Running head: TRUST IN TEXT

Reading to Learn: Pre-readers’ and Early Readers’ Trust in Text as a Source of Knowledge

Elizabeth J. Robinson
University of Warwick, UK

Shiri Einav
Oxford Brookes University, UK

Amy Fox
University of Warwick, UK

Corresponding author:
Elizabeth J Robinson,
Department of Psychology,
Warwick University,
Coventry CV4 7AL,
UK.
email e.j.robinson@warwick.ac.uk

Developmental Psychology, in press June 2012
Abstract

Literacy gives children an opportunity to benefit from others’ knowledge and experience that far exceeds what they can achieve when reliant on learning orally via personal encounters. Little is known about young children’s understanding and use of print as a source of knowledge. Three experiments investigated children’s use and understanding of printed names as sources of information about the identity of unfamiliar targets. Children in Experiment 1, (N = 34 aged 5 years; 5 months to 7;05) proactively used printed labels to correct their guesses. In Experiment 2 (N = 86 aged 3;07 to 6;02) early readers offered a picture strip with labels (illegible to them) rather than one without labels to help a doll identify the target. Younger pre-readers showed no such preference. In Experiment 3 (N = 69 aged 3;02 to 6;02), early readers believed oral suggestions backed up with labels (illegible to them), over suggestions without such backing. Younger pre-readers less frequently showed such trust in the reliability of information gained via print. Children may treat print as a reliable source of knowledge as soon as they can decode print for themselves, but not before.

Keywords: Testimony; literacy; print; trust; knowledge.
As humans we have the unique advantage of being able to learn about the world indirectly from other people who are ready to pass on their own knowledge. In this way we benefit from others’ experience. A great deal of information is of course passed on orally, but members of literate societies can also learn via print media. In UK, children are taught to read at the age of four to five years. This opens up for them the possibility of learning both truths and untruths about the world not only from what people around them can tell them, but from vast resources of printed material that have been written by experts they will never meet. Literacy bestows on the child a capacity to benefit from others’ knowledge and experience that goes way beyond what she could achieve when reliant on learning orally via personal encounters. A young reader can become an expert in her own right in a specialist area about which no adult in her social milieu is familiar, thanks to knowledgeable authors who may be distant or dead, who have shared their knowledge via print. On the other hand she can also become misinformed in ways that are potentially dangerous.

We know little of early readers’ understanding that printed material can fill a gap in their knowledge (but see Neuman, 2001, on the scarcity and value of informational books in primary school classrooms), and nothing about the trust they place in the likely accuracy of what they read. When do children in a literate society realise the knowledge-providing potential of print? It could well be that this happens before children can read, since pre-readers will witness others using print media such as text messages and the internet, if not books and newspapers, to gain factual information. On the other hand, perhaps children remain unaware of print as a source of knowledge until they can read for themselves. There may even be a period when children can read and gain knowledge from print yet still remain unaware of print as a source of knowledge, just as children who learn from oral testimony
may not be aware of the source of their knowledge (Taylor, Esbensen & Bennett, 1994; Robinson & Whitcombe, 2003).

In the three experiments reported here we examined for the first time young children’s use and understanding about print as a source of information. Given how little we know about this, in Experiment 1 we began with a basic check on whether young readers proactively made the effort to read printed labels to correct their guess about the identity of an unfamiliar target. That is, did they make use of printed information when the only alternative was to guess? In Experiment 2 we investigated pre-readers’ and early readers’ understanding that another individual who could read, could gain knowledge via the printed word.

Finally, in Experiment 3, we pitted information read aloud from print against oral information not backed up by print. Importantly for our purposes, the print was positioned so readers could not read it themselves, so pre-readers were not disadvantaged. Would children treat one source as more reliable than the other? Pre-readers and early readers have much more experience of gaining accurate information from what people tell them than from reading, and so they might show no greater trust in orally conveyed information that is backed up with print. On the other hand, children might have observed that print media are often used as reliable sources of factual information, and so might place greater trust in a suggestion backed up by print. Additionally, the mere physical presence of print might give it authority over transient speech. In our procedure, although the printed labels were positioned so children could not read them, they could see that there were labels present.

Our assumption was that other things being equal, individuals would trust information backed up with print over information that was not. Suppose on a visit to the zoo we encounter an unfamiliar animal. One spectator tells us “It’s a tapir.” Another consults the label on the cage and announces “The label says it’s an elephant mouse.” Our intuition is that we would trust the latter suggestion, even without being able to check the label for ourselves.
Einav, Robinson and Fox (nd) report results consistent with this assumption: Adults were more confident in the truth of printed assertions without speech marks than in the truth of those same assertions printed with speech marks. Do pre-readers and early readers show similar selective trust in oral information supported by print?

The answer to this question will add to what we know of young children’s ‘epistemic vigilance’ (Sperber et al., 2010). If children are to achieve the maximum benefit from their ability to learn from others, they need to manage the risk that information passed on is inaccurate. If they are too trusting they could believe what is false, but if they are too suspicious they might disbelieve what is true. A growing body of literature shows that by the age of three to four years children have in place a range of appropriate criteria for evaluating the likely truth of what others say to them. For example three- to four- year olds are more likely to believe factual information about a hidden object’s identity from a speaker who has access to relevant information than from one who lacks such access (Nurmsoo & Robinson, 2009a; Robinson, Champion & Mitchell, 1999; Robinson & Nurmsoo, 2009; Robinson & Whitcombe, 2003, but see Nurmsoo & Robinson, 2009b and Robinson, Butterfill & Nurmsoo, 2011, for limitations in children’s epistemic vigilance concerning an informant’s knowledge). Three- to four-year olds are more likely to learn the name of an unfamiliar object from a speaker who was previously accurate at naming familiar items than from one who was inaccurate, (Birch, Vautier & Bloom, 2008; Jaswal & Neely, 2006; Koenig, Clement & Harris, 2004; Koenig & Harris, 2005; Nurmsoo & Robinson, 2009b). In all the studies listed above, children’s rejection or ignoring of an informant’s oral suggestion was justifiable on the basis of variables associated with the informant herself, such as a history of unreliability, obviously inadequate informative access, or an explicit expression of uncertainty. In contrast, in the zoo example above and in Experiment 3 below, the child listener is faced with two oral informants about whom there is nothing to raise suspicions.
The only feature that differentiates them is that one has print support for her suggestion, print that cannot be read by the listener herself. Do children assume that a suggestion from an informant using textual support is more trustworthy than a suggestion from someone who relies on her own knowledge base?

**Experiment 1**

Beginning readers use pictures of familiar items to help them identify what an accompanying word says. Do children at this early stage of literacy also do the reverse, realizing that they can gain new knowledge from printed words, and identify an unfamiliar picture by reading its accompanying label? Given the emphasis in the early years’ classroom on the accurate decoding of print as an end in itself, early readers might not spontaneously make the effort to use print to identify an unfamiliar target. In the UK early years curriculum, one of the learning targets is that by the end of their first year of formal schooling, children will understand how information can be found in non-fiction texts, although it is unclear to what extent classroom teachers, with their focus on teaching children how to read, routinely make explicit to children why they learn to read: One important reason is that it gives them access to powerful sources of factual information. Quite apart from any explicit reference to this, early readers are likely to have observed other people’s use of print media to gain information, and this might be sufficient for them to realise that they can gain knowledge from print. The aim of Experiment 1 was to establish whether or not early readers proactively took the opportunity to use printed labels to correct their guess about the identity of an unfamiliar target.

In this and the subsequent experiments, our classifications of children by age were based on their school year (which begins in September in UK) rather than on chronological age (beginning in January), since we assumed that classroom experience with print would be more relevant to their performance in our tasks than age per se. For example, children aged
four years would have very different learning experiences relevant to literacy depending on whether they were still in their nursery year, or in the reception year.

**Method**

**Participants.** Participants were 34 children: 18 (8 boys, 10 girls) in their second year of formal schooling ($M_{age} = 6;0$, age range: 5 years 5 months - 6;05), and 16 (8 boys, 8 girls) in their third year of formal schooling ($M_{age} = 7;0$, age range: 6;06 - 7;05). In this and the subsequent experiments, children attended primary school in predominantly middle class areas of the UK midlands, were nearly all white and spoke English as their first language. No child took part in more than one experiment.

**Materials.** We used two commercially available picture books. One had a page showing a typical scene of a kitchen with many familiar items; the other book had a page of unfamiliar underwater creatures. A laminated strip showed four of the underwater creatures with accompanying names: cuttlefish, dolphin, mantra ray and snapper.

**Procedure.** The session began with children, tested individually in a quiet space near their classroom, being asked to point to familiar items from the kitchen scene in the first picture book. The second picture book was then introduced, and opened at a page showing many unfamiliar underwater creatures. Children were asked to point to the cuttlefish, and if necessary were encouraged to guess. Given the large number of items on the picture, the chance of a child pointing correctly was small, and indeed none did so. As soon as the child had pointed, the experimenter said “Oh, I forgot to give you this” and placed the strip casually on the open page of the picture book. As if returning to the original question and without any implication that the child’s initial guess was wrong, the child was asked “Which do you think is the cuttlefish?” We were interested in whether children spontaneously made use of the strip to attempt to identify the word cuttlefish and then to correct their initial guess. Importantly, although the strip with labels was within their line of sight, children had to make
deliberate effort to position the strip so they could attempt to read the labels, and for most of them the task of reading the labels was far from trivial. Finally, children were asked to justify their choice. For half the children this task followed another task and for half this was their first task. This other task is mentioned in the discussion of Experiment 3 below.

**Results and Discussion**

All but two of the children (N =32) modified their choice of the cuttlefish having used the words on the strip, although two of these made an error with their reading and pointed wrongly. The remaining 30 children correctly identified the cuttlefish and corrected their initial wrong guess. Hence nearly all these early readers spontaneously treated printed words as a reliable source of information, more accurate than their own previous guess. Eleven of the children explicitly mentioned the word when asked to justify their choice, saying for example “I read it and saw those are the same” (picture on strip and in book); “because it says cuttlefish”; “it starts with a c”. Most of the remaining children gave ambiguous justifications such as “I had that (strip)” and “that one is that one (picture on strip matches choice in book)” which imply that the strip somehow supplied them with the correct answer but did not explicitly refer to the word.

In conclusion, the early readers in Experiment 1 showed clear evidence that they treated printed words as reliable sources of new knowledge, and proactively used them to correct guesses about the identity of an unknown target. What of pre-readers in a literate society, who are likely to have witnessed other people using print sources to fill gaps in their knowledge? Might they also realise that print can provide knowledge to those who can read? In Experiment 2 we found out.
Experiment 2

The aim of Experiment 2 was to examine pre-readers’ and early readers’ understanding that someone else can gain knowledge by reading. The children’s task was to help a doll (that had demonstrated fluent reading) identify a target from a set of pictures of unfamiliar items. The child helped by giving the doll one of two picture strips. Both strips contained thumbnail versions of the main set, but one strip also bore the printed labels for each picture whilst the other strip had only asterisks in place of the labels. Importantly the children were not permitted to read the words themselves. We wanted this strip choice task to be equally accessible to children who could and could not read and we were interested in children’s understanding that knowledge can be gained from print rather than in their ability to gain knowledge in practice.

In order to find out how this understanding related to children’s reading ability, we assessed children’s reading ability in two ways. The first was a tailor-made word - picture matching task which could be passed by children who were at floor on standard word reading tests and allowed us to identify children on the very brink of being able to read. The second, given only to those who performed well at the matching task, consisted of words taken from the Early Word Recognition Test (Hatcher, Hulme & Ellis, 1994).

Participants. The sample consisted of 29 nursery children, 13 girls, 16 boys ($M_{\text{age}} = 3;07$, age range: 3;03 – 4;02); 28 reception children (16 girls, 12 boys) in their first year of formal schooling ($M_{\text{age}} = 4;08$, age range: 4;03 – 5;02); and 29 year 1 children (10 girls, 19 boys) in their second year of formal schooling $M_{\text{age}} = 5;08$, age range: 5;03 – 6;02).

Materials. We used a small wooden doll resembling a child of indeterminate gender aged around 6 to 7 years. A child’s story book was used for the doll to demonstrate fluent reading. For the practice and test trials of the strip choice task we used five A4 sized laminated sheets each bearing six colored pictures (insects, birds, animals, fruit, vegetables,
and underwater creatures), and five pairs of laminated strips. Each laminated sheet had a pair of matching strips that bore thumbnail versions of the pictures. One strip had labels in font size 9pt beneath each picture, and the other had a row of asterisks (‘stars’) in the same positions and font size. On each sheet and matching strip there were two items we expected to be familiar and four unfamiliar. One of the unfamiliar items was designated the target, with a second in reserve should any child know the first target. For example, on the bird sheet were robin and swan (familiar), with condor as the unfamiliar target and crane as the reserve. The positions of the familiar items varied across the sheets.

The word - picture matching task consisted of one demonstration trial, with a picture of a book and two separate label cards, *book* and *ball*, printed in font size 22 pt. For each of three test trials there were two pictures of familiar items, for example flower and shoes, and four separate label cards two of which were fillers, for example *hat* and *train*. The third test trial (only) had two word cards beginning with the same letter sound, *car* (pictured) and *cake* (filler). Hence a child could gain a score of 5 out of 6 just by recognizing the initial letter sounds for the pictured items.

The Early Word Recognition Test (Hatcher et al, 1994) consisted of three sheets each printed with six words in font size 22pt.: Card 1: *up, everyone, do, kangaroo, no, policeman*; Card 2: *red, elephants, me, mummy, my, playing*; Card 3: *it, driver, to, house, mum, down*. In this test, children had to decode printed words with no contextual cues.

**Procedure.** The experimenter introduced the doll to the child and explained that it was going to read to them. The doll, operated by the experimenter, then read fluently a few sentences from the story book, and the experimenter thanked the doll for its good reading. The *practice trial* for the strip choice task followed. The experimenter showed the child the sheet with the insect pictures and asked her to point to the ladybird and the spider. The experimenter then showed the child the matching strips, explaining “Look at these strips. All
the pictures (pointing to the pictures on the main sheet) are on here. One of these strips has stars on it and the other has names on it. See, this one says ladybird (pointing to the printed label).” The experimenter then pointed to an unfamiliar item on each of the strips and asked the child to identify the matching item on the main sheet. The aim of this practice was to ensure children understood the relationship between the strips and the picture sheets used on the subsequent test trials.

On each of four test trials of the strip choice task, the child was shown the picture sheet and identified one familiar item. This was to maintain interest and enjoyment and to encourage children to attend to the set of pictures on the sheet. The two matching strips were introduced, and the child was reminded that they contained all the same pictures as on the sheet, and that one had the names of the pictures on it and the other had stars. Importantly, and differently from the practice trial, the experimenter held the strips up and moved each one around as she referred to it, so that the child could see that there were names on the strip but did not have the opportunity to read them. (An adult observer confirmed that the letters could not be read so even partial information was not available to the child participant.) The doll was then asked to point to one of the unfamiliar targets, for example a condor, and operated by the experimenter, responded “I don’t know what a condor is.” The child was asked if she knew. On the few occasions that a child pointed correctly, this part of the procedure was repeated with a second unfamiliar target, for example a crane. Once the child’s ignorance had been established, the child was invited to help the doll: “One of these picture strips can help doll find the condor. Which one will be best to help doll find the condor, the one with the names or the one with the stars?” Order of mentioning the names and the stars was counterbalanced between children. Once the child had chosen a strip for the doll this was laid to one side with the picture sheet, with the promise “OK, we’ll help doll find out in a minute.” This procedure was followed for another three trials. After all the test trials had been
completed, to bring the game to a satisfactory conclusion, the experimenter brought back the picture sheets with their strips, allowed the child to try and find the targets, and showed her the correct answers.

The experimenter then demonstrated the word - picture matching task by showing the child how to place the correct word card immediately beneath the picture of the book. On each of three test trials, the experimenter named each of the two pictures as she laid them out, placed the four word cards in random order, and invited the child to find the word for each picture. Children who matched at least four of the six words correctly in the word recognition test were then given the Early Word Recognition Test. This criterion for giving the word reading test was based on pilot work, and our aim was to minimise the number of children given a task on which they could make no response without risking missing children who could identify words without contextual support. For each of the three sheets of words, the experimenter said “Can you tell me any words that you know on the sheet?” The experimenter noted how many words the child read correctly.

**Results**

Each child gained: (i) a names strip score between 0 and 4 based on the number of times she chose the strip with names to help the doll find the four unfamiliar items in the strip choice task; (ii) a word matching score between 0 and 6 based on the number of correctly placed words on the word - picture matching task. We classified word matching scores of 5 or 6 as passing and scores between 0 and 4 as failing; (iii) a reading score between 0 and 18 based on the number of words the child read correctly in the Early Word Recognition Test (for children who scored at least 4 on the word - picture matching task). The mean scores and standard deviations for each age group appear in Table 1.

Not surprisingly older children performed better at reading: None (0%) of the 29 3- to 4-year-old nursery children passed the word - picture matching task, 8 out of 28 (29%) 4- to
5-year old reception children did so, and 27 out of 29 (93%) 5- to 6-year-olds year 1 children. Even these oldest children were far from expert readers however: Only 3 children gained the maximum score of 18 on the words from the Early Word Recognition test.

We began by analysing the frequency of children choosing the strip with names to help the doll identify the unfamiliar items. The names strip scores of the 5- to 6-year-olds were above chance: $t(28) = 7.89, p < .001, d = 2.98$. while those of the two younger groups were not above chance. Children who passed the word - picture matching task ($N = 35$) were above chance at choosing the strip with names: $M = 3.29 (SD = 1.10); t(34) = 6.92, p < .001, d = 2.37$. In contrast, children who failed the word - picture matching task ($N = 51$) were not above chance: $M = 1.96 (SD = 1.34)$. For children who were given the 18 words from the Early Word Recognition test, when age in months was controlled there was no significant correlation between reading test score (number of words identified correctly) and names strip score: $r(41) = .16, p = .31$. This suggests that better reading skill as assessed by success at identifying printed words with no surrounding contextual cues gave no additional advantage for names strip score. For this reason reading test scores were not considered further and scores on the much easier word - picture matching task were used as our measure of early reading ability.

Next we made comparisons between groups based on age and on word matching scores. A preliminary check using ANOVA showed no significant effects of order of presentation of picture sheets or of whether the strip with names or the one with stars was mentioned first, so these variables were ignored in subsequent analyses. An ANOVA on names strip scores with age group (nursery, reception, year 1) as a between-subject factor showed a significant effect of age group: $F(2,83) = 13.11, p < .01$, partial $\eta^2 = .24$.

Bonferroni post hoc tests showed no significant difference between nursery 3- to 4-year-olds and reception 4- to 5-year-olds, with the year 1 5- to 6-year-olds significantly more likely
than both the younger groups to choose the strip with names (Year 1 versus reception, $p = .01$; year 1 versus nursery, $p < .01$). However, when word matching score was added as a covariate in an ANCOVA, there was no significant effect of age group but the covariate was significant: $F(3,82) = 6.26, p = .01$ partial $\eta^2 = .07$. Results were consistent when word matching scores (pass, fail) were entered into an ANOVA as a between-subjects factor: $F(1,84) = 15.01, p < .001$, partial $\eta^2 = .15$. With age in months added as a covariate in an ANCOVA, the covariate was nonsignificant and word matching score was marginally significant: $F(1,83) = 3.1, p = .08$.

**Discussion**

Children in the two youngest age groups, the great majority of whom failed the word-picture matching task, showed no preference for the strip with names to help the doll identify the unfamiliar targets. In contrast, the oldest age group, 5- to 6- year olds, 93% of whom passed the word-picture matching task, preferred the strip with names. Results of the analyses of covariance suggest that it was early reading ability as assessed by the word-picture matching task, rather than age, that predicted a preference for the strip with names. More advanced reading skill as assessed by the words from the Early Word Recognition test conferred no additional advantage.

Taken together, the results indicate that pre-readers failed to realise that the strips with names would help the doll identify the unfamiliar targets. Despite being surrounded by labelled pictures in their classrooms and being exposed to other printed material such as story books, these children did not differentiate between the strip with names and the strip with stars. On the other hand, children even at a very early stage of reading did understand that the strip with names would help. We cannot be sure just what these early readers understood. Importantly, the children could not read the names when selecting a strip to help the doll, so it was not children’s ability to identify the unfamiliar targets for themselves that allowed
them to judge that the names would help the doll. The weakest interpretation is that children who consistently selected the strip with names only knew that the presence of ‘names’ was somehow helpful. Maybe the presence of labelled pictures on their classroom walls and their general exposure to print materials had conveyed to them that there was something valuable about words, without yet understanding what that is. Yet in the nursery and primary school classroom stars are also an indication of something good. Furthermore, the pre-readers had also had exposure to words, and their classrooms were adorned with labelled pictures, yet the pre-readers seemed not to realise that the strip with names was more helpful than the one with stars.

A stronger interpretation is that children who consistently selected the strip with names understood that the names provided the doll with the information it needed. The close relationship with early reading ability might point to this stronger interpretation: It was only those who had begun to interpret the meaning of print for themselves who saw the value of the strip with names for the doll. Being read to and being exposed to print materials seemed to be insufficient; perhaps children had to experience gaining knowledge from print themselves in order to understand that it can help others.

An intermediate interpretation is that children judged what would help they themselves identify the target. Since pre-readers would not find the strip with names helpful, they did not choose it for the doll. In contrast, early readers judged that the strip with names would help them, and so they chose that for the doll. Whichever interpretation proves to be correct, it remains clear that pre-readers, despite their experience with printed material, do not yet realise that those who can read can gain knowledge from print. The results could have shown that pre-readers have learned that readers gain knowledge from print even though they themselves cannot yet gain knowledge by that route, but we found no evidence for this possibility.
Children who realise that other people (or rather a doll in the case of Experiment 1) can gain information from print, might also realise that somebody who has read information can pass it on to them. Suppose a doll used the strip with names to identify an unfamiliar target. Children might understand that the doll was now in a position to tell them which it was. Would they treat that doll as more reliable than one who relied on the strip with stars? In Experiment 3 we found out.

**Experiment 3**

The aim of this experiment was to find out if pre-readers and early readers treated an informant who had gained knowledge from reading as more reliable than one who had relied on her own knowledge base. Children received conflicting oral suggestions about the identity of an unfamiliar target from two doll informants, only one of whom had read the printed target name. Importantly, there was nothing to raise suspicions about the reliability of the doll informant who had no print support for its suggestion. None of the criteria that we know young children use to reject or ignore oral testimony were applicable: Participants had no information about either informants’ history of accuracy, the informants gave no indication of lack of confidence in their suggestions, and both could see the full set of potential targets (Birch, Vautier & Bloom, 2008; Jaswal & Neely, 2006; Koenig, Clement & Harris, 2004; Koenig & Harris, 2005; Nurmsoo & Robinson, 2009a; Robinson & Nurmsoo, 2009). The only grounds for preferring one doll’s suggestion over the other’s was that one doll’s suggestion was backed up with the printed label.

We made contrasting predictions. On the one hand, even pre-readers might have sufficient experience of people using print as reliable sources of information, to lead them to place greater trust in an informant who relied on print than one who did not. Even though pre-readers did not anticipate the knowledge-providing potential of the strip with names in Experiment 2, they might recognize the greater authority of a suggestion backed up by a
printed label. On the other hand, even early readers might give no greater weight to an informant who relied on print than one who relied on her own knowledge base. Young children have had years of experience receiving oral information before they experience print sources, and so they might not treat print sources as more reliable even though they recognize that print can provide new knowledge (as we found in Experiment 2).

**Method**

**Participants.** In total 69 children participated. 16 children (11 girls, 5 boys) attended nursery classes, ($M_{age} = 3;08$, age range: $3;02 – 4;02$); 25 (13 girls, 12 boys) were from reception classes, ($M_{age} = 4;09$, age range: $4;03 – 5;02$); and 28 (15 girls and 13 boys) were from year 1, ($M_{age} = 5;09$, age range: $5;05 – 6;02$).

**Materials.** The stimuli were similar to those used in Experiment 2. This time we used two wooden dolls, one wearing blue and the other wearing red, two pointers, three A4 sheets of paper each with six printed coloured pictures, and three pairs of matching strips, one with names and one with asterisks (stars). The sheet and strips used for the practice trial were the same as in Experiment 2. The other two sheets each had one familiar animal (a swan and a crab) and five unfamiliar ones given fictitious names, one of which was the target. One unfamiliar target was an elephant mouse, given the fictitious name “koba”, and the other was a bush baby, given the fictitious name “neri”.

The word - picture matching task was similar to that used in Experiment 2 except that on all three test trials one of the filler words had the same beginning letter as one of the correct words, so on each trial children who relied on the beginning sound were at risk of making one error. We did not use the word lists from the Early Word Recognition Test, given its lack of predictive power in Experiment 2.

**Procedure.** Children were given a practice trial as in Experiment 2, followed by two test trials and the word - picture matching task. As before, the practice trial served to
familiarise children with the picture sheets and the fact that the strips had matching pictures, one with names and one with stars. As in Experiment 2, on the practice trial children were encouraged to look at the printed names and the stars on the strips. The test trials followed, with the order of sheets counterbalanced between children. At the start of the first test trial, one of the picture sheets was placed in front of the child and the two dolls were introduced by their colour. It was explained that the dolls were going to play a game with the child and experimenter. The experimenter explained that she was giving one doll a strip with the names of the pictures on it and the other doll a strip with stars instead of names. It was emphasised that each doll had the same pictures on their strip as the child had on the sheet in front of them. Importantly on the test trials the dolls and their strips were positioned so that the child could see that there were names or stars on the strip but could not read the names. Each of the fictitious names on the strip was the same length so the child could not identify them just from their outline. Next the child was asked to point to a familiar item on the sheet. The child was then told that the dolls were going to help them find an unfamiliar target, the neri or the koba. One doll then left the scene and the experimenter invited the remaining doll to find the target. That doll consulted its strip, laid its pointer towards one of thumbnail pictures with its accompanying name or stars, and said either “That’s a neri / koba” (if the doll had the strip with stars) or “That word says neri / koba” if the doll had the strip with names. That doll then left the scene leaving behind its strip with the pointer in place as an aid memoire. The second doll returned and in the same way selected a different item for the target. When she had done this, the first doll returned and both dolls sat above their strips with their pointers in place. Hence the child had heard one doll identify the target by printed name, “That word says...”, and the other doll identify a different item as the target by referring to the picture “That’s a....” Importantly the strips were still positioned so that the child could not read the words. The experimenter said “The dolls said different things didn’t they? Which doll do you think
is right?” After answering, the child was asked to point to the target on the sheet. This was to assess whether a child who judged the doll with the names strip to be correct, generalised her trust to a new context with no print present. Children who selected the doll with the names strip as correct and also generalized to the correct target on the sheet, met a strict criterion of trust in print sources. The second test trial followed, with the other doll being given the strip with names so that each doll had a turn with each strip over the two trials. The order in which the red and blue dolls responded and the order in which the strips were presented (stars or names first) was counterbalanced between children. The word - picture matching task followed as in Experiment 2.

Results

Each child gained a names strip score between 0 and 2 according to the number of times they judged the doll with the strip with names to be correct. On the majority of occasions when children selected the doll with the names strip, they went on to endorse that doll’s selection on the sheet, thereby meeting the names strip score strict criterion: 61 out of 83, 73%. Each child gained a word matching score between 0 and 6 based on the number of times they matched the correct word to the picture in the word – picture matching task. The mean scores for children in each of the age groups appear in Table 2.

As in Experiment 2, scores of 5 and 6 were taken as a pass at word matching. The numbers (percentages) of children in each age group who passed the word-picture matching task were 0 out of 16 (0%), 6 out of 25 (24%) and 25 out of 28 (89%) in nursery (3- to 4-years), reception (4- to 5- years) and year 1 (5- to 6 years) respectively. These are similar to those found in Experiment 2. Concerning names strip score (choosing the doll with the names strip), nursery children performed no differently from chance, whereas both the reception and the year 1 children performed above chance: t(24) = 2.22, p = .04, d = .91; and t(27) = 2.17, p = .04, d = .84, respectively. Note that we cannot make comparisons against chance using
the stricter criterion (choosing the doll with the names strip and endorsing that doll’s item on the large sheet), nor using the item selections alone, since it is unclear what to take as the baseline for guessing: Although there were five unfamiliar items to choose from, two of these had been made more salient by the dolls’ suggestions.

Comparing by reading ability, pre-readers (N = 38) performed no differently from chance on names strip score (choice of doll with names strip): $M = .92, SD = .85$, whereas readers who scored at least 5 in the word-picture matching task (N = 31) performed above chance: $M = 1.52, SD = .77, t(30) = 3.74, p = .001, d = 1.37$. That is, nursery children / pre-readers showed no preference between the two dolls, whereas reception and year 1 children / readers showed a consistent preference for the doll with the names strip.

Preliminary analyses using ANOVA showed no significant effects of presentation order although there was a marginally significant tendency for children to prefer the first suggestion made. Such a bias is not surprising amongst children who saw no reason to prefer one doll’s suggestion over the other, but who were forced to make a choice. Since the order in which the dolls made their suggestions was counterbalanced any such bias is unlikely to mislead us in the analyses that follow.

A oneway ANOVA with names strip score (choice of doll with names strip) as the dependent variable and age group (nursery, reception, year 1) as a between-subjects factor showed a significant effect of age group: $F(2,66) = 4.97, p = 0.01$, partial $\eta^2 = .13$. Post hoc tests with Bonferroni correction showed that the difference between the two youngest groups was significant ($p = .02$), as was the difference between the youngest and the oldest ($p = .02$), but there was no significant difference between the 4- to 5-year-olds and the 5- to 6-year-olds. When word matching score was included as a covariate in an ANCOVA, age group was no longer significant, $F(3,65) = 1.60, p = .21$. The covariate, word matching score, was marginally significant, $F(3,65) = 3.08, p = .08$. 
The influence of word matching score on names strip score was checked by an ANOVA with word matching (pass, fail) as a between-subjects factor: $F(1,67) = 9.10, p = .004$, partial $\eta^2 = .12$. When age in months was included as a covariate in an ANCOVA, word matching score not significant: $F(2,66) = 2.12, p = .15$, partial $\eta^2 = .03$ and age in months was nonsignificant ($p = .31$).

The ANOVAs and ANCOVAs were repeated using the stricter criterion for success on names strip score: To gain credit the child had not only to select the doll with the names strip but also endorse that doll’s suggestion on the sheet, thereby generalizing to a new context with no print present. The pattern of results was the same. The mean scores for each age group appear in Table 2.

**Discussion**

The overall pattern of results suggests that children aged between 4 and 6 years who have only rudimentary reading skills, treat an informant whose knowledge was gained from print as more reliable than an informant with no print support for their suggestion. Unlike Experiment 2, in Experiment 3 word matching score was not a significant covariate in the ANCOVA with age group as a non-significant between subjects factor, but this could be due to the names strip scores ranging only between 0 and 2 in this experiment, compared with a range of 0 to 4 in Experiment 2.

The results suggest that the ability to read rather than age may be the stronger predictor of children’s greater trust in the suggestion backed up with print, although the very close correlation between the two variables makes it difficult to tease them apart in our study. Most of the younger children who were pre-readers placed no greater trust in the suggestion backed up with print than the one without: They were at chance at selecting the doll with the names strip, while the older children who were early readers were above chance. Our tentative conclusion is that despite children’s years of experience at hearing and believing
accurate information from informants who rely on their own knowledge base, as soon as they can decode print for themselves, but not before, they treat a suggestion backed up with print as more reliable.

Another possible interpretation is that children mistrusted the doll with the ‘stars’ strip for some reason, and chose the doll with the ‘names’ strip to avoid that doll without realising any positive benefits of having access to the names. This is unlikely given the results of Experiment 2, in which early readers offered the strip with names to help a doll identify an unknown target. Further evidence against this interpretation comes from additional results from the children who took part in Experiment 1. These children were also given a task in which they guessed which picture showed an unfamiliar target and then a puppet offered a conflicting suggestion. For children in one condition the puppet had relied on a strip with names, whereas for children in a second condition the puppet relied on its own knowledge base. The great majority of children in both conditions (56 out of 65, 86%) trusted the puppet’s suggestion in that they used it to correct their guess, and in this between-groups design there was no difference between conditions in children’s readiness to accept the puppet’s suggestion. Yet when oral and print information provide conflicting information, as in Experiment 3, early readers, but not younger pre-readers, give greater weight to the informant who relied on print.

**General Discussion and Conclusions**

Children in literate societies are exposed from an early age to people gaining information from print sources. Even in families where books are absent, leaflets and magazines offer text-based information about consumables and services, emails and text messages can give information on the whereabouts, plans and activities of friends, and computers may be used to find out about films or prices of consumables and holidays. Yet for young children, most of the knowledge they gain from other people comes from oral
testimony not backed up by print sources. As mentioned in the introduction, by the age of four or five years children show appropriate epistemic vigilance towards oral testimony, and seem to be well on course to achieving a reasonable balance between the risks of believing what is false and disbelieving what is true. In UK this is the age at which children are taught to read. Acquisition of literacy brings further opportunities for learning about the world but also new risks of believing falsehoods. Our aim in the experiments reported here was to make the first investigation of young children’s use, understanding of, and trust in, print as a source of new information.

Clearly there is little need to engage in epistemic vigilance concerning print sources if children never think of using print as a source of knowledge. Early readers aged around five years took part in all three experiments, and we begin by considering their responses. In Experiment 1 we checked on early readers’ proactive effort to use printed names provided casually by the experimenter. Five-year-olds made the effort to read the printed labels to correct their guesses about the identity of an unfamiliar target, as did 6- to 7-year olds. In Experiment 2, even when they were not in a position to read the labels themselves, five-year-olds children judged that a doll would be helped to identify an unfamiliar target by being given a strip of named pictures rather than a strip without names.

The results of these two experiments suggest that early readers aged around five years do treat printed information as a source of knowledge, and so in Experiment 3 we pitted oral suggestions backed up with print against oral suggestions without print support, to find out whether children showed differential trust. Five-year-old early readers frequently accepted a suggestion made by a doll who used named pictures rather than one who relied on its own knowledge base. Even though these children were far from expert readers (in Experiment 2 children this age performed near floor on a standard test of word recognition), they realised that they themselves could gain new knowledge from reading, and they judged that another
person (or rather, a doll) who could read could gain new knowledge in that way, and that a person who had gained knowledge by reading could pass on reliable information to them.

What of the pre-readers aged three and four years? They could not take part in Experiment 1, but the results of Experiments 2 and 3 provide no evidence that they saw benefit in relying on printed labels as a way of identifying unfamiliar targets. In Experiment 2, they showed no preference for giving the doll the ‘strip with names’ over the ‘strip with stars’ to help it identify an unfamiliar target. In Experiment 3 they showed no preference for the doll with the names strip over the doll with the stars strip, and were significantly less likely than the older early readers to show greater trust in the suggestion backed up with print than the one without print support.

As mentioned above, the close relationship between age and reading ability within our UK samples means we cannot be confident that it is the acquisition of literacy, rather than age or school experience, that drives children’s trust in information gained via print sources. In particular, what teachers do or say when they teach children to read may be important. Nevertheless it is plausible that it is only when children can decode text for themselves that they really understand what it means to gain knowledge from print sources; the pre-reader’s experience of observing other people gain knowledge in this way may be insufficient. An analogy might be the understanding of the knowledge gained from touch by someone who has no sensitivity to touch: Merely being surrounded by people who talk about how things feel cannot convey the essence of the experience of gaining knowledge by feeling an object.

In order to draw confident conclusions about the causal factors in coming to understand print as a source of knowledge, it will be important to repeat our procedures using children who are taught to read later than in UK, yet who are still in formal education and are surrounded by print media. Such a comparison will allow us to tease apart the variables and allow us to explain children’s developing trust in the authority of text. A further point of
interest would be to examine children with reading difficulties, whose understanding of print
as a source of knowledge might also be delayed, although many such children would meet the
very rudimentary reading skills of the children whom we classified as early readers.

It would also be interesting to check on children’s trust in print not read aloud. In our
experiments the printed labels were read aloud so that we could include pre-readers as well as
early readers. It is possible that for early readers, printed information that is not read aloud is
given less authority than information conveyed orally: Jaswal, Croft, Setia and Cole (2010)
showed that three-year-olds were more trusting of an adult’s oral testimony from a visible
speaker than of an arrow placed by the adult to provide equivalent information. These authors
conclude that ‘Three-year-olds have a specific, highly robust bias to trust what people,
particularly visible speakers- say’ (Jaswal et al., 2010, p.1541). This raises the possibility
that early readers give less weight to printed words accessed only visually than the same
words when spoken without print support.

In the light of our results suggesting that trust in the reliability of information gained via
print appears very early in the acquisition of literacy, the question arises of when children begin to
demonstrate epistemic vigilance for print materials. Under what conditions might they be
suspicious of the truth of information conveyed via print? Most of the criteria young children apply
to oral testimony are not helpful for evaluating the likely truth of printed material (Birch, Vautier &
Bloom, 2008; Einav & Robinson, 2010, 2011; Grant & Mills, 2011; Jaswal, 2004; Jaswal &
Malone, 2007; Jaswal & Neely, 2006; Kinzler, Corriveau & Harris, in press; Koenig & Harris,
2005; Nurmsoo & Robinson, 2009a; Robinson & Nurmsoo, 2009). Young readers normally lack
information about authors’ past history of accuracy, access to relevant information, native versus
non-native accent, expression of confidence or uncertainty, age, area of expertise, author’s
perceived intention to inform, and author’s self-interest or possible bias. Indeed young children
may not even be aware that printed material has an author.
On the other hand, plausibility of content is one variable that can be taken into account both for oral and for printed information. Eyden, Robinson, Einav and Jaswal (nd) showed that early readers were more likely to accept an implausible suggestion about the identity of a hybrid creature when integral printed labels were read aloud than when the suggestion was made only orally; younger pre-readers were equally likely to believe the implausible suggestion under both conditions. However, plausibility judgments depend heavily on prior relevant knowledge, the very thing that early readers may lack, and so it is not obvious that plausibility will be a very useful criterion for evaluating the likely truth of printed information. Further work is needed to find out how and when children show epistemic vigilance for print sources. Unlike oral testimony, children may be heavily reliant on explicit teaching in order to achieve appropriate vigilance concerning the likely reliability of printed information.
References


Nurmsoo, E. & Robinson, E.J. (2009a). Children's trust in previously inaccurate informants who were well or poorly-informed: When past errors can be excused. *Child Development, 80*, 23–27. doi: 10.1111/j.1467-8624.2008.01243.x


Author note

Elizabeth J Robinson, Amy Fox (née Williamson), Department of Psychology, University of Warwick, UK; Shiri Einav, Department of Psychology, Oxford Brookes University, UK.

We are grateful to the staff and children of Tanworth, Mill Lodge and Tidbury Green nursery and primary schools for their help with the research reported here, to Ursula Richards who prepared the materials, and to Sarah Green who collected the data for Experiment 1.

Correspondence concerning this article should be addressed to Elizabeth J. Robinson, Dept of Psychology, University of Warwick, Coventry CV47AL, UK.
Footnote

¹ We are grateful to an anonymous reviewer for this suggestion.
Table 1. Experiment 2: Mean (sd) names strip scores, word matching scores and reading scores (Early Word Recognition Test) for children in each age group.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Names strip score (max = 4)</th>
<th>Word matching score (max = 6)</th>
<th>Reading score (max = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery: 3-4 yrs</td>
<td>1.72 (1.46)</td>
<td>1.52 (.91)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>n = 29</td>
<td></td>
<td></td>
<td>n = 1</td>
</tr>
<tr>
<td>Reception: 4-5 yrs</td>
<td>2.39 (1.25)</td>
<td>3.25 (1.69)</td>
<td>.87 (1.36)</td>
</tr>
<tr>
<td>n = 28</td>
<td></td>
<td></td>
<td>n = 15</td>
</tr>
<tr>
<td>Yr 1: 5-6 years</td>
<td>3.38 (.94)</td>
<td>5.76 (.68)</td>
<td>11.68 (4.18)</td>
</tr>
<tr>
<td>n = 29</td>
<td></td>
<td></td>
<td>n = 28</td>
</tr>
</tbody>
</table>
Table 2. Experiment 3: Mean (sd) names strip scores and word matching scores for children in each age group.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Names strip score (max = 2)</th>
<th>Names strip score strict criterion (max = 2)</th>
<th>Word matching score (max = 6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery: 3-4 yrs</td>
<td>.63 (.72)</td>
<td>.31 (.60)</td>
<td>1.69 (1.08)</td>
</tr>
<tr>
<td>n = 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reception: 4-5 yrs</td>
<td>1.36 (.81)</td>
<td>.92 (.81)</td>
<td>3.68 (1.44)</td>
</tr>
<tr>
<td>n = 25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yr 1: 5-6 years</td>
<td>1.36 (.87)</td>
<td>1.14 (.89)</td>
<td>5.54 (1.23)</td>
</tr>
<tr>
<td>n = 28</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>