# Young Children's Knowledge of the Symbolic Nature of Writing

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Abstract

Two experiments with 114 3- to 5-year-old children examined whether children understand that a printed word represents a specific spoken word and that it differs in this way from a drawing. When an experimenter read a word to children and then a puppet used a different but related label for it, such as “dog” for the word ‹puppy›, children often stated the puppet’s label was incorrect. In an analogous task with drawings, children were more likely to state that the puppet was correct in using an alternative label. The results suggest that even young children who cannot yet read have some understanding that a written word stands for a specific linguistic unit in a way that a drawing does not.

Keywords: emergent literacy; print awareness; symbolic development; reading; writing; literacy development

# Young Children's Knowledge of the Symbolic Nature of Writing

Symbols play an important role in human thinking and learning. The emergence of spoken language during the second year of life changes children's interactions with others and increases their opportunities for learning. By three years of age children begin to understand the informational potential of symbolic artifacts, for example using a scale model of a room as a representation of the room itself (DeLoache, 2000). As children get older, they must learn to use another symbol system—writing. This poses a challenge for children (Uttal, Liu, & DeLoache, 2006), in part because writing differs from some other symbol systems that are familiar to them. Writing is glottographic: It is a set of graphic signs that stand for specific units of a language (Sampson, 1985). The written word ‹dog› represents its object not by virtue of any visual similarity to a dog but by virtue of the linguistic units for which the letters stand. A realistic drawing of a dog, in contrast, represents a dog by virtue of its appearance. It could be equally appropriate to label the drawing as "dog," "puppy," "Fido," or "cane," depending on what language one is speaking and what one wants to emphasize. Many studies have investigated children's attempts to write words after they have mastered the basic concept that writing represents units of language (Treiman & Kessler, 2014), but relatively few have investigated the emergence of the concept that writing represents specific units of a language. The experiments reported here were designed to do so.

Several influential theories of literacy development (Ehri, 1998; Frith, 1985) describe an initial period during which children, lacking knowledge of how to sound out words, do not treat writing as glottographic. Although these children may be familiar with a few printed words, they connect each one to a general meaning rather than a specific linguistic form. For example, a child

may identify ‹Crest› on a toothpaste box as “brush teeth” or as “toothpaste,” using different words on different occasions (Harste, Burke, & Woodward, 1982). Children interviewed for other studies appeared to believe that written words symbolize meaning in much the same way as pictures do (Ferreiro & Teberosky, 1982; Ferreiro, 1986). The children would posit that articles and verbs, which are difficult to picture, could not be written, and they would claim that a phrase such as “there aren’t any birds” cannot be written because no birds are present.

The studies mentioned above are largely observational, and few experiments have asked whether young children connect printed words with general meanings or specific units of language. Preliminary evidence comes from a study in which Homer and Olson (1999) asked children with a mean age of 4;1 (years; months) to write such phrases as “one dog,” “two dogs,” and “no dogs.” The researchers determined whether children used one graphic mark for each word in the linguistic expression or one graphic mark for each object described. Roughly 30% of the children used one mark for each object, suggesting a lack of understanding that writing is glottographic. Because children of this age may write using scribbles that are not composed of separate units, however, it can be difficult to base conclusions on the number of marks in children’s productions.

Additional experimental evidence that young children fail to understand the symbolic nature of writing comes from the moving word task (Bialystok & Martin, 2003; Bialystok, 1991). In this task, a printed word such as ‹girl› is placed underneath a picture of a girl. The word is then moved as if by accident to underneath another picture. If the word is moved to under a picture of a cup, for example, 3- to 5-year-old children sometimes say that the word is now “cup.” Such responses are less likely when a drawing of a girl that was said to be produced by a

young child and that does not look like a girl is moved to under a picture of a cup (Apperly, Williams, & Williams, 2004). This pattern of results suggests an early difficulty in understanding writing as a symbolic system in which a notation such as ‹girl› always carries the same meaning. However, children may be accustomed to using a picture that is near a written word to suggest the word's referent, as picture books are often laid out in this way. Children might show a better understanding of the symbolic function of writing when written words are not accompanied by pictures, as they are in the moving word task, but rather presented in isolation.

Reasons to think that children may have a better understanding of the symbolic function of writing than suggested by these previous experiments come from studies of parents' and children's everyday discussions of written words and letters as compared to pictures (Robins & Treiman, 2009; Robins, Treiman, Otake, & Rosales, 2012). Parents sometimes talk about written words "saying" things even when children are less three years of age, highlighting in this and other ways the similarities between writing and speaking and the differences between writing and drawing. Before four years of age, children also make these distinctions in their own speech, albeit imperfectly. Given children's ability to learn from even subtle patterns in language use, we hypothesized that 4-year-olds, the age group of interest in the present study, would show some understanding of the difference in symbolic function between writing and pictures when presented with a simple task that did not require them to produce writing and in which each child viewed either writings or drawings, not both. Children in the writing condition of our study saw a printed word not accompanied by a picture and were told what the word said. Children in the drawing condition saw a drawing presented alone and were told what it was. In both conditions, a puppet that had not heard the original label then labeled the word or drawing. On the trials of

primary interest, the related trials, the puppet used a new label that was appropriate for the object represented by the word or drawing. For example, the puppet would say “dog” for a word or a drawing that the experimenter had labeled as “puppy.” Children were asked whether the puppet was correct in his labeling. We measured how often children accepted the puppet’s label in the writing condition compared to the drawing condition. If children understand that writing is glottographic, then they should be less likely to say that the puppet was correct in the writing condition than in the drawing condition when he used a related label such as “dog.” Such a result would suggest some understanding that a written word corresponds to a specific linguistic form and that it would be inappropriate to use a different linguistic form, even one with a similar meaning. Our task also included trials on which the puppet provided a label such as “puppy” for a word or drawing that had been previously labeled as “puppy” (same trials) and trials on which the puppet provided a label such as “tree” for a word or drawing that had been previously labeled as “puppy” (unrelated trials). We expected children to perform well on these control trials.

## Experiment 1

### Method

**Participants.** Fifty-two children (28 girls) ranging from in age from 3;5 to 5;0 (*M* = 4;2, *SD* = 0;6) contributed data, half in the drawing condition and half in the writing condition. The children were native English speakers from a Midwestern urban area. Most were from White, middle class families. Forty of the participants were tested in a laboratory and the others at their preschools. The preschools that the children attended did not offer systematic reading instruction. Within each setting, approximately half the children were randomly assigned to each condition. One additional child was not included in the analysis due to failure to complete all trials, and

another child was disqualified for failing a check question, to be explained below. A third child was disqualified because he responded “yes” on all test trials, showing a bias to say “yes” that appeared to be unrelated to the experiment itself.

**Materials.** Twelve pairs of words were selected that could potentially be used to refer to the same object and that young children would be likely to know. Pairs were selected based on the results of a written survey conducted with parents whose children were in the same age range as the children in the experiment but who did not participate in it. For each word pair, we selected a third word that was not close in meaning to either word, yielding 12 triplets. For example, one triplet included the related words “baby” and “doll” and the unrelated word “train.” A list of the triplets appears in the Appendix.

The words were written by the same person in dark, bold, lowercase print. A drawing of an object to which both of the related words in each set could refer was produced by the same artist in colored pencil. Eighteen different random orders were created. Across the orders, each related word was the label that the experimenter used and the label that the puppet used an equal number of times. For example, the experimenter used the label “baby” in nine of the orders and the label “doll” in the other nine. Each order included four related trials, when the experimenter labeled a word or drawing as “doll” and the puppet labeled it as “baby”; four unrelated trials, when the experimenter used “doll” and the puppet used “train”; and four same trials, when the experimenter and the puppet both used “doll.” Each triplet (e.g., “doll,” “baby,” “train”) served in related, unrelated, and same trials in one third of the random orders. Each child was assigned to one of the random orders, with the same orders used for the drawing and writing conditions.

Before the study, parents were given a list of the words to be used and were asked if their

child could read any of them. The mean percentage of words that children were reported to be able to read was only 2%. In these rare cases, the word that the child was reported to be able to read was replaced with another word when the experiment was conducted with that child. The replacement items for the related trials involved “street”/“road” and “bear”/“teddy.” The replacement items for the unrelated trials involved “dirt”/“cow” and “bug”/“pizza,” and the replacement items for the same trials used “street.”

**Procedure.** The child sat at a table opposite the experimenter. On the table was a cardboard house with a puppet of Curious George, a monkey character from a popular children’s book, inside it. The experimenter explained that she and the child would look at drawings or words and would see what George said about them. The experimenter said that George could not hear anything outside his house when he was inside it. George emerged from his house for two warm-up trials. Before presenting these trials, the experimenter mentioned that George sometimes made mistakes. To demonstrate this, she showed George a toothbrush on the first warm-up trial and the puppet called it a crayon. On the second warm-up trial, the experimenter showed George a cup and he labeled it correctly. The experimenter then asked the child whether George could hear people talking when he was inside his house. If the child said that the puppet could not hear, the test trials began. If the child said that the puppet could hear, the experimenter explained that the puppet could not hear from inside his house and asked the question again. Three children failed to answer this check question correctly the first time, with two of them succeeding the second time. One child who did not answer this question correctly either time was disqualified from the study.

***Word condition.*** After the warm-up trials and the question about the puppet’s ability to

hear when inside his house, the experimenter showed the child a binder with one printed word on each page. She explained that her friend, who was very good at writing, had written the words. On each test trial, the experimenter showed the child a page from the binder and said what the friend had written on it. For example, the experimenter showed the child a page with the written word ‹puppy›. The experimenter labeled the word three times as follows: “It says puppy. See, she wrote puppy. Do you see the word puppy?” George was inside his house when the experimenter did this and so, according to the story, could not hear the label. The experimenter then had the child bring the puppet out of the house to look at the word. George provided a label, stating for example, “Oh, puppy. Oh look, puppy.” On same trials, the puppet’s label was the same word provided by the experimenter, in this example “puppy.” On related trials the puppet’s label was a closely related word, here “dog”, and on unrelated trials it was an unrelated word, “tree.” The experimenter then asked the child whether George was correct or incorrect in his word usage.

After the eighth trial, the experimenter showed the puppet a plastic toy bird, the puppet labeled it incorrectly, and the child was asked whether the puppet was right or wrong. Immediately after the sixth trial, and again at the end of the experiment, children were asked whether the puppet could hear when inside his house. These questions were intended to check children’s understanding of the task and their knowledge that the puppet could be incorrect in his labeling. Every child who completed the experiment answered these questions correctly.

***Drawing condition.*** The procedure was like that of the writing condition except that the experimenter showed the child drawings instead of words. The experimenter stated that her friend, who was very good at drawing, had drawn some pictures. The experimenter provided the label for each picture three times: “It’s a puppy. See, she drew a puppy. Do you see the drawing

of the puppy?" George was inside his house when the experimenter labeled the picture. George then emerged and labeled the picture, using either the same word provided by the experimenter, in this example "puppy"; a closely related word, "dog"; or an unrelated word, "tree." The experimenter asked the child whether the puppet was correct or incorrect in his word usage.

**Results**

Table 1 shows the mean proportion of positive responses, namely those in which the child said that the puppet was correct, on the same, related, and unrelated trials of each condition. Children performed well on the same trials, almost always stating that the puppet was correct when he provided the label for the word or drawing that the experimenter had given. Children also performed well on the unrelated trials, almost always saying that the puppet was not correct when he offered a label that was unrelated to the one the experimenter had given.

Of most interest is performance on the related trials, on which the puppet offered a label such as "dog" after the experimenter had used the label "puppy." As Table 1 shows, children were less likely to say that the puppet was correct in the writing condition than in the drawing condition, 50% as compared to 78%. To test the significance of this difference, we conducted mixed model analyses in R version 3.0.2 (R Core Team, 2013) using the package lme4 (Bates, Maechler, Bolker, & Walker, 2013). The models included random intercepts for children and word pairs, and a logit link function was used because the dependent variable was binary. A benefit of mixed model analyses is that it allows us to include in the same analyses not only condition, the main factor of interest, but also other child-related and trial-related factors that might influence performance, including the child's age and the order of the trial in the session for each child. Our first model included the fixed effects of condition, child age in months (which

was centered at its mean), and their interaction. There was a significant main effect of condition ($\beta = -2.17$, $SE = .69$, $p = .002$), such that children were less likely to accept related words in the writing condition than the drawing condition. The main effect of age was not significant ($\beta = 0.13$, $SE = .08$, $p = .11$), nor was the interaction between age and condition ($\beta = 0.06$, SD = .11, $p = .54$). A model that included the order of the trial in the experimental session did not fit the data significantly better than the model that did not ($p = .20$ according to a log-likelihood test), suggesting that performance did not vary systematically over the course of the session. The results were virtually identical when we eliminated from the analysis those few trials on which the child was reported to be able to read a written word that was originally slated to be used in the study and it had been replaced with another word.

## Discussion

Experiment 1 was designed to determine whether preschool age children are sensitive to an important difference in symbolic function between writing and drawing: that a written word stands for a specific spoken word whereas a picture can sometimes be labeled in more than one way. The results suggest that children have some knowledge of this difference, for they were less likely to accept synonymous labels for written words than for pictures. The same synonyms were used in both the writing and drawing conditions, indicating that the different results in the two conditions reflect children's different treatment of the two symbolic systems. The results therefore suggest that US preschoolers have a better understanding of the symbolic function of writing than suggested by some earlier research. When children are not asked to produce writing (as they were in the studies of Ferreiro, 1986, Ferreiro & Teberosky, 1982, and Homer & Olson, 1999), and when they are shown writing that is not accompanied by pictures (as in the studies of

Bialystok, 1991 and Bialystok & Martin, 2003), preschool age children who cannot read specific words demonstrate some understanding that written words map onto specific spoken words. This outcome is surprising in light of influential theories of literacy development according to which children do not understand the glottographic nature of writing (Ehri, 1998; Frith, 1985).

Before drawing strong conclusions, however, we must address some limitations of Experiment 1. One limitation is that we relied on parents' judgments about whether their children could read the words in the study. Previous work shows that parents are more likely to overestimate their children's reading ability than to underestimate it (Hiebert & Adams, 1987; Korat, 2009, 2011), but it is nevertheless possible that some children could read some of the words. Moreover, even a child who could not read a word such as ‹dog› might recognize one of the letters, such as ‹d›, and might know that it is pronounced as /d/. If the child had sufficient phonemic awareness to know that the spoken word "dog" does not begin with /d/, the child might be able to reject this related word as a label for the word ‹puppy›. Letter-sound knowledge and phonemic awareness are generally weak in children of the ages tested here (e.g., Anthony et al., 2002; Worden & Boettcher, 1990), but it is possible that some children could have used this approach to reject the puppet's suggestions of related words in the writing condition.

Experiment 2 was designed to address the limitations of Experiment 1. The items in the word condition were written in a cursive style that, as shown by the examples in Figure 1, was difficult even for adults to read. The use of cursive makes it unlikely that the children could read the words or identify letters within them. Preschool age children do generally accept cursive as a type of writing, however (Bialystok, 1995; Lavine, 1977). To check that the children in Experiment 2 were unable to decipher the cursive words, we gave them a forced-choice task

involving these words in the first session of the study of the study. For example, children were asked whether the cursive form at the top of Figure 1 said “spaghetti” or “garbage.” Children who performed significantly above the level expected by guessing on this forced-choice cursive task were excluded from the study.

To further characterize the literacy skills of Experiment 2 participants, we administered two other tasks during the first session in addition to the cursive task. In the forced-choice letter task, children were shown an uppercase letter such as ‹N› and were asked “Is this N or W?” In the word-reading task, children saw simple words that were written in easily recognizable uppercase letters and were asked to read any words that they could.

The puppet task, in which the words of the writing condition were presented in the difficult-to-read cursive style, was administered in the second session of Experiment 2. This experiment included fewer same and unrelated trials than Experiment 1, allowing us to include more related trials without increasing the length of the session. To help ensure that children understood the task, given the larger number of potentially difficult related trials, we provided explicit feedback about the correctness of children’s responses on the same and unrelated trials.

## Experiment 2

### Method

**Participants.** Sixty-two children (35 girls) ranging from 3;0 to 5;7 (*M* = 4;3; *SD* = 0;9) contributed data, 32 in the writing condition and 30 in the drawing condition. Children were from the same backgrounds as those in Experiment 1 but had not participated in the previous study. Children were tested at their preschools, and approximately half of the children at each preschool were randomly assigned to each condition. Three additional children were excluded

from the analyses because they responded correctly to 17 or more of the 24 trials on the forced-choice cursive task. According to a binomial test, such a score is unlikely to occur on the basis of random guessing ($p$ = .03, one tailed). Data from two additional children were not excluded because, as described below, they did not perform well on questions that checked their understanding of the puppet task.

**Materials.** The Appendix shows the triplets that were used in the puppet task. Five of the triplets from Experiment 1 were replaced with new ones in order to assess the generalizability of the results. Given that young children know relatively few pairs of words that can refer to the same objects, the other triplets were retained. As in Experiment 1, the same triplets were used in both the drawing and writing conditions.

The words for the puppet task were written by the same person in cursive (see Figure 1). Pictures of the new items were drawn in colored pencil; the other pictures were the same as those used in Experiment 1. Eighteen different random orders were created for use in the puppet task. This was done in a similar way as in Experiment 1, except that each random order in Experiment 2 included six related trials, three same trials, and three unrelated trials. Each child was assigned to one random order, and the same orders were used for the drawing and writing conditions.

The forced-choice cursive task of the first session used the same cursive words as the puppet task. There were two response options for each item: the correct pronunciation of the word and the pronunciation of another word from the set. The forced-choice letter task used 26 cards, each bearing a large black uppercase letter. The response options for each item were the correct letter name and the name of another randomly chosen letter. For the cursive and the letter tasks, the correct answer was presented first for half the trials and second for the other half. The

word-reading task used 11 cards, each of which contained two printed words and one easily recognizable colored picture. The words are listed in the Appendix. The pictures were included so that children who could not read any of the words would succeed at naming the pictures. The items for each task were presented in the same randomly chosen order for all children.

**Procedure.** The first session began with the forced-choice letter task, followed by the forced-choice cursive task and the word-reading task. For the forced-choice letter task, the child was shown the letter cards one at a time and was asked to select the letter's name from the two response options. For ‹N›, for example, the child was asked, "Is this N or W?" A similar forced-choice procedure was used for the cursive task. For example, children were asked whether the word shown in the top portion of Figure 1 was "spaghetti" or "garbage." For the word-reading task, children were asked to identify the words and pictures on each card.

For the second session, children were assigned to either the writing or the drawing condition of the puppet task. Children were introduced to a Curious George puppet, and the experimenter explained that the puppet could not hear anything that was said outside of his house when he was in it. Warm-up trials were presented as in Experiment 1. On each test trial, the experimenter showed the child either a cursive word or a drawing, depending on the condition to which the child was assigned. The experimenter labeled the item in the same manner as in Experiment 1. George, who was in his house when the experimenter did this, then emerged and provided a label in the same manner as in Experiment 1. The experimenter asked the child whether George's label was correct. In so doing, the experimenter reminded the child of the original label and of George's label. For example, the experimenter would say, "My friend wrote puppy. George called it dog. Did George get it right or wrong?" Another aspect of the procedure

that differed from that of Experiment 1 is that the experimenter provided explicit feedback about the child's responses on the same trials and the unrelated trials. For example, if the child said that George was wrong when he used "tree" for a drawing of a dog, the experimenter stated that George was indeed wrong and that George sometimes made mistakes. On those few occasions in which a child responded incorrectly on a same trial or an unrelated trial, the experimenter provided the correct answer. No feedback was provided about children's responses on the trials of primary interest, the related trials. As in Experiment 1, children's understanding that George could not hear when he was inside his house was checked at the end of the warm-up trials, halfway through the test trials, and at the end of the experiment. Two children failed to respond correctly on at least two of these three checks, and their data were not included in the analyses.

**Results**

As Table 2 shows, children in the writing and drawing conditions performed similarly on the cursive, word-reading, and letter tasks. For each of these tasks, a *t* test with participants as the unit of analysis showed no significant difference between the children in the two conditions ($p > .24$ for all). As expected given how participants were selected, children's performance on the forced-choice cursive task (50% correct, pooling over the two conditions) was at the level expected by random guessing. Children performed significantly above chance on the forced-choice letter task, with a mean of 88% correct ($p < .001$). Children almost never read any of the words in the word-reading task.

Children performed well in the same trials and unrelated trials of the puppet task, as Table 3 shows. Of primary interest is children's performance on the related trials, in which the puppet offered a label such as "dog" after the experimenter had used "puppy." As Table 3 shows,

children said that the puppet was correct on 29% of related trials in the writing condition as compared to 48% of such trials in the drawing condition. We conducted mixed-model analyses with random intercepts for each participant and each word pair. The predictors in our first model were condition, child age in months (which was centered at its mean), and their interaction. There was a significant main effect of condition ($\beta = -1.88$, $SE = .81$, $p = .020$), such that children were less likely to accept related words in the writing condition than in the drawing condition. The main effect of age was not significant ($\beta = 0.03$, $SE = .05$, $p = .60$), nor was the interaction between condition and age ($\beta = -0.12$, $SD = .09$, $p = .17$). A model that added the order of the trial in the session did not fit the data significantly better than the first model ($p = .13$ by a log-likelihood test). In an additional analysis, we found no significant correlation between the number of positive responses on the related trials of the puppet task and performance on the forced-choice letter task ($r = -.05$ and $-.03$ for children in the writing and drawing conditions, respectively).

## Discussion

The results of Experiment 2, like those of Experiment 1, suggest that preschool age children show some understanding of the difference in symbolic function between writing and drawing. The results are stronger than those of Experiment 1 because we documented that the participants could hardly ever read any words in a list of simple, common words. Also, we ensured that the children could not read the specific word forms used in the study by presenting them in a difficult-to-read cursive. Even though children could not read the cursive words, they were less likely to accept an alternative label for a word than an alternative label for a drawing.

Although there was a significant difference in the rate of positive responses in the writing

and drawing conditions in Experiment 2, as in Experiment 1, the overall rate of positive responses was lower in Experiment 2. Confirming this, a mixed model analysis on the data for those pairs that were used in both experiments using the factors of experiment, condition, and their interaction showed a main effect of experiment ($\beta = 3.44$, $SE = 1.02$, $p < .001$) in addition to the effect of condition that was expected given the results of the individual analyses of Experiments 1 and 2 ($\beta = -4.02$, $SE = 1.13$, $p < .001$). Procedural differences between the two experiments may help to explain why children in Experiment 2 were generally less accepting of the puppet's labeling attempts than were children in Experiment 1. Experiment 2 included fewer same trials, on which the puppet was obviously correct. Also, children in Experiment 2 were explicitly told on some of the test trials that the puppet sometimes made mistakes, whereas children in Experiment 1 received this information only at the beginning of the experiment. These considerations may help to explain why children in both conditions of Experiment 2 were more willing to state that the puppet was wrong than were children in Experiment 1. Although positive responses to related trials were less frequent overall in Experiment 2 than in Experiment 1, the critical finding is that Experiment 2, like Experiment 1, showed a significant difference between the drawing and writing conditions. Children were more likely to accept that a picture can have more than one label than to accept that a word can have more than one label.

## General Discussion

Modern children are exposed to writing from an early age. Their early knowledge about print, often referred to as print awareness, plays an important role in both emergent and conventional literacy (e.g., Puranik et al., 2011; Whitehurst & Lonigan, 1998). Most studies of print awareness and emergent literacy have examined children's knowledge about the outer form

of writing: the visual characteristics of letters and words. The results of these studies show that children begin to learn about the outer form of writing well before they can read or write themselves (see Treiman & Kessler, 2014, for a review). For example, as documented here and in other studies (e.g., Worden & Boettcher, 1990), many young US children are familiar with the shapes of some uppercase letters. Also, even young preschoolers appear to know about some of the visual differences between written words and pictures and attempt to reproduce some of these differences in their own productions (Lavine, 1977; Levin & Bus, 2003; Treiman & Yin, 2011).

Although a number of studies have investigated children's knowledge about the outer form of writing, relatively few have examined their knowledge about its inner structure, that is, how it functions as a symbol. The research reported here examined prereaders' knowledge of one important characteristic of writing: that written words symbolize meaning differently than pictures do. This aspect of writing seems so fundamental to literate adults that children's knowledge of it has been little studied. Those theories that have addressed the issue (Ehri, 1998; Frith, 1985) have suggested that children who cannot yet sound out words connect each printed word to a general meaning. These children do not yet know that writing connects to specific units of a language; that a written word represents a specific spoken word. The theories thus predict that children should children perform similarly in the drawing and the writing conditions of the present study, accepting the synonyms at similar rates. We found, however, that children with an average age of a little over 4 years were significantly less likely to accept a synonym when presented with written words than with drawings. Importantly, this held true even among children who could read virtually no words in a list of simple words and who could not read the cursive forms that were used in the experiment. It held true regardless of children's age, within

the age range in the present study, and also regardless of children's knowledge of the names of individual letters. Overall, the present results suggest that children have some knowledge that written words symbolize meaning differently than drawings at an earlier point in development than suggested by the influential theories of Ehri (1998) and Frith (1985).

The demonstration of children's knowledge that writing represents a specific linguistic form in a way that drawing does not is a surprising result that contrasts with some previous findings (Bialystok, 1991; Bialystok & Martin, 2003; Homer & Olson,1999). The differences may reflect the fact that our procedure did not rely on children's ability to produce segmented writing, as did Homer and Olson's, and the fact that the children in our writing condition saw written words that were not accompanied by pictures, unlike the children in the studies of Bialystok and colleagues. By presenting children with a novel, straightforward task that did not require them to write, we were able to demonstrate that children possess some of the most basic conceptual knowledge of the symbolic nature of printed words prior to being able to read. One possible concern about our task is that it relies on children's responses to yes–no questions, specifically questions about whether a puppet's response was correct. Some investigators have reported that young preschoolers show a bias to answer "yes" to yes–no questions that are asked by adult experimenters (Fritzley & Lee, 2015; Okanda & Itakura, 2010). These concerns were alleviated in our task by using a puppet rather than an adult experimenter as the agent who made mistakes. We also included trials on which "no" was the correct response, and children produced a high proportion of correct "no" responses on these trials.

How might children who cannot decode words themselves have learned that a written word, unlike a drawing, represents a specific linguistic item and not another of similar meaning?

As mentioned earlier, children hear adults talk about written words as “saying” things, just as they talk about people “saying” things (Robins & Treiman, 2009); such talk may aid children in learning that writing represents language. The ways in which drawings are discussed are somewhat different from the ways in which printed words and letters are discussed (Robins & Treiman, 2009; Robins et al., 2012). Also, the labels that are given to drawings (and pictures) do not necessarily match the physical appearance of the drawing—even 3- and 4-year-olds view drawings as based on the intentions of their creators (Bloom & Markson, 1998). Additional research is needed to investigate the experiences with words and drawings that contribute to children’s early knowledge that the two symbol systems operate in different ways.

Whereas previous studies have shown that preschool age children have some knowledge about the visual differences between writing and drawing (Lavine, 1977; Levin & Bus, 2003; Treiman & Yin, 2011), we are not familiar with any studies that have documented knowledge about differences in symbolic function between the two in children who are not yet able to read themselves. Our finding that preschool age children have some understanding that written words represent meaning in a different way than drawings do indicates that young children’s knowledge about the inner structure of writing—how it works as a symbol—is more sophisticated than the extant research and theory would lead us to believe (see Treiman, Decker, Kessler, & Pollo, 2015, for additional recent evidence about young children's knowledge about the inner structure of writing). Given the importance of early knowledge about writing for both emergent and conventional literacy (Puranik et al., 2011; Whitehurst & Lonigan, 1998), this aspect of print awareness deserves more attention.

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*Table 1*

*Mean Proportion of Positive Responses on Different Types of Trials in Puppet Task of Experiment 1 (Standard Deviations in Parentheses)*

| Condition | Related trials | Same trials | Unrelated trials |
|---|---|---|---|
| Writing | .50 (.37) | 1.00 (.00) | .00 (.00) |
| Drawing | .78 (.29) | .98 (.07) | .01 (.05) |

Table 2

*Mean Proportion of Correct Responses on Literacy Tasks of Experiment 2 (Standard Deviations in Parentheses)*

| Condition | Forced-choice cursive task | Forced-choice letter task | Word- reading task |
|---|---|---|---|
| Writing | .51 (.08) | .88 (.15) | .00 (.00) |
| Drawing | .50 (.09) | .88 (.15) | .01 (.06) |

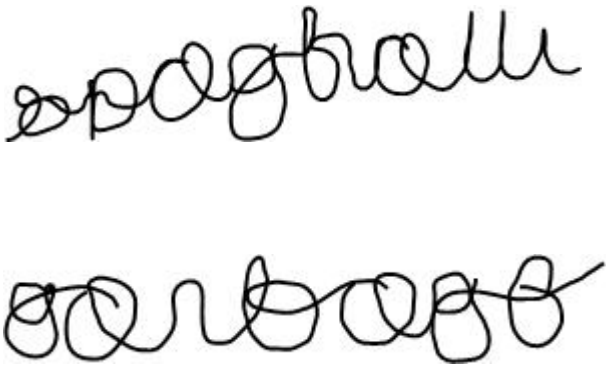
Table 3

*Mean Proportion of Positive Responses on Different Types of Trials in Puppet Task of Experiment 2 (Standard Deviations in Parentheses)*

| Condition | Related trials | Same trials | Unrelated trials |
|---|---|---|---|
| Writing | .29 (.34) | .91 (.19) | .06 (.18) |
| Drawing | .48 (.39) | .98 (.08) | .07 (.18) |

Figure 1

Sample written words (*spaghetti* and *garbage*) for Experiment 2



## *Appendix*

Triplets used in Experiment 1: baby, doll, train; bicycle, bike, house; book, story, pizza; bunny, rabbit, ball; cat, kitty, bottle; chair, seat, fish; child, kid, cookie; coat, jacket, pencil; dog, puppy, tree; flower, plant, radio; jeans, pants, airplane; potty, toilet, cow.

Triplets used in Experiment 2 (those not used in Experiment 1 are in italics): *rock, stone, train; horse, pony, cookie; garbage, trash, ball; spaghetti, noodles, radio; toast, bread, airplane;* book, story, pizza; cat, kitty, bottle; chair, seat, fish; child, kid, house; coat, jacket, pencil; dog, puppy, tree; potty, toilet, cow.

Words for reading task of Experiment 2: book, come, dog, eat, go, green, in, is, it, jump, look, no, play, red, see, stop, the, up, yellow, yes, you, we