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# Letter knowledge in parent–child conversations

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**Abstract** Learning about letters is an important component of emergent literacy. We explored the possibility that parent speech provides information about letters, and also that children's speech reflects their own letter knowledge. By studying conversations transcribed in CHILDES (MacWhinney, 2000) between parents and children aged one to five, we found that alphabetic order influenced use of individual letters and letter sequences. The frequency of letters in children's books influenced parent utterances throughout the age range studied, but children's utterances only after age two. Conversations emphasized some literacy-relevant features of letters, such as their shapes and association with words, but not letters' sounds. Describing these patterns and how they change over the preschool years offers important insight into the home literacy environment.

**Keywords** Print awareness · Home literacy environment · Letter knowledge · Parent–child conversations · Emergent literacy

The literacy-related experiences that young children have at home—before they begin formal schooling—provide a foundation for the development of their reading and writing skills (Adams, 1990; Foulin, 2005; Levin, Shatil-Carmon, & Asif-Rave, 2006; McBride-Chang, 1999). What home activities best promote children's school readiness? Sénéchal's Home Literacy Model (2006, 2012; Sénéchal & LeFevre, 2002) distinguishes between two general types of literacy-related experiences

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available to young children. First are activities where print is present but the focus of the interaction is on the meaning of the print. Parents may, for example, use storybooks to teach colors or animal names, focusing the child's attention on a book's pictures rather than its print. As may be expected from the nature of these meaning-focused activities, the time parents spend engaging in them has an influence on children's vocabulary and language development (Dickinson & Tabors, 2001; Ewers & Brownson, 1999; Jordan, Snow, & Porche, 2000).

Sénéchal's (2006, 2012) and Sénéchal and LeFevre (2002) second category of literacy-related activities contains those in which attention is directly on the print. These interactions include both talk about words and talk about individual letters, as when a parent helps a child spell her name or identify the letters of the alphabet. Sénéchal refers to these activities as formal literacy activities, as attention is on the form of print. Such discussions may occur during everyday interactions that are different in character from the explicit teaching that occurs when children enter school. While eating breakfast, for example, a parent might point out that an M on a cereal box has two humps. In the present study we explore these print-focused literacy activities in detail. Analyzing parent–child conversations, we ask what letters parents and children talk about, what information parents provide about letters, and whether and how these conversations change across the preschool years.

One motivation for studying print-focused interactions is that the frequency with which parents engage in these activities with their children appears to be related to the children's later literacy skills. Previous studies have shown that print-focused activities improve children's general understanding of print—including, for example, their awareness of the directionality of writing and their ability to recognize letter names and sounds and read simple words (Christian, Morrison, & Bryant, 1998; Evans, Shaw, & Bell, 2000; Hood, Conlon, & Andrews, 2008; Martini & Sénéchal, 2012; Sénéchal, LeFevre, Thomas, & Daley, 1998). However, the previous studies are limited in three ways. First, they rely on questionnaires to assess parents' input. In the studies by Martini and Sénéchal and Sénéchal et al., for example, parents were asked to rank, on a scale of 1–5, the frequency with which they taught their children about print and the frequency with which they read storybooks. Similarly, Evans et al. interviewed parents, asking them about the frequency, duration, and quality of various literacy-related activities. While potentially informative, parents' reports of what they do may be distorted by a desire to conform to ideas about what they should do. A second limitation of previous studies is that, even if parents provide accurate information about the frequency of literacy-related activities, this does not tell us exactly what happens during the activities. For example, we do not know which letters parent talk about most often or which features of letters they emphasize, such as the letters' shapes or the letters' sounds. A third limitation of previous studies of the home literacy environment is that they generally focus on older preschoolers—mostly 4- and 5-year-olds. The studies do not inform us about the literacy-related activities that occur during the earlier preschool years, which may differ in nature and in frequency from those that occur during the later preschool years.

Our study addresses these limitations by providing a direct and detailed account of the patterns found in parent–child conversations about letters across the preschool

years. We do so by examining conversations that are available in CHILDES, a computerized repository containing transcripts of communication in spoken language (MacWhinney, 2000). Most of the transcripts in CHILDES were collected for studies of children's spoken language development. As such, they provide an ideal resource for assessing patterns in talk about written language across a range of contexts where print is not often the direct focus. Previous studies (Robins & Treiman, 2009; Robins, Treiman, Rosales, & Otake, 2012) have shown that this approach can provide useful information about the home literacy environment. The conversations recorded in CHILDES were collected across a range of research contexts and in service of various research questions, mostly unrelated to literacy development. We control for the differences across transcripts statistically, as we will describe later, asking about the general patterns that emerge. Our analyses include virtually all of the conversations between US parents and children between 1;0 and 5;0 that are transcribed in CHILDES. This gives us a large sample of parent and child speech from which to identify patterns in talk about letters as well as potential changes in these patterns over the preschool years. By examining parent talk about letters in everyday interactions, we aim to provide a thorough description of the home literacy environment across the preschool years, not just the end of this period.

Studying conversations not only allows us to address the first goal of our study—to examine the literacy-related input that parents provide—but also to examine children's knowledge about letters. This is an important part of what is often called print awareness (Badian, 2000; Storch & Whitehurst, 2002). Although there are some exceptions (e.g., Lonigan, Burgess, & Anthony, 2000; Worden & Boettcher, 1990), most studies of young children's print awareness focus on 4- and 5-year-olds, asking them to identify visually presented letters by their names or sounds in an experimental setting (e.g., Evans, Bell, Shaw, Moretti, & Page, 2006; Levin, Patel, Margalit, & Barad, 2002). There are, however, even more basic things that children must know about letters before they can succeed in formal experiments such as these. For example, children need to know that the letter B is the same letter whether it is written in green, or red, or purple. They need to know that words comprise strings of letters and that the order of these letters is important for making a given word the word that it is. These basic facts about letters are transparent to adults, and so it easy to forget that this is information that children do not know and must acquire. Studying conversations, as we do here, can provide insight into this important but understudied foundational knowledge and how it develops across the preschool years.

Ours is a descriptive study of the home literacy environment, and it is not our aim to identify causal connections between early parent–child conversations about letters and children's later literacy development. Instead, our aims are more basic. Given that previous research has identified connections between home literacy activities and children's reading and writing development (Evans et al., 2000; Levin et al., 2006; Phillips & Lonigan, 2009), we step back to investigate one of these activities—everyday conversations—in detail, appealing to a larger sample than is typically used in studies of the home literacy environment. By identifying which letters parents and children talk about, and which features of letters these conversations emphasize, we offer a characterization of literacy-relevant activities in the home environment of preschool children that provides a context for other

work on how the home environment contributes to school readiness and later achievement.

We report five analyses, each of which focuses on a particular pattern in parent and child letter talk. We explain each analysis and the questions that it addresses in what follows.

## Analysis 1: Monograms

Previous studies of the home literacy environment have lumped together talk about different letters (e.g., Hood et al., 2008; Sénéchal et al., 1998). However, parents may talk more about some letters than others, giving children more opportunity to learn about them. In our first analysis, we studied utterances of monograms: the letter names that parents and children use in conversation, as in statements such as *that's a K*. We asked whether some letters are used more often than others and whether these differences reflect a letter's position in the alphabet and its frequency of use of English words. We also asked whether these patterns change over the preschool years.

### Method

#### *Utterances for analysis*

Transcripts involving conversations between parents and their normally developing children between 1;0 and 5;0 were selected from the set of US. English corpora available in CHILDES (MacWhinney, 2000) as of May 2011.[1] To be included, the corpora had to be transcribed according to the CHILDES guidelines such that letter utterances could be identified by a simple search function (done via an @l tag after each such utterance). A search of all eligible transcripts found letter utterances in 29 corpora, from 172 parents and 145 children. There were a total of 15,619 letter name utterances—7,046 from parents and 8,573 from children. Given the lag between collecting data and making it available on CHILDES, many of the corpora include conversations that took place before 2000. Date of transcription could not be included in the formal analyses, however, because individual corpora differed in how they reported it (e.g., by date of recording or date of publication).

#### *Coding and analysis procedure*

We combined the letter name utterances from all transcripts and pooled them into four groups, broken down by child age: 1;0–2;0, 2;0–3;0, 3;0–4;0, and 4;0–5;0. We ran separate regression analyses to predict the number of utterances of each letter

[1] Corpora included: Bates, Bernstein, Bliss, Bloom70, Bloom73, Bohannon, Brown, Clark, Cornell, Demetras1, Demetras2, Feldman, Gleason, Haggerty, Hall, Higginson, HSLLD, Kuczaj, MacWhinney, Morisset, Nelson, New England, Post, Providence, Sachs, Snow, Suppes, Tardiff, Valian, VanHouten, VanKleeck, and Warren. The corpora are available for download on the CHILDES website at http://childes.psy.cmu.edu/ (MacWhinney, 2000).

name by parents and by children. The dependent variable was the frequency of each letter's use, log transformed in order to make the distribution more normal. The predictor variables included child age group, position in the alphabet, and frequency in words. Our position measure, which we label ABC, distinguished the three letters at the beginning of the alphabet—the ones that are often used to label the sequence—from the remaining 23 letters. We selected this way of coding alphabetic position because, in preliminary analyses, it predicted more variance than coding each letter for its individual alphabetic position, from 1 to 26. The frequency variable reflects how often particular letters occur in English words that appear in books for young children. It was measured here as the number of occurrences of the letter across the 6,231 words in Zeno, Ivenz, Millard, and Duvvuri's (1995) survey of written materials for kindergarten and first-grade children. Because this variable showed moderate positive skewness, we performed a square root transformation. In addition to the variables of child age, ABC, and book frequency, the analyses included the interactions between child age and ABC and between child age and book frequency. All continuous variables were centered in our analyses.

## Results

### *Parents*

For parents, as shown in Table 1, we found a significant effect of ABC. Parents used the letter names A, B, and C significantly more often than expected on the basis of other factors. Indeed, 23 % (1,625 of 5,421) of parents' monogram utterances were one of these three letters. Parents' rate of A, B, and C utterances did not differ across the age range studied, as indicated by the lack of an interaction between child age and the ABC variable. Book frequency was not a significant predictor of parent letter use on its own, but it interacted significantly with child age. When we performed separate regression analyses for parent utterances during each year-long age group, the correlation between a letter's frequency in books and parents' use of the letter increased steadily, from $r = 0.28$ ($p = 0.05$) for children from 1 to 2 to $r = 0.71$ ($p < 0.001$) for children from 4 to 5. The main effect of child age, such that parents had more monogram utterances when talking with younger children than when talking with older children, is difficult to interpret on its own because there were different numbers of transcripts across age groups.

### *Children*

ABC position was a significant predictor of children's letter use. As Table 1 shows, children had more utterances of letter names at the beginning of the alphabet than of the letters in later positions. The first three letters of the alphabet constituted more than a quarter, 26 % (2,203 of 6,370), of children's monogram utterances throughout the 1;0–5;0 age range. The emphasis on A, B, and C continued throughout the preschool years, as indicated by the lack of an interaction between child age and ABC. Although book frequency did not significantly predict children's letter use on its own, it did so by way of an interaction with age. In

**Table 1** Summary of regression analyses for predictors of child and parent monogram utterances (children, N = 8,573; parents N = 7,046)

| Predictor | Child | | Parent | |
|---|---|---|---|---|
| | *B* | *SE B* | *B* | *SE B* |
| ABC | 1.75*** | 0.41 | 1.00** | 0.32 |
| × Age | −0.25 | 0.15 | −0.06 | 0.12 |
| Book frequency | 0.0006 | 0.0008 | 0.0003 | 0.0007 |
| × Age | 0.0006* | 0.0003 | 0.0006* | 0.0002 |
| Age | 0.28*** | 0.05 | −0.40*** | 0.04 |

*N* number of utterances. Overall model for children, $F$ (5, 98) = 26.41, $p < 0.001$, $R^2 = 0.55$. Overall model for parents, $F$ (5, 98) = 44.08, $p < 0.001$, $R^2 = 0.68$

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

separate analyses of children's monogram use for each year-long age group, the frequency of the letter in books did not significantly predict children's monogram use from 1 to 2 ($r = 0.21$), but was significantly related to letter use for children in each of the later age groups. The correlation between book frequency and children's monogram use increased to $r = 0.74$ ($p < 0.001$) for 4–5 year olds. Finally, older children uttered individual letter names more often than younger children, reflected in the main effect of child age.

## Discussion

In parent and child talk about letters, are all letters treated equally? Our first analysis addresses this basic question and finds that they are not. In the US, *ABC* is often used as shorthand for the alphabet and is featured in the names of many objects that children encounter, such as *ABC book*. We found that parents often talked about these beginning letters and that they did so throughout the preschool years. The same was true of children. At the older ages, the pattern of monogram use by parents and their children also became increasingly reflective of the frequency with which individual letters occur in children's books, which in turn reflects the frequency of the letters in the words of English as experienced by children. Our results show, further, that this gradual increase begins earlier for parents than for children. This finding marks a change in the letters that parents and children talk about: from an emphasis on the beginning letters of the alphabet to an emphasis on letters that occur in words commonly used with young children. This shift in patterns of monogram utterances represents a change in the home literacy environment across the preschool years, and it highlights the importance of studying younger preschoolers as well as older ones.

Of course, letters are not always uttered in isolation. Letters are commonly mentioned in sequences, as when parents and children sing the alphabet song or practice spelling words. In the next two analyses, we look at utterances that mention more than one letter.

## Analysis 2: Digrams

In Analysis 2, we extend the approach used in Analysis 1 to two-letter combinations, or digrams. We ask whether parents and children use some pairs of letters more often than others and, if so, what factors underlie these differences. Findings on this topic can shed light on the input that children receive and on the knowledge that they possess about how letters go together.

### Method

#### *Utterances for analysis*

We used the same set of letter name utterances identified in Analysis 1.

#### *Coding and analysis procedure*

For letters that occurred in sequences, defined as any instance of two or more letters separated at most by *and*, we identified each two-letter combination, or digram, in the sequence. For example, if a child said *D–O–G*, the utterance was coded as involving two digrams, *D–O* and *O–G*. The 26 letters of the alphabet can be combined to create 676 distinct digrams, and we kept track of how often each digram occurred in parent and child speech for each year group. The transcripts analyzed contained 6,463 digrams—2,313 from parents and 4,150 from children.

Our analyses of parent and child digram use included the monogram variables from Analysis 1, as well as a set of digram-level variables, for a total of nine factors. The monogram variables were coded as in the previous analysis and were applied separately to each letter in the digram: child Age, letter 1 ABC, letter 2 ABC, letter 1 Book frequency, and letter 2 book frequency. Four additional variables were added to code for digram-level features: digram ABC, digram alphabet, digram book frequency, and digram repeat. The digram ABC variable distinguished the digrams involved in the ABC sequence—*A–B* and *B–C*—from the remaining 674 digrams. The digram alphabet variable coded each digram for whether the two letters were in alphabetic order, as in *A–B, J–K,* and *X–Y*. Digram book frequency was calculated using the same set of words from children's books used to analyze monograms in this and the previous analysis. Finally, the digram repeat variable distinguished between digrams that repeated the same letter (e.g., *J–J* and *P–P*) and those that did not (e.g., *E–F*, *B–L*).

### Results

#### *Parents*

As Table 2 shows, there were no significant effects of monogram variables for parent digram utterances. That is, parent use of digrams was not influenced by features of the individual letters in these utterances, over and above the influences of the two-letter

sequence as a whole. Parent digram utterances were influenced by sequences in alphabetic order, as shown by the main effects of ABC and alphabetic order. Overall, 41 % (937 of 2,313) of parent digrams were in alphabetic order, and 37 % (344 of 937) of these were the first two digrams of the alphabet, *A–B* and *B–C*. These trends in parent digram use were stronger with younger preschoolers than with older ones, as shown by the interactions of ABC and alphabetic order with child age. Alphabetic order digrams made up 51 % (413 of 813) of parent digrams from child age 1 to 2, but only 31 % (133 of 433) from child age 4 to 5. Use of the *A–B* and *B–C* digrams declined as well, from 19 % (154 of 813) from child age 1 to 2, to 5 % (23 of 433) from child age 4 to 5. Parent digram utterances were also significantly predicted by the frequency of digrams in children's books. That is, even after controlling for the frequency with which each monogram occurred in children's books, parents were more likely to utter digrams that occurred frequently in books than digrams that occurred less frequently. This effect did not interact with age, indicating that parents tended to use digrams that were common in words throughout the preschool years.

Finally, parent digram utterances were significantly predicted by the digram repeat variable, and this effect showed a significant interaction with age. Overall, 11 % (254 of 2,313) of parent digrams were repetitions of a single letter. The rate decreased from 13 % (106 of 813) from child age 1 to 2 to 5 % (22 of 433) from child age 4 to 5.

### *Children*

None of the monogram level variables were a significant predictor of children's digram utterances, although we did find a significant interaction between the variables for letter 2 book frequency and child age. That is, the second letter of children's digram utterances was more likely to be a letter commonly found in children's books when children were older than when they were younger.

Many of children's digram utterances involved the sequences at the beginning of the alphabet. Overall, 16 % (666 of 4,150) of children's digrams were either *A–B* or *B–C*. These digrams were most frequent at the youngest ages, decreasing from 34 % (141 of 419) from 1 to 2 to 8 % (106 of 1,269) from 4 to 5. These trends were reflected in the regression analyses shown in Table 2 by a significant effect of the digram ABC variable and an interaction of digram ABC with child age. As shown by the main effect of the digram alphabet variable, children's digram utterances were also influenced by digrams in alphabetic order, over and above the influence of the digrams at the beginning of the alphabet. Indeed, almost half of the children's digram utterances, 48 % (2,006 of 4,150), were in alphabetic order. The tendency to utter digrams in alphabet order was especially pronounced for the older preschoolers, as shown by the interaction between digram alphabet and child age. Whereas the specific digrams *A–B* and *B–C* became less frequent with age, as indicated above, other digrams in alphabetic order became more common. Although there was no significant effect of the digram book frequency variable on children's digram utterances, the frequency of digrams in children's books did significantly predict

**Table 2** Summary of regression analyses for predictors of child and parent digram utterances (parents, N = 2,313; children, N = 4,150)

| Predictor | Child | | Parent | |
|---|---|---|---|---|
| | *B* | *SE B* | *B* | *SE B* |
| L1 predictors | | | | |
| Letter ABC | 0.40 | 0.55 | −0.01e−01 | 0.03 |
| × Age | 0.10 | 0.20 | 0.02 | 0.01 |
| Book frequency | 0.0008 | 0.001 | −0.000002 | 0.00007 |
| × Age | 0.0009 | 0.0005 | 0.00003 | 0.00003 |
| L2 predictors | | | | |
| Letter ABC | 0.37 | 0.55 | 0.03e−01 | 0.03 |
| × Age | −0.09 | 0.20 | 0.06e−01 | 0.01 |
| Book frequency | 0.0004 | 0.001 | 0.00007 | 0.00007 |
| × Age | 0.001* | 0.0005 | 0.00001 | 0.00003 |
| Digram predictors | | | | |
| Letter ABC | 100.00*** | 3.38 | 1.10*** | 0.17 |
| × Age | −12.80*** | 1.23 | −0.15* | 0.06 |
| Book frequency | −0.10 | 0.06 | 0.02** | 0.003 |
| × Age | 0.06* | 0.02 | 0.000009 | 0.001 |
| Alphabetic order | 5.90*** | 0.95 | 1.04*** | 0.05 |
| × Age | 3.22*** | 0.35 | −0.15*** | 0.02 |
| Repeat | 3.04*** | 8.94 | 0.06*** | 0.05 |
| × Age | 0.37 | 0.33 | −0.12*** | 0.02 |
| Age | 0.31** | 0.07 | −0.007 | 0.004 |

*N* number of utterances. Overall model for children, $F$ (17, 2,686) = 342.8, $p < 0.001$, $R^2 = 0.68$. Overall model for parents, $F$ (17, 2,686) = 153.5, $p < 0.001$, $R^2 = 0.49$

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

children's digram use via an interaction with child age. Separate regression analyses for children's digram utterances during each year-long age group showed that the coefficients for frequency increased from $r = -0.002$ (not significant) from 1 to 2 to $r = 0.25$ ($p < 0.001$) from 4 to 5.

Children's digram utterances were also influenced by repeated letter names; such utterances were significantly more common than expected on the basis of other factors. Digrams such as *B–B* and *J–J* constituted 12 % (483 of 4,150) of children's digram utterances, and children's tendency to repeat letters did not change across the age range studied.

Children's digram utterances were also significantly predicted by child age: There were more digram utterances for children at the older ages than at the younger ages. As with the monogram results in Analysis 1, this result is difficult to interpret because the number of transcripts that were available for analysis was not the same at each age.

### Discussion

In Analysis 1, we found that parents and young children do not treat all letter names equally. Here we see that that the same is true for digrams. Some combinations of letters are uttered more often than others, and the differences reflect properties of the digrams themselves, above and beyond properties of the individual letters within them.

Specifically, we found that parents often uttered pairs of letters in alphabetic order, particularly *A–B* and *B–C*. These digrams were especially common when parents were speaking to the youngest children. Parents also tended to utter digrams repeating a single letter name, although they did this less often with older preschoolers than with younger ones. Parent digram utterances were also influenced by digram patterns in children's books. This became a stronger predictor of parents' utterances at the older child ages, as the influence of alphabetic and repeated digrams waned. The decline in parent's use of alphabetic and repeated letter sequences, coupled with the increase in book digrams, highlights a change in the home literacy environment across the preschool years. The way that parents talk to older preschoolers—as has been the focus of most early literacy research—is different than how they speak with younger ones.

Children, too, often talk about letter names in sequences from the earliest ages. While alphabetic order digrams were less common for parents of older preschoolers than parents of younger preschoolers, children's utterances showed the opposite trend. Children were more likely to utter sequences such as *J–K* as they grew older, which may indicate their increasing interest in and knowledge of the alphabetic sequence. At older ages, children's letter utterances begin to reflect the frequency of digrams in the written materials that are designed for them. However, children also continued to produce two-letter combinations that repeated a single letter name.

Parents' use of letters in combination with one another may provide information that letters form a class. While considering letters as a set of symbols is intuitive to literate adults, this is something children must learn. Parents could provide this information explicitly—identifying letters as letters—by saying things such as *the letter C* and *the letter J*. But this rarely happened. Parents only included the category label *letter* in the noun phrase 2 % (170 of 7,046) of the time. Given the rarity of explicit reference to letter names as letters, digrams and other sequences may be a useful source of information that letters form a class of symbols.

## Analysis 3: Sequences

In Analysis 2, the study of letter sequences was limited to two-letter combinations. In Analysis 3, we include all talk about letter sequences, regardless of length. We ask how often letters occur in sequences as compared to individually, what types of sequences—including sequences in alphabetic order and sequences that contained both letters and numbers—occurred. and whether the use of different types of sequences changed between child ages 1 and 5.

## Method

### *Utterances for analysis*

We used the same set of letter name utterances identified in Analysis 1.

### *Coding and analysis procedure*

Each instance of a letter name was coded for whether it was part of a sequence. A sequence was defined as any instance of two or more symbols (letters or numbers) in a row, separated at most by *and*. For example, the letter names in the utterances *2L*, *XX42J*, and *DOG* would all be coded as being in a sequence, whereas the letters in the utterances *I put A on top of B* and *I see two Ds* would not be coded as part of a sequence. For all letters in sequence, we asked which were in alphabetic order. Sequences met this criterion even if they began in the middle of the alphabet (e.g., *lmnop*) or might have been part of spelling a word (e.g., *n–o*). We also kept track of which sequences contained both letters and numbers.

Because we collapse across utterances of particular letter names in this and the subsequent analyses, we use a different statistical procedure—multilevel modeling. In this approach, we use the utterance as the unit of analysis. We ask whether the occurrence of each feature of interest (e.g., whether the sequence was in alphabetic order) was predicted by the age of the child (in months) and the identity of the speaker (child or parent) as well as the interaction of these two factors. In each analysis, we treat the corpus from which the transcript came and the identity of the child as random factors. This allows us to control for differences in the patterns of utterances across individual children and corpora, ruling out the possibility that the results reflect idiosyncratic characteristics of particular children or corpora rather than general trends. In this and other respects, multilevel models provide more flexibility and power than traditional statistical analyses (Jaeger, 2008). Analyses were carried out using the lme4 software package (Bates, 2009), and child age was centered in each analysis.

## Results

Letter names often occurred in sequences. Indeed, as Table 3 shows, over half (55 %, 8,595 of 15,619) of the letter names that were produced were in a sequence. The average sequence contained 4.01 letters. Children's sequences were longer than parents', and this was due to an increase in the average length of sequences that children uttered across the preschool years. From age 1 to 2, children's sequences were an average of 3.01 letters long, and their sequences increased to 4.28 letters in length from 4 to 5. This interpretation is supported by main effects of speaker ($p = 0.047$) and child age ($p < 0.001$) in a multilevel model predicting sequence length, as well as an interaction between child age and speaker ($p = 0.009$).

As Table 3 shows, letter names were more likely to be uttered as part of a sequence at the older ages, and this was due to children's increased tendency to utter letter names in sequences as they grew older. Supporting these interpretations, a

**Table 3** Proportion of letter names in sequences versus individually and proportion of sequences in alphabetic order, by speaker and child age

| Child age | Letter names in sequence | | Sequences in alphabetic order | |
|---|---|---|---|---|
| | Child | Parent | Child | Parent |
| 1;0–2;0 | 0.54 | 0.48 | 0.57 | 0.54 |
| 2;0–3;0 | 0.55 | 0.37 | 0.62 | 0.44 |
| 3;0–4;0 | 0.70 | 0.48 | 0.62 | 0.26 |
| 4;0–5;0 | 0.69 | 0.62 | 0.33 | 0.33 |
| Total | 0.63 | 0.45 | 0.52 | 0.43 |

multilevel model of sequence use showed a main effect of age ($p < 0.001$) and an interaction between age and speaker ($p < 0.001$). Our interpretation of the interaction between child age and speaker is supported by separate models of parent and child utterances. The child-only model showed a main effect of age ($p < 0.001$), but no significant effects were seen in the parent-only model.

Given that over half of all letters occurred in a sequence, it is of interest to examine the types of sequences produced. Sequences that included letters in alphabetic order were quite common. Parents' use of such sequences declined as children grew older. Children used a higher proportion of alphabetic sequences than their parents did and, although children's relative use of alphabetic sequences also declined across the age range studied, the decline was weaker than it was for parents. Our multilevel model for alphabetic sequences supported these trends, showing a main effect of speaker ($p < 0.001$) that was modified by an interaction between age and speaker $p < 0.001$).

Only 1 % (106 of 8,596) of letters uttered in sequences occurred in a sequence that included both letters and numbers, and no effects of age or speaker were detected in a multilevel model. That is, neither parents nor children showed much tendency to mix letters with numbers in sequences.

## Discussion

Parents frequently talk to their young children about letters as items that occur together in sequences, often using sequences longer than the two-letter digrams studied in Analysis 2. For the purposes of reading and writing, the most important sequences are those that make up words. However, the results of Analysis 3 show that parents often talk about the alphabetic sequence, especially when children are younger. The decline in parents' use of alphabetic sequences for older children is consistent with the results of Analysis 1 and 2, and it further emphasizes the changes that occur in the home literacy environment across the preschool years.

Previous studies have shown that 4- and 5-year-olds sometimes confuse letters and numbers when they are presented visually, sometimes treating strings of numbers as writing and judging sequences that include both letters and numbers to be words (Bastien-Toniazzo, 1992; Ganapole, 1987). Our results suggest that this confusion reflects the similarity between the shapes of letters and numbers. Parents

mostly excluded numbers from sequences of letter names. This pattern in parent speech may provide clues as to the difference between letters and numbers.

Children also talked about letter sequences during the preschool years, and in fact were more inclined to talk about letters in relation to one another than individually. That letter sequences are common for even 1- and 2-year-olds—and that they rarely included numbers—suggests that children have an implicit understanding of letters as a class of objects. Even young children understand that letters are things that belong together, which may encourage them to notice differences between them and learn about the individual letters. As children grew older, they began to utter more sequences and longer sequences.

Many of the letter sequences that children used were in alphabetic order, and the relative proportion of these sequences declined as children grew older. The decline in alphabetic order sequences is interesting, in part, because of what it implies about the use of sequences that are not in alphabetic order. Indeed we found in Analyses 1 and 2 that, across the preschool years, children's letter utterances increasingly reflect the letter patterns that are found in words. In Analysis 4, we look directly at how parents and children associate letters with words.

## Analysis 4: Associations

Parents often produce letter names in sequences, as we have seen, providing information that letters form a class. But focusing on the first three letters of the alphabet and on sequences of letters in alphabetic order, as parents do particularly with younger children, does not provide information about the most important function of letters—to form words. If parents associate letters with words, saying things such as *M for MILK*, this could provide children with important information about the relationship between letters and words. At a general level, such statements show that letters are associated with words. At a specific level, they provide information about the letters in a particular word. In Analysis 4, we examined statements of this kind in which letters are associated with words. Because previous studies have shown that parents and children tend to focus on associations that are particularly important for the child (Levin & Aram, 2004), such as those involving the child's name, we distinguished proper names from other words and asked whether the relative prominence of associations with proper names, particularly the child's name, changed across the preschool years. We also explored other features of letter–word associations, including how often the associations were correct and how parent feedback may facilitate children's own attempts at associations (Aram & Levin, 2001; Taylor, Anthony, Aghara, Smith, & Landry, 2008).

### Method

#### *Utterances for analysis*

We used the same letter name utterances identified in the previous analyses. Because associations can be made indirectly—as in *DOG has three letters*—we also

included a search of the same corpora for the word *letter*, excluding uses of *letter* to refer to mailed correspondence. Each instance of a letter name or the word *letter* was treated as an individual utterance. This yielded a total 17,769 utterances (1,250 for *letter* and 15,619 for individual letter names).

### *Coding and analysis procedure*

First, we coded each utterance for whether it was associated with a word. To qualify as associated, both the letter (or word *letter*) and the word to which it referred needed to be explicitly stated in the same line of the transcript, as in *N–O spells no*. We also asked whether each association was correct (e.g., *D is for dog* is correct, but *B is for dog* is not). We asked whether each association involved a proper name and, when it did, whether it was the child's name or someone else's. Because CHILDES does not provide complete identifying information about the transcripts' participants, we could only identify utterances as name-related when the reference to the name was made explicitly, as in *your name starts with an S*.

Additionally, all children's utterances that qualified as associated were coded for whether and how the child received feedback on the association. We coded each of the children's associations in terms of whether or not the child received feedback from the parent. Then, for each of the child's utterances that received feedback, we asked whether that feedback was general or specific. Feedback was coded as general when it told the child that he or she had gotten the association correct or incorrect (e.g., *Great job!* and *No, that's not it*). Feedback was coded as specific when it included details about what made the utterance correct or incorrect, as in *Yes, boy starts with B* or *Cat starts with a C, not a K*.

An experienced researcher served as the primary coder for this and the following analysis. Because some of the codings in this analysis involved a degree of judgment, a second coder analyzed approximately 5 % of the utterances, randomly selected from the full set. Inter-rater agreement was never below 88 % for any feature, and the two coders agreed 94 % of the time overall. To ensure that this agreement was higher than expected by chance, we calculated the Cohen's kappa coefficient for each coding. All kappa scores were above 0.65. Scores above 0.60 have been characterized as good (Altman, 1991) and substantial (Landis & Koch, 1977).

Parent and child associations were analyzed using multilevel models. As in Analysis 3, corpus and child were included as random factors. For the questions about associations, we included the fixed effects of child age and speaker. For the questions regarding feedback, we included the effect of correctness (correct or incorrect) but not the effect of speaker, as only children's utterances were included.

## Results

Parents and children often associated letters with words throughout the age range studied. Table 4 provides the details of these associations. Overall, parents' letter utterances were more likely to be associated with words than children's: 38 % (3,032 of 7,966) for parents and 20 % (1,811 of 8,903) for children. Both parents

and children increased in the frequency with which they made these associations as children grew older, but the link between age and association was stronger for children. These results were supported by a multilevel model that showed main effects of age ($p < 0.001$) and speaker ($p < 0.001$), as well as an interaction between age and speaker ($p < 0.001$).

When letters were associated with words, these associations were usually correct. Not surprisingly, parents were almost always correct, 99 %. Children had more incorrect associations than parents did, but they were correct 82 % of the time, a surprisingly high rate. Across parents and children, associations were more likely to be correct as the child grew older. The multilevel model for correctness showed a main effect of speaker ($p < 0.001$) and a main effect of child age ($p = 0.005$), but no significant interaction between speaker and child age. Children's high rate of correct associations at the younger ages appears to reflect, in part, the fact that their associations were often cued by parents. Prior to age 3;0, 25 % of children's associated letter utterances occurred within 5 transcript lines of a parent's use of that letter. The number of cued utterances dropped to 13 % after age 3;0.

Given that letters were often associated with words, we examined the nature of these words. Whereas alphabet books typically involve associations of letters with words such as *alligator*, *boy*, and *cat*, many of the associations that children and their parents made were with proper names. This was particularly common at the younger ages, as confirmed by a main effect of age in a multilevel model ($p < 0.001$). When a letter was associated with a proper name, this was often the child's name. Indeed, 50 % (1,187 of 2,363) of all letters that were associated with names were associated with the child's name, pooling across ages. As Table 4 shows, the percentage of name associations that involved the child's name was especially high at the younger ages. The model confirmed this trend with a main effect of age ($p < 0.001$).

Children received feedback on their associations 48 % (868 of 1,811) of the time. Although the proportion of utterances receiving feedback appeared to decline as children grew older, as Table 5 shows, the effect of age was not statistically significant ($p = 0.077$). Also, the presence of feedback did not depend significantly on whether the association was correct. However, there were statistically significant changes in the type of feedback children received as they grew older. Children were most likely to receive specific feedback about their attempted associations when

**Table 4** Proportion of letters associated with types of words, by speaker and child age

| Child age | Letters associated | | Correct associations | | Proper name associations | | Child name associations | |
|---|---|---|---|---|---|---|---|---|
| | Child | Parent | Child | Parent | Child | Parent | Child | Parent |
| 1;0–2;0 | 0.08 | 0.33 | 0.83 | 0.99 | 0.39 | 0.37 | 0.50 | 0.45 |
| 2;0–3;0 | 0.18 | 0.39 | 0.83 | 0.99 | 0.56 | 0.48 | 0.62 | 0.59 |
| 3;0–4;0 | 0.14 | 0.47 | 0.67 | 0.99 | 0.63 | 0.56 | 0.65 | 0.46 |
| 4;0–5;0 | 0.35 | 0.40 | 0.88 | 0.99 | 0.59 | 0.30 | 0.42 | 0.11 |
| Total | 0.20 | 0.38 | 0.82 | 0.99 | 0.58 | 0.43 | 0.53 | 0.48 |

**Table 5** Proportion of children's letter–word associations that receive different types of feedback, by correctness and child age

| Child age | Feedback, overall | | Proportion of feedback that is specific | |
|---|---|---|---|---|
| | Correct | Incorrect | Correct | Incorrect |
| 1;0–2;0 | 0.74 | 0.76 | 0.83 | 0.69 |
| 2;0–3;0 | 0.58 | 0.55 | 0.53 | 0.53 |
| 3;0–4;0 | 0.47 | 0.44 | 0.24 | 0.50 |
| 4;0–5;0 | 0.38 | 0.53 | 0.25 | 0.53 |
| Total | 0.47 | 0.52 | 0.40 | 0.53 |

they were younger and when their associations were correct. This was supported by a multilevel model that showed an interaction between age and correctness ($p < 0.030$), modified by a main effect of age ($p < 0.001$). This finding helps to further explain the high proportion of correct utterances that children have at the younger ages, as it appears that these utterances are often both cued and reinforced through parent speech.

### Discussion

Parents often talk to their young children about letters as items that are associated with words, providing general information about the link between letters and words. The associations that parents produce are almost always correct, providing additional, specific information about which letters are linked with which words. Especially with younger children, parents often make a connection between letters and proper names. We found that parents were particularly focused on associating letters with the child's name with children younger than 4. This result coheres with previous findings suggesting that much of preschoolers' knowledge about print comes from their own first names (Levin & Aram, 2004; Both-de Vries & Bus, 2010). Children are more likely to associate letters with words as they get older, but even at the youngest ages their associations are often correct. When we look at these utterances in detail, we see that they are highly guided by parents: Many of the associations offered at the youngest ages are cued by parent associations and are followed by specific feedback from the parent, as in *that's right! A for Apple*. Parental influence is also seen in the amount and quality of feedback that children receive. Parents respond to children's associations directly almost half of the time, and at the youngest ages much of this feedback is specific, either repeating the child's association or correcting its error (Taylor et al., 2008).

## Analysis 5: Questions

We have seen that parent speech provides a good deal of basic information about letters: that letters form a class, that they often appear in alphabetic sequence, that the first letters of the alphabet are especially important, and that letters are

associated with words. Much of this information is provided implicitly. For example, parents imply that letters are a class of symbols by uttering them in sequences, but they rarely do so by explicitly stating things like *J is a letter* or *this is the letter B*. In our final analysis, we turn to investigate an explicit feature of parents' letter talk: What questions do parents ask their young children about letters? Additionally, we examine children's questions about letters for what they reveal about their letter knowledge. Previous studies (e.g., Yaden, Smolkin, & Conlon, 1989) have reported that older preschoolers sometimes ask questions about letters, but the studies do not tell us which features of letters these children ask about, nor do they tell us about the questions asked by younger preschoolers. We do not know, for example, whether children ask more about letter shapes or sounds, or whether their questions reflect curiosity about the associations between letters and words. For Analysis 5, we tracked when parents and children asked questions about letters, such as *where did the E go?, do you like ABC soup?*, and *what is the first letter in your name?* We asked which skills these questions focused on and whether the type of questions asked changed as children grew older.

## Method

### *Utterances for analysis*

Using the same 17,769 utterances of letter names and the word *letter* as in Analysis 4, we examined all parent and child statements that contained these words. Statements were defined as a line in the recorded transcript, and so often included several letter utterances. We analyzed 9,788 such statements in all, 1,010 including *letter* and 8,778 including individual letter names.

### *Coding and analysis procedure*

After identifying the utterances that were defined as questions in the transcripts, we distinguished between questions that asked about letter-related skills and those that did not. Non-skill questions included those that mentioned letters while asking about some other topic (e.g., *Do you like your ABC soup?*) and instances where parents asked children to repeat themselves (e.g., *A?*). We defined skill questions as those that required the respondent to know an additional feature about the letter, aside from its name, in order to answer the question. For example, in order to answer the question *which one is the K?* the respondent must be able to match the name *K* with *K*'s shape. As another example, the respondent must know about the sound that is associated with *M* in order to answer the question *what sound does M make?* Skill questions could involve more than one skill, as when a parent asked *where is the letter that your name starts with?*, which asks the respondent to identify the letter's shape and its association with a word.

As in Analyses 3 and 4, corpus and child were incorporated into our multilevel models as random factors and the age of the child and the speaker were used as fixed effects.

## Results

Many utterances about letters were questions. Indeed, questions constituted almost one quarter of parents' utterances about letters (1,154 of 5,161). Children were less likely to ask questions about letters than their parents were. Still, about one of every ten child utterances involving a letter was a question (453 of 4,627). Both parents and children were more likely to ask questions about letters as children grew older, and this trend was particularly strong for children. Questions represented only 4 % (28 of 723) of children's statements about letters from age 1 to 2, compared with 17 % (204 of 1,166) from 4 to 5. Parent use of questions increased from 19 % (290 of 1,530) at child age 1 to 2 to 22 % (124 of 553) from child age 4 to 5. Supporting this interpretation, a multilevel model showed a main effect of speaker ($p < 0.001$), a main effect of child age $p < 0.001$), and an interaction between age and speaker ($p < 0.001$).

Of all questions, 76 % (1,221 of 1,607) were classified as skill questions. That is, they required the respondent to know some feature of the letter other than its name in order to provide an answer. A multilevel analysis used to predict whether a question was a skill question showed no effects of child age or speaker. That is, the proportion of questions that were skill questions did not differ for parents and for children and did not change across the age range studied.

Information about the types of skill questions asked is displayed in Table 6. The majority of skill questions asked the respondent to identify letters by their shape, as in *which one is the B?* Both parents and children asked shape questions, but the proportion of skill questions that asked about shape was larger for children than for parents. Also, there was a small but significant effect such that shape questions became a smaller proportion of the skill questions as children grew older. These trends were reflected in a multilevel analysis of shape-related skill questions by main effects of both speaker ($p = 0.003$) and child age ($p = 0.004$).

Questions about associations between letters and words, such as *what word does O–F–F spell?*, were also fairly common. Parents asked a higher proportion of association questions than children did, and the proportion of association questions increased across the 1;0–5;0 age range. These trends were supported by main effects of both speaker ($p < 0.001$) and child age ($p = 0.039$) in a multilevel model.

**Table 6** Proportion of questions that ask about different types of letter skills, by speaker and child age

| Child age | Letter shape | | Association | | Letter sound | | Alphabetic order | |
|---|---|---|---|---|---|---|---|---|
| | Child | Parent | Child | Parent | Child | Parent | Child | Parent |
| 1;0–2;0 | 0.88 | 0.73 | 0.12 | 0.16 | 0.00 | 0.16 | 0.12 | 0.09 |
| 2;0–3;0 | 0.88 | 0.73 | 0.12 | 0.24 | 0.02 | 0.03 | 0.01 | 0.08 |
| 3;0–4;0 | 0.87 | 0.74 | 0.11 | 0.33 | 0.03 | 0.02 | 0.00 | 0.01 |
| 4;0–5;0 | 0.82 | 0.73 | 0.20 | 0.25 | 0.01 | 0.04 | 0.01 | 0.05 |
| Total | 0.86 | 0.73 | 0.15 | 0.23 | 0.02 | 0.03 | 0.01 | 0.07 |

Questions could ask about multiple skills, so the proportions do not sum to 1.00

Parents and children rarely asked questions about a letter's sound, and no differences across age or speaker were detected in a multilevel model. Questions that asked the respondent about a letter's alphabetic order were also rare; parents and children only occasionally asked questions like *can you sing your ABCs?* or *E–F–G…what comes next?* Although most of these questions occurred prior to age 3;0, as Table 6 shows, there were too few alphabetic order questions for the multilevel model to detect any differences as a function of age or speaker.

### Discussion

Parents often ask their children questions about letters. Of course, they usually do so not to learn the answers themselves but rather to encourage children to learn the answers. Across the four-year age range that we studied, many of parents' questions that mentioned letter names required the child to be able to identify the letter by its shape in order to answer. This could convey that shape is an important feature for identifying letters, more important for example than a letter's color. As children grew older, parents were more likely to ask children about the associations between letters and words, encouraging children to learn that words are made up of letters. However, parents rarely asked even older preschoolers about the sounds of letters, leaving the nature of the connection between letters and words unclear. The rarity of such questions may reflect that parents do not think that learning about letter sounds is important during the preschool years, or that they assume that a letter's sound is easily derived from its name.

Children also ask questions about letters. Our results go beyond previous reports that children sometimes ask questions about print (Yaden et al., 1989) by providing detailed information on the content of these questions and how they change across the preschool years. Surprisingly, even the youngest children's questions focus on literacy-relevant features of letters. Children do not ask many questions like *can I play with my letters now?* Instead, most of children's questions ask the respondent to identify the letter shape associated with a name, as when children ask *where is the B?* and *is this a J*? Across the age range studied, children asked a higher proportion of such shape-related questions than their parents, but fewer as they grew older. These findings suggest that younger children, especially, are trying to learn about the connections between letter names and their figures. Children also ask questions about the associations between letters and words. They do so more frequently as they grow older, suggesting an increased knowledge that words are made up of letters and an increased interest in which letters occur in which words.

## General discussion

Literacy-related activities in the home environment of young children are important for their later literacy achievement (Christian et al., 1998; Evans et al., 2000; Hood et al., 2008; Sénéchal et al., 1998). As Sénéchal's Home Literacy Model demonstrates, these activities can focus either on the meaning conveyed by printed language or on letters and words themselves (Sénéchal, 2006, 2012). Learning about

letters is an important component of the latter sort of literacy activity, and children's early letter knowledge is related to their later success in learning to read and write (e.g., Adams, 1990; Foulin, 2005; Levin et al., 2002; McBride-Chang, 1999). Although connections between early activities and later achievement have been documented, exactly what occurs during these activities is less clear. Previous studies have focused on the home literacy environment of older preschoolers and have assessed this environment using parent questionnaires. These research strategies are limited in the level of detail that they can provide about children's home literacy experiences throughout the preschool years. The present study was designed to correct for these limitations by providing a direct and detailed account of one potential source of information about letters in the everyday environment of young US children: parent speech.

Across five analyses, we found that US parents talk to their young children in ways that emphasize important features of letters. Parents often combine letters into sequences and associate letters with words. Parents also ask their young children questions that encourage them to identify letters visually, by their shape, and to learn the associations between letters and words. This method of direct questioning not only promotes the child's interaction with letters but also encourages children to learn about some of letters' features and functions. Parents' speech draws children's attention toward basic facts about letters that children would not otherwise know. Our results complement previous studies that stress the importance of parent references to print (Justice & Ezell, 2002; Justice, Pullen, & Pence, 2008) by detailing the specific sorts of information about letters that parent utterances convey.

Our study of the patterns in parent letter talk also shows that the information these interactions provide may be limited in some ways. When children are younger, parents often focus on uttering letters in sequence, particularly the alphabetic sequence and the first few letters of the alphabet, and associating letters with the child's name. Children may be especially interested in these activities, but they may also think of their names as special sequences of letters, failing to generalize from the letters in their names to the letters in similar sounding words (Drouin & Harmon, 2009). And, while use of the alphabetic sequence highlights letters as a distinct class of symbols, the order of the Latin alphabet is not informative for learning about why letters in words come in the sequences that they do. Further, our analyses reveal that parents do not emphasize certain features of letters, particularly letter sounds. Although one case study of the home literacy environment describes a parent telling her young child such things *The letter M makes a MMM sound* (Neumann, Hood, & Neumann, 2008), this does not appear to be reflective of general patterns in parent speech about letters during the time period documented by the current study. It is possible that such remarks have become more common in recent years or that they are more common among certain demographic or cultural groups, possibilities that should be explored in future studies.

We also found that the way in which parents talk to their children about letters changes across the preschool years. Whereas previous studies have focused on older preschoolers, highlighting the importance of parents explicitly teaching their children about print (Sénéchal et al., 1998; McBride-Chang et al., 2010), our results suggest that the way that parents talk to their children about letters is different for

younger and older preschoolers. As parents talk more about non-alphabetic sequences and transition toward letter–word associations beyond the child's name in the later preschool years, their utterances become increasingly informative about the general and specific functions of letters. Our results offer a picture of the home literacy environment as dynamic—the letters and sequences used in parent–child conversations are different with younger preschoolers than with older ones.

Studying conversations allowed us to assess children's letter knowledge as well. Previous studies of children's letter knowledge have tended to focus on older preschoolers (e.g., Evans et al., 2006; Levin et al., 2002). Younger ones may not comply well with formal assessments of letter knowledge, and indeed would likely do poorly on such assessments. By studying parent–child conversations, we found a way around this difficulty and gained new insights into what younger preschoolers know about letters. Our results show that young children in the US sometimes talk about letters, showing a rudimentary understanding of some of their characteristics. For example, children sometimes talked about letters prior to their second birthday, and even used letter names in sequences at this age, almost a year earlier than the children in previous studies (Lonigan et al., 2000; Worden & Boettcher, 1990). Including younger preschoolers in our study allowed us to identify not only topics that become more common as children get older, such as letter–word associations, but also those that become less so, including the emphasis on the child's name and the alphabet sequence.

A detailed understanding of the home literacy environment is important for studies intending to link features of that environment to children's later literacy outcomes and for studies aimed at improving that environment (e.g., Bus, van IJzendoorn, & Pellegrini, 1995; Hood et al., 2008; Martini & Sénéchal, 2012). Our results suggest that assessments of the home literacy environment could be improved by including multiple assessments to examine changes across the preschool years (Sénéchal & LeFevre, 2002). Self-report measures, if used, should be more specific. When possible, they should be supplemented with direct observations of parent–child interactions across a range of contexts. With better information about a child's home literacy environment, researchers will also be in a better position to understand how aspects of children's letter knowledge (e.g. Evans et al., 2006; Levin et al., 2002) and attempts at spelling (e.g., Pollo, Kessler, & Treiman, 2009) reflect the letters and combinations of letters to which children are exposed. Given that parent speech is an important part of the home literacy environment, it is important to learn more about its characteristics and how they vary across ages, families, and cultures.

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