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Young Children's Knowledge About Printed Names

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Abstract

Four experiments examined young children's knowledge about the visual characteristics of writing, specifically personal names. Children younger than 4 years of age, even those who could read no simple words, showed some knowledge about the horizontal orientation of English names, the Latin letters that make them up, and their left-to-right directionality. Preschoolers also had some familiarity with the shapes of the letters in their own first name, especially the leftmost letter. Knowledge of the conventional capitalization pattern for English names emerged later, after a period during which children preferred names in all uppercase letters. When tested with personal names, the kind of word they know best, young children are surprisingly knowledgeable about the visual characteristics of writing.

Young Children's Knowledge About Printed Names

Beginning reading ability is typically tested by asking children to read short words that are frequently seen in books, such as *in* and *look*. Children who cannot read such words, and who cannot sound out simple nonwords, are said to be nonreaders. However, such children may not be totally ignorant about reading and writing. In the research reported here, we explore the idea that even young children may be rather knowledgeable about one type of word that is well represented in their early literacy experiences and that is particularly important to them—personal names. Before discussing what children may know about personal names, we review previous research on children's knowledge about print in general.

Some findings suggest that children who have not yet been exposed to formal literacy instruction typically pay little attention to print. This appears to be the case for many of the signs and product labels that children see daily, where the letters themselves are not usually critical for identification. Masonheimer, Drum, and Ehri (1984) showed U.S. preschoolers (mean age 4;8 [years;months]) photographs of common signs and labels in their typical contexts (e.g., a *Pepsi* label on a bottle) and the same printed words out of context (e.g., *Pepsi* printed in manuscript type). Children who were classified as prereaders by typical reading tests often identified the labels correctly when they appeared in their normal settings. The children's responses did not change when a letter was altered, as when the initial *P* on the label of a Pepsi bottle was changed to *X*. When the children saw the words out of their normal contexts, they usually failed to identify them. Just as preschoolers pay little attention to the print on many commercial products, so they pay little attention to the print in storybooks. When young children are being read to, they spend far more time looking at the pictures than the print, limiting their ability to learn about the characteristics of the print (Evans & Saint-Aubin, 2005; Justice, Skibbe, Canning, & Lankford, 2005). Another sign of children's reliance on pictures is their tendency to identify the referents of

printed words on the basis of nearby pictures. In the *moving word task*, a printed word such as *girl* is placed under a picture of a girl and identified as meaning 'girl', but then is moved under a picture of a tree. Young children may claim, in this situation, that the word is now 'tree' (e.g., Bialystok, 1991, 2000). Yet another piece of evidence that preschoolers are more sensitive to the context in which writing appears than to the letters it contains comes from a study with 4 and 5 year olds discussed by Gough, Juel, and Griffith (1992). Children were taught to pronounce four words that were printed on cards. One of the cards had a thumbprint in the corner. The thumbprinted word was mastered most quickly. But when the children saw the word again without the thumbprint, less than half of them could identify it. The children apparently paid more attention to the smudge near the writing than the writing itself.

Findings like those just described suggest that preschoolers pay little attention to print itself, at least when pictures or salient contextual cues are available. Another line of research, however, suggests that youngsters know about at least some characteristics of writing well before they are exposed to formal literacy instruction. According to Tolchinsky's (2003) *differentiation hypothesis*, children learn about the features of print that are common to all writing systems before they learn about the features that are specific to their particular system. All current writing systems share certain graphic features, including the fact that the symbols are arranged in straight lines— what we call in this paper linearity—and the fact that the marks rarely look like what they represent—lack of iconicity. These features reflect the basic nature of writing—that it differs from drawing in representing language rather than representing meaning directly and that it employs sequences of symbols to represent sequences of linguistic units. Other graphic features of writing do not stem directly from its basic nature and so may vary across writing systems. For example, the symbols may be arranged horizontally or vertically and, if horizontal, may run from left to right or right to left. The shapes of the symbols may also vary from one writing system to another.

If children have some understanding of the basic nature of writing, such as the fact that the symbols represent sequences of linguistic units, then the visual characteristics of writing that reflect these facts may be relatively easy for them to master. Indeed, Tolchinsky argues that children's early scribbles adhere to the universal graphic features of writing but not necessarily to the specific features of the writing in their environments. Language-specific characteristics are mastered later, at which point children's own written productions begin to take on the characteristics of the system to which they are exposed. Evidence for the differentiation hypothesis comes not only from studies of children's written productions but also from studies in which children decide whether various displays are "writing," "words," or "something for reading." Children in such writing recognition studies rule out nonlinear strings of symbols from an early age, suggesting an understanding of the linear nature of writing (Ganapole, 1987; Lavine, 1977).

In the experiments reported here, we explored young children's knowledge about the characteristics of one important type of word that has not featured in most previous writing recognition studies—personal names. We examined names, especially children's own first names, because they appear to be learned early and to play an important role in literacy development (e.g., Bloodgood, 1999; Ferreiro & Teberosky, 1982; Levin & Aram, 2004; Levin, Both-de Vries, Aram, & Bus, 2005; Treiman, Kessler, & Pollo, 2006). We hypothesized that even young preschoolers who are classified as nonreaders by standard criteria would show relatively good knowledge about the visual characteristics of print when tested with personal names. We asked whether this knowledge included certain language-specific characteristics as well as characteristics common to all writing systems.

To verify that personal names figure heavily among early learned words, we surveyed the parents of 27 U.S. children aged 2;6 to 5;4. The sample for the survey, like those of the experiments that follow, was middle and upper middle class. We asked each parent whether his or

her child was familiar with any printed words and, if so, to list the first words the child had learned about, up to a maximum of five. Three of the 27 children were reported to be familiar with no printed words, and one parent was unable to specify the first word learned. Of the remaining children, 87% were reported to have learned a personal name first. This name was usually (85% of cases) the child's own first name. Of all the early learned words that the parents listed, 70% were personal names. In addition to the child's name, these included names of family members (including pets) and favorite characters (e.g., *Barbie*). Only 15% of children's early words were listed as preprimer and primer words by Harris and Jacobson (1972). Thus, the words that children learn first are not usually the words that appear on typical reading tests. Nor were there many words that typically appear in distinctive colors and fonts. Just 8% of the early words, such as *McDonald's*, fell into this category. Thus, personal names figure prominently among children's early learned words. Well before formal reading instruction begins, children have the opportunity to learn about the visual characteristics of personal names in general and their own names in particular.

Several previous studies have examined preschoolers' knowledge about personal names, almost always by asking them to write their own name, *Mom*, or *Dad* (e.g., Bader & Hildebrand, 1991; Levin et al., 2005; Welsch, Sullivan, & Justice, 2003). However, it can be difficult to draw conclusions about children's knowledge of names on the basis of production tasks alone. Successful performance on these tasks requires detailed memory representations and good motor skills. Performance also depends on children's willingness to produce a less than perfect product. Children who write a familiar name using an automatized sequence of motor movements may know that this form is one of several possibilities, but such knowledge would not be visible from the production alone. In the experiments reported here, we asked children not to write names but to judge whether various displays were correctly written names. We did not ask children to read the

names aloud, as our interest was not in children's ability to relate spellings to sounds but in their knowledge about the visual forms.

Experiment 1 was designed to study children's knowledge about two language-specific properties of personal names. The first is that names have a conventional capitalization pattern: an initial uppercase letter followed by a series of lowercase letters. The capitalization pattern for names differs from that for other English words, which typically begin with a lowercase letter unless at the beginning of a sentence. We asked whether children were more likely to accept as names displays with the initial letter in uppercase and the remaining letters in lowercase than displays with other capitalization patterns. A second characteristic of English names, and one they share with other English words, is that they are made up of letters from a particular inventory. We asked whether children were more likely to accept as names displays consisting of letters of the Latin alphabet than displays consisting of unfamiliar and visually dissimilar symbols from other writing systems.

No previous studies, to our knowledge, have examined preschoolers' knowledge of the capitalization pattern for English names. A few studies have examined children's judgments about displays made up of Latin letters as compared to displays made up of other symbols, although not in the context of names. Lavine (1977) found that U.S. 3 year olds tended to reject as writing displays composed of symbols that were visually dissimilar to Latin letters, such as Chinese characters. In a study by Levy, Gong, Hessels, Evans, and Jared (2006), however, children did not clearly discriminate between strings made up of letters of the Latin alphabet and strings made up of visually dissimilar characters (symbols from Indian writing systems) until about 4 ½ years of age. Experiment 1 tested both knowledge of name capitalization patterns and knowledge of letter inventory. It included a younger and an older preschool group, as well as a kindergarten group.

Experiment 1

Method

Participants

For this and the following experiments, children aged 3;1 to 4;3 were classified as younger preschoolers. Children who were older than 4;3 and less than 6;0 and who had not yet entered kindergarten formed the older preschool group. The preschoolers attended nursery schools and daycare centers that did not offer formal literacy instruction. The third group for Experiment 1 included children who were enrolled in kindergartens that formally taught about letters and beginning reading. All of the children in this and the following experiments were native speakers of English. The educational institutions that they attended were in the St. Louis metropolitan area, generally in middle or upper-middle class neighborhoods. Table 1 provides background information about the children who participated in this and the other experiments.

Stimuli

Stimuli consisted of 200 plastic-coated cards, each 8×13 cm. Each child saw 46 pairs of cards. Thirty-six of the pairs were designed to examine children's preferences for different capitalization patterns, and the others examined their ability to distinguish between stimuli containing letters of the Latin alphabet and stimuli containing visually dissimilar symbols from unfamiliar scripts.

Each of the 36 nonwords used for the capitalization stimuli was printed using five different capitalization patterns: initial uppercase letter followed by lowercase letters (display type Ab), all uppercase letters (display type AB), all lowercase letters (display type ab), medial uppercase letter, and final uppercase letter. The last two capitalization patterns were grouped together conceptually for the purposes of the study as an idiosyncratic "other" pattern (display type aB). The stimuli were printed in Verdana font such that the uppercase letters were 2.6 cm high. All of the nonwords had a consonant–vowel–consonant (CVC) structure, as with *fet* and *tig*. No letter was repeated

within a nonword. The letters used were *a, e, i, b, d, f, g, m, n, r,* and *t*. We chose these letters

because they have different shapes in upper- and lowercase, making the distinction between the

cases more apparent. Although *h* and *j* also have different shapes in upper- and lowercase, they

were not included because they rarely appear at the ends of English words. The vowels *a*, *e*, and *i*

were each used in 12 nonwords. Each consonant appeared in the initial position in four or five

nonwords and in the final position in three to six nonwords.

      A pair of cards consisted of a single nonword shown in two different capitalization

patterns. The six pair types were display type Ab versus ab, as in *Bem* vs. *bem*; display type Ab

versus AB, as in *Bem* vs. *BEM*; display type Ab versus aB, as in *Bem* vs. *bEm*; display type ab

versus AB, as in *bem* vs. *BEM*; display type ab versus aB, as in *bem* vs. *beM*; and display type AB

versus aB, as in *BEM* vs. *bEm*. In order to control for effects of position, such as a child always

choosing the card that was closest to him, every other pair of a given type was placed on the table

in a reverse order. For example, children saw half of the ab vs. AB pairs with the ab pattern closest

to them and the other half of the pairs with the AB pattern closest to them. Each child saw each of

the 36 nonwords in only one pair type. For instance, the first participant only saw the nonword

bem presented as *Bem* vs. *bem*. This was accomplished by constructing six lists of stimuli

containing the same 36 nonwords but with different pairing combinations. For example, the first

participant saw *Bem* vs. *bem*, the second *Bem* vs. *BEM*, and the third *Bem* vs. *bEm*. There were six

lists, and each child was randomly assigned to a list. Each child saw six pairs of cards of each of

the six pair types.

      In order to examine children's ability to distinguish between displays containing letters of

the Latin alphabet and displays containing unfamiliar foreign symbols, 10 cards with Latin letters

were paired with 10 non-Latin stimuli. These used letters and letter components from five different

Indian fonts. The symbols in these scripts look quite different from letters of the Latin alphabet,

unlike certain Greek or Cyrillic letters that look rather similar to Latin letters. The Indian symbols

were presumed to be unfamiliar to the children. Each stimulus was composed of three different

symbols, as with ଓଝୟ and ভগী. The ten Latin letter displays contained three letters of the Latin

alphabet in a CVC structure. Letters for these nonwords included *u, o, c, k, s, v, w,* and *z*. These

letters were not used in the other 36 nonwords and were chosen so as not to influence children's

performance on those pairs. The ten nonwords displayed various patterns of letter size. Four were

printed with a larger initial letter, two were printed with a larger medial or final letter, and four

were printed with all letters equally sized. Each of the six lists of stimuli contained pairs

contrasting Latin and non-Latin stimuli, and the stimuli were paired differently in each list.

To assess children's ability to read simple words of the kind typically included on

beginning reading tests, 11 cards were prepared, each 14×22 cm. On each card two unrelated

words were printed in all uppercase letters. These were simple words such as *in* and *look*. Each

card also contained one picture. The pictures were included to give children who could not read

any words a feeling of success.

Procedure

The children were tested in a quiet location at their school. Children were shown a toy

mailbox and a toy trashcan. They were told that they would play a game involving mailing cards

or throwing them away. The experimenter explained that the child would see two cards at a time

and should put the one that "looks more like how a name in English should look" in the mailbox.

"The other card, the one that doesn't look like a name," should be put in the trashcan. The children

were told that the names probably wouldn't be ones they knew. For practice, the experimenter

introduced the child to a stuffed animal named Coco, wrote Coco's name on a card, and explained

to the child that he or she was writing the puppet's name. All of the letters in this name were

printed the same size. The experimenter then showed this card next to a card with three geometric shapes on it and asked the child which card looked more like a name. If the child did not respond correctly, the experimenter explained again which card contained Coco's name. During the test trials, children were not told whether particular responses were correct or incorrect.

The experiment was spread over two sessions. In the first session, children worked with 30 pairs of cards from their assigned list (24 nonwords pairs and 6 Latin vs. non-Latin pairs) in a random order. The second session began with the same instructions and practice item as the first session, followed by the remaining pairs. The reading task was given at the end of the second session. Children were shown each card in turn and were asked to identify anything they knew on it. If a child did not identify all three items, the experimenter pointed to each item and asked the child if he or she knew what it was. Table 1 provides information about the reading performance of each group of children in this and the following experiments.

Results

Table 2 shows the results for each pair type. All groups of children, even the younger preschoolers, showed a reliable preference for displays consisting of Latin letters over displays consisting of visually dissimilar non-Latin symbols. Although the strength of this preference appeared to increase with age, the groups did not differ reliably according to a between-groups analysis of variance (ANOVA; $F(2, 48) = 2.06$, $p = .14$). Restricting the analyses to those 31 children (17 younger preschoolers, 12 older preschoolers, and 2 kindergartners) who could not read any of the simple words on our reading task, we continued to find a significant and strong preference for Latin letters over non-Latin symbols. The nonreaders chose the Latin letter displays 94% of the time.

Although the younger preschoolers considered strings of Latin letters to look more like names than strings of unfamiliar symbols, they did not distinguish among the capitalization

patterns that were presented to them. The younger preschoolers showed no significant preferences for any of the pair types involving displays with Latin letters (Table 2). Also, they showed no reliable preferences when the results for each display type were pooled over the pair types in which it occurred (Table 3). All but two of the younger preschoolers failed to score on our reading test, and the results were the same when we restricted the analyses to the nonreaders. The young preschoolers thus appeared to have no knowledge of the conventional capitalization pattern for names.

The older preschoolers, unlike the younger ones, showed reliable preferences on some types of nonword pairs. For all three pair types that contrasted an AB display with another display, the older preschoolers showed a reliable preference for the AB pattern. Overall, they chose the all uppercase pattern 68% of the time, significantly more often than the 50% expected by chance. When Ab displays—the conventional pattern for English names—were contrasted with ab displays—the typical pattern for words that are not proper names—the older preschoolers showed a reliable preference for the Ab displays. The older preschoolers' knowledge of the conventional capitalization pattern for names was weak, however, in that their overall rate of Ab choices did not significantly exceed 50% (see Table 3). The pattern of significant and nonsignificant results was the same when we analyzed the results of the 12 older preschoolers who could not read any words.

The kindergartners showed more knowledge of the conventional Ab pattern than the preschoolers, selecting the Ab pattern over half the time when it was paired with other patterns. Although the preference for the Ab pattern was statistically significant for only one of the three relevant pair types, Ab versus aB, the kindergartners showed a reliable preference for the Ab pattern when the results for the three pair types containing this pattern were pooled (Table 3). Only two kindergartners were nonreaders, and we did not perform separate analyses for this subgroup.

ANOVAs carried out across the young preschool, old preschool, and kindergarten groups

on the data in Table 3 found significant effects of group for the Ab, ab, and AB displays ($F(2, 48)$ = 5.42, p = .008; $F(2, 48)$ = 4.67, p = .014; and $F(2, 48)$ = 8.11, p < .001, respectively). Kindergartners had the strongest preference for Ab displays, whereas older preschoolers showed the strongest preference for AB displays. Children in the older preschool group were most likely to avoid spellings that consisted of all lowercase letters.

Discussion

The younger preschoolers, who were on average less than 4 years old and most of whom could not read any common words, distinguished between displays made up of Latin letters and displays made up of unfamiliar and visually dissimilar letters. They considered the former displays more likely to be names. This result suggests that young prereaders know about certain properties of the specific writing system to which they are exposed when they are tested in the context of personal names. Previous studies that have examined children's knowledge of their writing system's symbols using letter strings that were not identified as personal names have reported mixed results. Lavine (1977) found that U.S. children between the ages of 3 and 4 had some knowledge about the shapes of Latin letters and could distinguish them from visually dissimilar symbols from other writing systems. However, Levy et al. (2006) reported that performance was not consistently above chance until age 4 ½ when children were tested with strings of Latin letters and strings of Indian symbols. It is not obvious why the two studies found different results. The instructions used by Levy et al. ("Can you tell me which one you think Mommy would like to read or which one you think is a better word/sentence to read?") may have been hard for some children to understand. Our results support Lavine's in finding early knowledge about the language-specific property of letter shapes.

Although the younger preschoolers in our study differentiated strings of Latin letters from strings of visually dissimilar non-Latin letters, these children were insensitive to differences in

capitalization among the letters of the Latin set. Older preschoolers did discriminate among the capitalization patterns, but they preferred an unconventional capitalization pattern for names—all uppercase letters. In the Discussion of Experiment 2, we will consider possible reasons why older preschoolers preferred the all-uppercase format. Not until kindergarten did children favor names with only the initial letter in uppercase, the conventional Ab capitalization pattern.

Before concluding that preschoolers lack knowledge about the language-specific property of name capitalization pattern, we must consider whether the task of Experiment 1 was engaging enough for them to have displayed any knowledge they may have possessed. The younger preschoolers did not respond at random, for they picked the Latin-letter displays over the non-Latin displays, but they were not always highly involved in the task. In Experiment 2, we used a short and simple task that was very engaging for children. We printed the child's own name in different capitalization patterns and asked the child whether each name was written correctly. No practice trials were needed in this task. This forestalls an objection like one that could be raised for Experiment 1, which is that the practice trial, which was ambiguous between an AB pattern and an ab pattern, boosted acceptance of these patterns and lowered acceptance of Ab patterns.

Experiment 2

Method

Participants

Table 1 provides information about the participants. Only children whose first names followed the typical capitalization pattern for English (e.g., *Mary* and *John*, but not *DJ*) were included. Approximately half of these children were tested after they had participated in Experiment 1. The time between the studies was never more than a few days, and so the word reading test was not given again. The remaining children had previously participated in a pilot study similar to Experiment 1. We did not expect the prior participation to affect children's

responses because no feedback about the correctness of the responses had been given in the prior

tasks.

Procedure

The experimenter explained that he or she would show the child cards with the child's

name on them and that the child should say whether the name was written correctly on each card.

The child's name (or nickname, if the child used a nickname) had been printed by hand with an

initial uppercase letter followed by all lowercase letters (Ab), all uppercase letters (AB), all

lowercase letters (ab), and all lowercase letters except for one randomly chosen medial or final

uppercase letter (aB). The cards were presented in a random order and children were asked

whether the card was written "like your name should look." Children were asked to explain each

answer.

Results

Table 4 shows the proportion of times that children in each group accepted each display as

a correct rendition of their own name. Cochran *Q* tests were performed to determine whether "yes"

responses varied significantly among the four categories. These were followed up by McNemar

tests to determine which specific categories differed from one another.

The younger preschoolers accepted the four types of displays at similar rates, showing no

reliable differences among the categories. This continued to be true when we restricted the

analyses to those 33 of the 38 younger preschoolers who failed to score in our word reading task.

The older preschoolers showed significant differences among the four categories ($p <$

.001). They were most likely to endorse the AB spelling of their name, although the difference

between AB spellings and conventional Ab spellings did not reach significance by a McNemar

test. The older preschoolers as a group also showed a reliable preference for Ab displays over ab

and aB displays. The pattern of significant and nonsignificant results remained the same when we

restricted the analyses to those 19 of the 34 older preschoolers who could not read any words. The

results for this subgroup were very close to the results shown in Table 4 for the whole group of

older preschoolers. Further analyses of the older preschoolers' data revealed that the preference for

Ab over ab patterns was confined to those 22 children for whom the first letter of the first name

had a different shape in upper- and lowercase. For example, children with names such as *Becky*

were significantly more likely to accept *Becky* than *becky*. The 12 children in the older preschool

group for whom the first letter of the first name had the same shape in the two cases, such as *Olga*,

accepted Ab and ab displays equally often.

For the kindergartners, as for the older preschoolers, positive responses varied significantly

in frequency across the four categories ($p < .001$). The kindergartners were most likely to endorse

the conventional Ab version of their name, accepting this version significantly more often than

they accepted each of the other versions. This pattern appeared to hold for kindergartners with

names like *Olga* as well as kindergartners with names like *Becky*. However, only 6 of the 30

kindergartners had names whose first letters differed only in size in upper- and lowercase, so no

strong conclusions can be drawn for this subgroup. Four kindergartners were unable to read any

words, and no separate analyses were done for these children.

Explanations that mentioned the shape or size of a letter were relatively uncommon among

preschoolers, occurring 11% of the time for the younger preschoolers and 20% of the time for the

older ones. The kindergartners often—72% of the time—mentioned the shape or size of a letter

when justifying their response. Kindergartners more often provided such explanations when shown

an ab, AB, or aB display than when shown with a conventional Ab display (80% vs. 47%). That is,

the kindergartners were more likely to mention the size or the shape of a letter for the display types

that they rejected at higher rates. They typically mentioned the letter's size or shape as a basis for

rejecting that rendition of their name.

Discussion

The results of Experiment 2 confirm that young preschoolers have little knowledge of the conventional capitalization pattern of personal names. Even with their own name, the word they are likely to know best, the younger preschoolers failed to differentiate among versions that differed in letter case. The older preschoolers and kindergartners did make such distinctions. The older preschoolers were most likely to accept spellings of their own name with all-uppercase letters, in line with the results of Experiment 1. However, they accepted conventional Ab spellings at relatively high rates as well. This latter outcome supports the suggestion made on the basis of the results of Experiment 1 that, although older preschoolers show a preference for all-uppercase names, they are beginning to learn about the conventional capitalization pattern. The results further suggest that children more easily differentiate the conventional Ab pattern from the unconventional ab pattern when the uppercase form of the first letter differs in shape as well as size from the lowercase form. The displays used in the relevant trials of Experiment 1 began with letters that had different shapes in upper- and lowercase, and this was also true for children with names like *Becky* in Experiment 2. By kindergarten, children accepted the conventional Ab spellings of their names significantly more often than they accepted other patterns.

The results of Experiments 1 and 2 show that knowledge about the conventional capitalization pattern for names takes time to develop. During a period of time before its emergence, children prefer names that are written in all-uppercase letters. To find out why, we examined capitalization patterns in various types of writing that children see. We began by looking at the proper names and other words that appeared in 20 English-language books that were designed for children aged 4 and under. We classified each word as having an Ab, ab, AB, or other capitalization pattern. The 20 books included a total of 98 proper names, and all used the Ab pattern. This capitalization pattern was less common among words that were not proper names,

occurring 11% of the time for these words, chiefly when they began a sentence. As expected, words that were not proper names typically (85% of the time) had the ab capitalization pattern. AB patterns occurred 2% of the time on these words, and other capitalization patterns occurred 1% of the time. Thus, the older preschoolers' high acceptance rate for names in all-uppercase letters does not appear to reflect experience with print in books.

If the older preschoolers' tendency to endorse names like SAM does not reflect their experience with books, where does it originate? We examined children's names that were visible in preschool classrooms, selecting 11 different classrooms from among those attended by the preschoolers in the present studies. We looked at names that were written by adults rather than by children, and we excluded a few names that do not conventionally have an Ab capitalization pattern. Of the 670 remaining names that appeared on children's cubbies, displayed art works, and so on, nearly one third (220) had the AB pattern. The other names had the conventional Ab pattern. Thus, children have some exposure to the all-uppercase pattern in their classrooms but not to an extent that can explain why the older preschoolers in Experiment 1 and 2 tended to prefer the AB pattern to the conventional Ab pattern.

Does the preference for uppercase reflect children's experiences at home? We asked 28 middle- and upper-middle class adults with children aged 2;1 to 5;4 whether they wrote their child's first name for the child when teaching them to write or recognize it. All but one parent said that they did this. Of these, 59% said that they usually used all-uppercase letters when they began to do so. All but one of the parents also reported showing their child individual letters of the alphabet or writing individual letters for the child. The preference for uppercase letters was stronger here, with all of the parents reporting more use of upper- than lowercase, except for one parent who indicated approximately equal use. These findings suggest that U.S. preschoolers' home experiences with their names and with letters in general tend to be biased toward uppercase.

Indeed, children of this age are better able to recognize and label uppercase letters than lowercase ones (e.g., Worden & Boettcher, 1990), which could have contributed to the preference for all-uppercase names shown here. Children's experiences with written names at preschool and in books are not at first enough to counteract the bias toward uppercase letters.

The results of Experiments 1 and 2 show that, despite young children's focus on the context in which print appears, they pay enough attention to printed names in certain situations to learn something about their properties. One of the properties that even children know about before they are able to read involves the shapes of the symbols, a language-specific property. In Experiment 3, we examined preschoolers' knowledge about another language-specific property, the orientation of print. We tested children on versions of their name that differed in orientation, including one version in which the letters were horizontally arranged and other versions with vertical, diagonal, and nonlinear arrangements. All displays consisted of uppercase letters only, given the preferences for such letters that were found in Experiments 1 and 2. If knowledge about written names begins with features that are common to all writing systems and that stem from the basic nature of writing, extending later to features that are specific to particular writing systems (Tolchinsky, 2003), then younger preschoolers should accept horizontal and vertical arrangements at high rates. Both of these arrangements are represented among the writing systems of the world, unlike diagonal and nonlinear arrangements. With experience, U.S. children should gradually learn about the horizontal pattern of their writing system and should begin to choose horizontal names over vertical ones. Previous studies using stimuli that were not identified as names have found that preschoolers exposed to English prefer horizontal displays to nonlinear displays (Ganapole, 1987; Lavine, 1977). However, the previous studies have not compared children's performance on horizontal and vertical displays and so do not permit a good test of Tolchinsky's differentiation hypothesis.

Experiment 3

Method

Participants

This study included groups of younger and older preschoolers, as Table 1 shows. None of the children had taken part in Experiments 1 or 2.

Procedure

The procedure was similar to that of Experiment 2. Five versions of each child's name were prepared. In one, the letters were printed horizontally from left to right. In another, the letters were printed vertically from top to bottom. Two displays had a diagonal arrangement with the first letter of the name on the left, one a rising and the other a falling diagonal. In the fifth display, the letters of the name were arranged in a random pattern, not on a line. All letters were uppercase in all displays, and the displays were hand printed.

Results

Table 5 shows the proportion of times that the children accepted each display as a correct rendition of their name. The results for diagonal displays are pooled over the two types of diagonals. For each age group, the five display types differed significantly from one another in acceptance rate ($p < .001$ by Cochran tests). The pattern was the same for both age groups, and follow-up tests revealed that children were significantly more likely to accept the horizontal rendition of their name than the other versions and least likely to accept the nonlinear version. The vertical and diagonal renditions of the name showed intermediate acceptance rates, and performance on these display types did not differ significantly from one another. The results were very similar when we restricted the analyses to those children (31 in the younger group and 20 in the older group) who could not read any words. The main difference between the younger and older preschoolers is that the younger ones were more likely to accept any of the presented

displays as correct renditions of their names ($t(76) = 2.16$, $p = .034$, pooling over all display types). The group difference remained significant when we limited the analyses to nonreaders.

We examined how often children justified their responses by pointing out the orientation of the display or making a comment that indicated attention to orientation (e.g., "It's a staircase"). The younger preschoolers did so 19% of the time, and the older preschoolers did so 50% of the time. For both age groups, such responses were most common for the nonlinear displays (a rate of 45%, pooling over the two groups), intermediate in frequency for the vertical and diagonal displays (34%), and least common for the horizontal displays (22%). That is, children were most likely to mention orientation for the displays they rejected most often, the nonlinear ones. The children often used the unusual orientation to justify their rejection of these names.

Discussion

Even the younger preschoolers, who averaged less than 4 years of age, were more likely to accept versions of their name in which the letters were arranged along a horizontal line than versions in which the letters were not so arranged. This result suggests that children from the population tested here are familiar with certain language-specific features of their writing system at an early age, at least when tested with personal names. Notably, even those preschoolers who could not read any of the simple words in our reading task preferred horizontally arranged names. Neither the younger nor the older preschoolers showed a significant preference for vertical names over diagonal names. Some writing systems of the world use vertical arrangements, but no writing system typically uses a diagonal arrangement. If knowledge about writing begins with universal features and proceeds to language-specific features, as Tolchinsky's (2003) differentiation hypothesis states, then the acceptance rate for vertical arrangements should have been higher than the acceptance rate for diagonal arrangements. The children in Experiment 3 were less likely to accept nonlinear displays than either vertical or diagonal displays. This occurred, we suspect,

because the letters from the child's name were out of sequence in the nonlinear displays.

Experiment 4 tests the idea that even young preschoolers have some knowledge about the letters in

their name and their order.

The results of Experiments 1 and 2 suggest that children's learning about the graphic

characteristics of printed names is not governed by an understanding of the basic nature of

writing— an understanding that would make language-universal characteristics that reflect

writing's basic nature easier to learn about than language-specific properties that do not. Instead,

children's learning about the graphic characteristics of printed names is governed by the visual

characteristics of the print to which the children attend. Children who are exposed to English learn

about the shapes of the Latin letters at an early age because virtually all the print they see and

attend to uses these letters. Children take longer to learn about the conventional capitalization

pattern for names because the printed names to which their attention is drawn at an early age often

do not follow this pattern. Children probably learn about the horizontal orientation of English quite

early because the print they notice almost always has this orientation. When we examined proper

names and other words in children's books, using the same books that were analyzed in connection

with Experiment 2, we found that the proportion of spellings that were oriented horizontally was

extremely high—98%, pooling over names and other words. Likewise, the print produced by

parents and the print seen in preschool classrooms is generally oriented horizontally.

In Experiment 4, we examined children's knowledge about the specific symbol shapes in

their own names. Preschoolers saw versions of their name in which either the initial letter, a

medial letter, or the final letter was replaced with a different letter. The substitution was either

visually similar or dissimilar to the correct letter. For example, Brendan saw PRENDAN (initial

letter replaced with visually similar letter), VRENDAN (initial letter replaced with visually

dissimilar letter), BREMDAN (medial similar), BREGDAN (medial dissimilar), BRENDAW

(final similar), and BRENDAC (final dissimilar), as well as the correct BRENDAN. We asked how often children accepted each display as a correct rendition of their name.

Of particular interest was whether children were more sensitive to disruptions at the beginning of their name than in other positions. If so, this would indicate knowledge of another language-specific characteristic of English: the fact that the letters at the left side of a word are particularly important. Several previous reports suggest that children who are exposed to horizontal writing systems do not learn about the specific direction used by their system until at least 5 years of age. For example, Masonheimer et al. (1984) found that U.S. 4 year olds were no more likely to notice changes to the leftmost letters of words like *Pepsi* than changes to other letters, and Ehri and Wilce (1985) reported that U.S. prereaders do not remember initial letters better than final letters. In a study by Share and Gur (1999), Israeli 4 year olds were not significantly worse at identifying classmates' names when the first letter of the name (the rightmost letter in the case of Hebrew) was concealed than when the last letter was concealed. Although these findings suggest that young children do not pay special attention to initial letters, even in names, unpublished studies cited by Levin and Aram (2004) found that Israeli children of similar ages to those tested by Share and Gur did pay more attention to the first letters of names than the last letters. Also, Bowman and Treiman (2002) observed a priority for word-initial letters among U.S. preschoolers in words that were not personal names. Given the mixed results of previous studies, we asked in Experiment 4 whether younger and older preschoolers were more knowledgeable about the beginning letter shapes in their own name than the later letter shapes.

Experiment 4

Method

Participants

Experiment 4 included a younger and an older preschool group, as Table 1 shows. Children

whose names or commonly used nicknames had fewer than three letters (e.g., *DJ*) were not included, as no medial letter is available for replacement in such cases. A subset of the children who took part in Experiment 4 had previously participated in Experiment 3. The interval between the studies was never more than a few days, so the word reading task was not given again to these children. Preliminary analyses showed that the responses of the children who had previously participated in Experiment 3 were quite similar to the responses of the children who had not, so the data from all children were analyzed together.

Procedure

The procedure was similar to that of Experiments 2 and 3. Seven versions of each child's name were printed by hand on cards. All had the letters arranged horizontally, and all letters were uppercase. In the correct version, all letters in the name were correct. In the initial similar and dissimilar versions, the first letter was replaced with a visually similar letter or a visually dissimilar letter, and analogously for the medial and final versions. If the name had an even number of letters, we randomly chose one of the two middle letters to replace. For each letter of the alphabet, two visually similar and two visually dissimilar letters were selected in advance. The selections were based on adults' visual similarity ratings for uppercase letters of the Latin alphabet (Boles & Clifford, 1989; Treiman et al., 2006) and analyses of the visual features of these letters (Briggs & Hocevar, 1975; Thorson, 1976). The similar and dissimilar letters were selected so as to be comparable, across the replacement sets for all letters of the alphabet, in their frequencies in reading materials designed for kindergarten and grade 1 children (Zeno, Ivenz, Millard, & Duvvuri, 1995). For *B*, for instance, *P* and *R* were the two similar letters and *V* and *W* were the dissimilar letters. Generally, in choosing between the two similar letters and the two dissimilar letters, we attempted to minimize use of letters that appeared elsewhere in a child's name and repeated use of the same substitute letter in the displays shown to a given child. When one of the

two similar letters was clearly more similar to the target letter than the other, or when one of the two dissimilar letters was clearly more dissimilar, we generally chose the more extreme example.

Results

Table 6 shows how often the children accepted each display as a correct rendition of their name. For the older preschoolers, a Cochran's test revealed significant differences among the seven types of displays ($p < .001$ for both). The older preschoolers accepted the correct spelling of their name more often than they accepted any of the incorrect variants. The incorrect versions were accepted at low rates, and a Cochran's test showed no reliable differences among them. The patterns remained the same when we restricted the analyses to those 33 of the 48 older preschoolers who failed to score on our reading task.

For the younger preschoolers, unlike the older ones, reliable differences were found among the six versions of the name in which one letter was incorrect ($p < .001$ by a Cochran test). The younger preschoolers were less likely to accept displays with initial letter substitutions than those with medial or final letter substitutions, position having a significant effect according to a one-way ANOVA ($F(2, 110) = 6.36$, $p = .002$). Visual similarity did not affect the younger preschoolers' acceptance rate for initial letter substitutions. However, visual similarity did influence these children's decisions about medial and final letters. The young preschoolers were more likely to accept a version of the name in which a medial letter had been replaced with a similar than a dissimilar letter ($p = .035$ by a one-tailed McNemar test). The trend was the same in the final position ($p = .073$). Of the 56 younger preschoolers, 51 failed to score on our reading task; their results were very similar to those of the group as a whole.

Overall, the younger preschoolers were more likely to produce "yes" responses than the older preschoolers ($t(102) = 4.31$, $p < .001$, pooling over all display types). This continued to be true when we compared the nonreaders in the younger and older groups.

We looked separately at the results for younger preschoolers with short names (3 or 4 letters, $n = 12$) and those with long names (7 or more letters, $n = 17$) to determine whether the two groups showed different effects of position. A reliable effect of position was found for children with long names ($F(2, 32) = 3.96$, $p = .029$). These children were more likely to accept forms with medial or final substitutions than those with initial substitutions. For the children with short names, position did not have a significant effect. These findings support the hypothesis of Levin and Aram (2004) that children whose names contain more letters than they can easily memorize tend to focus on the initial letter. Children with short names distribute their attention more evenly across the letters.

In justifying their decisions, the younger preschoolers mentioned the spelling or the letters in the display 49% of the time, pooling over all display types. The rate of such explanations was 60% for the older preschoolers. Davis, for example, rejected OAVIS as a spelling of his name, saying that his name starts with *D*. Both groups gave letter-based explanations more often for the incorrectly spelled versions of the name, the ones that they tended to reject, than for the correctly spelled versions. For the younger preschoolers, but not the older ones, mentions of spelling were somewhat more common when the first letter was altered than when a medial or final letter was altered (55% as compared to 50%) and when the substituted letter was visually dissimilar to the correct one than when it was similar (58% versus 48%).

Discussion

Even the younger preschoolers, who were less than 4 years of age on average and most of whom could not read any real words, had some knowledge about the shapes of the letters in their own names. These children were less likely to accept versions of the name that contained a single incorrect letter than versions that contained all correct letters. This result shows that young preschoolers' knowledge about their own names extends beyond the characteristics that are shared

by all words in all writing systems, such as linearity and lack of iconicity. Had we used displays with both uppercase and lowercase letters, good performance could have been attributed to sensitivity to overall word shape, as when May prefers May to Mab because the word's envelope has a different shape in the two cases. Such an explanation becomes less tenable with the all-uppercase displays used here. It appears that the children were knowledgeable about the shapes of the individual letters in their names and not just the overall word shape.

The younger preschoolers knew more about the shape of their name's first letter than about the later letter shapes. Supporting this conclusion, they rejected variants of the name with initial substitutions at higher rates than variants with medial or final substitutions. No effect of visual similarity was found for first letter substitutions, suggesting that the children had a relatively detailed knowledge about the first letter's shape. With medial and final substitutions, in contrast, the young preschoolers were more often misled by similarly shaped letters than by differently shaped ones. Previous studies, as mentioned earlier, have found mixed results on the question of whether word-initial letters have a special status for young children (Bowman & Treiman, 2002; Ehri & Wilce, 1985; Levin & Aram, 2004; Masonheimer et al., 1984; Share & Gur, 1999). But none of the earlier studies examined the word that children know best—their own first name. With at least this word, even young nonreaders give priority to the first letter. Detailed knowledge of letter shape emerges first for the initial letter of the name and later extends to the subsequent letters. This early evidence of left-to-right directionality among children exposed to English suggests that knowledge of language-specific characteristics can emerge quite early, at least in the context of personal names.

General Discussion

There are a number of things that preschoolers cannot do with regard to reading and writing. Many of them cannot recognize common words such as *book* or *stop*, and they cannot

sound out words either. However, as researchers in the constructivist and emergent literacy traditions (e.g., Ferreiro & Teberosky, 1982; Sulzby, 1985) have pointed out, even unschooled children may possess some knowledge about writing. The goal of the present study was to better understand the nature and development of this knowledge. We asked whether preschoolers' understanding of the visual characteristics of print was better than anticipated on the basis of previous studies when children are tested with the kinds of words they know best, personal names.

When we tested children with personal names, we found that even nonreaders of less than 4 years of age have some knowledge of certain graphic characteristics that apply to English but that are not universal. These include the stock of letters used for English, the horizontal orientation of its writing, and its left to right direction. Such children also have some knowledge about the specific letter shapes in their own names, especially the shape of the first letter. Thus, children learn quite early about certain language-specific features in the domain of personal names. That preschoolers did not show a reliable preference for vertically oriented names over diagonal names does not support Tolchinsky's (2003) idea that knowledge of the universal graphic properties of writing emerges earlier than knowledge of language-specific features.

The universal graphic characteristics of writing reflect its language-symbolizing function, and a finding that children learn about the universal characteristics before the language-specific ones would have supported the idea that children's learning is molded by an understanding of writing's basic nature. But many young children do not seem to understand that writing symbolizes language, believing instead that it represents meaning directly, much as pictures do (e.g., Bialystok, 1991, 2000). Children may thus focus on the visual characteristics of writing, learning first about those characteristics that are visually salient and that attract attention. Supporting this view, our results suggest that learning of letter shapes in personal names proceeds from general to detailed and, for writing systems with a left-to-right direction, from left to right.

Even before the age of 4, nonreaders in our population have a relatively complete knowledge of the shape of their name's first letter. Children pay more attention to the first letter of their name than to the other letters, and so their knowledge of the other letter shapes is fuzzier. Thus Brendan may accept M for N in the middle or at the end of his name, but not C for N. By the age of 5, children remember even the middle and end letter shapes in some detail. The specific ages at which children achieve these milestones may be different among children who have less exposure to print than the children studied here. But we would expect the sequence of development—general to detailed and left to right, as opposed to language-universal to language-specific—to be the same among a variety of groups.

Researchers and educators have often assumed that children learn about writing primarily from being read to and observing the print in books (e.g., Pick, Unze, Brownell, Drozdal, & Hopmann, 1978). However, our results show that some of what preschoolers have learned about the visual appearance of personal names does not match the writing they see in books. Forms like Sam appear in books, but the older preschoolers in our studies preferred forms like SAM. This preference appears to reflect children's experiences at home with names and letters. The parents we surveyed used all-uppercase spellings such as SAM over half the time when showing children their names and teaching them how to write the names. Preschool teachers are less likely to use all-uppercase forms on name displays in classrooms, although they do this some of the time. Given that printing the name is the most frequent literacy-related activity in which children engage at home and the activity that is most likely to be initiated by the child (Levy et al., 2006), it would seem that parents' early practices in this regard are more influential than preschool teachers'. The limited impact of book print in our study is consistent with recent findings that preschoolers spend little time looking at words in books and much more time looking at pictures (Evans & Saint-Aubin, 2005; Justice et al., 2005).

The differences that we found among younger preschoolers, older preschoolers, and kindergarteners reflect differences in experiences, not age per se. Kindergartners appear to be influenced by exposure to book print. Most could read simple words that commonly appear in books, and they preferred names with the capitalization pattern typical of book print. Preschoolers, in contrast, appear to gain much of their knowledge about writing from sources other than books. Prominent among these, we suggest, is exposure at home to the spelling of their names. We found differences between younger and older preschoolers even when we restricted our analyses to nonreaders. For example, older preschool nonreaders were more knowledgeable about the letter shapes in their names than younger preschool nonreaders. These group differences do not reflect age itself but differential experience with personal names. The results suggest that reading tests using "book words" do not fully capture differences among unschooled children in the knowledge they possess about certain critical aspects of writing.

Existing tests designed to assess young children's knowledge about writing, which are often called concepts-of-print tests, may also fail to capture important differences among children. This is because the tests are usually based on book print. Children are read to from a specially designed book and are questioned about the direction of reading, the location of the front of the book, and so on (e.g., Clay, 2002; Justice & Ezell, 2001). Our findings suggest that assessments based solely on book print miss some of the knowledge that preschoolers possess and, indeed, some of the knowledge that is best developed at this age. Most concepts-of-print tests, for example, do not examine children's knowledge about their own names. Procedures similar to those used here could be developed to do so, including distractors that contain numerous incorrect letters as well as those that differ more subtly from the conventional version. Children show some knowledge about their own names at a time when they show little knowledge about other words, and this early knowledge of names may help set the stage for later learning.

Our findings point to a need to disentangle the abilities that are typically grouped together under the rubric of concepts about print. Some concepts, such as the knowledge that English names are written with an initial uppercase letter followed by a series of lowercase letters, emerge relatively late. Other concepts, such as the knowledge that English names are arranged horizontally, emerge quite early. Young children's performance on existing concept-of-print tests helps predict their phoneme awareness and their learning of sound–letter mappings, giving us the potential to identify children who may have problems learning to read (e.g., Lomax & McGee, 1987). To realize this potential, it will be important to learn more about the specific abilities and types of knowledge that young children possess about print. Unpacking the abilities that are involved in phonological awareness and sound–letter mapping has been valuable for researchers and educators, and we believe that the same is true for the visual aspects of writing.

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Author Note

Table 1

Background Information About Children in Each Experiment

Exp.	Measure	Younger preschoolers	Older preschoolers	Kindergartners
1	*N*	19	17	15
	Mean age and range	3;7 (3;2 to 4;0)	4;11 (4;5 to 5;4)	6;2 (5;4 to 6;9)
	Number of words read (max. = 22), range, and standard deviation	0.26 (0 to 3; 0.81)	0.41 (0 to 3; 0.80)	13.80 (0 to 22; 8.45)
2	*N*	38	34	30
	Mean age and range	3;8 (3;2 to 4;3)	4;10 (4;4 to 5;6)	6; 2 (5;4 to 6;10)
	Number of words read (max. = 22), range, and standard deviation	0.42 (0 to 7; 1.33)	1.62 (0 to 22; 4.06)	13.57 (0 to 22; 8.14)
3	*N*	41	37	—
	Mean age and range	3;9 (3;1 to 4;3)	4;11 (4;4 to 5;11)	—
	Number of words read (max. = 22), range, and standard deviation	0.79 (0 to 18; 2.92) [a]	1.95 (0 to 21; 4.34)	—
4	*N*	56	48	—
	Mean age and range	3;9 (3;2 to 4;3)	5;0 (4;4 to 5;11)	—
	Number of words read (max. = 22), range, and standard deviation	0.21 (0 to 4; 0.76)	1.56 (0 to 21; 3.96)	—

[a] Two of the children in this study did not take the word and picture reading test.

Table 2

Mean Proportion Selections of First-Listed Display for Each Pair Type in Experiment 1

Pair type	Younger preschoolers	Older preschoolers	Kindergartners
Ab vs. ab	.54	.69*	.59
Ab vs. AB	.49	.35*	.66
Ab vs. aB	.50	.56	.72*
ab vs. AB	.44	.35*	.61
ab vs. aB	.50	.41	.72*
AB vs. aB	.53	.75*	.40
Latin vs. non-Latin letters	.89*	.97*	1.00*

*significantly different from chance (.50), $p < .05$.

Table 3

Mean Proportion of Times Selected for Each Capitalization Pattern Overall in Experiment 1

Capitalization pattern	Younger preschoolers	Older preschoolers	Kindergartners
Ab	.51	.53	.66*
ab	.47	.36*	.58
AB	.54	.68*	.38
aB	.49	.42*	.39

*significantly different from chance (.50), $p < .05$.

Table 4

Proportion Affirmative Responses for Each Display Type in Experiment 2

Display type	Younger preschoolers	Older preschoolers	Kindergartners
Ab	.79	.74	.93
ab	.63	.38	.50
AB	.79	.91	.50
aB	.76	.26	.33

Table 5

Proportion Affirmative Responses for Each Display Type in Experiment 3

Display type	Younger preschoolers	Older preschoolers
Horizontal	.95	.92
Vertical	.66	.43
Diagonal	.60	.42
Nonlinear	.44	.24

Table 6

Proportion Affirmative Responses for Each Display Type in Experiment 4

Display type	Younger preschoolers	Older preschoolers
Correct	.93	.92
Similar initial	.30	.13
Dissimilar initial	.30	.13
Similar medial	.55	.17
Dissimilar medial	.45	.13
Similar final	.52	.13
Dissimilar final	.41	.10