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## Comparing Effects of Instruction on Word Meaning and Word Form on Early Literacy Abilities in Kindergarten

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### ABSTRACT

*Research Findings:* The present study compared effects of explicit instruction on and practice with the phonological form of words (form-focused instruction) versus explicit instruction on and practice with the meaning of words (meaning-focused instruction). Instruction was given via interactive story-book reading in the kindergarten classroom of children learning Dutch. We asked whether the 2 types of instruction had different effects on vocabulary development and 2 precursors of reading ability—phonological awareness and letter knowledge—and we examined effects on these measures of the ability to learn new words with minimal acoustic-phonetic differences. Learners showed similar receptive target-word vocabulary gain after both types of instruction, but learners who received form-focused vocabulary instruction showed more gain in semantic knowledge of target vocabulary, phonological awareness, and letter knowledge than learners who received meaning-focused vocabulary instruction. Level of ability to learn pairs of words with minimal acoustic-phonetic differences predicted gain in semantic knowledge of target vocabulary and in letter knowledge in the form-focused instruction group only. *Practice or Policy:* A focus on the form of words during instruction appears to have benefits for young children learning vocabulary.

The number of words a child knows at the start of primary school is predictive of later school success (Verhoeven & Vermeer, 2006a). But there are large individual differences in vocabulary size among learners, particularly between native speakers and sequential bilingual children who enter primary school with hardly any knowledge of the language of instruction, which is their second language (L2; e.g., Bialystok, Luk, Peets, & Yang, 2010; Griffin, Burns, & Snow, 1998). Because vocabulary differences appear to remain stable throughout the school years (Leseman, 2000), classroom instruction is typically given to help increase vocabulary and reduce gaps in vocabulary knowledge. Such instruction in general focuses on the semantic aspects of words; for example, new words are linked with words based on semantic features in a word web (e.g., *cat* is linked with *animal*, *whiskers*, *fur*, etc.; e.g., Beck & McKeown, 2007). However, explicit instruction on the phonological form of words—for example, linking new words with rhyme words (e.g., linking *cat* with *hat*, *bat*, *mat*, etc.)—may stimulate vocabulary development and also early literacy skills that support word learning (De Jong, Seveke, & Van Veen, 2000; Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; Hu, 2003; Lonigan, 2007; Piasta & Wagner, 2010; Storkel, 2009). A direct comparison of the two types of instruction has not previously been made. The present study thus sought to compare the effects of form-focused versus meaning-focused classroom vocabulary training in kindergarten children with larger and smaller vocabularies.

Furthermore, it has recently been shown that teaching children new words with only minimal acoustic-phonetic differences does more than add items to their vocabulary. This kind of training

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increases the depth of knowledge a child has about acoustic-phonetic properties of words (i.e., lexical specificity), and this appears to enhance phonological awareness in both first language (L1) learners (Van Goch, McQueen, & Verhoeven, 2014) and L2 learners (Janssen, Segers, McQueen, & Verhoeven, 2015). Consequently, the present study aimed to compare not only the effects of form-focused versus meaning-focused classroom vocabulary instruction on vocabulary itself but also subsequent effects on skills that strongly predict later reading ability, namely, phonological awareness and letter knowledge, taking into account individual variation in levels of ability to learn words that are phonetically minimally different.

### ***Vocabulary and early literacy development***

Verhoeven, Van Leeuwe, and Vermeer (2011) longitudinally examined the relationship between vocabulary growth and development of reading throughout primary school in a group of Dutch children who varied in terms of linguistic background and socioeconomic status (SES). The children showed continuity over time in the development of receptive and advanced written vocabulary. Furthermore, early receptive vocabulary predicted word decoding and reading comprehension, but after 2 years of formal reading education, word decoding predicted vocabulary development in later years. Finally, there was a reciprocal relationship between advanced vocabulary and reading comprehension. These results show that early vocabulary sets the stage for the development of later vocabulary and that vocabulary knowledge and reading skills interact. Consequently, children who start primary school with less target vocabulary knowledge, such as sequential bilingual children, may be disadvantaged.

Not only knowledge of word meanings but also knowledge of word forms plays a role in further development of vocabulary and reading ability (e.g., Verhoeven et al., 2011). Being aware of the phonological makeup of words and being able to manipulate word structures (i.e., phonological awareness) is, along with vocabulary, strongly predictive of later reading skills (Melby-Lervåg, Lyster, & Hulme, 2012). Specific representations of word forms in memory, that is, thorough knowledge of acoustic-phonetic properties of words, may be necessary for phonological awareness to develop from larger units of sound, such as rimes, to smaller units of sounds, such as phonemes, and for performing increasingly detailed manipulations of word structures (Vloedgraven, Keuning, & Verhoeven, 2009; De Cara & Goswami, 2003; Elbro, Borstrøm, & Petersen, 1998; Garlock, Walley, & Metsala, 2001; Mark, Müller-Myhsok, Schulte-Körne, & Landerl, 2014; Ziegler & Goswami, 2005). As children become aware that spoken words are made up of individual speech sounds, they must understand that letters in written words map onto these speech sounds in order to learn to read in an alphabetic language; that is, they need to grasp the alphabetic principle (Adams, 1990). Because phoneme manipulation skill and the ability to make connections between letters and sounds are strongly associated (Foy & Mann, 2006), detailed knowledge of word forms may also support the development of letter knowledge (Goswami, 2000).

Recently, it was found that the ability to learn new word pairs that differ only minimally in phonological form (minimal pairs) predicted vocabulary size and rhyme awareness in children who were learning Dutch as their L1 (L1-Dutch-learning children; Janssen, Segers, McQueen, & Verhoeven, 2016; Van Goch, 2016) and predicted phoneme awareness in children who were learning Dutch as their L2 (L2-Dutch-learning children; Janssen et al., 2016) in first year of kindergarten. Furthermore, the ability to learn phonetically minimally different words in the first year of kindergarten predicted letter knowledge in the second year of kindergarten (Van Goch, 2016). It appears that specificity of word form representations in the mental lexicon as well as the ability to acquire these representations influence vocabulary and early literacy development in both L1- and L2-learning children.

## **Vocabulary learning**

Building up a vocabulary is a gradual and complex process. New word labels and meanings are learned incrementally (breadth of vocabulary knowledge, or number of words known, increases), and words are categorized while meaningful relations among words are constructed (depth of vocabulary knowledge, or how much is known about a word, increases). The ultimate goal is for new words to become connected with knowledge the learner has already acquired (Frishkoff, Perfetti, & Collins-Thompson, 2011) or with new knowledge (as when the learner acquires a new concept along with a new word for that concept). Words can be learned in several ways. Implicit word learning occurs when new words are encountered once or multiple times in an incidental fashion (Mol, Bus, & De Jong, 2009). Explicit word learning occurs when the learner is provided with semantic information during the learning process that supports consolidation and integration of words with prior knowledge (Henderson, Weighall, & Gaskell, 2013).

But vocabulary learning involves more than building semantic representations and relations among words that are based on semantic information. It also entails establishing phonological and, during the process of learning to read, orthographic representations of words and relations among words that are based on phonological and orthographic information (Storkel, 2009). This leads to deeper and sustainable vocabulary knowledge, that is, a higher lexical quality (Perfetti, 2007; Perfetti & Hart, 2002). As their vocabulary grows, learners are more likely to come across words that differ minimally in their meaning, their phonology, or their orthographic makeup. It has been suggested that these encounters with minimal differences trigger increases in lexical specificity. Word representations are stored in more and more detail, which makes it possible to define and keep apart the words (e.g., Gerken, Murphy, & Aslin, 1995; Goswami, 2000; Metsala & Walley, 1998; Werker, Byers-Heinlein, & Fennell, 2009). The acquisition of new word pairs that are only minimally phonetically different has been found to enhance phonological awareness (Janssen et al., 2015; Van Goch et al., 2014), which in turn may support further word learning (Cooper, Roth, Speece, & Schatschneider, 2002; De Jong et al., 2000; Hu, 2003; Storch & Whitehurst, 2002). In a similar fashion, increases in detailed phonological knowledge may help learners make letter-sound connections (Goswami, 2000; Mann & Foy, 2003). When information on the form of words is explicitly provided during the learning process, phonological representations of new words that become stored in memory may be highly specific. This may not only stimulate vocabulary development but also boost phonological awareness and letter knowledge.

When learning takes place in a language other than the mother tongue, acquiring knowledge of word forms in that language may be particularly important. Often phonological information is processed similarly between languages, and in many cases languages show overlap in phonological structure and phonological units (Melby-Lervåg & Lervåg, 2011). This leads to the transfer of phonological knowledge and skills between languages (Janssen et al., 2015; Janssen et al., 2016; Carroll, 2008). Transfer can be helpful in L2 acquisition, for example when phonological elements such as phonemes are of similar importance between languages, but can hinder L2 acquisition as well, for example when L2 speech sounds are categorized according to their representations in L1 (Carroll, 2008; Ellis, 2015). Explicit information on the form of words during vocabulary learning therefore may improve L2 learners' ability to cope with phonological variation between the two languages and their ability to use phonological features in learning new target language words and may stimulate development of early literacy skills in the target language.

## **Classroom vocabulary interventions**

Learning new words therefore has possible benefits beyond increases in vocabulary itself, but the question remains how vocabulary can best be taught. Interaction plays an important role in current ideas on vocabulary stimulation in the classroom. Interactive language education follows three interrelated principles, namely, that learning should take place in interaction with both teachers

and peers, that learning should take place within a meaningful context that fits with learners' experiences, and that learners should be taught strategies for planning and controlling their own learning process (e.g., McDaniel & Pressley, 1989; McKeown & Curtis, 2014). Interactive storybook reading is a method of learning new words in kindergarten that is based on these principles. A storybook provides the rich context that is needed for learning new words implicitly, and new words can be taught explicitly by giving definitions either during (embedded instruction) or after reading (Beck & McKeown, 2007; Butler et al., 2010; Mol et al., 2009; Wasik & Bond, 2001). Breadth of vocabulary knowledge has been found to improve as a result of interactive storybook reading (e.g., Biemiller & Boote, 2006). To foster depth of vocabulary knowledge too, extended instruction in the form of providing in-depth explanation of word meanings, presenting target words in different contexts, and asking questions about the target words has been suggested (e.g., Beck & McKeown, 2007; Butler et al., 2010; Coyne, Simmons, Kame'enui, & Stoolmiller, 2004; Hadley, Dickinson, Hirsh-Pasek, Golinkoff, & Nesbitt, 2015). Studies have indeed shown that learning words via implicit encounters and explicit (extended) instruction within the context of a storybook is effective for L1 learners (for a review, see Damhuis, Segers, & Verhoeven, 2014, ; Marulis & Neuman, 2010). Effects on L2 learners have only been investigated in a few studies. The available results suggest that interactive reading can positively influence word learning in this group too (Collins, 2005; Silverman, 2007a).

It is interesting that a link from vocabulary instruction to phonological awareness can be made. Lonigan (2007) examined effects of vocabulary training versus phonological training on vocabulary and early literacy skills in preschool children. Results showed that children who received a vocabulary intervention improved in both vocabulary and phonological awareness skills compared to a business-as-usual control group. Children who received a phonological awareness intervention improved only in phonological awareness skills, not in vocabulary. It is possible that when the meaning of new words is taught, new word forms are encountered implicitly and phonological knowledge increases, which may improve phonological awareness.

Explicit vocabulary instruction that focuses on the meaning of words as well as on phonological and orthographic aspects may have additional effects in that it may more directly stimulate both vocabulary development and early literacy skills. This was demonstrated in a classroom intervention study by Droop, Peters, Aarnouste, and Verhoeven (2005) that focused on the enhancement of both vocabulary and early literacy skills and in classroom intervention studies by Silverman (2007b) and Damhuis, Segers, Scheltinga, and Verhoeven (2016) that both focused on the enhancement of vocabulary. In all three studies, kindergarten L1 and L2 learners received interactive storybook reading interventions and additional in-depth instructional activities to learn unfamiliar words that targeted semantic as well as phonological and orthographic aspects of the words.

In Droop et al. (2005) study, children in the experimental classrooms received the intervention for 20 weeks, 1 hr per day. On Monday, the teacher introduced the storybook and explained the meaning of new words. On Tuesday, activities on the form of words were carried out. On Wednesday, instruction was directed at understanding the story. On Thursday, writing activities were performed. Finally, on Friday, the teacher evaluated the activities with the children and discussed plans for the next week. L2 learners improved on receptive vocabulary, and both L1 and L2 learners improved on phonological awareness and letter knowledge in comparison to matched control classrooms.

Silverman (2007b) compared three types of interactive storybook reading interventions: (a) connecting words to how they are used in books and to personal experiences of the children (contextual instruction), (b) contextual instruction including in-depth analysis of the meaning of words (analytical instruction), and (c) analytical instruction including attention to spoken and written word forms (anchored instruction). Results showed that children who received analytical instruction and children who received anchored instruction improved more on target vocabulary breadth and depth than children who received contextual instruction.

In Danhuis et al.'s (2016) study, L1 and L2 learners received intervention for 12 weeks, 30 min a day, for 4 days per week. On Monday, the storybook was introduced, and the teacher explained the

meaning of two target words. On Tuesday, the storybook was reviewed, and the teacher explained the meaning of six more target words. On Wednesday, children carried out activities on the meaning of the target words. On Thursday, a letter was introduced, and children carried out activities with this letter, such as searching for the letter in the storybook. Children improved on both target vocabulary breadth and depth. Children who received additional instruction on retrieving the meaning of words they answered incorrectly after the interactive storybook reading intervention improved more in target vocabulary breadth and depth than children who did not receive this additional instruction. Phonological awareness and letter knowledge were not assessed in the Silverman (2007b) and Danhuis et al. (2016) studies.

Thus, interactive reading with in-depth instruction on semantics as well as phonology and orthography appears to improve both vocabulary and early literacy skills. Phonological training by itself did not lead to the acquisition of new word meanings (Lonigan, 2007). A high level of phonological awareness when confronted with unfamiliar word forms, however, may lead to a more finely grained initial representation of these words, resulting in an improved ability to learn new words (e.g., De Jong et al., 2000). In two recent training studies, 4-year-old L1 and L2 learners of Dutch were confronted with acoustic-phonetic minimally different unfamiliar word pairs with corresponding pictures. In a short 15-min training session, children were taught the form and the meaning of the words by learning to associate the words with the pictures. Results showed vocabulary gains, as well as the enhancement of phonological awareness, in both L1 and L2 learners (Janssen et al., 2015; Van Goch et al., 2014). Children who are better able to acquire the meaning of words in such a minimal word-pair learning paradigm may have higher abilities to infer meanings of unfamiliar words incidentally, as they tune more easily into the phonological constituents of which words are composed (Nagy, 2007; Nagy & Scott, 2000).

In research on interactive vocabulary instruction in the classroom so far, however, the role of knowledge of the phonological form of words in comparison with the role of knowledge of the meaning of words in word acquisition has not been examined. Explicit, in-depth information on the phonological form of words during classroom-based learning may improve a child's ability to pick up on minimal phonological differences among words and to use this detailed phonological information in learning word meanings (e.g., De Jong et al., 2000; Nagy, 2007). Moreover, implicitly, children's attention may be more easily drawn to meaning aspects than to form aspects of words, as meaning is of more communicative value during interactions (Robinson, 2003). Explicit instruction on word form may highlight the less salient form features of words on top of the more salient meaning features of words, leading to more in-depth word representations, and therefore could stimulate vocabulary development more than explicit instruction on word meanings. Children who receive explicit vocabulary instruction focusing on the phonological form of words, and especially those who perform better on a minimal word-pair learning task, may therefore show larger vocabulary growth. It can also be hypothesized that compared to instruction based on the meaning of words form-focused vocabulary instruction may lead to higher gains in phonological awareness and letter knowledge in kindergarten L1 and L2 learners.

### **The current study**

In the current study, effects on word learning and transfer to phonological awareness and letter knowledge were compared between two classroom vocabulary instruction groups: one group in which the instruction was focused on the form of words and building phonological relations among words (i.e., a form-focused instruction group) and one in which the instruction was focused on semantic aspects of words and building semantic relations among words (i.e., a meaning-focused instruction group). In an everyday classroom situation, it is not possible to present new words as phonological forms without meanings or to present new words as meanings without forms. Thus, in what follows *form-focused instruction* means that there was a focus on form but with some attention naturally given to meaning, whereas *meaning-focused instruction* means that although there was

a focus on meaning, some attention was naturally given to form. Participants were L1 and L2 learners of Dutch in first and second years of kindergarten. Two research questions were formulated:

- (1) Does form-focused vocabulary instruction in an interactive reading context lead to higher target vocabulary, phonological awareness, and letter knowledge gains than (contemporary) meaning-focused vocabulary instruction in an interactive reading context in mixed L1/L2-learning kindergarten classrooms?
- (2) What is the effect of level of ability to learn phonetically minimally different words, as measured with an additional word-learning task, on target vocabulary, phonological awareness, and letter knowledge learning gains? (a) Does ability to learn phonetically minimally different words (also) have an indirect effect via general receptive vocabulary on target vocabulary, phonological awareness, and letter knowledge learning gains? (b) Do direct and/or indirect effects differ between the form- and meaning-focused instruction groups?

Regarding the first question, children in the form-focused instruction group were expected to gain more in target-word knowledge during the intervention than children in the meaning-focused instruction group for the reasons discussed earlier (based on De Jong et al., 2000; Nagy, 2007; Robinson, 2003). In contrast to Lonigan (2007), children in the current study did not receive phonological training by itself but instead phonological training connected to the target words to be learned. Gains in phonological awareness and letter knowledge were also expected to be higher in the form-focused group than in the meaning-focused group (e.g., Janssen et al., 2015; Van Goch et al., 2014).

Regarding the second question, we created a moderated mediation model to test our hypotheses. We included general receptive vocabulary as a possible mediating factor between ability to learn phonetically minimally different words and gain in (a) target vocabulary, (b) phonological awareness, and (c) letter knowledge. Instruction group was a possible moderator of both the relationship between ability to learn phonetically minimally different words and target vocabulary, phonological awareness, and letter knowledge learning gains and the relationship between general receptive vocabulary and these learning gains. We predicted that word-learning ability would be positively related to gains in vocabulary, but more strongly in the form-focused group than in the meaning-focused group. This is because the intervention in the former group built more directly on the ability to learn words with minimal phonological differences than the intervention in the latter group. Regarding early literacy skills, we expected the level of the ability to learn phonetically minimally different words to be positively related to gains in phonological awareness and letter knowledge in both the meaning- and form-focused instruction groups, as has previously been found in training studies (e.g., Janssen et al., 2015; Van Goch et al., 2014). We expected that this word-learning ability would also have a positive indirect effect on gains in vocabulary and early literacy skills via general vocabulary level.

## Method and materials

### Participants

Kindergarten is a 2-year program (junior and senior kindergarten) in The Netherlands prior to Grade 1. Most often children are in mixed-age groups because, throughout the year, children enter junior kindergarten when they reach the age of 4. At the start of each school year, children who have been in kindergarten for at least two school years go to Grade 1. Formal reading education starts in Grade 1. In total, 85 kindergarten children participated. Of these, 41 children received form-focused instruction (nine L1-Dutch: two girls, seven boys; 32 L2-Dutch: 14 girls, 18 boys), and 44 received meaning-focused instruction (31 L1-Dutch: 17 girls, 14 boys; 13 L2-Dutch: seven girls, six boys). The mean age of the children in the form-focused instruction group was 58 months (range = 46--75 months,  $SD = 7.12$  months). The mean age of the children in the meaning-focused instruction

group was 59 months (range = 48–75 months,  $SD = 6.33$  months). The children who participated in the current study were divided over four kindergarten groups in two primary schools in two different cities in the south and the center of The Netherlands. Schools were recruited in municipalities in which 4% to 12% of the families are of non-Western European origin (Centraal Bureau voor de Statistiek [Statistics Netherlands], 2015). Schools were randomly assigned to one or the other instruction group. Parents gave informed consent. They were able to prevent their child from participating, but none did so.

Within the school environment, the language of communication was Dutch. Parents filled out a short questionnaire on language use at home and SES. A total of 61% ( $n = 25$ : six L1-Dutch, 19 L2-Dutch) of the parents of the children in the form-focused instruction group and 93% ( $n = 41$ : 28 L1-Dutch, 13 L2-Dutch) of the parents of the children in the meaning-focused instruction group responded to the questions. According to the answers of the parents and information received from the school, the L2-Dutch children had various language backgrounds: Moroccan-Arabic/Berber ( $n = 15$ ), Turkish ( $n = 7$ ), Arabic ( $n = 7$ ), a Western European language (Spanish, Portuguese, French, English;  $n = 5$ ), Chinese ( $n = 3$ ), Polish ( $n = 2$ ), Russian ( $n = 2$ ), Madingo ( $n = 1$ ), Vietnamese ( $n = 1$ ), Surinamese ( $n = 1$ ), other (home language not known by the school or written down by the parents;  $n = 1$ ). The education level of the parents was taken as a measure of SES, with a score of 1 indicating low-level primary school education, a score of 2 indicating intermediate-level vocational education, and a score of 3 indicating high-level professional education of the parents. On average, both parents of children in the form-focused instruction group and parents of children in the meaning-focused instruction group were educated at an intermediate to high level (form-focused instruction group: mother,  $M = 2.20$ ,  $SD = 0.58$ ; father,  $M = 2.43$ ,  $SD = 0.59$ ; meaning-focused instruction group: mother,  $M = 2.68$ ,  $SD = 0.47$ ; father,  $M = 2.56$ ,  $SD = 0.50$ ). However, the difference between the groups in the level of education of the mother was significant: mother,  $t(64) = 3.706$ ,  $p < .001$ ,  $d = 0.93$ ; father,  $t(62) = 0.905$ ,  $p = .369$ ,  $d = 0.23$ . On average, both parents of the L1-Dutch and the L2-Dutch children were educated at an intermediate to high level (L1: mother,  $M = 2.59$ ,  $SD = 0.50$ ; father,  $M = 2.50$ ,  $SD = 0.51$ ; L2: mother,  $M = 2.41$ ,  $SD = 0.62$ ; father,  $M = 2.53$ ,  $SD = 0.57$ ). The difference was not significant: mother,  $t(64) = 1.323$ ,  $p = .190$ ,  $d = 0.33$ ; father,  $t(62) = -0.232$ ,  $p = .817$ ,  $d = -0.06$ .

### **Vocabulary intervention**

A 4-week vocabulary intervention was designed covering two themes, Animals and Feelings, based on the intervention described in Danhuis et al. (2016). One narrative book that was appropriate for the children's age and contained a rich storybook context, as well as corresponding pictures that were attractive and supported the story, was selected for each theme. Twenty words from within the storybooks were chosen as target words. Twenty words that did not occur in the storybooks but did fit with the themes were also chosen. In total therefore 40 target words were taught to the children during the vocabulary intervention. Target words consisted of nouns, verbs, function words, and adjectives and occurred in the expanded list for children in Kindergarten Year 2 of the Basiswoordenlijst Amsterdamse Kleuters [Basic Vocabulary List for Kindergarten Children of Amsterdam] (Mulder, Timman, & Verhallen, 2009). The goal of the list is for children to know these words at the end of Kindergarten Year 2 but not yet at the beginning of Kindergarten Year 2 or in Kindergarten Year 1. Therefore, it was safe to assume that the children had not yet acquired the words at the start of the vocabulary intervention. An overview of the books and target words by theme can be found in [Appendix A](#).

The structure of the vocabulary intervention was the same for the form- and meaning-focused instruction groups. Activities were carried out in a fixed order, and a similar amount of time was spent on each of the activities in both groups. The content, however, differed between the two groups (see [Table 1](#) for the structure of the vocabulary intervention and examples of activities per day).



**Table 1.** Vocabulary intervention: Structure and example of activities per day.

Week	Day	Time	Activity	Form-Focused Instruction	Meaning-Focused Instruction
1	Monday	0:00–0:10	Introduction of the theme: an activity with objects or a puppet to introduce the general theme of the storybook	Theme: Animals. Children match a plush animal with its name. The plush animal and the name start with the same sound, for example, <i>SSSSara de SSSSpin</i> [Sarah the Spider].	Theme: Animals. Children sort out plush animals. Which animals belong on a farm, which animals belong in a zoo?
		0:10–0:22	The storybook is introduced: The teacher mentions the title and author and discusses with the children what the story will be about. The teacher reads the book.	Storybook <i>Bertje Big</i>	Storybook <i>Bertje Big</i>
		0:22–0:35	The first four target words are defined, and the teacher gives examples.	<i>De bok</i> [the male goat] is a male goat. You can recognize him by his horns. <i>Bok</i> rhymes with ( <i>schapen</i> ) <i>hok</i> [(sheep) barn]. Together with the teacher, children make funny sentences with words that rhyme with <i>bok</i> , for example, <i>de bok eet een sok</i> [the male goat eats a sock]. The teacher writes these sentences down. A picture of <i>de bok</i> is put on the wall. The word is written next to the picture.	<i>De bok</i> [the male goat] is a male goat. You can recognize him by his horns. The teacher discusses with the children the meaning of the word in more depth. A picture of <i>de bok</i> is put on the wall. The word is written next to the picture.
		0:35–0:40	Activity on the four target words	Game: When I Clap My Hands... When the teacher claps his or her hands, for example, all children say “ <i>de bok</i> .”	Game: When I Clap My Hands... When the teacher claps his or her hands, for example, all children pretend they are male goats.
	Tuesday	0:00–0:05	The storybook and the first four target words are briefly reviewed.	The teacher briefly reminds the children of the first four target words.	The teacher briefly reminds the children of the first four target words.
		0:05–0:25	Six new target words are defined, and the teacher gives examples.	<i>De wei</i> [the whey] is a large lawn surrounded by a fence. Often there are animals in the whey. Together with the teacher, the children think of more words that start with /w/. The teacher writes these words down. A picture of <i>de wei</i> is put on the wall. The word is written next to the picture.	<i>De wei</i> [the whey] is a large lawn surrounded by a fence. Often there are animals in the whey. The teacher discusses with the children the meaning of the word in more depth. A picture of <i>de wei</i> is put on the wall. The word is written next to the picture.
		0:25–0:35	Activity on the six new target words	The teacher reads a story with gaps. The children need to find the correct words that fit in the gaps. For example, <i>Toen we bij de boerderij aankwamen, zagen we allemaal koeien. Die liepen in (dit woord begint met de “w”)</i> [When we arrived at the farm, we saw cows. The cows were in (this word starts with /w/)].	The teacher reads a story with gaps. The children need to find the correct words that fit in the gaps. For example, <i>Toen we bij de boerderij aankwamen, zagen we een plek met veel gras en een hek eromheen. Er liepen koeien in (de wei)</i> [When we arrived at the farm, we saw a field with a lot of grass surrounded by a fence. There were cows in (the whey)].
	Wednesday	0:00–0:15	Activity on the 10 target words learned this week	Discussing a drawing. All kinds of things are happening in this picture. Find target words in this picture and create word webs with words that are phonologically related to the target words. For example, <i>bok, sok, bol, bos</i> [male goat, sock, globe, forest].	Discussing a drawing. All kinds of things are happening in this picture. Find target words in this picture and create word webs with words that are semantically related to the target words. For example, <i>bok, geit, schaap, lammetje</i> [male goat, goat, sheep, lamb].

(Continued)

Table 1. (Continued).

Week	Day	Time	Activity	Form-Focused Instruction	Meaning-Focused Instruction
		0:15–0:25	Activity on the 10 target words learned this week	Children need to think of words that rhyme with the target words. For example, <i>wei, ei, kei</i> [whey, egg, boulder].	Children listen to a song. Target words occur in this song. Children need to identify the target words and give definitions. For example, <i>De koe die boe zei, de koe die boe zei Stond zo lekker in de wei De koe die boe zei, de koe die boe zei Leefde vrij en blij</i> [The cow said boo, the cow said boo, she was happily in the <b>whey</b> . The cow said boo, the cow said boo, she lived free and happily].
		0:25–0:35	Activity on the 10 target words learned this week	The teacher reads a series of words out loud. Each series contains a target word. Children need to clap their hands when they hear the target word. For example, <i>das, bok, deur, bol, dok, bon</i> [tie, <b>male goat</b> , door, globe, dock, receipt].	The teacher reads a story that contains target words. Children play the story. For example, <i>Plotseling klonk er lawaai. Er kwam een bok tevoorschijn! Hij kwam heel hard aanrennen</i> [Suddenly, there was noise. A <b>male goat</b> appeared! He came running very fast]. Children make horns with their hands on their heads and/or pretend they are scared of the male goat.
	Thursday	0:00–0:15	Activity on the 10 target words learned this week	Children fill out worksheets. For example, children need to stamp target words according to the example.	Children fill out worksheets. For example, children color a picture. Color the animals that belong on the farm.
		0:15–0:20	Introduction of the <i>Kletstheater</i> [chat theater]	Introduction of the <i>Kletstheater</i> [chat theater]	Introduction of the <i>Kletstheater</i> [chat theater]
		0:20–0:40	<i>Kletstheater</i>	Children craft pictures themselves with all kinds of materials based on the target words and phonologically related words, for example, <i>bok, sok, bol, wei, ei, wesp</i> [wasp].	Children craft pictures themselves with all kinds of materials based on the target words and semantically related words, for example, <i>bok, schaap, koe, boerderij, wei, gras</i> .

### Form-focused instruction group

On Monday in the first week of each theme, the theme and the storybook were introduced; teachers read the name of the author, read the title of the book, and discussed with the children what the story would be about. Then teachers read the whole storybook and gave definitions (the meaning of the words was explicitly provided only in the words' definitions that were given on the day the words were introduced) and examples, focused on form aspects, of the first four storybook-specific target words. On Tuesday, the teachers interactively retold the storybook and gave definitions and examples, focused on form aspects, of another six storybook-specific target words. On Wednesday and Thursday, teachers carried out classroom activities with the children focused on form aspects of the 10 target words that were learned on Monday and Tuesday. The second week was equivalent to the first week in that similar activities were conducted for the same storybook as was read in the first week. However, these activities were now focused on the 10 new target words that did not occur in the storybook but did fit with the theme.

### Meaning-focused instruction group

The intervention was the same as that of the form-focused instruction group, but definitions and examples focused on semantic aspects of the target words. Information on the form of the words was

not explicitly provided. Also, in the classroom activities, the focus was on the semantic aspects of the target words.

## **Vocabulary measures**

### **General receptive vocabulary**

General vocabulary knowledge was assessed with the receptive vocabulary test of the Taaltoets Alle Kinderen [Language Test for all Children] (Verhoeven & Vermeer, 2006b). A total of 96 spoken words (80 nouns, 16 verbs) were presented that increased in difficulty. For each item, four pictures were shown to the child. The child had to point out the picture that corresponded to the spoken word. The task ended when the child responded incorrectly to five consecutive items. The number of pictures that were correctly identified was the total score on the test. Construct validity of the task is good. Factor analyses show that the majority of the variance in the receptive vocabulary test results can be explained by the vocabulary factor (Verhoeven & Vermeer, 2006b). The reliability of this test is good (Cronbach's  $\alpha = .97$ ; Verhoeven & Vermeer, 2006b).

### **Target-word receptive vocabulary**

Children's knowledge of 12 target words from the Animals theme (*het erf, scharrelen, de stal, de bok, kriebelen, ritselen, fladderen, klauteren, het verblijf, de overall, de uier, brullen*) and 12 target words from the Feelings theme (*schrikken, missen, durven, spannend, nieuwsgierig, voorzichtig, bovenop, zielig, kippenvel, bewonderen, beschermen, trouw*) was tested with receptive vocabulary tests (see Appendix A for an overview of all target words and their translations). Child-friendly photographs or drawings were used as stimuli. These pictures were dissimilar to the pictures that occurred in the storybooks to avoid picture recognition effects. For each item, the child had to select the target word out of four pictures that were presented to him or her on paper. One of the distracters was phonologically related to the target word, one of the distracters was semantically related to the target word, and one of the distracters was unrelated to the target word (e.g., *lam* (semantically related)—*bok* (target word)—*fles* (unrelated)—*bom* (phonologically related) [lamb—goat—bottle—bomb]). The total score was the number of target words selected correctly. The reliability of the receptive target vocabulary tests was acceptable (Cronbach's  $\alpha = .72$ ; Santos, 1999).

### **Target-word semantic knowledge**

Children's deeper knowledge of eight target words of the Animals theme (*voor het eerst, behalve, de wei, grazen, grommen, de flamingo, de kameleon, zwiepen*) and eight target words of the Feelings theme (*berouwen, vals, bibberen, allemaal, vrezen, uitgelaten, verlangen, nijdig*) was tested with semantic knowledge tests. For each item, the following question was asked: "Wat is denk je [target word]?" [What do you think is {target word}?]. The child was asked to give as much information about the target word as possible. The only way in which the test administrator was allowed to stimulate the child to give more information than the initial response was with the question "Wat kun je nog meer vertellen over [target word]?" [What else can you tell about {target word}?]. The child received 2 points if he or she could describe the exact meaning of the target word and 1 point if he or she knew a few defining characteristics of the target word. No points were given if the child gave incorrect information about the target word or did not know the word at all. The total test score was the total number of points collected throughout the tests, with a maximum score of 32 points (16 points for each test). The reliability of the semantic knowledge tests was good (Cronbach's  $\alpha = .80$ ; Santos, 1999).

## **Early literacy measures**

### **Phonological awareness**

Phonological awareness was assessed with the rhyme awareness and phoneme blending tasks of the Screeningsinstrument Beginnende Geletterdheid [Diagnostic Instrument for Emergent Literacy]

(Vloedgraven et al., 2009). The rhyme awareness task (two practice items, 15 test items) was used to measure awareness of larger sound units (rimes), whereas the phoneme blending task (two practice items, 15 test items) was used to measure awareness of smaller sound units (phonemes). In both tasks, each trial consisted of three pictures that were presented on the computer screen. The words represented by the pictures were provided by a recorded female voice. In the rhyme awareness task, a fourth word was pronounced. The child had to find the picture on the screen that rhymed with this fourth word and press it. In the phoneme blending task, the name of one of the three pictures on the screen was provided phoneme by phoneme. The child had to identify and press the correct image. The total score on both tasks was the number of pictures correctly identified by the child. Construct validity of the tasks is good. Factor analyses show that 80% to 90% of the variance in task results can be explained by one dominant factor (Vloedgraven et al., 2009). The reliability of each task is good (Cronbach's  $\alpha = .90$  in both cases; Vloedgraven et al., 2009).

### **Receptive letter knowledge**

Receptive letter knowledge was assessed with the receptive letter knowledge task of the Screeningsinstrument Beginnende Geletterdheid [Diagnostic Instrument for Emergent Literacy] (Vloedgraven et al., 2009). A total of five practice items and 34 test items were presented. For each item, four letters were presented on the computer screen. One of these letters was provided by a recorded female voice. The child had to identify the correct letter on the screen and press it. The total score on the task was the number of letters correctly identified by the child. All letters of the alphabet were used in the task with the exception of low-frequency letters in Dutch (*c*, *x*, *q*, and *y*) but including the more frequent digraphs (such as *oo*, *ee*, and *aa*). Construct validity of the task is good. Factor analyses show that about 90% of the variance in task results can be explained by one dominant factor (Vloedgraven et al., 2009). The reliability of the receptive letter knowledge task is good (Cronbach's  $\alpha = .90$ ; Vloedgraven et al., 2009).

### **Ability to learn phonetically minimally different words**

The ability to learn phonetically minimally different words was assessed with a word-learning task (reliability is good: Cronbach's  $\alpha = .96$ ; Santos, 1999; protocol designed by Van Goch et al., 2014). Via this task, 16 new word pairs were taught that differed only minimally in their phonological makeup (minimal-pair words). Sixteen quadruplets that consisted of monosyllabic Dutch words with matching pictures were created (see Appendix B for an overview of all of the quadruplets). Each quadruplet comprised two unfamiliar target words that differed on only one acoustic-phonetic feature (e.g., *peuk*—*beuk* [cigarette end—beech]: these words differ in voicing), an unfamiliar control word (e.g., *reuk* [smell]), and a familiar control word (e.g., *jeuk* [itch]). Words were considered familiar to the children if they received a rating of 75% or higher (percent agreement among teachers about whether a word is familiar to 6-year-old children [second-year kindergartners]) on the *Streeflijst voor 6-jarigen* [target list for 6-year-olds] (Schaerlaekens et al., 1999) and were considered unfamiliar to the children if this percentage was below 75% or if they did not occur on the list. The control words were dissimilar to both target words in two acoustic-phonetic features.

A practice phase and a training phase were incorporated into the word-learning task. A trial in each phase of the task started with a fixation cross presented on the computer screen (500 ms). Thereafter, four pictures were presented (1,000 ms). An auditory question was played during the presentation of the pictures (mean duration = 1,379 ms): "*Wat is denk je een [target]?*" [What do you think is a [target]?]. In response to the question, the child had to press one of the pictures on the computer screen. If the child gave the correct answer, a picture of a clown appeared on the screen as positive feedback, both in the practice and in the training phases (1,000 ms). If the child did not give the correct answer, the next trial started right away without feedback.

The first five trials of the word-learning task (the practice phase) were used to accustom the children to the task. Then the training phase started, which consisted of three blocks of experimental trials of increasing difficulty (32, 32, and 16 trials, respectively). In Block 1, each target word was

presented together with its familiar control word and two filler words. In Block 2, each target word was presented together with its unfamiliar control word and two filler words. In Block 3, both target words of a quadruplet were presented in the same trial, together with two filler words. Throughout the training phase, nine highly familiar and frequent filler trials appeared in random positions in the running order. In total, with practice and training phases combined, 94 trials were included. The total score on the task was the number of experimental trials in which the child gave the correct answer, which showed how well the child was able to learn new word pairs based on minimally phonological differences between the words of each pair. It took about 10–15 min on average for a child to complete the word-learning task.

### Procedure

Before the study started, teachers were informed about how to work with the intervention materials during a 1-hr meeting with the first author. Also, the teachers received all of the information in print. To control for differences in teachers' teaching processes as much as possible, we wrote out extensive instructions for them in an information booklet. Information about the study was summarized in the booklet as well.

A pretest–intervention–posttest design was used (see Table 2). Children were tested individually in a quiet room in their schools by either the first author or one of four other experimenters, who were trained educational science master of science students. At pretest, the general receptive vocabulary, minimal-pair word-learning, phonological awareness, and letter knowledge tasks were administered to the children. Also, the target-word receptive vocabulary and target-word semantic knowledge pretests for the first theme of the intervention, Animals, were administered. Testing took about three times 30 min per child. The week after the pretest was finished, the first 2 weeks of the intervention started, covering the Animals theme. In the week after these first 2 weeks of the intervention (the in-between test week), children received the target-word receptive vocabulary and target-word semantic knowledge posttests for the Animals theme and received the target-word receptive vocabulary and target-word semantic knowledge pretests for the second theme of the intervention, Feelings. Testing took one time 20 min. Because the pretest and the first 2 weeks of the intervention took place in October, children had 1 week of autumn holidays after the in-between test week. Immediately after the autumn holidays, the last 2 weeks of the intervention started, covering the Feelings theme. At posttest, children received the target-word receptive vocabulary and target-word semantic knowledge posttests for the Feelings theme and were tested again on phonological awareness and letter knowledge. Testing took about two times 20 min.

The intervention was implemented within the regular curriculum of the schools. In the intervention an instruction procedure was used that differed slightly from the procedure used in the regular curriculum design. Both schools are familiar with interactive reading but less so with carrying out in-

**Table 2.** Study design.

Month	Week	Activity
September	1–4	General receptive vocabulary, ability to learn phonetically minimally different words Pretest early literacy measures Pretest Theme 1: Animals, target-word receptive vocabulary and target-word semantic knowledge measures
October	1–2	Vocabulary intervention, Theme 1: Animals
	3	Posttest Theme 1: Animals, target-word receptive vocabulary and target-word semantic knowledge measures Pretest Theme 2: Feelings, target-word receptive vocabulary and target-word semantic knowledge measures
	4	Autumn holidays, no intervention or tests
November	1–2	Vocabulary intervention, Theme 2: Feelings
	3–4	Posttest Theme 2: Feelings, target-word receptive vocabulary and target-word semantic knowledge measures Posttest early literacy measures

depth activities on the story. In both schools, activities are most of the time carried out individually or in small groups in *hoeken* [corners], or parts of the classroom or places outside of the classroom equipped for performing certain activities, such as drawing, or playing certain games, such as language games. Activities involving all children in the classroom are performed as well but are less common or have a different goal. Both schools carry out activities within the context of themes, for example, the seasons (spring, summer, autumn, winter), Christmas, or hobbies. Both schools consider language development to be important in kindergarten and offer instruction and materials in their regular curriculum to expand vocabulary knowledge and stimulate early literacy skills.

Several actions were taken to ensure fidelity of the intervention. In each intervention week, the first author visited the schools to make observations in each classroom at least once. Also, notes pages for each day of the week were added to the teachers' information booklets so they could keep a log on, among other things, how much time they spent on the lessons or whether they did something different from what was written down in the booklet and give a general evaluation of the day. Finally, in the week after each half of the intervention the first author evaluated the intervention with the teachers during a 1-hr meeting. According to the observations, the teacher logs, and the evaluation meetings, all teachers followed the instructions as outlined in the information booklet as closely as possible. This means that in the form-focused instruction group teachers focused on form aspects of the words and that in the meaning-focused instruction group teachers focused on semantic aspects of the words. In all four kindergarten groups, children were engaged during the lessons, but engagement decreased as activities took longer or were experienced as difficult. In both types of instruction groups teachers spent about 45 min to 1 hr on the intervention lessons each day, which was more time than the 35–40 min originally planned. Also, in both groups teachers sometimes had to swap activities or spread them over the day to make the intervention fit within their regular program. In sum, there was high accordance among teachers in the administration of all materials.

## Results

### *Descriptive statistics*

Means and standard deviations for all measures can be found in Table 3. We first checked whether there were any significant differences between the form- and meaning-focused instruction groups at pretest. Multivariate analyses of variance on the vocabulary measures (general receptive vocabulary, target-word receptive vocabulary pretest, and target-word semantic knowledge pretest), the early literacy measures (rhyme awareness pretest, phoneme blending pretest, and receptive letter knowledge pretest), and the minimal-pair word-learning task performance were carried out. Instruction group (form-focused, meaning-focused) and language (L1-Dutch, L2-Dutch) were the between-subjects factors. The analysis of the vocabulary measures revealed no interaction effects (all  $F_s < 2$ ). There were main effects of instruction group and language: instruction group,  $F(3, 74) = 3.39, p = .022, \eta_p^2 = .12$ ; language,  $F(3, 74) = 3.86, p = .013, \eta_p^2 = .14$ . Follow-up univariate analyses with Bonferroni correction showed that the children in the meaning-focused instruction group had higher scores on general receptive vocabulary, the target-word receptive vocabulary pretest, and the target-word semantic knowledge pretest than the children in the form-focused instruction group: general receptive vocabulary,  $F(1, 76) = 4.37, p = .040, \eta_p^2 = .05$ ; target-word receptive vocabulary pretest,  $F(1, 76) = 4.71, p = .033, \eta_p^2 = .06$ ; target-word semantic knowledge pretest,  $F(1, 76) = 10.34, p = .002, \eta_p^2 = .12$ . The L1-Dutch children had higher scores than the L2-Dutch children on general receptive vocabulary, the target-word receptive vocabulary pretest, and the target-word semantic knowledge pretest: general receptive vocabulary,  $F(1, 76) = 4.37, p = .040, \eta_p^2 = .05$ ; target-word receptive vocabulary pretest,  $F(1, 76) = 4.07, p = .047, \eta_p^2 = .05$ ; target-word semantic knowledge pretest,  $F(1, 76) = 11.89, p = .001, \eta_p^2 = .14$ . The analyses of the early literacy

**Table 3.** Descriptive statistics for the children in the two instruction groups.

Variable	Form-Focused Instruction (n = 41)	Meaning-Focused Instruction (n = 44)	Maximum Score
Vocabulary measures			
General receptive vocabulary <sup>a</sup>	41.83 (17.43)	53.44 (12.18)	96
Pretest: target-word receptive vocabulary <sup>a</sup>	9.41 (4.13)	12.09 (3.27)	24
Posttest: target-word receptive vocabulary <sup>a</sup>	15.28 (5.28)	18.45 (3.25)	24
Pretest: target-word semantic knowledge <sup>b</sup>	3.18 (4.01)	7.83 (3.96)	32
Posttest: target-word semantic knowledge <sup>b</sup>	10.26 (7.35)	14.48 (4.45)	32
APW and early literacy measures			
APW: minimal-pair word-learning task <sup>c</sup>	.41 (.16)	.47 (.14)	80
PA pretest: rhyme awareness <sup>d</sup>	.53 (.18)	.65 (.17)	15
PA posttest: rhyme awareness <sup>d</sup>	.63 (.22)	.65 (.18)	15
PA pretest: phoneme blending <sup>d</sup>	.44 (.20)	.59 (.26)	15
PA posttest: phoneme blending <sup>d</sup>	.52 (.28)	.61 (.27)	15
Pretest: receptive letter knowledge <sup>c</sup>	.34 (.14)	.43 (.17)	34
Posttest: receptive letter knowledge <sup>c</sup>	.40 (.20)	.44 (.20)	34

Note. Unless stated otherwise, data are *M* (*SD*). APW = ability to learn phonetically minimally different words; PA = phonological awareness.

<sup>a</sup>Number of known words.

<sup>b</sup>Points scored on the target-word semantic knowledge tests.

<sup>c</sup>Proportion of correct trials (chance = .25).

<sup>d</sup>Proportion of correct trials (chance = .33).

measures and the minimal-pair word-learning task results revealed no interaction or main effects (all *F*s < 3).

The current study took place within the existing classroom situation. Although this means we were not able to randomly assign individual children to one or the other instruction group, schools were randomly assigned. Vocabulary differences therefore emerged by chance. We controlled for these differences in vocabulary in subsequent analyses by entering general receptive vocabulary as a covariate, as the other vocabulary tasks were dependent variables at posttest. Consequently, we did not include language (L1-Dutch, L2-Dutch) as a between-subjects factor in analyses of effectiveness of the interventions. L1- and L2-Dutch children were unequally distributed across the two instruction groups, which made some cells of the design very small. Moreover, because the L2-Dutch children tended to have smaller vocabularies than the L1-Dutch children, it was impossible to disentangle L1 effects from effects of other possible causes of the vocabulary difference. As Miller and Chapman (2001) argued, it is not appropriate to include a between-groups factor in a covariance analysis when the two groups are known to vary in their scores on the covariate.

### Effects of type of instruction on word learning

To answer the first research question, whether form-focused vocabulary classroom instruction leads to more target vocabulary gains than meaning-focused vocabulary classroom instruction, we conducted repeated measures multivariate analyses of covariance with Bonferroni correction on the target-word receptive vocabulary and target-word semantic knowledge tests, with instruction group (form-focused, meaning-focused) as a between-subjects factor and time (pretest, posttest) and target vocabulary (receptive, semantic knowledge) as within-subjects factors. General receptive vocabulary was a covariate. Differences between the two instruction groups can be shown by interactions involving time and instruction group. We indeed found a Time × Instruction Group × General Receptive Vocabulary interaction and a Time × Instruction Group × Target Vocabulary × General Receptive Vocabulary interaction: Time × Instruction Group × General Receptive Vocabulary,  $F(1, 76) = 11.79, p = .001, \eta_p^2 = .13$ ; Time × Instruction Group × Target Vocabulary × General Receptive Vocabulary,  $F(1, 76) = 4.62, p = .035, \eta_p^2 = .06$ .

To explore the four-way interaction, we conducted two repeated measures analyses of covariance with Bonferroni correction on the target-word receptive vocabulary and target-word semantic knowledge tests separately, with instruction group (form-focused, meaning-focused) as a between-

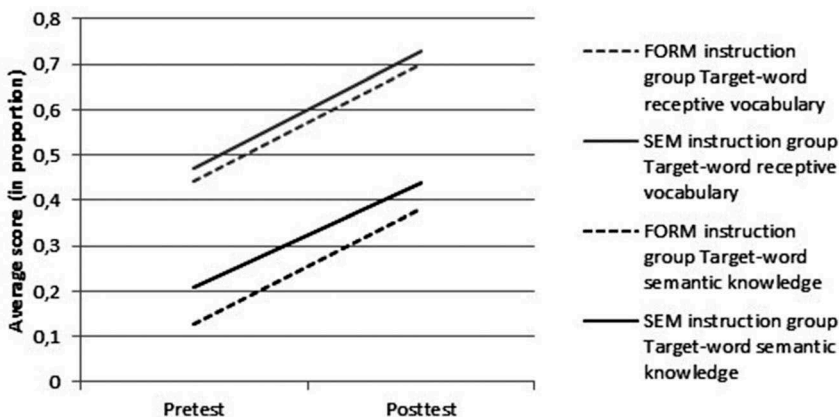
subjects factor and time (pretest, posttest) as a within-subjects factor. Again, general receptive vocabulary was a covariate.

For the target-word receptive vocabulary tests, no interaction was found between time and instruction group,  $F(1, 78) = 1.11, p = .295, \eta_p^2 = .01$ , which showed that there were no differences between the two instruction groups in improvement on these tests. A main effect of time indicated that there was overall improvement in target-word receptive vocabulary,  $F(1, 78) = 13.27, p < .001, \eta_p^2 = .15$ . Also, an interaction effect between instruction group and general receptive vocabulary and main effects of instruction group and general receptive vocabulary were found: interaction effect between instruction group and general receptive vocabulary,  $F(1, 78) = 5.03, p = .028, \eta_p^2 = .06$ ; main effect of instruction group,  $F(1, 78) = 6.29, p = .014, \eta_p^2 = .08$ ; main effect of general receptive vocabulary,  $F(1, 78) = 146.79, p < .001, \eta_p^2 = .65$ . As the multivariate analyses of variance at pretest also revealed, children in the meaning-focused instruction group scored higher on the receptive vocabulary test than children in the form-focused instruction group.

For the target-word semantic knowledge tests, Time  $\times$  Instruction Group and Time  $\times$  Instruction Group  $\times$  General Receptive Vocabulary interactions indicated that children in the form-focused instruction group improved more on the target-word semantic knowledge tests than children in the meaning-focused instruction group: Time  $\times$  Instruction Group,  $F(1, 76) = 12.66, p = .001, \eta_p^2 = .14$ ; Time  $\times$  Instruction Group  $\times$  General Receptive Vocabulary,  $F(1, 76) = 16.47, p < .001, \eta_p^2 = .18$ . Children in the form-focused instruction group with a higher level of general receptive vocabulary showed more improvement on these tests than children in the form-focused instruction group with a lower level of general receptive vocabulary. Next to these interaction effects, a main effect of time was found,  $F(1, 76) = 12.00, p = .001, \eta_p^2 = .14$ , indicating overall improvement in target-word semantic knowledge. Also, a main effect of general receptive vocabulary was found,  $F(1, 76) = 58.87, p < .001, \eta_p^2 = .44$ , indicating that children in the meaning-focused instruction group scored higher on this test than children in the form-focused instruction group. Improvement on the target-word receptive vocabulary and target-word semantic knowledge tests, by instruction group, is shown in Figure 1.

### Effects of type of instruction on early literacy skills

The first research question also asked whether vocabulary instruction would have an effect on phonological awareness and letter knowledge. A repeated measures multivariate analysis of covariance with Bonferroni correction on the rhyme awareness, phoneme blending, and receptive letter

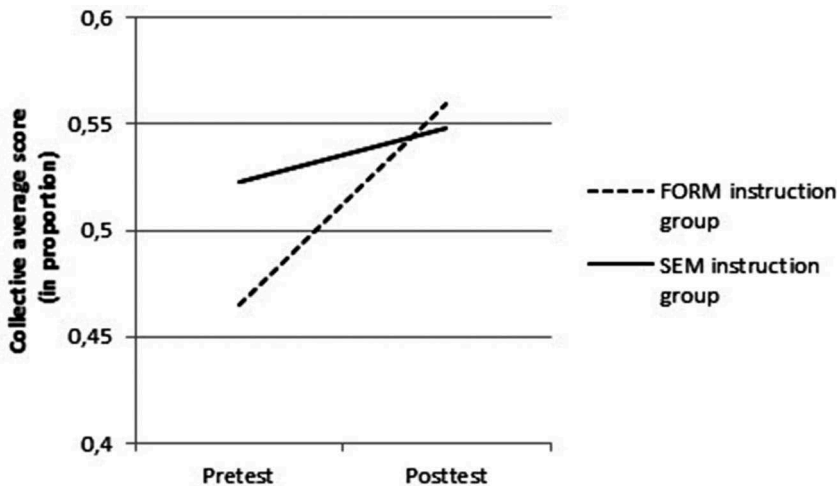


**Figure 1.** Average scores (in proportion) on the target-word receptive vocabulary and semantic knowledge pre- and posttests in the form (FORM)- and meaning (SEM)-focused instruction groups. The covariate general receptive vocabulary was evaluated at .50 for the target-word receptive vocabulary tests and at .51 for the target-word semantic knowledge tests.



knowledge tasks with instruction group (form-focused, meaning-focused) as a between-subjects factor and time (pretest, posttest) and task (rhyme awareness, phoneme blending, receptive letter knowledge) as within-subjects factors was conducted. Again, general receptive vocabulary was added to the analysis as a covariate.

Time  $\times$  Group and Time  $\times$  General Receptive Vocabulary interactions were found: Time  $\times$  Group,  $F(1, 66) = 5.35$ ,  $p = .024$ ,  $\eta_p^2 = .08$ ; Time  $\times$  General Receptive Vocabulary,  $F(1, 66) = 12.45$ ,  $p = .001$ ,  $\eta_p^2 = .16$ . There were no interactions with or a main effect of task, which showed that there were no significant differences between the rhyme awareness, phoneme blending, and receptive letter knowledge measures in how much the children improved on these tasks. Children in the form-focused instruction group improved more on the rhyme awareness, phoneme blending, and receptive letter knowledge tasks than children in the meaning-focused instruction group. Children with a higher level of general receptive vocabulary improved more on these tasks than children with a lower level of general receptive vocabulary. Furthermore, a main effect of time,  $F(1, 66) = 4.01$ ,  $p = .049$ ,  $\eta_p^2 = .06$ , indicated overall improvement in rhyme awareness, phoneme blending, and receptive letter knowledge. A main effect of general receptive vocabulary,  $F(1, 66) = 37.20$ ,  $p < .001$ ,  $\eta_p^2 = .36$ , indicated that children in the meaning-focused instruction group scored higher on this test than children in the form-focused instruction group. No other interaction or main effects were found (all  $F_s < 3$ ). Improvement on the early literacy measures, by instruction group, is shown in Figure 2.



**Figure 2.** Collective average scores (in proportion) on the rhyme awareness, phoneme blending, and receptive letter knowledge pre- and posttests in the form (FORM)- and meaning (SEM)-focused instruction groups. The covariate general receptive vocabulary was evaluated at .50.

### ***Effects of ability to learn phonetically minimally different words on learning gains***

The second research question asked whether the ability to learn phonetically minimally different words would affect learning gains, directly as well as indirectly via general receptive vocabulary, and whether this effect would differ between the form- and meaning-focused instruction groups. To answer this question, we used the process plug-in (Hayes, 2013) in SPSS Version 19 to carry out moderated mediation analyses. Direct effects were tested with ordinary least squares regression. We

estimated indirect effects using bootstrapping, with a sample number of 5000 (Preacher & Hayes, 2008). The mediator and moderator were significant if zero was not included in the calculated 95% confidence interval. To evaluate model fit, we used the  $F$  statistic and  $R^2$ .

First, Pearson's  $r$  correlations between intervention group, general receptive vocabulary, ability to learn phonetically minimally different words, gain in target-word receptive vocabulary, target-word semantic knowledge, rhyme awareness, phoneme awareness, and receptive letter knowledge were calculated (see Table 4). Ability to learn phonetically minimally different words was significantly associated with general receptive vocabulary and gain in target-word semantic knowledge, phoneme awareness, and receptive letter knowledge. Next to ability to learn phonetically minimally different words, general receptive vocabulary was significantly associated with instruction group, gain in target-word receptive vocabulary and target-word semantic knowledge, and phoneme awareness.

Next, the moderated mediation models were tested. Five similar models were specified, one model for each dependent variable (gain in target-word receptive vocabulary and target-word semantic knowledge, rhyme awareness, phoneme awareness, and receptive letter knowledge). General receptive vocabulary was entered as a mediator between the independent variable ability to learn phonetically minimally different words and the dependent variable. Instruction group was entered as a possible moderator of the relationship between ability to learn phonetically minimally different words and gain in the dependent variable as well as the relationship between general receptive vocabulary and gain in the dependent variable.

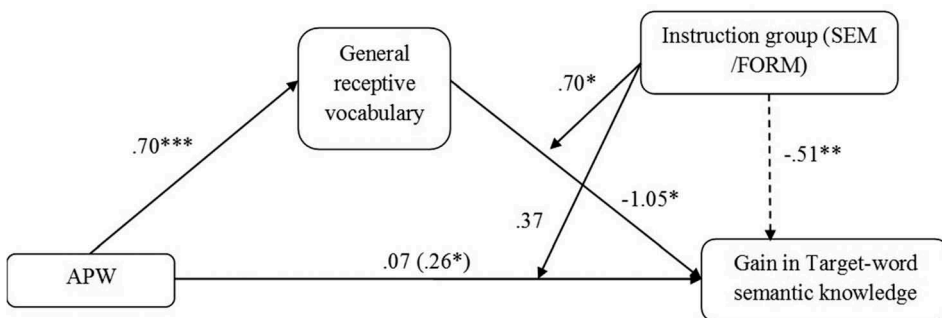
The model with gain in target-word receptive vocabulary as the dependent variable was not significant ( $R^2 = .09$ ),  $F(5, 59) = 1.18$ ,  $p = .330$ . The model with gain in target-word semantic knowledge as the dependent variable, however, was significant ( $R^2 = .32$ ),  $F(5, 57) = 5.46$ ,  $p < .001$ .

**Table 4.** Pearson's  $r$  correlations between study variables.

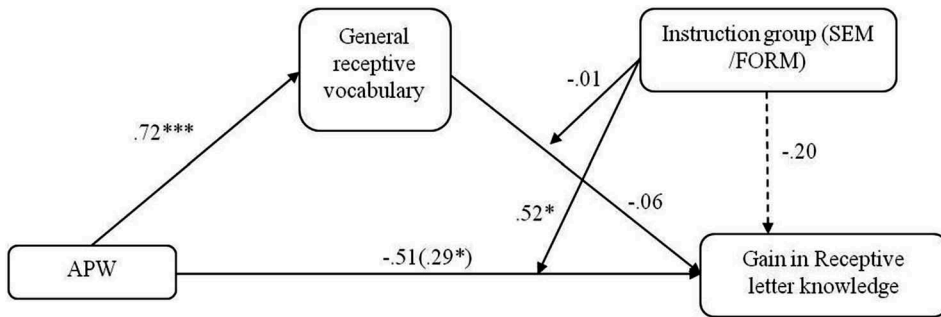
Variable	1	2	3	4	5	6	7	8
1. Instruction group	—							
2. General receptive vocabulary	-.365**	—						
3. APW: minimal-pair word-learning task	-.193	.621**	—					
4. Gain in target-word receptive vocabulary	-.071	.231*	.118	—				
5. Gain in target-word semantic knowledge	.023	.259*	.286*	.372**	—			
6. Gain in PA: Rhyme awareness	.182	.231	.094	.260*	.325**	—		
7. Gain in PA: Phoneme awareness	-.032	.243*	.255*	.181	.322**	.147	—	
8. Gain in receptive letter knowledge	.077	.151	.341**	.183	.346**	.176	.231	—

Note. Gain: difference scores, posttest – pretest. APW = ability to learn phonetically minimally different words; PA = phonological awareness.

\* $p < .05$ . \*\* $p < .01$ .



**Figure 3.** Mediation model of ability to learn phonetically minimally different words (APW), general receptive vocabulary, and gain in target-word semantic knowledge with instruction group as a moderator of both the relationship between APW and gain in target-word semantic knowledge and the relationship between general receptive vocabulary and gain in target-word semantic knowledge. The total effect is in parentheses. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



**Figure 4.** Mediation model of ability to learn phonetically minimally different words (APW), general receptive vocabulary, and gain in receptive letter knowledge with instruction group as a moderator of both the relationship between APW and gain in receptive letter knowledge and the relationship between general receptive vocabulary and gain in receptive letter knowledge. The total effect is in parentheses. \* $p < .05$ . \*\*\* $p < .001$ .

(see Figure 3). In this model, the total effect of ability to learn phonetically minimally different words on gain in target-word semantic knowledge was significant, but the direct effect was no longer significant. There was an effect of ability to learn phonetically minimally different words on general receptive vocabulary and of general receptive vocabulary on gain in target-word semantic knowledge. Also, there was a significant effect of instruction group on gain in target-word semantic knowledge and a significant interaction between instruction group and the effect of ability to learn phonetically minimally different words on gain in target-word semantic knowledge. This means that for the form-focused instruction group only, ability to learn phonetically minimally different words indirectly affected gain in target-word semantic knowledge via general receptive vocabulary (confidence interval [0.0427, 0.4800]). It appeared that a high ability to learn phonetically minimally different words was related to a larger preexisting vocabulary, which in turn supported the acquisition of deeper word knowledge when explicit instruction was directed to the form of words.

Next we tested the model with gain in rhyme awareness as the dependent variable; this model was significant ( $R^2 = .17$ ),  $F(5, 59) = 2.45$ ,  $p = .044$ . However, this was driven only by a significant effect of ability to learn phonetically minimally different words on general receptive vocabulary. The other individual effects and the interaction effect were not significant. The model with gain in phoneme blending as the dependent variable was not significant ( $R^2 = .10$ ),  $F(5, 59) = 1.38$ ,  $p = .244$ . Finally, the model with gain in receptive letter knowledge as the dependent variable was significant ( $R^2 = .21$ ),  $F(5, 59) = 3.08$ ,  $p = .015$  (see Figure 4). In this model, the total effect of ability to learn phonetically minimally different words on gain in receptive letter knowledge was significant, and there was a significant interaction between instruction group and the effect of ability to learn phonetically minimally different words on gain in receptive letter knowledge. This means that for the form-focused instruction group only, scores on the word-learning task predicted gain in receptive letter knowledge directly (confidence interval [0.1819, 0.8894]). In addition, there was a significant effect of ability to learn phonetically minimally different words on general receptive vocabulary. All other effects in this model were not significant. When instruction was directed to the form of words, a high ability to learn phonetically minimally different words appeared to support the acquisition of receptive letter knowledge.

## Discussion

In the current study, form-focused vocabulary classroom instruction in an interactive reading context was compared with (contemporary) meaning-focused vocabulary classroom instruction in an interactive reading context in terms of the effects they have on word learning and skills that strongly predict later reading ability (phonological awareness and letter knowledge) in children in

mixed L1/L2-learning kindergarten classrooms. The influence of level of ability to learn phonetically minimally different words on vocabulary and early literacy gains was also examined. Results showed that, after level of general receptive vocabulary was controlled for, learners in the form-focused and meaning-focused instruction groups gained similarly in target-word receptive vocabulary but that learners in the form-focused instruction group gained more in target-word semantic knowledge, phonological awareness, and letter knowledge than learners in the meaning-focused instruction group. Finally, level of ability to learn phonetically minimally different words predicted gain in target-word semantic knowledge indirectly via level of general receptive vocabulary and predicted gain in letter knowledge directly for learners in the form-focused instruction group only.

Our first hypothesis was that children who received explicit, in-depth information on the phonological form of words during the learning process would benefit more from vocabulary instruction than children who received explicit, in-depth instruction on the meaning of words. Contrary to our hypothesis, children in both instruction groups had similar gains in target-word receptive vocabulary, but in line with our hypothesis children in the form-focused instruction group had higher gains in target-word semantic knowledge than children in the meaning-focused instruction group. At first sight, this result may appear surprising. To explain why the form-focused advantage was limited to the measure of semantic knowledge of words, we have to consider what the children had to do in the two vocabulary tasks.

In the target-word receptive vocabulary task, the children were presented with the phonological forms of words. They had to recognize their meaning by pointing to pictures. They were not asked to give an oral explanation. In the target-word semantic knowledge task, the children were also presented with the phonological forms of words, but then they had to retrieve information from semantic memory that was associated with the phonological forms (without the help of visual information) and to explain their meaning orally. This semantic recall ability may be more strongly encouraged when new words are learned via form-focused instruction than via meaning-focused instruction. Children may implicitly focus on meaning aspects of words first, as these aspects have more communicative value than form aspects and create a more in-depth representation of words if phonological information is explicitly provided on top of implicitly processed semantic information (Robinson, 2003). More detailed representations of words may support semantic recall.

Alternatively, or in addition, because the teacher's form-focused instruction is focused on the form of words, and semantic information is encountered only implicitly, the children have to actively bring back the words' meanings from the context and from memory. This active semantic recall process may strengthen phonological-semantic mapping (e.g., De Jong et al., 2000; Nagy, 2007; Nagy & Scott, 2000) more so than under meaning-focused instruction, in which each time children are confronted with a phonological form its meaning is also explicitly presented. That is, and somewhat counterintuitively, semantic recall may be trained more in the form-focused instruction group than in the meaning-focused instruction group.

Moreover, as predicted, increases in phonological awareness and letter knowledge occurred in both the form- and meaning-focused instruction groups, but children in the former group improved more on these early literacy measures. By acquiring new word meanings children encounter new word forms and learn implicitly about phonological similarities and differences among words, which stimulates development of phonological awareness (e.g., Metsala & Walley, 1998; Werker et al., 2009). Explicit attention to the form of words during vocabulary instruction may lead to more detailed phonological representations of the learned words and in turn to stronger enhancement of phonological awareness and letter knowledge abilities (e.g., Janssen et al., 2015; Van Goch et al., 2014).

With regard to the second research question it was expected that level of ability to learn phonetically minimally different words would influence intervention outcomes. This appeared to be true for gains in target-word semantic knowledge (indirectly via level of general receptive vocabulary) in learners in the form-focused instruction group only. It seems that, if phonological information is explicitly provided during the process of learning new words, a higher level of ability to learn phonetically minimally different words is beneficial for semantic recall. This may be because

children who are able to acquire the meaning of words in a minimal word-pair learning paradigm can put phonological information to good use in the process of word learning. They easily tune into the phonological constituents of which words are composed (Nagy, 2007; Nagy & Scott, 2000), which may lead them to profit more from form-focused vocabulary instruction than children with less ability to learn minimal-word pairs.

The ability to learn phonetically minimally different words influenced gains in letter knowledge directly, again in learners in the form-focused instruction group only. If phonological information is explicitly provided during the process of learning new words, high sensitivity to acoustic-phonetic differences among word representations supports learners in making letter-sound connections independent of the number of words already in their lexicon (Goswami, 2000; Mann & Foy, 2003). This is in line with a study by De Jong and Olson (2004), wherein no independent effect of vocabulary knowledge on letter learning was found after phonological memory was controlled for. A possible explanation why a higher level of ability to learn phonetically minimally different words may be beneficial for semantic recall and in making letter-sound connections, but only when instruction is focused on word form, is that it may make it easier for learners to carry out activities wherein words are phonologically manipulated and to process phonological information that is explicitly presented to them (e.g., Goswami, 2000). Because learners are not confronted with the task of manipulating words phonologically when instruction is focused on word meaning, level of ability to learn phonetically minimally different words may play a smaller role in the learning process.

No effects of level of ability to learn phonetically minimally different words on gain in rhyme awareness and phoneme awareness were found. This is surprising, as in Van Goch et al. (2014) and Janssen et al. (2015) children learned new words during minimal-pair word-learning training, and this gain in detailed phonological knowledge improved rhyme awareness and phoneme awareness. Correlations in the present study showed that there was a significant association between scores on the minimal-pair word-learning task and gain in phoneme awareness. It is possible that minimal-pair word-learning training by itself leads to gain in phonological awareness, but in the current study gain in phonological awareness was completely explained by the classroom intervention. There was no variance left to be explained by the minimal-pair word-learning task administered prior to the classroom intervention.

Vocabulary knowledge and early literacy skills interact in the development of reading (e.g., Verhoeven et al., 2011). Children who start primary school with smaller vocabularies in the language of instruction—here, sequential bilingual children who were learning Dutch as an L2—may therefore learn to read with greater difficulty than children with larger vocabularies in the language of instruction. Because the ability to acquire representations of word forms in the mental lexicon and the extent to which these representations become specified play a role in vocabulary as well as in early literacy development (Janssen et al., 2016; Van Goch, 2016), a focus on form in vocabulary instruction in the classroom may lead to vocabulary gains and stimulate early literacy skills in children with smaller and larger vocabularies. Indeed, results of the current study showed that explicit attention to the form of words during the learning process led to deeper target-word knowledge and greater gains in early literacy abilities in mixed L1/L2-learning classrooms than explicit attention to the meaning of words. In addition, a greater ability to learn words that are phonetically only minimally different appeared to be helpful in recalling semantic information about words and in making letter-sound connections in case instruction was focused on word form. Including explicit instruction on word forms in vocabulary education therefore may prove a fruitful approach to stimulating early reading development in children entering primary school with various levels of vocabulary in the target language.

There are several limitations to be addressed and questions left to be answered in future studies. First, the goal of the current study was to compare effects of form-focused and meaning-focused vocabulary instruction. An additional group that does not receive a vocabulary intervention at all could provide information on effects of intervention versus no intervention. Second, the intervention took only 4 weeks. In a follow-up study, it could be implemented for a longer period of time, and

a retention test could be administered some time after the intervention has ended to examine long-term effects.

Third, only two schools with four classrooms participated in the current study, and L1/L2 learners and boys/girls were unevenly distributed across instruction groups. Therefore, we were unable to describe effects of the interventions for L1/L2 learners and boys/girls separately. Moreover, at the start of intervention, the form-focused instruction group scored significantly lower on SES of the mother and vocabulary knowledge than the meaning-focused instruction group. Although we controlled for these differences by adding general receptive vocabulary as a covariate in our analyses (vocabulary size seems to be the aspect of language that is most affected by SES; see Hoff, 2013), it was not possible to separate effects of each intervention for L2 learners from effects for L1 learners (Miller & Chapman, 2001). The following hypotheses would therefore need to be addressed in future research. L2 learners may have profited from their experience with two language systems in processing phonological information (e.g., Campbell & Sais, 1995), especially in the form-focused instruction group, as in this group information on word form was explicitly provided. It is possible that specific L1 knowledge and skills played a role in the learning process, mainly in the form-focused instruction group as well, because linguistic transfer occurs most clearly in phonology (Carroll, 2008; Ellis, 2015). To cope with phonological differences and similarities between L1 and L2, form-focused instruction in vocabulary learning may be most helpful for L2 learners.

A further limitation is that, because vocabulary intervention took place in the existing classroom situation, it was not possible to create a randomized controlled experimental environment and present children with either form or semantic aspects of words in isolation. Also, given the small sample size, there was not enough power to correct for nesting in multilevel analyses. Even though fidelity of the intervention was ensured via observations in each classroom, a teacher log, and evaluation meetings, and we controlled for differences in teachers' teaching practices as much as possible by providing them with extensive instructions in print, we acknowledge that many classroom factors, such as illness of the children or interaction between the teacher and an individual child, are difficult to regulate, and these may affect the outcomes of any applied educational research, including the current study (Tuckman & Harper, 2012). Therefore, results should be interpreted with caution. To support generalization, replication of the study with a larger sample, in different classrooms with various L1/L2 learner ratios, and with learners growing up in language environments other than L1/L2-Dutch is recommended.

By comparing effects of form-focused versus meaning-focused vocabulary instruction in mixed L1/L2-learning kindergarten classrooms, the current study reveals first and foremost that learning about the form of new words can stimulate both vocabulary and early literacy development in these learners. Direct instruction on the form of words may improve word learning for two reasons. (a) Because phonological information is explicitly provided on top of implicitly processed semantic information a more in-depth representation of words may be created, which may support semantic recall (Robinson, 2003). (b) Because instruction is focused on the forms of words, semantic information is encountered only implicitly, and the meanings of words need to be actively inferred from context or retrieved from memory. This active semantic recall process may strengthen phonological-semantic mapping (e.g., De Jong et al., 2000; Nagy, 2007; Nagy & Scott, 2000).

Second, this study shows that a high level of the ability to pick up minimal phonological differences among words supports gain in letter knowledge and learning to recall the meanings of new words if, perhaps counterintuitively, instruction is focused on the phonological form of these words.

These results add to the evidence that classroom vocabulary instruction in an interactive reading context can be successful in children with diverse language backgrounds. They also show that knowledge of the phonological form of words is important in word acquisition, next to knowledge of the meaning of words, as well as strongly supports the development of early literacy abilities. Some implications for educational policy and practice in bilingual environments can be drawn from the outcomes of the current study: When teaching vocabulary in kindergarten, not just instruction on the meaning of words

should be provided. Explicit instruction on the form of words can facilitate word learning and lead to increased stimulation of early literacy skills in L1 and L2 learners with various initial vocabulary levels.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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## Appendices

### Appendix A

#### Dutch Intervention Books and Target Words With Their English Translations by Theme

**Table A-1.** Dutch intervention books and target words with their English translations by theme.

Vocabulary Theme	Book (Author)	Dutch Target Words	English Target Words
Animals	<i>Bertje Big [Petey Piglet]</i> (Peter Brouwers)	Book: <i>voor het eerst, behalve, het erf, scharrelen, de wei, grazen, de uier, de stal, de bok, kriebelen</i> Theme: <i>grommen, brullen, ritselen, fladderen, de flamingo, de kameleon, zwiepen, klauteren, het verblijf, de overall</i>	Book: <i>for the first time, except, the yard, to scratch, the whey, to graze, the udder, the stable, the male goat, to tickle</i> Theme: <i>to growl, to roar, to rustle, to flutter, the flamingo, the chameleon, to wag, to clamber, the residence, the overall</i>
Feelings	<i>Wie niet sterk is ... [Who Is Not Strong ...]</i> (Ingrid & Dieter Schubert)	Book: <i>durven, spannend(s), berouwen, vals, schrikken, nieuwsgierig, voorzichtig, bibberen, bovenop, allemaal</i> Theme: <i>missen, zielig, kippenvet, vrezen, trouw (zijn), bewonderen, beschermen, verlangen, uitgelaten, nijdig</i>	Book: <i>to dare, exciting, to regret, mean, to be frightened, curious for, careful, to shiver, on top, all</i> Theme: <i>to miss, sad, goose bumps, to fear, to be loyal, to admire, to protect, to desire, exuberant, angry</i>

### Appendix B

#### Quadruplets Used in the Word-Learning Task

**Table B-1.** Quadruplets used in the word-learning task.

Target 1	Target 2	Unfamiliar Control	Familiar Control	Minimal Phonetic Distinction	C/V	Type of Distinction	Place of Distinction
<i>Pol</i>	<i>Pon</i>	<i>Pos</i>	<i>Pop</i>	/l/-/n/	C	Manner	Final
<i>Lier</i>	<i>Nier</i>	<i>Pier</i>	<i>Bier</i>	/l/-/n/	C	Manner	Initial
<i>Bar</i>	<i>Dar</i>	<i>Nar</i>	<i>Kar</i>	/b/-/d/	C	Place	Initial
<i>Toss</i>	<i>Dos</i>	<i>Hos</i>	<i>Vos</i>	/t/-/d/	C	Voice	Initial
<i>Riek</i>	<i>Rek</i>	<i>Reuk</i>	<i>Rok</i>	/i/-/ɛ/	V	Height	Medial
<i>Poer</i>	<i>Por</i>	<i>Peur</i>	<i>Peer</i>	/u/-/o/	V	Height	Medial
<i>Buut</i>	<i>Boet</i>	<i>Biet</i>	<i>Bad</i>	/y/-/u/	V	Place	Medial
<i>Pal</i>	<i>Pel</i>	<i>Peul</i>	<i>Pijl</i>	/ɑ/-/ɛ/	V	Place	Medial
<i>Vet</i>	<i>Wet</i>	<i>Led</i>	<i>Bed</i>	/v/-/u/	C	Manner	Initial
<i>Gijs</i>	<i>Vijs</i>	<i>Sijs</i>	<i>Reis</i>	/ɣ/-/v/	C	Place	Initial
<i>Hiel</i>	<i>Ziel</i>	<i>Kiel</i>	<i>Wiel</i>	/ʃ/-/z/	C	Place	Initial
<i>Rang</i>	<i>Ram</i>	<i>Ras</i>	<i>Rat</i>	/ŋ/-/m/	C	Place	Final
<i>Nis</i>	<i>Nes</i>	<i>Noes</i>	<i>Neus</i>	/ɪ/-/ɛ/	V	Height	Medial
<i>Ries</i>	<i>Ris</i>	<i>Ruis</i>	<i>Roos</i>	/i/-/ɪ/	V	Height	Medial
<i>Lef</i>	<i>Laaf</i>	<i>Loef</i>	<i>Lijf</i>	/ɛ/-/a:/	V	Place	Medial
<i>Kout</i>	<i>Kuit</i>	<i>Kit</i>	<i>Kat</i>	/ɔu/-/œy/	V	Diphthong	Medial

Note. Target words differed in only one acoustic-phonetic feature (i.e., either place of articulation, manner of articulation, or voicing); control words differed in two acoustic-phonetic features from the target words. C/V = minimal phonetic distinction either in a consonant or a vowel position.