

Reading to bilingual preschoolers: An experimental study of two book formats

Melanie Brouillard*

Daphnée Dubé*

Krista Byers-Heinlein

Concordia University

Author Note

Melanie Brouillard: orcid.org/0000-0002-7129-3221, melanie.brouillard@mail.concordia.ca

Daphnée Dubé: orcid.org/0000-0002-3022-3454, daphnee.dube@mail.mcgill.ca

Krista Byers-Heinlein: orcid.org/0000-0002-7040-2510, k.byers@concordia.ca

- *MB & DD contributed equally to this manuscript.
- DD conducted this work at Concordia University, but is now at McGill University.
- Correspondence for this article should be addressed to Melanie Brouillard, Concordia University, 7141 Sherbrooke St. W., SP-347.03, Montreal, QC, H4B 1R6. Email: melanie.brouillard@mail.concordia.ca

Data, Materials, and Code Availability Statement

The data, materials, and code that support the findings of this study are available at osf.io/yf8gx/?view_only=ab44925b9b904de7b8bbe11724909286.

Funding Statement

This work was supported by a Concordia University Research Chairs program grant to KBH, Natural Sciences and Engineering Council of Canada Discovery Awards to KBH (402470-2011, 2018-04390), the Natural Sciences and Engineering Council of Canada Undergraduate Research Summer Awards to DD and MB, and Fonds de recherche de Québec – Nature et technologies summer research supplement awards to DD and MB.

Conflict of Interest Disclosure

The authors have no conflict of interest to declare.

Ethics Approval Statement

This research was conducted in accordance with the Declaration of Helsinki and was approved by the Human Research Ethics Committee at Concordia University (approval # 10000439). Participants' parents provided written consent and participants provided verbal assent prior to participation.

Author Contribution Statement

- Contributed to conception and design: MB, DD, KBH
- Contributed to acquisition of data: MB, DD
- Contributed to analysis and interpretation of data: MB, DD, KBH
- Drafted and/or revised the article: MB, DD, KBH

Abstract

Reading stories to children provides opportunities for word learning. Bilingual children, however, encounter new words in each of their languages during shared storybook reading, and the way in which these words are presented can vary. We compared learning from two types of bilingual book materials: single-language books and bilingual books. Five-year-old French-English bilinguals ($n = 67$) were randomly assigned to hear an original story from a balanced bilingual experimenter in one of the two book formats. Children's learning of French and English labels for five novel objects embedded in the story was assessed via a pointing task. Children were successful at learning words in both languages, and performance was not affected by book format nor children's language proficiency. These results suggest that children are flexible word learners and that shared book reading — regardless of book format — is an effective way to teach bilingual children new words in two languages.

Keywords: bilingual, shared book reading, word learning, preschoolers, second-language learning, vocabulary

Highlights

- In a shared storybook reading task, bilingual 5-year-olds encountered new words in two languages via single-language or bilingual books.
- Word learning from the two book formats was compared. Both formats supported word learning, regardless of children's language proficiency.
- Bilingual children are flexible word learners and shared book reading — regardless of book format — supports bilingual literacy development.

Reading to bilingual preschoolers: An experimental study of two book formats

At storytime, all families decide what books to read, but only bilingual families also decide in which language they will read. If families choose to use both languages, they must also decide when to use each one: should they read one book in English and then another in French, or should they translate the story page-by-page? Does the child's proficiency in each language affect which words they will be able to learn? To date, there exists little research that can provide families with evidence-based answers. Here, we present an experimental study investigating how book format (single-language versus bilingual books) and children's language proficiency (proficient bilinguals versus second-language learners) affect word learning during shared book reading when a caregiver reads to their child.

Much of the previous research on shared bilingual book reading has investigated English-language learners in the United States, whose first language is Spanish. The focus has largely been on how shared book reading — whether in English or in the child's first language — can promote English language skills (see Fitton et al., 2018 for a meta-analysis). Within this context, reading to children in either English or a different home language supports early literacy skills, for example, concepts about print and letter knowledge (Hammer et al., 2003). This basic finding has been replicated in other bilingual populations (e.g., Chow et al., 2010; Kalia, 2007) and mirrors the benefits of shared book reading on monolingual children's literacy skills (e.g., Bus et al., 1995; Mol & Bus, 2011).

Beyond benefits for general literacy skills, it is equally important to understand the effects of shared book reading on bilinguals' vocabulary development, as this is a strong predictor of children's reading ability (Hammer et al., 2007; Snow et al., 1998). Some aspects of

READING TO BILINGUAL PRESCHOOLERS

literacy can readily transfer across languages (e.g., understanding the link between print and sound), but vocabulary is language-specific. Indeed, studies show that shared book reading is positively related to children's vocabulary size in the reading language, but this benefit does not transfer to the other language (Patterson, 2002; Quiroz et al., 2010). Thus, in order to learn words from both languages during shared book reading, both languages need to be used.

Given the language-specific nature of vocabulary learning, it is also important to ask what strategies are most effective for exposing bilingual children to both of their languages during shared book reading. We know that for monolinguals, word learning is increased when caregivers read interactively, for example by re-reading, defining words, asking questions, or pointing (e.g., Blewitt et al., 2009; Elley, 1989; Horst et al., 2011; Robbins & Ehri, 1994; Sénéchal, 1997; Sénéchal et al., 1995; Walsh & Blewitt, 2006; Whitehurst et al., 1988; Wilkinson & Houston-Price, 2013; see Flack et al., 2018 and Mol et al., 2008 for meta-analyses). These same strategies promote bilingual children's vocabulary knowledge in their non-dominant language (Collins, 2010; Pollard-Durodola et al., 2016; Quiroz et al., 2010; Roberts, 2008, Silverman, 2007) and may be even more effective in the dominant language (Walsh et al., 2012).

When two languages are used during book reading, these languages can be presented in different ways. Bilingual children may encounter their languages sequentially within the same storytime, for example, reading a story in one language and then in the other (e.g. Hu et al., 2012; Naqvi et al., 2013; Restrepo et al., 2012; Tsybina & Eriks-Brophy, 2010; Wolsey et al., 2018). Alternately, they may hear their languages intermixed within the same storytime, for example, when parents read bilingual storybooks that present both languages on each page, or when parents spontaneously translate single-language books (e.g., Ernst-Slavit & Mulhern, 2003;

READING TO BILINGUAL PRESCHOOLERS

Jiménez et al., 2006; Semingson et al., 2015; Simoncini et al., 2018). Yet, little is known about the effects of each bilingual reading method.

A few studies have investigated specific techniques used for bilingual book reading, for example, providing additional translations and explanations in a different language than the story. However, these studies have typically focused on outcomes in one language only, and findings have been mixed (Leacox & Jackson, 2014; Lugo-Neris Jackson, & Goldstein, 2010; Ulanoff & Pucci, 1999; Wood et al., 2018). Another technique is reading bilingual books with the two languages intermixed, which was found to lead to greater increases in the letter-to-sound knowledge of English learners compared to reading to them in English only (Naqvi et al., 2013). In another study, in which children heard a book with sentences in the dominant language with key words in the non-dominant language and a single-language book in the non-dominant language, older second-language learners learned more non-dominant language words in the intermixed book, and younger second-language learners learned more from the single-language book (Read et al., 2020). Finally, interactive book reading and vocabulary instruction in one language at a time has been found to promote vocabulary gains in each language when done with bilingual preschoolers with delayed language development (Restrepo et al., 2012; Tsybina & Eriks-Brophy, 2010). Yet, as most studies have focused on a single reading strategy, measured different outcomes, or outcomes only in one of the languages, there is a lack of research on which bilingual book reading approaches best support word learning in both languages. This study will compare word learning using two approaches to bilingual book reading: reading two single-language books successively (a book in one language after a book in the other language), versus reading one bilingual book (which presents both languages on each page).

READING TO BILINGUAL PRESCHOOLERS

We hypothesize that single-language and bilingual books will have different effects on word learning during shared book reading. Different reading strategies may engender different cognitive demands, which could in turn affect learning. Indeed, increased cognitive load has been shown to reduce word learning in studies of shared book reading to monolinguals. For example, word learning was impaired when children saw two storybook pages simultaneously (higher cognitive load) compared to when children saw one storybook page at a time (lower cognitive load; Flack & Horst, 2018). Similarly, differences in cognitive demands between single-language and bilingual books could affect word learning. However, there are different plausible predictions for the direction of this effect.

One possibility is that bilingual books will facilitate bilingual children's word learning compared to single-language books. Bilingual children must learn translation equivalents, which are cross-language synonyms such as English *dog* and French *chien*. Translation equivalent pairs might be easier to learn when encountered in close proximity, as they are in bilingual books. Research has shown that monolingual preschoolers learn better when the same novel word is presented repeatedly in successive sentences rather than spaced apart in time (Schwab & Lew-Williams, 2016). Switching monolingual children's attention between different objects creates discontinuity of reference, which impairs word learning (Schwab & Lew-Williams, 2018), possibly due to an increase in the cognitive load required to direct attention from one referent to another. Bilingual books provide more continuous reference than single-language books, as each object is discussed on a single occasion in both languages on the same page. Thus, we might predict that children would learn more words from bilingual books than from single-language books, as bilingual books limit referent switches and thus reduce referent-related cognitive load.

READING TO BILINGUAL PRESCHOOLERS

However, an alternate possibility is that single-language books better support word learning than bilingual books. While bilingual books maintain continuity of reference, they also necessarily involve frequent language mixing and switching. Children experience greater cognitive load and reduced word learning when they encounter language switches (Byers-Heinlein, 2013; Byers-Heinlein et al., 2017; Potter et al., 2018; Potter & Lew-Williams, 2019). These findings support the prediction that single-language books — which limit language switches and thus reduce cognitive load related to language switching — would better support word learning than bilingual books. Indeed, there is some direct support for this possibility: one study of school-aged children found that word learning in the second language was impaired when an immediate first-language translation was provided (Ulanoff & Pucci, 1999).

We hypothesize that children's language proficiency will also interact with how book format affects word learning. Most bilingual children have a dominant (most familiar) language and a non-dominant (least familiar) language. Each language's proficiency levels vary widely across children due to different ages of acquisition and amounts of exposure and use (Hoff et al., 2012; Thordardottir, 2011; Unsworth, 2013). Proficiency might affect how well children learn in each language or could interact with book format. For example, proficient bilinguals might easily learn words in both languages, but second-language learners might learn words better in their dominant language. As an example of an interaction, bilingual books might increase children's learning in their non-dominant language, but not in their dominant language (e.g., if the presence of the dominant language makes the story easier to follow). Thus, word learning could differ across children's two languages as a function of their proficiency and/or the format of the bilingual books.

Current study

The current study assessed bilingual children's word learning during shared book reading, comparing single-language and bilingual books. The bilingual sample consisted of 2 groups: proficient bilinguals, who were highly proficient in both English and French, and second-language learners, who were highly proficient in their dominant language but had limited proficiency in their non-dominant language.

In an experimental paradigm, children heard an original story with embedded novel words presented in one of two reading conditions: single-language books and bilingual books. There were five novel objects embedded in the story, named with phonetically distinct English and French labels. In the single-language book condition, children heard the entire story in French and then the entire story in English (or vice-versa), such that language only switched at one point in time. In the bilingual book condition, children heard the same story once, with the two languages interleaved such that both the English text and the French text were read on each page, resulting in 31 language switches. Importantly, the words encountered in each condition were identical, as children in both conditions heard the entire story once in French and once in English over the course of the reading session. What differed was whether the two languages were blocked (single-language books) or interleaved (bilingual book).

We measured children's learning of novel words in both languages through a pointing task. We assessed both the total number of words children learned in each language and the number of translation equivalent pairs that they learned (i.e., how often they learned both the French and the English label for each object).

Our primary research question was whether children would show different learning in the single-language versus bilingual book condition. We also investigated whether learning would

READING TO BILINGUAL PRESCHOOLERS

differ for each child's dominant and non-dominant language and as a function of whether they were proficient bilinguals or second-language learners.

Materials & Methods

This research was conducted in accordance with the Declaration of Helsinki and was approved by the Human Research Ethics Committee at Concordia University (approval # 10000439). Participants' parents provided written consent, and participants provided verbal assent prior to participation.

Participants

Participants were recruited from a database of interested families identified through government birth lists and the community, for example, events at libraries or recreation centers. Participants were pre-screened on the phone via parent interview for whether they met inclusion criteria, specifically that they were typically developing and had a high level of proficiency in French and/or English (discussed further below).

The final sample consisted of 67 (females = 37) typically developing French-English bilingual children ranging in age from 5.0 to 6.0 years ($M = 5.48$ years). Though we initially planned to analyze data in two separate studies, one study for proficient bilinguals and one for second-language learners, we ultimately decided to combine them for ease of reading and simplicity. Our sample slightly exceeded our target sample size of 64 children (16/ book condition/ proficiency group), which was determined prior to data collection based on a calculated average effect size in previous similar studies of $d = 1.07$ (*Cohen's d throughout*; Ard & Beverly, 2004; Horst et al., 2011; McLeod & McDade, 2011), and a target power of 80% to observe a difference between our two book reading conditions in an independent-samples t -test.

READING TO BILINGUAL PRESCHOOLERS

Testing was completed for the proficient bilingual group first. Three children subsequently recruited for the second-language learners group instead matched eligibility criteria for the proficient bilingual group on the day of their participation and were included, resulting in unequal groups and a slightly larger sample than planned (proficient bilinguals: $n = 35$, $M_{\text{age}} = 5.43$ years, $SD_{\text{age}} = 0.27$ years; second-language learners: $n = 32$, $M_{\text{age}} = 5.53$ years, $SD_{\text{age}} = 0.31$ years). All children were acquiring English and French and lived in the Montreal area, where both languages are widely spoken in everyday life and education is available in both languages. Participating families were from mid to high socioeconomic status (SES). Four additional children participated as pilot participants to assess the procedure's flow and feasibility and were not included in the analyses. An additional twenty children were tested but not included in analyses due to failure to meet language criteria (15), experimenter error (1), procedural non-compliance (2), and reported developmental delay (2). Participants' scores on the language measures discussed below are reported in Table 1.

Parent-reported language background

Children's English and French proficiency was measured via parental report given in an interview format, using an adaptation of the Language Experience and Proficiency Questionnaire (LEAP-Q; Marian et al., 2007). We established children's language dominance from a LEAP-Q question that asked parents to rank their child's languages in order of dominance. Fifty-three children were English-dominant, and 14 children were French-dominant. In most cases (31/35 proficient bilinguals, 32/32 second-language learners), the dominant language had been acquired from birth, but in a few cases, it was acquired sometime after birth (range = 0.75 – 3.50 years). Children's regular exposure to their non-dominant (i.e., second) language began on average at 1.66 years ($SD = 1.97$ years, range = 0 – 5.75 years). Children in the second-language learner

READING TO BILINGUAL PRESCHOOLERS

group started learning their second language considerably later ($M = 3.11$ years, $SD = 2.01$, range = 0 – 5.75) than the children in the proficient bilingual group ($M = 0.50$, $SD = 0.88$, range = 0 – 4.00). Note that since most children in Montreal have at least some incidental exposure to both languages from birth, age of acquisition was defined as the age at which children had a regular exposure of at least 10 hours per week, typically from home, daycare, or school.

Parents rated their child's language comprehension ability compared to same-aged peers on a scale from 0 (“*doesn't understand at all*”) to 10 (“*native proficiency*”). In their dominant language, all children were rated at least 8/10 ($M = 9.70$, $SD = 0.58$; proficient bilinguals: $M = 9.69$, $SD = 0.63$; second-language learners: $M = 9.72$, $SD = 0.52$) and groups did not differ significantly ($t(65) = -0.23$, $p = .82$, $d = 0.057$). In their non-dominant language, children were rated between 2/10 and 10/10 ($M = 5.85$, $SD = 2.59$). As pre-established criteria, proficient bilinguals were rated between 6/10 and 10/10 ($M = 7.99$, $SD = 1.43$), and second-language learners between 2/10 and 5/10 ($M = 3.52$, $SD = 1.15$). As expected, proficiency in the two groups differed significantly ($t(65) = 14.018$, $p < .001$, $d = 3.43$). Most children (35/35 proficient bilinguals, 28/32 second-language learners) had at least 10 hours per week of exposure to their non-dominant language at the time of participation. However, due to the later age of acquisition of the non-dominant language by the second-language learners, they had less cumulative exposure than proficient bilinguals, likely explaining their lower proficiency. For a summary of participants' language scores, see Table 1.

Direct assessment of language proficiency

We also used a direct proficiency assessment to confirm children's ability to follow a basic conversation with the experimenter in both their languages and validate parent report (rather than as an inclusion/exclusion criterion). This also served to prepare participants for the

READING TO BILINGUAL PRESCHOOLERS

bilingual nature of the task. Prior to the main experiment, the experimenter engaged the child in casual conversation in one language at a time. The order of the languages used during this conversation matched the order of the languages used in the reading portion of the experiment. Immediately following the conversation in each language, the experimenter scored the participant's proficiency on a scale from 1–3, using the following scoring criteria:

- 1: The child shows little to no understanding of the conversation.
- 2: The child appears to understand the conversation, but does not respond grammatically, does not respond in full sentences, or responds in their other language.
- 3: The child appears to understand the conversation and responds accurately, in full sentences, and in the appropriate language.

All children scored either a 2/3 or 3/3 in their dominant language (proficient bilinguals: $M = 2.86$, $SD = .36$; second-language bilinguals: $M = 2.97$, $SD = .18$). Proficient bilinguals and second-language learners were not significantly different in their dominant language proficiency ($t(65) = -1.60$, $p = .11$, $d = .39$). However, in the non-dominant language, the two groups did differ substantially ($t(65) = 7.27$, $p < .001$, $d = 1.78$); as expected, proficient bilinguals were also rated highly in their non-dominant language ($M = 2.43$, $SD = .50$), and second-language learners scored significantly lower than the proficient bilinguals in their non-dominant language ($M = 1.53$, $SD = .51$). Proficiency levels were thus consistent across direct assessment and parent report, and scores confirmed that children understood both languages and would be able to follow the experimental task.

Vocabulary assessment

Children's productive vocabulary in French and English was measured using the Developmental Vocabulary Assessment for Parents (DVAP; Libertus et al., 2013). This

READING TO BILINGUAL PRESCHOOLERS

assessment asked parents to check off words they have heard their child produce from a list of increasingly difficult words, based on words used in the Peabody Picture Vocabulary Test, Fourth Edition (PPVT-IV; Dunn & Dunn, 2007) and its French adaptation (Dunn et al., 1993). Data were missing for four children in their dominant language (3 proficient bilinguals, 1 second-language learner) and for four children in their non-dominant language (2 proficient bilinguals, 2 second-language learners). A summary of scores is reported in Table 1.

Parent-reported home reading experience

Children's reading experience in each language was assessed using a Bilingual Home Reading Questionnaire (by the authors, adapted from Hood et al., 2008 and Sénéchal et al., 1998). This questionnaire assessed a variety of home reading behaviors in each language. The most pertinent question for the current study was whether children could read on their own (see also Gonzalez-Barrero et al. (2020) for a more detailed analysis of other questions). Ten of the sixty-seven children were reported to know how to read (2/35 proficient bilinguals, 8/32 second-language learners).

Storybook materials

An original story was created by the authors for the purposes of the study. Illustrations for the story were created using public domain images and images labelled for reuse and were edited using the GNU Image Manipulation Program (GIMP, 2014). Links to these raw materials are available at osf.io/yf8gx/?view_only=04f87280b2ea4335b3f36a0d1c2ac829 [anonymized link].

The narrative was an original story titled *Charlie's Toys* in English and *Les jouets de Charlie* in French. The story follows a girl named Julia, who finds and names her friend Charlie's toys one by one as she looks for him. Once she finds him, he thanks her for finding each toy,

READING TO BILINGUAL PRESCHOOLERS

renaming each one. These toys, labeled in French and in English, were novel objects that served as the targets for word learning.

To maximize children's learning, each novel word was presented twice in each language, as more exposures provide more opportunities for word learning (Flack et al., 2018). The repetitive nature of the story also allowed for all novel words to be presented in the same sentential context (following Sénéchal, 1997). The story was first written in French, and then translated into English by the first and second authors, who are native French-English bilinguals. To the degree possible, translations were matched for number of words, while ensuring that the meaning was consistent across the two languages. Novel words were always presented sentence-finally, and every effort was made to make the French and English versions of the story as similar as possible.

The five novel toys presented in the story were selected from images available in the Novel Object and Unusual Name (NOUN) Database (Horst & Hout, 2016). Each object was labeled with a unique nonsense French and English label to ensure that participants had no previous knowledge of target words. See Figure 1 for novel objects and their labels. Children thus encountered a total of ten novel words, as in other similar studies (e.g., Ard & Beverly, 2004; McLeod & McDade 2011; Sénéchal, 1997; Sénéchal & Cornell, 1993). Nouns were the focus of the current study, as previous research suggests that these are easier for children to learn than other word types (e.g., Ard & Beverly, 2004; McLeod & McDade, 2011; see Golinkoff & Hirsch-Pasek, 2008 for a review, but see also Flack et al., 2018). The French and English nonsense words were created to be consistent with French and English phonology respectively. The English words were: *teeler*, *bicket*, *fidum*, *luba*, and *meebo*. The French words were *kivon*, *ratu*, *janquet*, *pimmie*, and *darème*. These words were matched in syllable length across

READING TO BILINGUAL PRESCHOOLERS

languages (all disyllabic), had simple syllable onsets (no consonant clusters), and the two labels for each object were dissimilar-sounding (i.e., they were not cognates).

Separate books were printed for the two experimental conditions. For the single-language condition, separate French and English versions of the book were printed with identical illustrations. For the bilingual condition, books were printed with both the French and the English texts on each page, with versions that counterbalanced the order of presentation of the languages. All books used the same font in each language, as discussed by Ernst-Slavit and Mulhern (2003) and Huang and Chen (2015). See Figure 2 for a sample page from each book format.

Procedure

Participants were randomly assigned to one of eight experimental conditions varying book type (bilingual book or single-language books), reading language order (dominant or non-dominant first), and test language order (dominant or non-dominant first).

Participants sat next to a trained, highly proficient French-English bilingual experimenter at a child-sized table and completed the proficiency assessment as described above. Next, the experimenter asked participants whether they would like to be read a story. Once participants provided assent (all did), the experimenter read the story to participants in French and English according to their condition assignment. The experimenter followed a script that detailed exact wording, hand movements including pointing, and timing of all actions, to ensure treatment fidelity. When the experimenter had to go off script due to children's comments or questions, she used pre-determined generic responses that redirected participants to the task (e.g., "That's interesting/I'm not sure. Let's keep reading to see what happens next," similar to Sénéchal, 1997). The experimenter pointed to the target object each time it was labeled. At all other times, the

READING TO BILINGUAL PRESCHOOLERS

experimenter's hands remained at the bottom of the page following each page turn. Each novel word was followed by a three-second pause to give children time to encode the word. The experimenter paused for two seconds before and after turning each page. Every effort was made to read the story with a consistent rate and intonation across conditions.

Once children had heard the story in French and English, the experimenter administered a comprehension test to measure novel word learning in each language. The procedure was modeled after previous studies examining word learning through shared book reading (e.g., Ard & Beverly, 2004; Blewitt et al., 2009; Horst et al., 2011; Sénéchal, 1997; Sénéchal & Cornell, 1993) and involved the children pointing to objects the experimenter named. The comprehension test was a pointing task, presented in a book. Each page displayed four images placed in a two-by-two matrix (similar to the Peabody Picture Vocabulary Test), as done in similar studies of shared book reading (Flack et al., 2018). See Figure 3 for a sample trial. Test trials were blocked by language to avoid language mixing (e.g. English practice, English test, French practice, French test), and the order of languages (English-first or French-first) used during the comprehension test was counterbalanced across participants. The experimenter told children that they would play a game in which the child had to touch the toy that the experimenter named in the language about to be tested in both English and French blocks. However, during the non-dominant language block, second-language learners were presented task instructions in both languages to ensure children understood the task. Children completed a total of two practice trials in each language in which they were asked to identify familiar objects from the story, and five test trials, one for each novel object. The positions of the target and the distractor images within the quadrants were random and different for each target word. Targets in each language

READING TO BILINGUAL PRESCHOOLERS

were elicited in a consistent order across participants but were elicited in a different order across languages.

On each trial, the experimenter asked the child to touch the target toy. While awaiting the child's response, the experimenter looked at the center of the matrix to avoid biasing children's responses. Children who hesitated to provide an answer were asked to try their best. After each response, the experimenter recorded the child's answer on a scoring sheet. When children provided more than one answer, their final choice was recorded, following Sénéchal (1997). Videos taken of children's participation were later re-scored by the experimenter to verify responses. Additionally, a coder blind to condition re-coded a randomly selected group of 25% of the participants (half from the proficient bilingual group, half from the second-language learners group). Interrater reliability was 100%.

Results

The main dependent variable was the number of words children correctly identified during the word comprehension test, such that scores ranged from 0 to 5 in each language. See Table 2 and Figure 4 for scores at test. The full dataset and analysis scripts are available at: osf.io/yf8gx/?view_only=04f87280b2ea4335b3f36a0d1c2ac829 [anonymized link].

Single-sample *t*-tests performed separately for the proficient bilinguals and the second-language learners compared whether the number of words children correctly identified in their dominant and non-dominant languages were different from chance. Chance level was a score of 1.25 in each language, given that children completed 5 test trials in each language with $\frac{1}{4}$ chance of guessing correctly on each trial ($5 * \frac{1}{4} = 1.25$). Children in both groups performed above chance in each language and condition (see Table 3 and Figure 4).

READING TO BILINGUAL PRESCHOOLERS

Subsequently, a 2 (book format: single-language, bilingual) by 2 (proficiency: proficient bilingual, second-language learner), by 2 (dominance: dominant language, non-dominant language) repeated measures analysis of variance (ANOVA) was conducted to assess whether these factors affected word learning. None of these factors affected word learning, nor interacted significantly (see Table 4).

Next, we investigated children's learning of translation equivalents — learning of the French and English words for the same object. Our first analysis focused on whether learning one word for an object made it more likely or less likely that children would learn its translation equivalent. In other words, did children favour learning translation equivalents, avoid learning translation equivalents, or neither?

The number of translation equivalents each child could have learned is dependent on the total number of words they learned in each language. For example, a child who did not learn any words in either language, as a result, could not learn any translation equivalents, and a child who learned all 5 words in each language would necessarily have learned 5 translation equivalents. Thus, for each child, we calculated the number of translation equivalents which would be expected by chance if learning of the two words was independent. This unique value was calculated by multiplying the number of words a child learned in their dominant language by the number of words learned in their non-dominant language and dividing this number by 5, resulting in a predicted number of translation equivalent pairs that could have been learned if children neither favoured nor avoided learning them. For example, if a child learned all 5 French words, but only 1 English word ($5 \times 1 \div 5 = 1$), one translation equivalent pair would be predicted to have been learned by chance. This predicted value was then subtracted from children's actual translation equivalent learning scores to determine if children's learning varied

READING TO BILINGUAL PRESCHOOLERS

from this chance value. If children neither favoured nor avoided learning translation equivalents, this difference score should be close to zero.

Overall, children's translation equivalent difference scores were strongly clustered around zero and not different from chance (see Table 5 and Figure 5). A 2 (book format: single-language, bilingual) by 2 (proficiency: proficient bilingual, second-language learner) ANOVA was conducted to assess whether these factors affected translation equivalent learning (see Table 6). None of these factors nor their interactions were significantly related to children's translation equivalent scores.

Pearson's correlations analyses were computed to investigate individual differences, specifically the effects of age and vocabulary size on learning in the dominant and non-dominant languages, and on translation equivalent learning. Overall, total scores were significantly correlated with scores in the non-dominant and dominant languages, which is unsurprising as these subscores were used to calculate the total score. The total DVAP score was also correlated with the number of translation equivalents reported on the DVAP. No other statistically significant correlations were observed between total test score, non-dominant test score, dominant test score, DVAP total score, DVAP-reported translation equivalents, translation equivalent difference from chance score, nor age (see Table 7). In proficient bilinguals, the same results were observed, with the addition that the number of TEs reported on the DVAP was significantly correlated with age (see Table 8). Lastly, second-language learners showed the same pattern of statistical significance as participants overall (see Table 9).

In sum, children — both proficient bilinguals and second-language learners, in both book conditions and across both of their languages — successfully learned new words during shared book reading.

Discussion

Bilingual children often encounter both of their languages during shared book reading. The purpose of this study was to understand whether different types of materials — single language versus bilingual books — would differentially support word learning, and whether this would interact with bilingual children's proficiency in each of their languages. We tested 5-year-old proficient bilinguals and second-language learners. Overall, children showed a remarkable ability to learn words in both of their languages, regardless of book format. All children learned above chance in all conditions. Our key finding is thus that five-year-old bilinguals are flexible word learners, even in challenging conditions in which they have lower proficiency in one of their languages.

Our main hypothesis was that book format would affect children's success in word learning. We found little support for this hypothesis. There were no significant differences across conditions nor depending on language dominance, and no interactions with language proficiency. While we hypothesized that book format would affect word learning, the predicted direction was unclear. This is because single-language and bilingual books present different learning challenges. Both types of books involve alternation, which could increase cognitive load. Single-language books alternate referential context more often; children encounter a narrative and set of referents in one language, then encounter the entire set again in the other language. In contrast, bilingual books alternate language more often; children encounter a switch between each language on each page, while in single-language books, children switch languages only once between stories. Previous research has shown that both switches in referential context (Schwab & Lew-Williams, 2016; 2018) and switches in language (Byers-Heinlein, 2013; Byers-Heinlein et al., 2017; Potter et al., 2018; 2019) can pose challenges to word learning. It may be that in this

READING TO BILINGUAL PRESCHOOLERS

case, the two different types of challenges were of the same magnitude and balanced each other out. Although children were not at ceiling performance on the task, their strong word learning across both conditions suggests that neither condition was overly challenging for them. The structure of our reading task might have also contributed to this result. The experimenter clearly pointed to the labeled object each time, and there is evidence that this type of support can mitigate cognitive challenges in word learning during shared book reading (Flack & Horst, 2018). Conducting the same study with younger children, who are more novice language and word learners, could be revealing.

A second prediction was that children would show better learning in their more proficient (i.e. dominant) than in their less proficient (i.e., non-dominant) language. Contrary to this prediction, children showed equal learning in their dominant and non-dominant languages. This is consistent with other findings that bilingual children's two languages seem to be strong enough to comparably support familiar word recognition and novel word learning in both languages (Kan & Kohnert, 2008; Legacy et al., 2016). Moreover, in a recent meta-analysis on shared book reading with English learners, children's level of English proficiency did not play a role in language or literacy outcomes (Fitton et al., 2018). Given that both proficient and less proficient bilingual learners in our study performed comparably across their two languages, our findings support the idea that bilingual children are not at a disadvantage when learning in their non-dominant language compared to their dominant language.

Beyond looking at the number of words children were able to learn in our task, we were also interested in which words they would learn. We asked whether learning a word in one language would facilitate or hinder learning of this word in the other language — these cross-language synonyms are also called translation equivalents. Monolingual children tend to avoid

learning synonyms, a phenomenon called mutual exclusivity (Markman & Wachtel, 1988). For within-language synonyms, bilinguals show weaker use of mutual exclusivity than monolinguals (Byers-Heinlein & Werker, 2009; 2013; Davidson et al., 1997; Davidson & Tell, 2005, Houston-Price et al., 2010). Bilinguals also show knowledge and use of translation equivalents (De Houwer et al., 2006; Holowka et al., 2002; Pearson et al., 1995), and it has been proposed that greater exposure to each language may provide greater support for learning these word pairs (David & Wei, 2008). Indeed, proficient bilinguals' knowledge of familiar-word translation equivalents, according to parental report of productive vocabulary, was positively related to age. Moreover, the more words children produced, the greater number of familiar word translation equivalents they knew. However, on our experimental task, we found no evidence that learning one word either facilitated or hindered learning its translation equivalent. Together, these results suggest that translation equivalent learning is a normal product of acquiring words across two languages, rather than being a special case of word learning.

A strength of our study was our highly-controlled experimental design; children encountered the words equally in both conditions, using controlled timing and gestures, from a balanced bilingual experimenter. However, our results may not necessarily generalize to real-world bilingual book reading. Parents and other caregivers often have unequal proficiency in each language. This could affect the quality of the reading in each language, the time they choose to spend reading in each language, and their ability to provide optimal learning supports. It will be important for future research to incorporate these real-world considerations, for example by observing parents reading freely to their children using different types of bilingual materials. Moreover, children in the current studies were growing up in Montreal learning English and French — two languages with high prestige in the community. Ideally, this type of work would

READING TO BILINGUAL PRESCHOOLERS

be replicated across different language communities, including those with unequal support for the two languages.

Our study investigated two specific types of bilingual book formats: single-language books and bilingual books. However, there are other strategies that can be used for reading with bilingual children, for example translating only key words. Future studies could investigate other strategies using a similar design to test this strategy in the dominant and non-dominant languages, as well as compare the strategies we tested. Moreover, our design focused on nouns, which were all presented in a sentence-final position. Yet, children encounter all sorts of words when hearing stories, in all sorts of sentence positions. Future studies might test a greater variety of word types encountered in different contexts.

Finally, our study has important implications for promoting bilingual children's word learning during shared book reading. A unique aspect of our study was that we gave children equal opportunities to learn words in both of their languages, whereas much of the previous research has focused on one language or the other. Our results show that bilingual children are highly capable word learners in both languages; in our study, they encountered each word only twice in each language, yet showed performance in both the dominant and non-dominant language that was well above chance. Both single-language and bilingual books promoted word learning to a similar degree. Bilingual book reading experiences, no matter how the two languages are encountered, can be used to support vocabulary growth in both languages.

Although we did not find a clear advantage for bilingual books, there are practical reasons why they might nonetheless be advantageous. Bilingual books give parents and teachers the option of reading in either a single-language style or in a bilingual style, and do not engender the same cognitive burdens on readers as spontaneous translation of single-language books.

READING TO BILINGUAL PRESCHOOLERS

Additionally, buying one bilingual book is more cost-effective than buying two single-language books. Unfortunately, bilingual storybooks are less available in bookstores and libraries, and the quality of translation can be poor (Huang & Chen, 2015). Publishers, governments, schools, and community agencies might work to increase the quality and availability of bilingual books as a way to support word learning and early literacy across both of bilingual children's two languages. No matter the format, and no matter the learners' proficiency, our results show that shared bilingual book reading is an effective way to teach bilingual children new words in both of their languages.

References

- Ard, L. M., & Beverly, B. L. (2004). Preschool word learning during joint book reading: Effect of adult questions and comments. *Communication Disorders Quarterly*, 26, 17–28.
<https://doi.org/10.1177/15257401040260010101>
- Blewitt, P., Rump, K. M., Shealy, S. E., & Cook, S. A. (2009). Shared book reading: When and how questions affect young children's word learning. *Journal of Educational Psychology*, 101, 294–304. <https://doi.org/10.1037/a0013844>
- Bus, A. G., Van Ijzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of Educational Research*, 65, 1–21. <https://doi.org/10.3102/00346543065001001>
- Byers-Heinlein, K. (2013). Parental language mixing: Its measurement and the relation of mixed input to young bilingual children's vocabulary size. *Bilingualism: Language and Cognition*, 16, 32–48. <https://doi.org/10.1017/S1366728911000010>
- Byers-Heinlein, K., & Werker, J. F. (2009). Monolingual, bilingual, trilingual: infants' language experience influences the development of a word-learning heuristic. *Developmental science*, 12, 815–823. <https://doi.org/10.1111/j.1467-7687.2009.00902.x>
- Byers-Heinlein, K., & Werker, J. F. (2013). Lexicon structure and the disambiguation of novel words: Evidence from bilingual infants. *Cognition*, 128, 407–416.
<https://doi.org/10.1016/j.cognition.2013.05.010>
- Byers-Heinlein, K., Morin-Lessard, E., & Lew-Williams, C. (2017). Bilingual infants control their languages as they listen. *Proceedings of the National Academy of Sciences*, 114, 9032–9037. <https://doi.org/10.1073/pnas.1703220114>

- Chow, B. W. Y., McBride-Chang, C., & Cheung, H. (2010). Parent–child reading in English as a second language: Effects on language and literacy development of Chinese kindergarteners. *Journal of Research in Reading*, 33, 284–301.
<https://doi.org/10.1111/j.1467-9817.2009.01414.x>
- Collins, M. F. (2010). ELL preschoolers' English vocabulary acquisition from storybook reading. *Early Childhood Research Quarterly*, 25, 84–97.
<https://doi.org/10.1016/j.ecresq.2009.07.009>
- David, A., & Wei, L. (2008). Individual differences in the lexical development of French–English bilingual children. *International Journal of Bilingual Education and Bilingualism*, 11, 598–618. <https://doi.org/10.1080/13670050802149200>
- Davidson, D., Jergovic, D., Imami, Z., & Theodos, V. (1997). Monolingual and bilingual children's use of the mutual exclusivity constraint. *Journal of Child Language*, 24, 3–24.
<https://doi.org/10.1017/S0305000996002917>
- Davidson, D., & Tell, D. (2005). Monolingual and bilingual children's use of mutual exclusivity in the naming of whole objects. *Journal of Experimental Child Psychology*, 92, 25–45. <https://doi.org/10.1016/j.jecp.2005.03.007>
- De Houwer, A., Bornstein, M. H., & De Coster, S. (2006). Early understanding of two words for the same thing: A CDI study of lexical comprehension in infant bilinguals. *International Journal of Bilingualism*, 10, 331–347.
<https://doi.org/10.1177/13670069060100030401>
- Dunn, L. M., & Dunn, L. M. (2007). *PPVT-IV: Peabody Picture Vocabulary Test*. American Guidance Service.

- Dunn, L. M., Dunn, L. M., & Thériault-Whalen, C. (1993). *EVIP: Échelle de vocabulaire en images Peabody*. Pearson Canada Assessment.
- Elley, W. B. (1989). Vocabulary acquisition from listening to stories. *Reading Research Quarterly*, 24, 174–187. <https://doi.org/10.2307/747863>
- Ernst-Slavit, G., & Mulhern, M. (2003). Bilingual books: Promoting literacy and biliteracy in the second-language and mainstream classroom. *Reading Online*, 7, 1096–1232. Retrieved from <http://www.literacyworldwide.org/>
- Fitton, L., McIlraith, A. L., & Wood, C. L. (2018). Shared book reading interventions with English learners: A meta-analysis. *Review of Educational Research*, 88, 712–751. <https://doi.org/10.3102/0034654318790909>
- Flack, Z. M., & Horst, J. S. (2018). Two sides to every story: Children learn words better from one storybook page at a time. *Infant and Child Development*, 27, e2047. <https://doi.org/10.1002/icd.2047>
- Flack, Z. M., Field, A. P., & Horst, J. S. (2018). The effects of shared storybook reading on word learning: A meta-analysis. *Developmental Psychology*, 54, 1334–1346. <https://doi.org/10.1037/dev0000512>
- Golinkoff, R. M., & Hirsh-Pasek, K. (2008). How toddlers begin to learn verbs. *Trends in Cognitive Sciences*, 12, 397–403. <https://doi.org/10.1016/j.tics.2008.07.003>
- Gonzalez-Barrero, A. M., Salama-Siroishka, N., Dubé, D., Brouillard, M., & Byers-Heinlein, K. (2020). Effects of language dominance on home reading practices of bilingual families. *International Journal of Bilingualism*. <https://doi.org/10.1177/1367006920938153>.
- GNU Image Manipulation Program. (2010). GNU Image Manipulation Program, Version 2.6.11 [Computer software]. Retrieved from: <https://www.gimp.org/>

READING TO BILINGUAL PRESCHOOLERS

- Hammer, C. S., Lawrence, F. R., & Miccio, A. W. (2007). Bilingual children's language abilities and early reading outcomes in Head Start and kindergarten. *Language, Speech, and Hearing Services in Schools, 38*, 237–248. [https://doi.org/10.1044/0161-1461\(2007/025\)](https://doi.org/10.1044/0161-1461(2007/025))
- Hammer, C. S., Miccio, A. W., & Wagstaff, D. A. (2003). Home literacy experiences and their relationship to bilingual preschoolers' developing English literacy abilities: An initial investigation. *Language, Speech, and Hearing Services in Schools, 34*, 20–30. [https://doi.org/10.1044/0161-1461\(2003/003\)](https://doi.org/10.1044/0161-1461(2003/003))
- Hoff, E., Core, C., Place, S., Rumiche, R., Señor, M., & Parra, M. (2012). Dual language exposure and early bilingual development. *Journal of Child Language, 39*, 1–27. <https://doi.org/10.1017/S0305000910000759>
- Holowka, S., Brosseau-Lapr , F., & Petitto, L. A. (2002). Semantic and conceptual knowledge underlying bilingual babies' first signs and words. *Language Learning, 52*, 205–262. <https://doi.org/10.1111/0023-8333.00184>
- Hood, M., Conlon, E., & Andrews, G. (2008). Preschool home literacy practices and children's literacy development: A longitudinal analysis. *Journal of Educational Psychology, 100*, 252–271. <https://doi.org/10.1037/0022-0663.100.2.252>
- Horst, J. S., & Hout, M. C. (2016). The Novel Object and Unusual Name (NOUN) Database: A collection of novel images for use in experimental research. *Behavior Research Methods, 48*, 1393–1409. <https://doi.org/10.3758/s13428-015-0647-3>
- Horst, J. S., Parsons, K. L., & Bryan, N. M. (2011). Get the story straight: Contextual repetition promotes word learning from storybooks. *Frontiers in Psychology, 2*, 1–11. <https://doi.org/10.3389/fpsyg.2011.00017>

- Houston-Price, C., Caloghiris, Z., & Raviglione, E. (2010). Language experience shapes the development of the mutual exclusivity bias. *Infancy*, 15, 125–150.
<https://doi.org/10.1111/j.1532-7078.2009.00009.x>
- Hu, R., Chen, X., & Li, X. (2012). Exploring Bilingual Books with Five Chinese First Graders: Children's Responses and Biliteracy Development. *Reading Horizons*, 52, 57–87.
- Huang, Q., & Chen, X. (2015). Examining the text quality of English/Chinese bilingual children's picture books. *International Journal of Bilingual Education and Bilingualism*, 5, 475–487. <https://doi.org/10.1080/13670050.2015.1011076>
- Jiménez, T. C., Filippini, A. L., & Gerber, M. M. (2006). Shared reading within Latino families: An analysis of reading interactions and language use. *Bilingual Research Journal*, 30, 431–452. <https://doi.org/10.1080/15235882.2006.10162884>
- Kalia, V. (2007). Assessing the role of book reading practices in Indian bilingual children's English language and literacy development. *Early Childhood Education Journal*, 35, 149–153. <https://doi.org/10.1007/s10643-007-0179-2>
- Kan, P. F., & Kohnert, K. (2008). Fast mapping by bilingual preschool children. *Journal of Child Language*, 35, 495–514. <https://doi.org/10.1017/S0305000907008604>
- Leacock, L., & Jackson, C. W. (2014). Spanish vocabulary-bridging technology-enhanced instruction for young English language learners' word learning. *Journal of Early Childhood Literacy*, 14, 175–197. <https://doi.org/10.1177/1468798412458518>
- Legacy, J., Zesiger, P., Friend, M., & Poulin-Dubois, D. (2016). Vocabulary size, translation equivalents, and efficiency in word recognition in very young bilinguals. *Journal of Child Language*, 43, 760–783. <https://doi.org/10.1017/S0305000915000252>

- Libertus, M. E., Odic, D., Feigenson, L., & Halberda, J. (2015). A Developmental Vocabulary Assessment for Parents (DVAP): Validating Parental Report of Vocabulary Size in 2-to 7-Year-Old Children. *Journal of Cognition and Development, 16*, 442–454.
<https://doi.org/10.1080/15248372.2013.835312>
- Lugo-Neris, M. J., Jackson, C. W., & Goldstein, H. (2010). Facilitating vocabulary acquisition of young English language learners. *Language, Speech, and Hearing Services in Schools, 41*, 314–327. [https://doi.org/10.1044/0161-1461\(2009/07-0082\)](https://doi.org/10.1044/0161-1461(2009/07-0082))
- Marian, V., Blumenfeld, H. K., & Kaushanskaya, M. (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech, Language, and Hearing Research, 50*, 940–967.
[https://doi.org/10.1044/1092-4388\(2007/067\)](https://doi.org/10.1044/1092-4388(2007/067))
- Markman, E. M., & Wachtel, G. F. (1988). Children's use of mutual exclusivity to constrain the meanings of words. *Cognitive psychology, 20*, 121–157. [https://doi.org/10.1016/0010-0285\(88\)90017-5](https://doi.org/10.1016/0010-0285(88)90017-5)
- McLeod, A. N., & McDade, H. L. (2011). Preschoolers' incidental learning of novel words during storybook reading. *Communication Disorders Quarterly, 32*, 256–266.
<https://doi.org/10.1177/1525740109354777>
- Mol, S. E., & Bus, A. G. (2011). To read or not to read: A meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin, 137*, 267–296.
<https://doi.org/10.1037/a0021890>
- Mol, S. E., Bus, A. G., De Jong, M. T., & Smeets, D. J. H. (2008). Added value of dialogic parent–child book readings: A meta-analysis. *Early Education and Development, 19*, 7–26.
<https://doi.org/10.1080/10409280701838603>

Naqvi, R., Thorne, K. J., Pfitscher, C. M., Nordstokke, D. W., & McKeough, A. (2013).

Reading dual language books: Improving early literacy skills in linguistically diverse classrooms. *Journal of Early Childhood Research*, 11, 3–15.

<https://doi.org/10.1177/1476718X12449453>

Patterson, J. L. (2002). Relationships of expressive vocabulary to frequency of reading and

television experience among bilingual toddlers. *Applied Psycholinguistics*, 23, 493–508.

<https://doi.org/10.1017/S0142716402004010>

Pearson, B. Z., Fernández, S., & Oller, D. K. (1995). Cross-language synonyms in the lexicons

of bilingual infants: One language or two? *Journal of Child Language*, 22, 345–368.

<https://doi.org/10.1017/S030500090000982X>

Pollard-Durodola, S. D., Gonzalez, J. E., Saenz, L., Soares, D., Resendez, N., Kwok, O., ... &

Zhu, L. (2016). The effects of content-related shared book reading on the language development of preschool dual language learners. *Early Childhood Research Quarterly*,

36, 106–121. <https://doi.org/10.1016/j.ecresq.2015.12.004>

Potter, C., Fourakis, E., Morin-Lessard, E., Byers-Heinlein, K., & Lew-Williams, C. (2018).

Bilingual infants process mixed sentences differently in their two languages. In

Proceedings of the 40th annual meeting of the Cognitive Science Society.

Potter, C. E., & Lew-Williams, C. (2019). Infants' selective use of reliable cues in

multidimensional language input. *Developmental psychology*, 55, 1–8.

<https://doi.org/10.1037/dev0000610>

Quiroz, B. G., Snow, C. E., & Zhao, J. (2010). Vocabulary skills of Spanish–English

bilinguals: Impact of mother–child language interactions and home language and literacy

support. *International Journal of Bilingualism*, 14, 379–399.

<https://doi.org/10.1177/1367006910370919>

Read, K., Contreras, P. D., Rodriguez, B., & Jara, J. (2020). ¿Read Conmigo?: The Effect of Code-switching Storybooks on Dual-Language Learners' Retention of New Vocabulary.

Early Education and Development, 1-18. <https://doi.org/10.1080/10409289.2020.1780090>

Restrepo, M. A., Morgan, G. P., & Thompson, M. S. (2013). The efficacy of a vocabulary intervention for dual-language learners with language impairment. *Journal of Speech, Language, and Hearing Research*, 56, 748–765. [https://doi.org/10.1044/1092-4388\(2012/11-0173\)x](https://doi.org/10.1044/1092-4388(2012/11-0173)x).

Robbins, C., & Ehri, L. C. (1994). Reading storybooks to kindergartners helps them learn new vocabulary words. *Journal of Educational Psychology*, 86, 54–64.

<https://doi.org/10.1037/0022-0663.86.1.54>

Roberts, T. A. (2008). Home storybook reading in primary or second language with preschool children: Evidence of equal effectiveness for second-language vocabulary acquisition.

Reading Research Quarterly, 43, 103–130. <https://doi.org/10.1598/RRQ.43.2.1>

Schwab, J. F., & Lew-Williams, C. (2016). Repetition across successive sentences facilitates young children's word learning. *Developmental Psychology*, 52, 879–886.

<https://doi.org/10.1037/dev0000125>

Schwab, J. F., & Lew-Williams, C. (2018). Discontinuity of reference hinders children's learning of new words. *Child Development*. Advance online publication.

<https://doi.org/10.1111/cdev.13189>

Semingson, P., Pole, K., & Tommerdahl, J. (2015). Using bilingual books to enhance literacy around the world. *European Scientific Journal*, 11, 132–193.

Sénéchal, M. (1997). The differential effect of storybook reading on preschoolers' acquisition of expressive and receptive vocabulary. *Journal of Child Language*, 24, 123–138.

<https://doi.org/10.1017/s0305000996003005>

Sénéchal, M., & Cornell, E. H. (1993). Vocabulary acquisition through shared reading experiences. *Reading Research Quarterly*, 28, 360–374. <https://doi.org/10.2307/747933>

Sénéchal, M., LeFevre, J., Thomas, E. M., & Daley, K. E. (1998). Differential effects of home literacy experiences on the development of oral and written language. *Reading Research Quarterly*, 33, 96–116. <https://doi.org/10.1598/RRQ.33.1.5>

Sénéchal, M., Thomas, E., & Monker, J. -A. (1995). Individual differences in 4-year-old children's acquisition of vocabulary during storybook reading. *Journal of Educational Psychology*, 87, 218. <https://doi.org/10.1037/0022-0663.87.2.218>

Silverman, R. D. (2007). Vocabulary development of English-language and English-only learners in kindergarten. *The Elementary School Journal*, 107, 365–383.

<https://doi.org/10.1086/516669>

Simoncini, K., Pamphilon, B., & Simeon, L. (2018). The 'Maria'books: the achievements and challenges of introducing dual language, culturally relevant picture books to PNG schools. *Language, Culture and Curriculum*, 1–16.

<https://doi.org/10.1080/07908318.2018.1490745>

Snow, C. E., Burns, M. S., & Griffin, P. (Eds.). (1998). *Preventing reading difficulties in young children*. National Academies Press.

Thordardottir, E. (2011). The relationship between bilingual exposure and vocabulary development. *International Journal of Bilingualism*, 15, 426–445.

<https://doi.org/10.1177/1367006911403202>

- Tsybina, I., & Eriks-Brophy, A. (2010). Bilingual dialogic book-reading intervention for preschoolers with slow expressive vocabulary development. *Journal of Communication Disorders, 43*, 538–556. <https://doi.org/10.1016/j.jcomdis.2010.05.006>
- Ulanoff, S. H., & Pucci, S. L. (1999). Learning words from books: The effects of read-aloud on second language vocabulary acquisition. *Bilingual Research Journal, 23*, 409–422. <https://doi.org/10.1080/15235882.1999.10162743>
- Unsworth, S. (2013). Current issues in multilingual first language acquisition. *Annual Review of Applied Linguistics, 33*, 21–50. <https://doi.org/10.1017/S0267190513000044>
- Walsh, B. A., & Blewitt, P. (2006). The effect of questioning style during storybook reading on novel vocabulary acquisition of preschoolers. *Early Childhood Education Journal, 33*, 273–278. <https://doi.org/10.1007/s10643-005-0052-0>
- Walsh, B. A., Rose, K. K., Sanchez, C., & Burnham, M. M. (2012). Exploration of how Spanish and English noneliciting questions affect the novel vocabulary acquisition of Hispanic dual language learners enrolled in Head Start. *Early Childhood Education Journal, 39*, 383–390. <https://doi.org/10.1007/s10643-011-0483-8>
- Whitehurst, G. J., Falco, F. L., Lonigan, C. J., Fischel, J. E., DeBaryshe, B. D., Valdez-Menchaca, M. C., & Caulfield, M. (1988). Accelerating language development through picture book reading. *Developmental Psychology, 24*, 552–559. <https://doi.org/10.1037/0012-1649.24.4.552>
- Wilkinson, K. S., & Houston-Price, C. (2013). Once upon a time, there was a pulchritudinous princess...: The role of word definitions and multiple story contexts in children's learning of difficult vocabulary. *Applied Psycholinguistics, 34*, 591–613. <https://doi.org/10.1017/S0142716411000889>

Wolsey, J. L. A., Clark, M. D., & Andrews, J. F. (2018). ASL and English bilingual Shared Book Reading: An exploratory intervention for signing deaf children. *Bilingual Research Journal*, *41*, 221–237. <https://doi.org/10.1080/15235882.2018.1481893>

Wood, C., Fitton, L., Petscher, Y., Rodriguez, E., Sunderman, G., & Lim, T. (2018). The Effect of e-Book Vocabulary Instruction on Spanish–English Speaking Children. *Journal of Speech, Language, and Hearing Research*, *61*, 1945–1969. https://doi.org/10.1044/2018_JSLHR-L-17-0368.

Tables

Table 1

Participants' Scores on Language Measures

	Proficient bilinguals		Second-language learners	
	<i>M (SD)</i>		<i>M (SD)</i>	
	Dominant	Non-Dominant	Dominant	Non-Dominant
LEAP-Q	9.69 (.63)	7.99 (1.43)	9.72 (.52)	3.52 (1.15)
DVAP	94.65 (26.29)	45.91 (31.34)	115.32 (27.10)	18.10 (11.40)

Note: LEAP-Q indicates parent-reported comprehension ability out of 10. DVAP indicates parent-reported vocabulary items produced.

READING TO BILINGUAL PRESCHOOLERS

Table 2

Novel Words Correctly Identified at Test, by Proficiency

	Proficient bilinguals		Second-language learners	
	<i>M (SD)</i>		<i>M (SD)</i>	
	Single-language book	Bilingual book	Single-language book	Bilingual book
Dominant language	2.22 (1.35)	2.47 (1.42)	2.25 (1.39)	3.31 (1.35)
Non-dominant language	2.50 (1.25)	2.41 (1.28)	2.13 (1.20)	2.19 (1.42)
Translation equivalent difference from chance score	−.06 (.33)	−.03 (.46)	−.19 (.38)	.19 (.46)

READING TO BILINGUAL PRESCHOOLERS

Table 3

Novel Words Learned in Each Language and Condition, Compared to Chance

Language	Book Condition	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	95% CI, Lower	95% CI, Upper	Cohen's <i>d</i>
Dominant	Single-language	2.24	1.35	4.30	33	<.001	1.76	2.71	.73
Dominant	Bilingual	2.88	1.43	6.50	32	<.001	2.37	3.39	1.14
Non-dominant	Single-language	2.32	1.22	5.10	33	<.001	1.90	2.75	.88
Non-dominant	Bilingual	2.30	1.33	4.50	32	<.001	1.83	2.78	.79

Note. Chance is 1.25.

READING TO BILINGUAL PRESCHOOLERS

Table 4

*2 x 2 x 2 (Book Format x Proficiency x Dominance of Language in Which Words Learned)
ANOVA Results for Words Learned*

Predictor	df_{Num}	df_{Den}	F	p	η^2_g
Book format	1	63	2.04	.15	.02
Proficiency	1	63	.09	.76	.00
Dominance	1	63	1.19	.28	.01
Book format x Proficiency	1	63	1.15	.29	.01
Book format x Dominance	1	63	1.99	.16	.02
Proficiency x Dominance	1	63	2.41	.13	.02
Book format x Proficiency x Dominance	1	63	.49	.49	.00

Note. df_{Num} indicates degrees of freedom numerator. df_{Den} indicates degrees of freedom denominator. η^2_g indicates generalized eta-squared.

READING TO BILINGUAL PRESCHOOLERS

Table 5

Translation Equivalent Difference Scores, Difference from Chance

Book Condition	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	95% <i>CI</i> , Lower	95% <i>CI</i> , Upper	Cohen's <i>d</i>
Single-language	-.12	.35	-1.90	33	.06	-.24	.01	.33
Bilingual	.07	.47	.89	32	.40	-.09	.24	.15

Note. Chance is 0.

READING TO BILINGUAL PRESCHOOLERS

Table 6

2 x 2 (Book Format x Proficiency) ANOVA Results for Translation Equivalent Difference from Chance Scores

Predictor	df_{Num}	df_{Den}	F	p	η^2_g
Book format	1	63	3.87	.054	.06
Proficiency	1	63	.20	.653	.00
Book format x Proficiency	1	63	3.11	.083	.05

Note. df_{Num} indicates degrees of freedom numerator. df_{Den} indicates degrees of freedom denominator. η^2_g indicates generalized eta-squared.

READING TO BILINGUAL PRESCHOOLERS

Table 7.

Correlations Between Test Scores (Total, Non-dominant Language, Dominant Language), DVAP Score, Number of TEs on the DVAP, Translation Equivalent Difference from Chance Score, and Age, for All Participants

	Total Test Score	Non-dom. Test Score	Dominant Test Score	DVAP Total Score	DVAP Non-dom. Language	DVAP Dominant Language	DVAP TEs	TE Difference from Chance Score	Age (days)
Total Test Score	—								
Non- dominant Test Score	.64**	—							
Dominant Test Score	.73**	-.06	—						
DVAP Total Score	.02	-.02	.04	—					
DVAP Non-dom. Language	-.13	-.06	-.11	.61**	—				
DVAP Dominant Language	.17	.01	.21	.71**	-.12	—			
DVAP TEs	-.11	.03	-.17	.63**	.92**	-.03	—		
TE Difference from Chance Score	-.01	-.00	-.01	.04	-.04	.01	.03	—	
Age (days)	.21	.17	.12	.10	-.00	.14	.18	.13	—

Note. Pearson's *r*. Non-dom. = Non-dominant. TE = Translation Equivalent. DVAP TEs = number of translation equivalents endorsed between English and French DVAPs.

Note. ** $p < .001$

READING TO BILINGUAL PRESCHOOLERS

Table 8.

Correlations Between Test Scores (Total, Non-dominant Language, Dominant Language), DVAP Score, Number of TEs on the DVAP, Translation Equivalent Difference from Chance Score, and Age, for Proficient Bilinguals

	Total Test Score	Non-dom. Test Score	Dominant Test Score	DVAP Total Score	DVAP Non-dom. Language	DVAP Dominant Language	DVAP TEs	TE Difference from Chance Score	Age (days)
Total Test Score	—								
Non-dominant Test Score	.57**	—							
Dominant Test Score	.67**	-.23	—						
DVAP Total Score	.06	-.06	.12	—					
DVAP Non-dom. Language	-.04	-.13	.07	.73**	—				
DVAP Dominant Language	.19	.03	.20	.68**	-.00	—			
DVAP TEs	-.02	-.02	-.01	.77**	.92**	.14	—		
TE Difference from Chance Score	.04	.07	-.01	.07	-.00	-.01	.13	—	
Age (days)	.13	.12	.05	.34	.25	.21	.48*	.06	—

Note. Pearson's *r*. Non-dom. = Non-dominant. TE = Translation Equivalent. DVAP TEs = number of translation equivalents endorsed between English and French DVAPs.

Note. ** $p < .001$, * $p < .05$

READING TO BILINGUAL PRESCHOOLERS

Table 9.

Correlations Between Test Scores (Total, Non-dominant Language, Dominant Language), DVAP Score, Number of TEs on the DVAP, Translation Equivalent Difference from Chance Score, and Age, for Second-Language Learners

	Total Test Score	Non-dom. Test Score	Dominant Test Score	DVAP Total Score	DVAP Non-dom. Language	DVAP Dominant Language	DVAP TEs	TE Difference from Chance Score	Age (days)
Total Test Score	—								
Non- dominant Test Score	.72**	—							
Dominant Test Score	.79**	.14	—						
DVAP Total Score	-.02	.02	-.04	—					
DVAP Non-dom. Language	-.35	-.14	-.37*	.60**	—				
DVAP Dominant Language	.15	.10	.13	.94**	.30	—			
DVAP TEs	-.21	-.01	-.29	.61**	.77**	.40*	—		
TE Difference from Chance Score	-.05	-.05	-.02	-.01	-.13	.05	-.15	—	
Age (days)	.26	.26	.13	-.13	-.18	-.04	.11	.17	—

Note. Pearson's *r*. Non-dom. = Non-dominant. TE = Translation Equivalent. DVAP TEs = number of translation equivalents endorsed between English and French DVAPs.

Note. ** $p < .001$, * $p < .05$

Figures

Legends

- *Figure 1.* Novel objects from the NOUN database used in the story (Horst & Hout, 2016), and their English and French labels.
- *Figure 2.* Sample pages from a bilingual book (left) and single-language books (right).
- *Figure 3.* Sample trial from the comprehension test.
- *Figure 4.* Children's word learning in their dominant and non-dominant language, by proficiency group and book format condition. Circles represent individual data points. Bars represent standard error of the mean.
- *Figure 5.* Translation equivalents difference scores. Circles represent individual data points. Bars represent standard error of the mean.

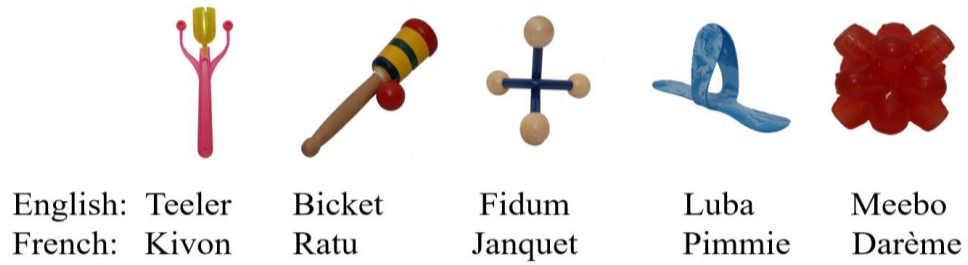


Figure 1. Novel objects from the NOUN database used in the story (Horst & Hout, 2016), and their English and French labels.

READING TO BILINGUAL PRESCHOOLERS



Figure 2. Sample pages from a bilingual book (left) and single-language books (right).

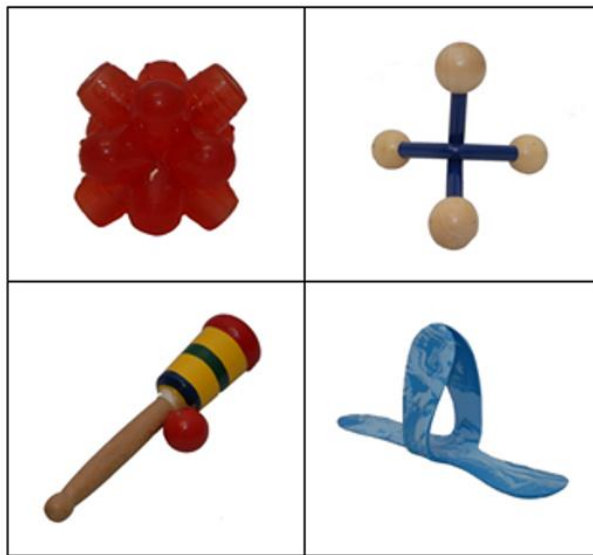


Figure 3. Sample trial from the comprehension test.

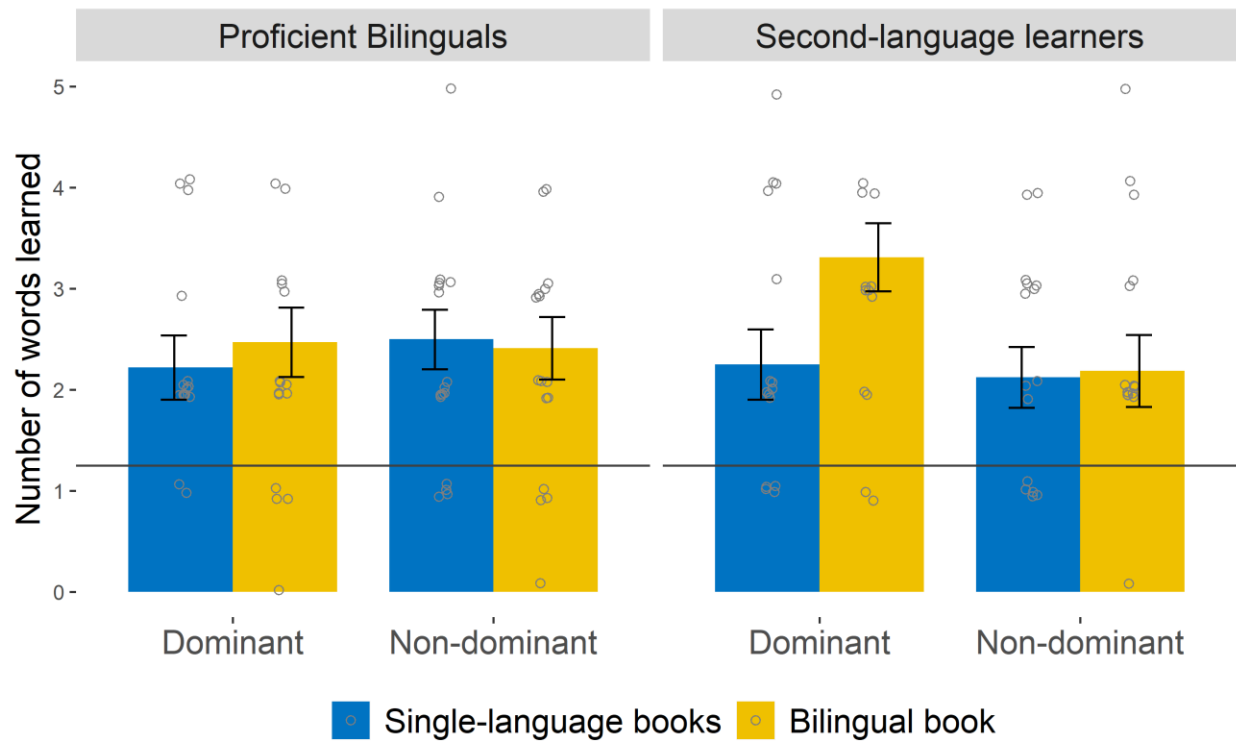


Figure 4. Children's word learning in their dominant and non-dominant language, by proficiency group and book format condition. Circles represent individual data points. Bars represent standard error of the mean.

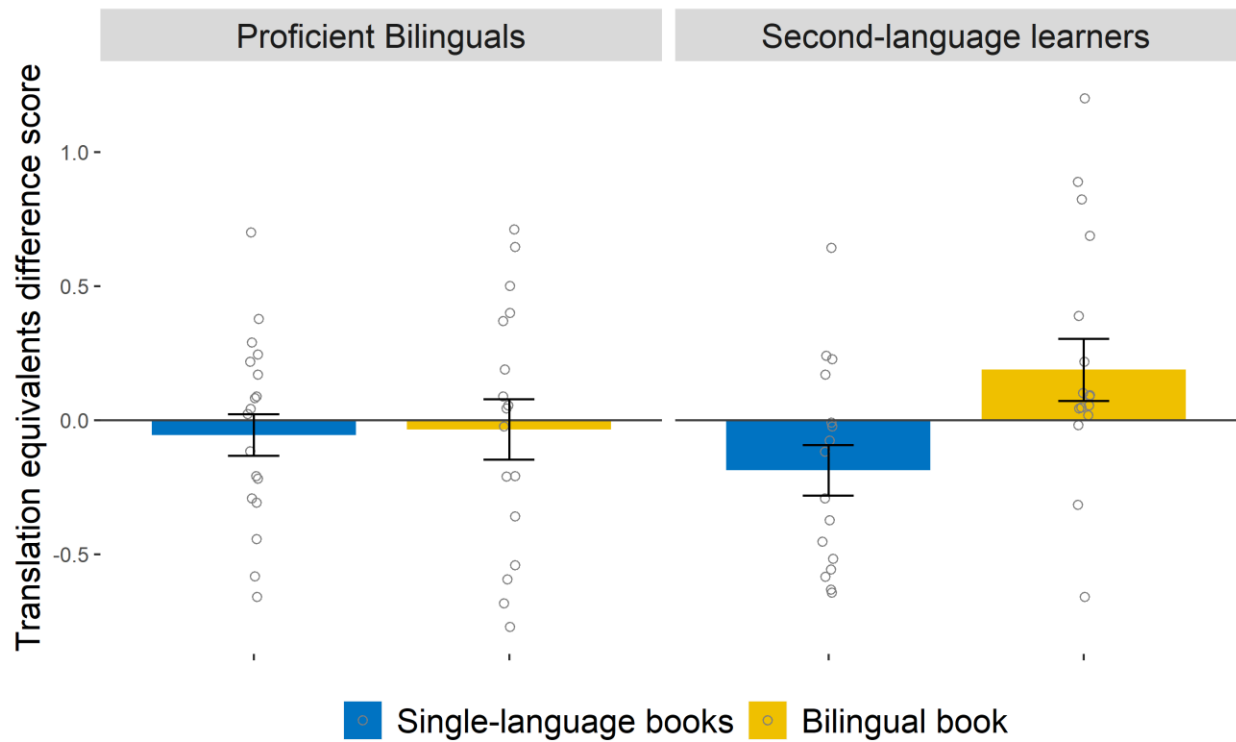


Figure 5. Translation equivalents difference scores. Circles represent individual data points. Bars represent standard error of the mean.