching at school. One skill that is critical to a child's success during the first years of reading and spelling instruction is decoding, which is the ability to sound out written words. Decoding ability depends, in part, on a child's knowledge of letters (Lonigan, Burgess, & Anthony, 2000). Given that learning about letters in the home can lead to improved letter knowledge and decoding ability (Burgess, Hecht, & Lonigan, 2002; Evans, Shaw, & Bell, 2000; Sénéchal & LeFevre, 2002), we would benefit from a better understanding of what parents teach their young children about letters and what children learn from these experiences. Here we examine this letter teaching through observation of parent–child conversations, studying how letters are discussed in the homes of U.S. preschool children and how talk about letters changes over the early years of a child's life.

The little that we know regarding how North American parents teach their children about letters comes from studies of two types: questionnaire-based and transcript-based. Questionnaire-based studies draw on information that parents report about their own behavior. Parents fill out questionnaires that ask, for example, whether and how often they teach their children about letters (e.g., Haney & Hill, 2004; Hood, Conlon, & Andrews, 2008; Martini & Sénéchal, 2012). Transcript-based studies analyze transcribed parent–child conversations to examine whether and how parents and children discuss letters and other literacy-related matters (Robins, Ghosh, Rosales, & Treiman, 2014; Robins & Treiman, 2009; Robins, Treiman, & Rosales, 2014;

Robins, Treiman, Rosales, & Otake, 2012; Treiman et al., 2015). Although both questionnaire- and transcript-based studies provide quantitative data regarding the amount of conversation about letters throughout the early years of a child's life, there have been relatively few efforts to gather qualitative data to describe letter teaching by parents. In this study, we use a transcript-based approach to investigate both quantitative and qualitative characteristics of parent–child conversations about letters. One advantage of transcript-based research is that it allows us to examine the behavior of children, in addition to that of parents. Another advantage of transcript-based research is that it allows for a detailed and objective depiction of letter-related activities. A limitation of questionnaires is that they often do not explore any fine-grained details about letter-related activities in the home. In addition, parents might have an unconscious bias to over-report teaching and there is no inter-rater reliability to offset that possibility. In the present study, we can analyze the qualitative details of how both parents and children discuss letters while avoiding the drawbacks of parental self-reports. Specifically, we will examine two aspects of parent–child conversations: the letter features that are the focus of conversations and the materials that are used in the discussions.

Letters have several features crucial to decoding that parents can choose to teach children about in the home. The first is identification. Although the letters of the alphabet all look rather similar, children must learn to identify individual letters. For example, the letter forms that are labeled as E belong in one category, and this is different from the category of F, or of H. Production, or how to form the shape of each letter, is another important feature children must learn. Children must also learn that words are made up of letters and that letters must be combined in a specific order to spell words. We refer to this feature as spelling. A final feature we are interested in is sound, which involves learning the sounds to which letters correspond.

Although no single study of conversations between parents and children has addressed all these letter features, all four have been the focus of both questionnaire-based and transcript-based research. Among the four features, identification appears to be the most commonly referenced. Haney and Hill (2004) found that 70% of U.S. parents of children aged 3 to 5 reported having taught letter names to their children at some point, while Martini and Sénéchal (2012) found that 87% of Canadian parents of 5-year-olds reported that they often or very often taught letter names to their children. Transcript-based research has also found that parents ask questions that encourage children to identify letters (Robins, Treiman, et al., 2014). Referencing production seems to be less common than identification. Around half of U.S. parents of 3- to 5-year-olds and three-quarters of Canadian parents of 5-year-olds reported teaching their children how to print letters (Haney & Hill, 2004; Martini & Sénéchal, 2012). Although questionnaire-based research has not examined how frequently parents' discussions of letters reference spelling, transcript-based research suggests references to spelling may be quite frequent. When examining associations such as "N O spells no" or "D is for dog", transcript-based research of 1- to 5-year-old children found that 38% of parents' and 20% of children's letter name utterances were associated with words in this way (Robins, Treiman, et al., 2014). Data about references to sound is less consistent across questionnaire- and transcript-based studies. In responses to questionnaires in the U.S. and Canada 64% of U.S. parents and 79% of Canadian parents reported teaching letter sounds (Haney & Hill, 2004; Martini & Sénéchal, 2012). Although those percentages are similar to those for teaching letter names, it is interesting to note that transcript-based research has reported that discussion of letters' sounds is quite rare. For example, one study found that only 3% of parents' questions about letters reference the letters' sounds (Robins, Treiman, et al., 2014). Another study reported that parents were not significantly more

likely to talk about letters having or making sounds than pictures having or making sounds (Robins et al., 2012). The mixed and sometimes inconsistent results between questionnaire- and transcript-based studies of letter features, especially for the sound feature, suggest the need for a more comprehensive study addressing all four letter features. The current transcript-based examination is explicitly designed to help us to understand which features of letters parents and children are likely to emphasize in their conversations.

In addition to the features of letters that are discussed, the second qualitative aspect of talk about letters that we are interested in is what materials parents and children use when discussing letters. Although there are games and toys designed to expose young children to letters, such as blocks, tablet games, and coloring sheets, there are also opportunities to reference letters on materials that were brought into the home for reasons other than teaching about letters, such as those on cereal boxes, grocery lists, or in storybooks. Previous corpora of transcripts have generally not included supplemental information about the objects in the environment, making it difficult to address this issue. Additionally, only a few questionnaire-based studies have examined these materials. Canadian parents of children aged 3 to 5 reported primarily using storybooks to teach about letters (Martini & Sénéchal, 2012). Parents also reported using words present in the environment, such as street signs and the labels on household objects, to teach about letters (Martini & Sénéchal, 2012). In addition to these materials that were not specifically intended to teach about letters, these parents also reported using materials that were designed to teach children about letters. Parents reported using paper-based letter teaching materials such as alphabet books and workbooks, as well as manipulatives such as magnetic letters and alphabet blocks (Martini & Sénéchal, 2012). Use of alphabet books and workbooks was reported as more frequent than the use of manipulatives (Martini & Sénéchal, 2012). U.S. parents of children

younger than 18 months also reported using magnetic letters, although this study did not ask how parents used these materials (Burgess, 2011). Research on tablets as an electronic letter teaching material found that Australian parents reported their 2-4 year-old children using literacy apps not more than once a week (Neumann, 2016). Those parents also reported that their children read and write with paper more frequently than with tablets (Neumann, 2016). Our analysis of materials used for letter teaching materials in parent–child conversations will be the first that we know of to use transcripts instead of questionnaires and examine all of these different materials in a single study.

In the present study the transcripts we analyzed had been collected in a longitudinal study, allowing us to ask whether the child's age influenced parent–child conversations about letters. This is the second goal of our study: to document whether the letter features parents and children discuss, and the materials they use, change as children get older. From questionnaire- and transcript-based research we know that parents sometimes talk about letters even with children as young as one year old (Burgess, 2011; Treiman et al., 2015) and that the amount of parents' talk about letters increases across the toddler and preschool years (Robins, Treiman, et al., 2014; Treiman et al., 2015). While previous studies have examined parents' references to a variety of letter features, most have not separated parents based on the age of their child and we know of no previous questionnaire-based research on letter teaching materials that has followed families longitudinally. We therefore know very little about possible changes across the toddler and preschool years in how parents and children discuss letters. In line with a Vygotskian perspective (Vygotsky, 1978), parents may change the way they discuss letter features as their children get older, guiding the discussion of letters to help children to grasp concepts otherwise just beyond their knowledge. Previous research has revealed this type of adaptive support,

finding that when 5-year-old children are writing, mothers adjust their levels of guidance to the child's current skill level (Levin, Aram, Tolchinsky, & McBride, 2013). The proportion of parents' talk about letters that references more advanced knowledge, like sound and spelling, may increase over time to reflect children's increasing knowledge and skills. Because few studies have examined changes with age, questionnaire-based research has not been able to examine this possibility. Transcript-based research does suggest that parents may modify how frequently they associate words with their letters as their children get older. These studies suggest that parents appear to increase their use of utterances like "M is for milk" across the age range of 1 to 2 years (Robins, Treiman, et al., 2014) and that the use of associations then remains fairly constant with children aged 3 to 5 (Robins, Ghosh, et al., 2014). Given past findings supporting the Vygotskian perspective, we would expect to see parents in the current study increasing the complexity of their discussion of letters as their children learn more, and therefore change which letter features they are more likely to reference.

Children's increasing knowledge about letters could also be reflected in changes over time in the features that they discuss. As mentioned earlier, questionnaire-based research reveals nothing about the features children reference, so the only data about children's behavior comes from transcript-based research. Such research has found that children do show changes in the features they reference as they get older. For example, from age 1 to 5, children increasingly use statements like "M is for milk" (Robins, Ghosh, et al., 2014; Robins, Treiman, et al., 2014) in which they associate a letter with a word. Testing of children between the ages of 3 and 5 has found that children's letter knowledge and literacy skills emerge over the early years of life, with this acquisition occurring gradually (Worden & Boettcher, 1990). The current study may

similarly find that talk about letters increasingly references more complicated features such as spelling and sound, reflecting this growing knowledge.

The third goal of our study is to examine whether there are differences across socio-economic status (SES) in parent–child conversations about letters. Recent analysis of parent interviews suggests that engagement in cognitive activities, including teaching about letters, occurs in U.S. families across the range of SES (Schaub, 2015). In addition, transcript-based research has found no relationship between the amount of parents' talk about letters and family SES (Robins, Ghosh, et al., 2014; Treiman et al., 2015). Similarly, in a questionnaire-based study, U.S. parents of children aged 2 to 5 reported similar frequencies of teaching the alphabet regardless of income (Chen, Pisani, White, & Soroui, 2012). Although these studies have examined whether there are overall differences in the discussion of letters, we do not know of any questionnaire-based study that has examined whether there are SES-related differences in the letter features parents and children discuss. Transcript-based research has not included all of the features of letters we are interested in here, but it has examined the frequency of references to the associations between letters and words and did not find SES-related differences in parents of 3- to 5-year-old children (Robins, Ghosh, et al., 2014). To our knowledge, previous questionnaire-based research on letter teaching materials has also not included background information about family SES. Previous research has hypothesized that, although most families are likely to discuss letters, lower-SES families may own fewer books than higher-SES families and may therefore rely more on environmental print (Chen et al., 2012). In the current study we have family SES information which will allow us to not only to test this hypothesis, but also to ask if there are other SES-related qualitative differences in the details of how both parents and children discuss letters.

The current study relies on data that was gathered for the Chicago Longitudinal Language Project, a study of language development (Goldin-Meadow et al., 2014). The project recruited a sample of economically, ethnically, and educationally diverse families in the Chicago area. Researchers used identical data collection procedures across families, studied families longitudinally, and collected information on parental education and income. The families were visited in their homes every 4 months, starting when the target child was 14 months old. At every session, the parent and child were videotaped during ordinary daily activities and their conversations were later transcribed. The transcriptions were supplemented with information about what the parents and their children were doing and what objects they were using. For the current study, we analyzed parent–child conversation from all 12 sessions from the 14- through 58-month home visits. In Analysis 1, we examined what features of letters parents and children referenced and how that changed over time. In Analysis 2, we asked what materials parents and children used when discussing letters in the home and how that changed over time. In both analyses, we also examined whether the behaviors were related to family SES.

Chapter 2: Analysis 1

2.1 Method

Participants

We used data from 55 children and their parents in the Chicago, Illinois, area who were participating in the Chicago Longitudinal Language Project. Families were recruited via direct mailings to families living in targeted zip codes as well as through an advertisement in a free monthly magazine for parents. Interested parents were interviewed about their backgrounds, and 64 families who were representative of the greater Chicago area in ethnicity and income were selected. In all of the families, parents spoke English at home as the primary language. The present study included data from 55 of the original 64 families. We excluded data from 6 families that missed more than one of the 12 home visits and 3 families in which the children were later diagnosed with a developmental disorder that could have impacted their development. The primary caregiver was the mother in 48 of the families included in the present study and the father in one; 6 were dual caregiver families. The children included 29 boys and 26 girls, 38 of whom were reported to be White, 11 African American, and 6 of two or more races. Six of the children were reported to be Hispanic.

Information about the education level of the caregivers and the family's income was collected categorically in a questionnaire that was given at or before the first home visit. Each category for education was assigned a value equivalent to years of education. For example, completion of high school received a value of 12 and completion of an undergraduate degree received a value of 16. We used the value for the primary caregiver for families in which one parent was the primary caregiver and the average value for the two parents for dual-caregiver families. The categories for family income, which ranged from less than $15,000 to over

$100,000 per year, were transformed into a scale by using the midpoints of the incomes in each category except the highest, which was coded as $100,000. According to these scales, the mean number of years of education of the caregivers was 16.29 (*SD* = 2.94). The sample was skewed toward more highly educated families; for example, eight primary caregivers had high school education but no further education while 19 had completed an advanced degree. The mean family income was $60,500 (*SD* = 31,998). Education and income were positively correlated (*r* = .38). As in several previous studies using data from the Chicago Longitudinal Language Project (Goldin-Meadow et al., 2014; Rowe, Raudenbush, & Goldin-Meadow, 2012; Treiman et al., 2015), we used principal components analysis to combine education and income into a composite measure of SES with a mean of 0 and a standard deviation of 1.0. Families with high scores on this composite measure had high incomes and primary caregivers with high levels of education.

Procedure

Home visits. We analyzed data from 12 home visits that took place when each child was approximately 14, 18, 22, 26, 30, 34, 38, 42, 46, 50, 54, and 58 months. Eight of the 55 families had data from 11 rather than 12 home visits because one visit could not be scheduled in a timely manner. The visits, which began in 2002, were conducted by research assistants, each of whom continued with a family over a series of visits. At each visit, the research assistant videotaped the parent–child dyad for approximately 90 minutes. Because the goal was to obtain a picture of typical parent–child interactions, the research assistant did not bring toys or books but asked parents to interact with their child as they normally would. The activities in which parents and children engaged varied, but typical sessions included activities such as playing with toys and eating. All caregiver speech to the child and all child speech in the videotaped sessions were

transcribed. Caregiver speech to the child's siblings, if any, was also transcribed and included in our analyses. The unit of transcription was the utterance, which was defined as a sequence of words that was preceded and followed by a pause, a change in a conversational turn, or a change in intonation pattern. The transcriptions also included information about what parents and children were doing and what objects they were using. Transcription reliability was established by having a second individual transcribe 20% of each transcriber's videotapes. Reliability was assessed at the utterance level and was achieved when coders agreed on 95% of transcription decisions. The transcripts were supplemented with information about the activities the parents and children were doing and the objects in the environment while they spoke.

Coding of letter talk. We searched the transcripts to locate utterances by children and parents that included names of letters. We refer to such utterances as letter name utterances. Utterances that used the article *a* and the pronoun *I* were not counted as letter name utterances, nor were those in which a letter name was part of a word, such as *TV* or *ABC soup*. Each letter name utterance was coded for whether it referenced each of the following features: identification, production, sound, or spelling. A letter name utterance could be coded as referencing more than one feature.

A letter name utterance was coded as referencing identification if the letter that was named was physically present, potentially allowing the letter to be identified or recognized, or if a letter's appearance was described without the letter present, as in "I has a dot." For example, a parent's question "Does 'cereal' have an L in it?" in the presence of visible letters, as evidenced by the transcription or supplemental information about objects in the environment, would be coded as referencing identification. Utterances about letters that a parent or child was writing or utterances that described how to produce the shape of a letter were marked as production. For

example, a child's "I wrote this M" and a parent's "Write an O with a tail" were coded as referencing production. Utterances that mentioned the sound of the letter were coded as referencing sound. For example, a parent's "That's a K for kuh Kevin" was coded as referencing sound; this utterance was also marked as identification if the letter was present. Utterances in which a child or parent spelled a word or provided one of the letters of a word were coded as representing spelling. For example, "That's a K for kuh Kevin" referenced spelling as well as sound; "This is a Z for zebra" and "You wrote B O Y" also referenced spelling. Note that some utterances, such as the "The letter of the day is S" and "We could play A P B D," did not reference any of the features that have been described. Reliability of this coding was assessed by having a second individual code the data from two randomly selected families from each session. Inter-rater agreement was 95% for identification, 98% for production, 100% for sound, and 99% for spelling.

2.2 Results

We found a total of 8566 letter name utterances. Table 1 shows the number of letter name utterances by parents and children, broken down by the age of the child. Although age was treated as a continuous variable in the statistical analyses, for the purpose of presentation we show the results for four year-long age groups in this and other tables. Table 2 shows, for both children and parents, the proportion and number of letter name utterances that referenced each letter feature. The most common feature for both parents and children was identification. The next most common letter feature was spelling, although spelling appeared to be more common in parents than children. Sound was the least commonly discussed feature. Of the 8566 letter name utterances, 7% (605) did not refer to one of the four features and 30% (2574) were coded as referencing more than one feature.

We fit a model for each of the four letter features to statistically examine the factors that were associated with the proportion of letter name utterances that referenced the feature. We used a negative binomial regression model because we had over-dispersed count data, with a variance that exceeded the mean. For each model, the dependent variable was the number of letter name utterances that referenced the specific feature. The offset variable, or the number of times the event could have occurred, was the number of letter name utterances by the speaker in the session. Family number was included as a random factor to characterize variation due to differences across families. All of the models to be described included the fixed factors of speaker (child or parent, coded as 1 and 0, respectively), SES (the composite measure described earlier), the mean-centered linear and quadratic effects of child age (age in days), and all possible interactions except for those involving interactions between linear age and quadratic age. The negative binomial analyses were conducted using R version 3.1.3 (R Core Team, 2016), using the package glmmADMB (Skaug, Fournier, Bolker, Magnusson, & Nielsen, 2016).

Although there was no main effect of age or speaker for the feature of identification, there was a significant interaction between the linear effect of age and speaker ($\beta = 0.20$, $SE = 0.06$, $p = .001$) and also between the quadratic effect of age and speaker ($\beta = -0.11$, $SE = 0.05$, $p = .032$). There were no significant effects involving SES. We ran separate negative binomial regression models for parents and children including linear and quadratic age as fixed factors. The model for children found significant linear ($\beta = 0.24$ $SE = 0.05$, $p < .001$) and quadratic effects of age ($\beta = -0.15$ $SE = 0.04$, $p < .001$). As Table 2 shows, the likelihood that a child's letter name utterance would involve identification increased as the child got older, but the increase with age slowed after the children were around two years of age. In contrast, the

likelihood that a parent's letter name utterance would reference identification did not change significantly as children got older.

As Table 2 shows, parents were more likely than children to use letter name utterances to reference production. This interpretation was supported by a significant main effect of speaker (β = -0.81, *SE* = 0.25, *p* = .001). Although there was no main effect of age, the interaction between speaker and linear age was significant (β = 0.87, *SE* = 0.28, *p* = .002), as was the interaction between speaker and quadratic age (β = -0.42, *SE* = 0.20, *p* = .032). There was no main effect of SES and no other significant interactions. A separate model for children that included linear and quadratic age as fixed factors found significant linear (β = 1.01, *SE* = 0.28, *p* < .001) and quadratic effects of age (β = -0.43, *SE* = 0.19, *p* = .024). As Table 2 shows, the likelihood that a child's letter name utterance would reference production increased as the child grew older, but the effect of age flattened out by around age three and a half. A similar analysis for parents did not find a significant linear or quadratic effect of child age.

Returning to the results reported in Table 2, references to a letter's sound were rare for both parents and children. The negative binomial regression showed a significant main effect of speaker, such that parents were more likely than children to reference sound (β = -1.68, *SE* = 0.77, *p* = .030). There was also a significant main effect of linear age (β = 0.68, *SE* = 0.27, *p* = .011). Although the main effect of quadratic age was not significant, there were significant interactions of linear age and speaker (β = 4.93, *SE* = 1.73, *p* = .004) and quadratic age and speaker (β = -2.64, *SE* = 0.97, *p* = .007). A separate model for children that included linear and quadratic age as fixed factors found significant linear (β = 2.95, *SE* = 0.86, *p* < .001) and quadratic effects of age (β = -1.57, *SE* = 0.54, *p* = .003). The separate model for parents found a smaller but significant linear effect of age (β = 0.58, *SE* = 0.22, *p* = .008). As Table 2 shows, the

likelihood that a parent's or child's letter name utterance would reference sound increased as children got older. In children, the increase with age slowed during the last year of the study.

Parents were more likely than children to reference spelling in their letter name utterances (see Table 2) and this was supported by a significant main effect of speaker ($\beta = -0.39$, $SE = 0.13$, $p = .003$). In addition, there was a significant main effect of SES ($\beta = 0.20$, $SE = 0.09$, $p = .031$). A letter name utterance was less likely to reference spelling when the speaker was a lower-SES parent or child than when the speaker was a higher-SES parent or child. To illustrate, the proportion of letter name utterances that referenced spelling was .27 (1066/3906) for families that were below the median in SES and .38 (1770/4660) for families that were above the median. Although there was no main effect of age, there were significant interactions between linear age and speaker ($\beta = 0.85$, $SE = 0.14$, $p < .001$) and between quadratic age and speaker ($\beta = -0.42$, $SE = 0.11$, $p < .001$). To follow up on the interactions, we ran separate negative binomial regression models for parents and children that included linear age and quadratic age as fixed factors. The model for children found significant linear ($\beta = 0.81$, $SE = 0.14$, $p < .001$) and quadratic effects of age ($\beta = -0.46$ $SE = 0.10$, $p < .001$). As children got older, there was an increase in the likelihood that a letter name utterance would reference spelling (shown in Table 2), but the increase slowed during the last year of the study. For parents, the likelihood that a letter name utterance would reference spelling did not change significantly as a function of the child's age.

In addition to the models for the four features, we ran models to examine the letter name utterances that were coded as referencing multiple features and those that were coded as referencing none of the four features. In these two models the offset, as well as the random and fixed effects, were the same as in the previous models. In the first model, the dependent variable was the number of letter name utterances that referenced more than one feature. As Table 3

shows, parents were more likely than children to reference more than one feature during a letter name utterance (β = -0.65, *SE* = 0.15, $p < .001$). In addition, there was a significant main effect of linear age (β = 0.19, *SE* = 0.06, $p = .002$). Although there was no main effect of quadratic age, there were significant interactions of linear age and speaker (β = 0.69, *SE* = 0.16, $p < .001$) and quadratic age and speaker (β = -0.32, *SE* = 0.12, $p = .007$). A separate model for children that included linear and quadratic age as fixed factors found significant linear (β = 0.83, *SE* = 0.15, $p < .001$) and quadratic effects of age (β = -0.37, *SE* = 0.11, $p < .001$). The separate model for parents found a smaller but significant linear effect of age (β = 0.17, *SE* = 0.05, $p = .001$). As shown in Table 3, the likelihood that a parent's or child's letter name utterance would reference more than one feature increased as children got older. In children, the effect of age flattened out by around age 4. In the second model, the dependent variable was the number of letter name utterances that didn't reference any of the four features. The only significant effect for this model was a main effect of speaker (β = 0.63, *SE* = 0.28, $p = .023$), such that children were more likely than parents to have a letter name utterance not reference any of the four features.

2.2 Discussion

The results of Analysis 1 provide us with both quantitative and qualitative details about the features of letters that U.S. parents and children reference during everyday conversations. A novel finding for transcript-based research was that parents and children reference a variety of letter features throughout the years in which they were studied. Identification was the most commonly referenced feature for parents and children, followed by spelling, production, and finally sound. Parents were overall more likely than children to discuss the features of production, sound, and spelling. Parents were also more likely than children to reference more than one feature within a letter name utterance, while children were more likely to have a letter

name utterance that did not reference any of the four letter features we studied. This finding in children is at least partially due to the several sessions in which children were talking to themselves and there was not enough context provided to know for certain what they were doing.

We found that, as children grew older, they were more likely to reference each of the four features that we examined. In addition, they became more likely to reference more than one feature at once when discussing letters. These findings suggest a steadily increasing knowledge of letters and letter features, allowing children to discuss more features as they got older. This result is similar to previous assessments of children that have found that letter knowledge develops gradually over the early years of a child's life (Strang & Piasta, 2016; Worden & Boettcher, 1990). Familiarity with letter forms, names, and sounds makes up an important part of decoding and literacy skills (Whitehurst & Lonigan, 1998), and the current research provides a unique method of depicting the knowledge that children have about letters.

For parents, unlike for children, the proportion of letter talk that referenced different features remained fairly constant over the years studied. This result suggests that parents do not, in fact, adjust their behavior in response to their child's knowledge as much as would be expected under a Vygotskian perspective (Levin, Aram, Tolchinsky, & McBride, 2013; Vygotsky, 1978). Even during the first year of the study, a third of parents' letter name utterances referenced spelling while children rarely referenced spelling during this time. However, parents did show a slight increase in the likelihood that their letter name utterances would reference letter sounds, as well as an increase in the likelihood that their letter name utterances would reference more than one feature. Both of these findings suggest an increase in the complexity of parents' letter name utterances that may reflect a sensitivity to their child's letter knowledge.

Another new finding was the general lack of differences related to family SES. As discussed earlier, previous questionnaire-based research has found few SES-related quantitative differences in the amount of talk about letters, but has not examined qualitative differences in the characteristics of parent–child conversations about letters. The only SES-related difference that was found was that a conversational focus on how letters relate to spelling was stronger in higher-SES families than in lower-SES families. Although the current results replicate previous transcript-based research that found that more than a third of parent letter utterances made reference to the connections between letters and words, that research did not find SES-related differences in parents of 3- to 5-year-old children (Robins, Ghosh, et al., 2014). A possible explanation for the discrepancy in results is that in the previous study, given the background data available, only a bimodal (low vs. high) SES split was possible. Nevertheless, only scattered reports of SES-related differences in transcript-based research suggests that U.S. parents, regardless of SES, discuss multiple features of letters with their young children.

The results related to the discussion of letter sounds raise concerns about the extent to which we can rely on parental questionnaires for accurate reporting on the features of letters that parents discuss with their children. Previous questionnaire studies have found that more than half of parents of 3- to 5-year-olds report teaching letter sounds (Haney & Hill, 2004; Martini & Sénéchal, 2012), while our results show that talk about letter sounds occurs infrequently. Our results are in line with previous transcript-based research that found few references to sounds (Robins, Treiman, et al., 2014). The discrepancies in the amount of references to sounds suggest that questionnaires may be misleading in certain respects. Parents may be unaware of or inaccurately remember the letter features they discuss. Another possibility is that parents and children may not use the explicit references to letter sounds we were examining in the current

study, but instead use indirect references letter sounds such as alliteration or rhyming. Parents and children may discuss letter sounds but they do not appear to do so directly.

In addition to the features of letters that are discussed, the second qualitative aspect of talk about letters that we are interested in is what materials parents and children use when discussing letters. For example, perhaps the SES-related differences in references to spelling reflect differences in the letter teaching materials found in the home. As mentioned earlier, we test the hypothesis that lower-SES families rely more on environmental print to teach about letters because they have fewer books in the home (Chen et al., 2012). Lower-SES families may also have fewer materials such as workbooks and electronic games that are explicitly intended to teach about letters, further promoting use of print on ordinary household objects. Therefore, in Analysis 2, we looked in detail at what materials parents and children use when they reference letters.

Chapter 3: Analysis 2

3.1 Method

Participants

Analysis 2 was conducted using data from the same 55 families as in Analysis 1.

Procedure

From the set of letter name utterances that were coded as referencing identification in Analysis 1, we selected those 6539 that referenced a letter in the environment. We excluded utterances in which speakers described an imagined letter, such as "I has a dot." We also excluded utterances in which speakers did things such as identifying an apple slice or an arm movement as a letter because these objects were not letters and may not have looked much like them. For the remaining 6407 utterances, we then coded where the letter being referenced was in the environment. Six coding categories were created. The first three were for materials that were not specifically designed to teach about letters: storybooks, environmental print, and writing. The storybook category was used for references to letters in storybooks, such as a child saying "If you turn the book around it turns into a P." The environmental print category included letters on objects that fulfill real-life functions and were not designed for the purpose of literacy instruction. For example, letters that were named on a coffee can were coded as environmental print. The writing category included letters that were written or drawn on materials that were not explicitly designed to teach about letters, such as letters that a parent or child were writing on a piece of blank paper. We also created three categories to include materials that were specifically designed to teach about letters: manipulative, paper-based teaching material, and electronic teaching material. Letters in the manipulative category were those on puzzles, blocks, cards, magnets, stickers, and the like—materials that appeared to have been designed for use in

teaching about literacy. Letters in the electronic teaching material category were those in computer or tablet games intended to teach letters or other literacy skills. The paper-based teaching material category involved letters in workbooks, letter coloring sheets, activity sheets, word searches, crosswords, and alphabet books. Although it would have been possible for a letter-name utterance to refer to letters in more than one of the categories, this did not occur. There were 40 utterances that could not be coded because the information about context that was provided did not make clear what material was being used. Reliability of this coding was assessed by having a second individual code the data from two randomly selected families from each session. The two coders agreed 95% of the time.

3.2 Results

Table 4 shows the proportion of the 6367 letter utterances that fell into each of the six categories. The data in Table 4 are pooled over parents and children because the statistical analyses to be described showed no significant effects of speaker. Over three-quarters of the letter name utterances that referenced a letter in the environment involved a letter that was part of materials intended to teach literacy skills: manipulative, paper-based teaching material, or electronic letter teaching material. Of these, manipulatives were the most common, followed by paper-based teaching materials. The apparent peak in references to manipulatives around age 2 is due to those three sessions having the greatest number of families referencing manipulatives as well as three families that spent a large part of a session playing with blocks. The materials that were not specifically designed for letter teaching were less commonly referenced than those designed for letter teaching. The letters that were referenced least often were those in storybooks.

We fit a negative binomial regression model for each of the six letter type categories. The offset was the number of letter name utterances coded as referencing identification of a letter

where the material could be identified and it was clear the object was a letter. Participant number was included as a random factor. The model for each category included the fixed factors of speaker (child or parent), SES (the composite measure described earlier), child age (age in days), and the quadratic effect of age, as well as all possible two- and three-way interactions involving the fixed factors, excluding interactions involving linear and quadratic age.

There were no significant speaker-, age-, or SES-related effects for the categories of environmental print, manipulatives, or paper-based teaching materials. The model for the storybook category found only a significant main effect of SES ($\beta = 0.99$, $SE = 0.46$, $p = .032$). A letter name utterance was less likely to reference letters in storybooks in a lower-SES family than in a higher-SES family. To illustrate, the proportion of letter name utterance that referenced letters in storybooks was .02 (65/2983) for families that were below the median in SES and .05 (179/3384) for families that were above the median.

There was a main effect of linear age for the written letter category ($\beta = 0.79$, $SE = 0.35$, $p = 0.026$). As Table 4 shows, the likelihood that a letter name utterance would reference a letter in writing increased as children got older. There were no other significant main effects or interactions in the model.

For the electronic teaching material category, the only significant effects were the linear ($\beta = 0.57$ $SE = 0.20$, $p = .004$) and quadratic effect of age ($\beta = -0.36$ $SE = 0.14$, $p = .008$). As Table 4 shows, the likelihood that a letter name utterance would reference a letter in electronic teaching materials increased as children got older, with the effect of age flattening out around age three and a half.

3.3 Discussion

The results of Analysis 1 revealed that parents and children discuss a variety of letter features across the years in which they were studied. In Analysis 2, we turned our attention to the types of materials used in these discussions. Materials that were specifically designed to teach about letters were used in 77% of letter name utterances that referenced letters in the environment. The teaching in these conversations was not as informal as might have been expected given previous parental reports of teaching materials (Martini & Sénéchal, 2012). We found that parents and children used a variety of materials when discussing letters, and that there were a few changes in the pattern of use across the years in which they were studied. Parents and children did not differ in their overall likelihood of referencing any of the six materials studied. Our findings suggest that parents bring materials into the home with the intention of providing letter instruction to their young children. Martini and Sénéchal (2012) found that parents reported using storybooks and environmental print to teach about letters more frequently than manipulatives such as letter blocks and magnetic letters, or paper-based teaching materials such as workbooks and flashcards. In the current study, however, manipulatives and paper-based teaching materials were the most common, with storybooks being the least common for both parents and children across the years in which they were studied. The finding that referencing letters in storybooks was rare is in line with previous observational studies of parents reading books to their 3- to 5-year-old children, which have found that references to letters are infrequent (Hindman, Connor, Jewkes, & Morrison, 2008; Hindman, Skibbe, & Foster, 2013). These discrepancies emphasize the need for caution in our reliance on parental questionnaires for qualitative data regarding the materials used in talk about letters.

Environmental print was the most commonly referenced material not intended for teaching, but was much less common than manipulative or paper-based material use. A possible explanation for this finding comes from previous research suggesting that environmental print may be used more frequently for references to words than letters. In observational research, Neumann, Hood, and Ford (2013) found that 66% of mothers of four-year-olds in an environmental print-rich play setting referenced written words within environmental print and only 11% of mothers referenced the letters within the print. The parents in the Martini and Sénéchal (2012) study who reported frequent use of environmental print might also have been remembering teaching words and not letters, which may partially explain the discrepancy between the questionnaire results and our current results. These results highlight a potential advantage of transcript-based research over questionnaire-based research that may overestimate the use of environmental print used to teach children about letters.

Another new finding was that use of electronic teaching materials increased across the earliest years of the child's life. Although Neumann (2016) found that parents of 2- to 4-year-olds reported that their children used literacy apps, the study did not ask whether there were differences across ages or whether the apps focused on letter teaching. The present study shows not only that families use electronic letter teaching material but also that their use increases as the children got older. Given that the current study began in 2002, it would not be surprising if a more current study would find even more common tablet use for teaching about letters.

The finding that references made to letters during writing increased across the ages studied may reflect an overall increase in the amount of writing during parent–child conversations over the years. This would be in line with the result from Analysis 1 that children increase their references to production, further suggesting that the frequency of writing increases

as children get older. The increase in the referencing of letters in writing might reflect a sensitivity on the part of parents to their child's individual knowledge level. Unlike the lack of change in the features parents discuss, this result may reflect parents behaving in line with a Vygotskian perspective. As children got older, parents recognized a child's potential for writing and provided guidance that helped the children approach the difficult task of writing.

As with the results for letter features, there were few differences related to family SES. We found no support for the hypothesis that lower-SES families are less likely than higher-SES families to use materials that are explicitly intended to teach about letters, such as workbooks and electronic games and instead rely on environmental print. While lower-SES families were not more likely than higher-SES families to rely on environmental print, we did find support for the idea that lower-SES families may have less access to storybooks than higher-SES families (Chen et al., 2012). In the current study, higher-SES families were more likely than lower-SES families to reference letters in storybooks. Past research has also found that higher-SES families are more likely than lower-SES families to read books (Chen et al., 2012; Federal Interagency Forum on Child and Family Statistics, 2016; Schaub, 2015), which would provide more opportunities to talk about letters during shared book reading. That is, even though talk about letters does not occur very often during book reading, if book reading still occurs more frequently in higher-SES families than in lower-SES families, this suggests that a greater amount of time might be spent referencing letters in storybooks.

Chapter 4: General Discussion

Parents can participate in the transmission of the cultural tools related to reading and spelling through interactions in the home. Given that literacy activities in the home correlate with later decoding and literacy skills (Burgess et al., 2002; Evans et al., 2000; Sénéchal & LeFevre, 2002), it is important to understand how parents teach their young children about letters and what children learn from these experiences. However, previous questionnaire-based research has largely focused on the amount of letter teaching and provides few details about how letters are discussed and what materials are used to do so. Here, we directly observed and coded parent–child conversations from a recent longitudinal study of a representative sample of children in the Chicago area. We examined what features of letters parents and children discussed and what materials they used when referencing letters. In addition to differences between parents and children, we examined how these behaviors differed across the children's age and family SES.

Our results show that parents and children discuss a variety of letter features in everyday conversations when the children are between the ages of 14 and 58 months. We replicated the finding from questionnaire-based research that parents most commonly reference letter identification (Haney & Hill, 2004; Martini & Sénéchal, 2012), and we found that children are also most likely to reference this feature. Another new finding was that spelling was the second most commonly referenced letter feature for both parents and children, followed by production. We also found that parents and children rarely reference letter sounds, replicating previous findings from transcript-based research (Robins, Treiman, et al., 2014; Robins et al., 2012) and contradicting previous questionnaire-based results (Haney & Hill, 2004; Martini & Sénéchal, 2012). These results underscore the advantage of relying on both transcript- and questionnaire-

based research for qualitative analysis of the characteristics of parent–child conversations about letters.

Our results show that children change with age more than parents in how they discuss letter features. Children's talk about letter features became increasingly complex across the toddler and preschool years, with references to production, sound, spelling, and multiple features becoming more likely as the children gr older. These changes appear to reflect an increasing knowledge about letters, in line with previous research findings (Strang & Piasta, 2016; Worden & Boettcher, 1990). Parents, on the other hand, generally did not alter what features of letters they referenced as their children got older. This result is surprising given the Vygotskian view that parents help their children to develop skills by providing developmentally appropriate guidance. Although the scarcity of age-related changes could reflect a lack of sensitivity on the part of parents to their child's knowledge level, the increase in references to letter sounds and multiple features at once suggests that parents consider some discussions of letters too complex or abstract to have with very young children. Another possibility is that even more changes in parental behavior would emerge if we used a more detailed coding approach. For example, the letter name utterances that reference spelling may have become more complex as the children grew older. When children were young, spelling may have mainly been made up associations between a single letter and a word, such as "C is for cat." As children got older, parents may have introduced more complicated examples, such as spelling a whole word. Looking in detail at what words are being spelled would give us further insight into how parents teach their children about letters in the home. Given how little longitudinal research exists, these findings need to be replicated and examined in even more detail.

In addition to referencing a variety of letter features, our results show that parents and children used an assortment of materials when discussing letters. Our study of this aspect of parent–child conversations provides new information because our previous knowledge comes from a small amount of questionnaire-based research (e.g. Burgess, 2011; Martini & Sénéchal, 2012; Neumann, 2016). We found that, across the years which were studied, parental teaching was not as informal as had been expected given the findings of the questionnaire research. Surprisingly, materials intended for letter teaching were more commonly referenced than those not intended for teaching. Parents went beyond using items already likely to be the home, namely environmental print and storybooks. Manipulatives and paper-based teaching materials were used frequently with children of all ages, suggesting that parents considered it important for their children to learn about letters and brought materials into the home that were specifically designed for letter teaching. These results are in line with research suggesting that U.S. parents, regardless of their level of education, have increased their engagement in cognitive activities with their children in recent years (Schaub, 2015). Although this may appear to be a positive development, research has found that preschool programs that stress basic number and letter skills had negative effects on children's motivation and their expectations for success on academic tasks (Stipek et al., 1998; Stipek, Feiler, Daniels, & Milburn, 1995). Other researchers have similarly suggested that materials that are beyond the ability of children, such as worksheets, may not be the most effective teaching tools (Lonigan, Farver, Phillips, & Clancy-Menchetti, 2011). Before we encourage further early emphasis on cognitive skills, we should consider the impact of this teaching and whether materials such as workbooks are developmentally appropriate for children not yet in school.

We found that family SES did not have a large impact on conversations about letter features or on the materials used by parents when discussing letters. A new finding was that higher-SES parents and children were more likely than lower-SES parents and children to reference spelling. We also found support for the hypothesis that lower-SES families have less access to storybooks than higher-SES families (Chen et al., 2012). Although the SES differences were significant, they were small and the number of parents with low education levels was fairly small. This demonstrates the importance of replication with an even more diverse sample. Additionally, although lower-SES families had a lower use of storybooks for teaching and a smaller focus on spelling, there was no support for the suggestion that lower-SES families rely more on environmental print than higher-SES families and use fewer materials explicitly intended to teach about letters. Lower-SES parents in this study brought letter teaching materials into the home and discussed all of the letter features we examined. Our results support the suggestion of past questionnaire-based research (Chen et al., 2012; Schaub, 2015) that a broad range of U.S. parents believe that parenting for cognitive development is important.

By developing a detailed depiction of how parents discuss letters with their children during everyday conversations, we can understand how children learn about letters in the home prior to any formal school instruction. While past studies have linked learning in the home to improved letter knowledge and decoding ability (Burgess et al., 2002; Evans et al., 2000; Sénéchal & LeFevre, 2002), the results of the current study provide more insight into the ways that parents engage in letter teaching. By better characterizing parental practices, we can better understand the impact they may have on child learning. Our results show the benefit of conducting observational research instead of relying on questionnaires when studying the features of letters discussed in the home and what materials parents and children use when

referencing letters. Given that so much teaching and learning can occur in the home, it is important that we have a rich understanding of how it takes place.

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Table 1

Number of Letter Name Utterances by Parents and Children

Child Age	Number of Letter Name Utterances	
	Parents	Children
1;2 – 1;10	587	165
2;2 – 2;10	1049	675
3;2 – 3;10	1394	1465
4;2 – 4;10	1766	1465
Total	4796	3770

Table 2

Proportion of Letter Name Utterances by Parents and Children That Referenced Identification, Production, Sound, and Spelling as a Function of Child Age (Number of Utterances Referencing Each Feature Out of Total Number of Letter Name Utterances in Parentheses)

	Identification		Production		Sound		Spelling	
Child Age	Parents	Children	Parents	Children	Parents	Children	Parents	Children
1;2 – 1;10	.68 (400/587)	.64 (106/165)	.12 (69/587)	.01 (1/165)	.01 (7/587)	.00 (0/165)	.34 (202/587)	.02 (4/165)
2;2 – 2;10	.82 (864/1049)	.75 (506/675)	.07 (72/1049)	.04 (30/675)	.02 (23/1049)	.00 (2/675)	.37 (386/1049)	.18 (119/675)
3;2 – 3;10	.74 (1035/1394)	.74 (1077/1465)	.21 (288/1394)	.08 (117/1465)	.02 (29/1394)	.02 (25/1465)	.46 (639/1394)	.30 (441/1465)
4;2 – 4;10	.81 (1433/1766)	.76 (1118/1465)	.19 (333/1766)	.09 (126/1465)	.04 (63/1766)	.03 (50/1465)	.37 (646/1766)	.29 (421/1465)
Total	.78 (3732/4796)	.74 (2807/3770)	.16 (763/4796)	.07 (274/3770)	.03 (122/4796)	.02 (77/3770)	.39 (1873/4796)	.26 (985/3770)

Table 3

Proportion of Letter Name Utterances by Parents and Children That Referenced Either More than One or None of the Features as a Function of Child Age (Number of Utterances Referencing Each Feature Out of Total Number of Letter Name Utterances in Parentheses)

	More than one feature		None of the features	
Child Age	Parents	Children	Parents	Children
1;2 – 1;10	.28	.01	.12	.34
	(163/587)	(2/165)	(72/587)	(56/165)
2;2 – 2;10	.33	.12	.05	.15
	(351/1049)	(80/675)	(55/1049)	(98/675)
3;2 – 3;10	.45	.21	.04	.09
	(625/1394)	(304/1465)	(561394)	(128/1465)
4;2 – 4;10	.41	.23	.03	.06
	(718/1766)	(331/1465)	(48/1766)	(92/1465)
Total	.39	.19	.05	.10
	(1857/4796)	(717/3770)	(231/4796)	(374/3770)

Table 4

Proportion of Identification Letter Name Utterances Referring to Letters on Different Materials as a Function of Child Age (Number of Utterances Referencing Each Material Type Out of Total Number of Identification Letter Name Utterances in Parentheses)

	Not Explicitly Intended for Letter Teaching			Explicitly Intended for Letter Teaching		
Child Age	Storybooks	Environmental Print	Writing	Manipulative	Electronic teaching material	Paper-based teaching material
1;2 – 1;10	.02 (12/492)	.25 (125/492)	.01 (7/492)	.35 (172/492)	.00 (0/492)	.36 (176/492)
2;2 – 2;10	.06 (76/1366)	.12 (162/1366)	.01 (19/1366)	.64 (868/1366)	.04 (57/1366)	.13 (184/1366)
3;2 – 3;10	.03 (53/2024)	.11 (230/2024)	.06 (131/2024)	.41 (820/2024)	.15 (297/2024)	.24 (493/2024)
4;2 – 4;10	.04 (103/2485)	.13 (320/2485)	.04 (105/2485)	.30 (744/2485)	.13 (313/2485)	.36 (900/2485)
Total	.04 (244/6367)	.13 (837/6367)	.04 (262/6367)	.41 (2604/6367)	.10 (667/6367)	.28 (1753/6367)