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## **Benefits of repeated book readings in children with SLI**

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## **Benefits of repeated book readings in children with SLI**

### **Abstract**

In this pilot study, we ask whether repeated storybook reading is also beneficial for word learning in children diagnosed with SLI. We compared 3-year-old German children diagnosed with SLI to typically-developing children matched on age and SES. One week later, children with SLI retained the target words from the stories just as well as their peers, although they did perform significantly worse on immediate recall.

### **Introduction**

Joint book reading is highly beneficial for teaching children new vocabulary (e.g., Reese, 2015). Recent research demonstrates that children retain more new words when stories are repeated (Horst, Parsons & Bryan, 2011; McLeod & McDade, 2011). Repetition is important because word learning extends beyond the initial encounter with a new word, when only some (partial) information about a word and its meaning are encoded (Munro, Baker, McGregor, Docking & Arciuli, 2012). Critically for joint book reading, each time a story is re-read children have less information to encode because some information was already encoded on a previous reading (Horst, 2015). This then allows children to devote more resources to finer details, such as new vocabulary items. The study by Horst and colleagues (2011) provided evidence for this claim by exploring how repetition of joint book readings enables word learning. They taught 3-year-old children novel words across three reading sessions. Children were presented with the novel words either through reading the *same* story repeatedly (with one new story being repeated three times on each session) or through reading three *different* stories (with three new stories on each session). Using a 4-alternative forced-choice picture pointing task, children's immediate recall was tested after each session and retention for words from the first two sessions was tested

at the end of Session 3. Children who heard the same stories exhibited better word retention than children who heard different stories. Thus, although both groups performed well on immediate recall, only children who experienced the novel words embedded in the same story repeatedly showed a robust long-term learning effect—resulting in better retention of those novel words after a delay of several days.

McLeod and McDade (2011) also examined the effects of repetition in word learning from joint book reading. Children either heard the same story three times or one longer story, but all children heard the novel words the same number of times. All children were post-tested one day after reading. Children learned more words when exposed to the same story repeatedly than when the words were presented within a single story. This suggests that for book reading to be beneficial, it is important to familiarize children with this activity over several readings and to allow the knowledge to consolidate (see also Damhuis, Segers & Verhoeven, 2015).

In sum, research demonstrates that children learn more new words when stories are repeated (Horst, Parsons & Bryan, 2011; McLeod & McDade, 2011). The familiarity of this activity seems to facilitate encoding and foster consolidation processes. However, it is not known whether children at-risk for language delays also benefit from repeated book readings. Although robust acquisition mechanisms are apparent in children with SLI (Rice, Oetting, Marquis, Bode & Pae, 1994), they may require more word repetitions to reach the same level of word learning performance as typically developing age-matched peers (Kan & Winsor, 2010). For example, Niebuhr-Siebert and Ritterfeld (2012) used a pre-post-follow-up design to deliver audio books as a complex language input to facilitate language processing in preschool children. When repeated, audio books significantly impacted word retrieval—also in children with SLI.

In this pilot study, applying the method of repeated book readings (Horst et al., 2011) we addressed the question of whether a repeated joint book reading activity is as advantageous for children diagnosed with SLI as it was reported for typically developing children. We hypothesized that children with SLI would also benefit from the repetition of the context in which the word learning is embedded. Further, following the findings suggesting that learning effects became prominent within a delayed rather than immediate test, we expected the greatest benefit of repetition in children with SLI to occur during at the delayed test (e.g. McGregor, Rohlfsing, Bean, & Marschner 2009).

### **Method**

Sixteen 3-year-old German-speaking children participated: 8 children diagnosed with SLI (3 girls) and 8 typically developing age-matched peers (5 girls). Demographic information is presented in Table 1. Children were recruited from a large city in Western Germany. Children with SLI were recruited via language pathologists, daycare centers, playgroups and one otorhinolaryngologist. All the children were monolingual with no further physical and cognitive impairment. We assessed children's language skills with the SETK3-5 (Grimm, 2010). This is a diagnostic tool containing of five subtests: (1) comprehension of sentences (2) verbal descriptions of pictures, (3) plural formation, (4) phonological working memory and (5) memory span for sequences of individual words.

Children were visited in their homes three times over the course of approximately one week. For each reading, children sat next to the experimenter to ensure they could see the illustrations. The experimenter read a different story on each visit, but the story was repeated three times during each visit. Children were read German translations of three of the illustrated storybooks created by Horst and colleagues (2011). Each story was appropriate for the German

culture and depicted two novel objects; each object was named exactly four times during each story. Thus, altogether, children heard each of two target words 12 times per visit (see Horst et al., 2011). In contrast to the original study, the order of the stories was fixed to minimize experimenter errors: On Session 1, children heard the story about a bold dog, on Session 2 they heard a story about the library and finally on Session 3 they heard a story about a mysterious aunt. Critically, both testing conditions and book order were the same for the children with SLI and the typically developing children, thus any effects of book order would be the same for both groups. The experimenter did not emphasize target words or provide definitions or other dialogic cues. Children's questions and comments were neither encouraged nor discouraged. If children asked questions during the story, the experimenter encouraged the child to return attention to the story (e.g., "let's keep reading, and see!") and avoided naming any objects (see Horst et al., 2011). Parents completed a demographic questionnaire and a list of children's books and authors to determine familiarity (which can be provided by the authors on request).

Children's immediate recall and retention was tested via a 4-alternative forced-choice pointing task using a test booklet containing four familiar object pictures per practice page and four novel object pictures per test page. On the final visit, after the recall trials, children were also tested on their retention of the words from Session 1 and Session 2 using the same task (8 retention trials, see below). Practice page, trial order and target locations (e.g., top left) were counterbalanced within and across participants. Children received 12 immediate recall trials (4 each in Sessions 1–3) and 8 retention trials (4 each on the words from Sessions 1-2, tested on Session 3). To facilitate comparison between immediate recall and retention scores, scores were converted into proportion correct out of 12 or 8, respectively.

## Results

As can be seen in Table 1, children diagnosed with SLI and typically-developing children differed with respect to all measures revealed via the SETK 3–5 test: sentence production,  $Z = -3.26, p < .001$ , sentence understanding,  $Z = -3.00, p < .01$ , morphological rules,  $Z = -2.02, p = .05$ , and phonological memory,  $Z = -3.22, p < .001$ , but not age  $Z = -0.85, df = 16, p = .44$ .

Both groups demonstrated better immediate recall than expected by chance (25%): for the children with SLI,  $Z = 1.9, p = .05, d = 1.1$  and for the typically-developing children,  $Z = 3.6, p < .001, d = 4.2$ , see Table 2). A linear mixed-effect model found a significant difference between groups: Typically-developing children scored on average 25% better than the children with SLI,  $F(1,41) = 8.03, p < .01, \eta^2 = .36$ , immediately after hearing the stories. In addition, we found a group by session interaction, driven by lower performance of the typically developing children after the book about the library (Estimate =  $-.44, p < .05$ ).

Both groups also demonstrated better word retention than expected by chance (25%): for the children with SLI,  $Z = 1.94, p = .05, d = 1.1$  and for the typically-developing children,  $Z = 3.61, p < .001, d = 4.2$ . A linear mixed-effect model found a significant difference between groups: retention performance differed significantly for words from Session 1 and Session 2,  $F(1,14) = 4.45, p = .052, \eta^2 = .23$ , with children performing better on retention of words from Session 1. Our analysis further revealed that the typically developing children scored on average 17.25% higher than the children with SLI. However, the difference in retention performance between the groups was not statistically significant ( $p > .19$ ), suggesting that children with SLI benefited from the repetition as did typically developing children.

Correlational analyses (see Table 3) revealed that both sentence understanding and phonological memory (as assessed by SETK 3–5) were associated with the recall performance as

we found a significant positive correlation of sentence understanding and recall:  $r_s = .64, p < .01$  and a marginally significant positive correlation of phonological memory and performance in recall:  $r_s = .46, p = .07$  for all children. None of the SETK 3-5 measures correlated with retention performance, which itself did not differ between groups. Correlational analyses further revealed a statistically marginal relationship between the SES of the family and the child's recall performance,  $r_s = .47, p = .07$ . This effect is reported in several studies suggesting that children from families with low SES have an elevated risk for language delays (Adlof, McLeod, Leftwich, 2014). Further, on the children's book questionnaire mothers of the children with SLI reported having significantly fewer books than mothers of typically developing children,  $Z = -1.96, p = 0.05$ . Interestingly, how many book titles or authors parents knew and how many books they had at home were not correlated ( $ps < .6$ ). However, how many book titles parents knew correlated significantly with the numbers of authors parents knew,  $r_s = .87, p < .001$  as well as the book content they knew,  $r_s = .93, p < .001$ .

### **Discussion**

Previous studies demonstrated that children can learn novel words from repeated book readings (e.g., Horst et al., 2011). Our results extend this effect to a group of children diagnosed with SLI. While children with SLI performed significantly worse than typically developing children in immediate recall, they did retain novel words from the stories at similar rates as typically developing children when tested up to 12 days later. Thus, familiarity with a repeated story appears to have enabled children to devote memory resources to finer details such as new words that may not be the focus on attention when first learning about new characters and plots. We therefore conclude that repeating a story with new words is a method that may contribute to improve intervention programs to help children with SLI achieve good long-term learning



results. Specific suggestions include repeatedly reading the same books within a short timeframe (i.e., within a single session), reading books that introduce few new vocabulary items simultaneously and generally increasing children's familiarity with the activity of shared book reading.

In addition, the analyses revealed a significant positive correlation between sentence understanding and immediate recall and a marginally significant positive correlation of phonological memory and immediate recall. These findings suggest that deficits in sentence understanding as well as phonological memory might be particularly crucial in the early stages of word learning, but become less relevant during word consolidation. While relations of phonological and grammatical competencies to short-term memory have already been recognized (see Leonard, 2014 for a summary), the lack of relation between these competencies to long-term learning introduces novel insight to this literature. Finally, our correlational analyses of home reading environment are consistent with studies indicating an elevated risk for language delays in children from homes where fewer books are present (Payne, Whitehurst & Angell, 1994): Although parents of children with SLI knew as many book titles as parents of typically developing children, fewer books were available to their children at home.

We are aware of the limitations our study bears. First, our method encompasses a small sample, although this is appropriate for exploratory studies (Asendorpf, et al., 2013: 111). We consider this a pilot investigation of the effect and nature of context repetition for children with SLI. Clearly, future research is needed to further investigate the effects of different forms of repetition in word learning for children with SLI and at even longer timescales. Second, we tested children's word retention but not generalization. Thus, it is possible that children in our study only learned to associate the novel word with a specific exemplar and not an entire object category. Furthermore, we tested the acquisition of nouns, while children with SLI seem to

traverse through a more problematic acquisition process for verbs. For example, in their study with 5-year-olds, Rice and colleagues (1994) found a decrease in verb retention. Thus, further research is needed to confirm the benefits of repeated book readings on the acquisition of words from other word classes. Finally, we did not analyze the interactions during the book readings. It is possible that the groups differ in terms of strategies that aid them to remember novel words. Future research can test whether e.g. children in the SLI group ask more questions than their typically developed peers.

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**Table 1.** Demographic information for the children who participated in the current study: means (standard deviations in parentheses). The SETK 3–5 (Grimm, 2010) is a German standardized diagnostic tool to assess language capabilities of children between 3;0 and 5;11 years of age. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

	<i>p</i>	<i>SLI Group</i>	<i>TD Group</i>
Age in months	<i>ns.</i>	39.7 (3.5)	41.1 (3.6)
Sentence understanding (SETK 3–5)	***	40.7 (6.4)	59.1 (7.9)
Sentence production (SETK 3–5)	**	42.4 (8.3)	60.3 (8.9)
Morphological rules (subtest of SETK 3–5)	*	46.1 (12.7)	59.6 (11.4)
Phonological Memory (subtest of SETK 3–5)	***	37.4 (5.9)	60.0 (9.0)
SES	<i>ns.</i>	14.8 (4.2)	18.13 (1.6)
Books at home	*	51 (17.0)	77 (28.1)
Book titles	<i>ns.</i>	22.6 (9.2)	27.6 (6.3)
Days between Session 1 and 2	<i>ns.</i>	2.1 (1.5)	1.5 M (1.1)
Days between Session 2 and 3	<i>ns.</i>	2.4 (1.3)	2.2 M (1.3)
Overall duration for the study [in days]	<i>ns.</i>	7.5 (2.4)	6.8 M (1.3)

**Table 2:** Percentage of correct recall in the two groups: TD stands for typically developing children and SLI stands for children with SLI; the chance level was at 25%.

	Immediate recall		Retention	
	TD	SLI	TD	SLI
<b>1</b>	0.58	0.25	0.70	0.50
<b>2</b>	0.83	0.42	1.00	0.25
<b>3</b>	0.50	0.42	0.37	0.87
<b>4</b>	0.42	0.33	0.50	0.63
<b>5</b>	0.50	0.17	0.50	0.25
<b>6</b>	0.42	0.25	0.50	0.63
<b>7</b>	0.92	0.42	1.00	0.37
<b>8</b>	0.50	0.50	0.37	0.12
<b>Mean</b>	<b>0.58</b>	<b>0.34</b>	<b>0.62</b>	<b>0.45</b>
(SD)	(0.19)	(0.11)	(0.26)	(0.25)

**Table 3:** Correlations between recall performances, language measures (SETK 3–5) and SES. <sup>+</sup> $p < 0.10$ , **\*\*** $p < 0.01$ .

	sentence		morphological	phonological	SES
	understanding	production	rules	memory	
<b>recall</b>	<b>.64**</b>	<b>.35</b>	<b>.41</b>	<b>.46<sup>+</sup></b>	<b>.47<sup>+</sup></b>
<b>retention</b>	<b>.32</b>	<b>.14</b>	<b>.29</b>	<b>.20</b>	<b>.37</b>