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Enhancing Reading Comprehension in First Graders: The Effects of Two Training Programs Provided in Listening or Written Modality

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Abstract: It has been well documented that oral language skills are precursors of the development of written abilities, meaning that improving oral language skills, e.g. vocabulary, listening comprehension, could have positive effects reading comprehension. The main aim of the present study was to analyze the effect of a training program focused on four components of comprehension ability provided in listening or written modality on first-graders' reading and listening comprehension. The training programs were implemented by school teachers as part of the class's normal school activities, under the supervision of experts. Their efficacy was compared with the results obtained in a passive control group. Our results showed that both the training programs produced positive effects on listening and reading comprehension (by comparison with a passive control group), and that the gains in reading comprehension were maintained at a five-month follow-up. Findings demonstrated specific improvements in listening comprehension with the listening modality program, as well as an improvement in the modality not directly trained. A similar cross-modality effect was found from the written modality training group, therefore confirming the strict relation between oral and written abilities. Reading comprehension performance of first graders can be improved with activities provided in listening and written modality. Hence, it is possible to enhance reading comprehension even before decoding and fluency in reading are acquired.

Keywords: *Reading comprehension, listening comprehension, training, first-graders, vocabulary.*

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Introduction

Should we wait for children to learn decoding as a first step towards the promotion of reading comprehension skills? If not, how could reading comprehension be promoted in children who are still acquiring reading decoding skills? The current paper aims to answer these questions by analyzing the effect of two training programs, provided in either written or oral modality, focusing on four components of comprehension ability. The trainings address first-graders' reading and listening comprehension skills.

Good reading comprehension abilities are important in everyday life and at school. In this sense, the ultimate purpose of reading instruction should be to promote adequate reading comprehension skills. To acquire literacy skills, children must develop the ability to decode words fluently and the skills needed to understand what they read; whereas decoding skills depend on phoneme awareness and letter knowledge, broader language skills are required for successful reading comprehension (e.g. Catts et al., 1999; Muter et al., 2004). It has been well documented, however, that oral language skills (in terms of both comprehension and expression) are precursors of the development of written abilities (e.g. Berninger & Abbott, 2010; Kim, 2015; Lepola et al., 2016), meaning that improving oral language skills could also enhance reading comprehension (e.g. Tunmer & Chapman, 2012).

Literature Review

The interdependence between reading and listening is consistent with several models of reading comprehension that have postulated an overlap between the processes involved in language comprehension, irrespective of the language-based modalities involved (e.g. Gernsbacher, 1990). This relationship is well described by the so-called "Simple view of reading" (SVR) model proposed by Gough and Tunmer (1986), in which reading comprehension is the product of reading decoding and language comprehension. In other words, comprehension = decoding x language comprehension. This equation can

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describe the developmental trajectories of individuals learning to read. There is robust evidence of decoding being the strongest predictor of reading comprehension ability in the first years of schooling, whereas language comprehension acquires a more important role as reading decoding subsequently becomes automatized (Gough et al., 1996; Lepola et al., 2012). Kendeou et al. (2009) analyzed the relation between these three components in English-speaking students from the kindergarten to the second year of primary school. In line with the SVR model, Kendeou et al. (2009) reported that reading comprehension performance of second-graders is independently predicted by their reading decoding and listening comprehension measured at the end of the kindergarten. These results are confirmed by several more recent studies (Ecalte et al., 2020; or see the meta-analysis by García & Cain, 2014) which also allowed to better understand when and how reading decoding and listening comprehension contributed to reading comprehension. For example, Lervåg et al. (2017) examined the underlying structure of listening comprehension in a 5-year longitudinal study and its relation with reading comprehension, starting at 7.5 years of age. They demonstrated that vocabulary, grammar, verbal working memory, and inference skills was a powerful longitudinal predictor of variations in both listening and reading comprehension. The latent factor derived from these four components was a predictor of both the early and later growth of reading comprehension skills, thus supporting the idea that listening comprehension is more important for reading comprehension in older children (see the systematic review by Hjetland et al, 2017).

The pattern of this relationship may change, however, as a function of the characteristics of the language involved: it has been argued that in children with one-two years of schooling reading decoding predicts reading comprehension performance in transparent languages to a lesser extent than in languages with a deep orthography (see, for example, the meta-analysis by Florit & Cain, 2011). Megherbi et al. (2006), indeed, assessed French-speaking students of the first and second year of the primary school on decoding, comprehension and listening comprehension ability and found that in both grades listening comprehension was the most powerful predictor than decoding of reading comprehension. Bianco et al. (2012) arrived at similar results in a 3-year longitudinal study. They examined relationships between oral language development, early training and reading acquisition on word-identification and reading-comprehension tests. Hierarchical linear models showed that both phonological awareness and oral comprehension at 4 years of age were relevant for reading acquisition 2 years later. These two broad skills explained separate parts of the variance on both outcome measures, while revealing opposite effects: phonological skills explained more variance for alphabetic reading skills and oral comprehension explained more variance for reading comprehension.

Although the independent influence of these two components in predicting reading comprehension is a source of debate (e.g. Tunmer & Chapman, 2012), the relationship between listening abilities and the development of reading comprehension postulated by the SVR model has interesting educational implications. For instance, the fact that nonwritten media can be used to foster skills involved in reading comprehension. Higher level processes such as inference making, executive functions, and attention-allocation skills are recruited in similar ways during reading a text, listening to a text, or even during a visual presentation-of the narrative. This generalization across media offers the opportunity for training higher level skills in children who struggle with reading or in prereading children (Desmarais et al., 2013; van den Broek et al., 2011) or in children for whom reading decoding is not completely automatized, allowing them to engage in higher level comprehension processes, as proposed in the current study.

The importance of promoting through specific intervention depends on the fact that the spontaneous development of oral language comprehension may not suffice for promoting specific reading comprehension skills because the language used in written texts differs from everyday speech, even of the type used at school. Written language generally involves a more complex vocabulary and syntax, for example, and does not offer the reader non-verbal cues. For a coherent mental model to be constructed, written language also demands that the reader integrate an extensive piece of discourse (van den Broek, 2010), while this is rarely the case in everyday oral exchanges.

It consequently seems important to program specific and structured activities based on listening abilities to produce effects on reading comprehension, and to gauge the depth of the relationship between oral and written abilities using a treatment-based approach.

The effectiveness of oral language training at an earlier age stage was demonstrated by Fricke et al. (Fricke et al., 2013; Fricke et al., 2017) who used *Nuffield Early Language Intervention* to improve vocabulary, develop narrative skills, encourage active listening, and build confidence in independent speaking of children aged between 4 and 6 years of age. In particular Fricke et al. (2013) reported that the 20 sessions intervention program, focusing primarily on vocabulary, narrative and listening skills, with additional work on letter-sound knowledge and phoneme awareness was effective in improving oral language and spoken narrative skills immediately following the intervention, and these effects were each maintained 6 months later. Interestingly, the oral training program produced positive effects on reading comprehension measured at a 6 months follow-up. However, a second replication study by Fricke et al. (2017), using the same training procedure, reported positive effects on oral language abilities, but no transfer effects to literacy skills and reading comprehension. More recently, a meta-analysis by Silverman et al. (2020) brought convergent evidence on the effectiveness of early interventions on language comprehension to foster reading comprehension. However, their results showed that interventions produced changes on custom measures of vocabulary, listening comprehension, and reading comprehension but not on standardized measures of these outcomes.

Considering primary school children, Garner and Bochna (2004) demonstrated that specific skills relating to reading comprehension could be improved in first-graders by an intervention administered using a listening modality. In this case, the listening activities promoted the ability to recognize the essential elements of a story's grammar, so pupils were taught to recognize the main characters in a text, the setting for the story (time and place), the problem and the solution in the narrative. The effect of this training was compared with an active control group who read or listened to texts without being told to focus specifically on the above-mentioned elements in the narrative. The authors (Garner & Bochna, 2004) reported specific training effects, i.e. the trained children demonstrated a better grasp of all the story elements in tasks assessing both listening and reading comprehension, which was not seen in the active control group. The previously mentioned study by Bianco et al. (2012) also assessed the effects of two preschool training programs, focusing on either phonological awareness or oral comprehension skills on reading acquisition in first graders. The results showed that phonological awareness training had a positive effect on alphabetic scores, and comprehension training had a positive effect on reading comprehension, measured in the first months of first grade (see for similar results Bianco et al., 2010).

The effect of modality was also analyzed in a study by Carretti et al. (2014), who compared the efficacy of two training programs administered in two formats: in one, fourth- and fifth-graders were asked to read written material; in the other, all the activities involved listening to texts. The processes being trained were the same, i.e. metacognitive knowledge and control, working memory and integration skills. The results revealed cross-modality improvements i.e. the training provided in the form of reading material improved the Reading group's listening comprehension too, and vice versa (though the effect was less robust in the Listening group than in the Reading group). It is noteworthy that most of the benefit was maintained at a five-month follow-up.

In the same vein, Clarke et al. (2010) studied children (8- to 10-year-olds) with a profile of specific reading comprehension difficulties, and found that a training focusing on oral language skills enhanced their reading comprehension abilities to a greater extent than a training focusing on text comprehension. Clarke et al. also reported that the greater benefit in the oral training group was also maintained 11 months afterwards, and that there was an increase in this group's expressive vocabulary, which emerged as a significant mediator of the improvement from pre-test to post-test. This latter result led the authors to emphasize the role of oral language abilities (including vocabulary) in explaining individual differences in reading comprehension (see Hulme & Snowling, 2009). It should be noted, however, that the two training programs were not comparable in terms of content: the reading training focused mainly on metacognition and inferences, the oral training on figurative language and vocabulary. The advantage of one over the other may therefore have been due more to this different modality.

Methodology

An ABA design (pre-test, treatment, post-test) was applied to verify the efficacy of the training, with a follow-up conducted five months later in order to identify any maintenance effects. Each participant completed the pre-test assessment phase first, consisting in two sessions, each lasting one hour and occurring within the same week. The study followed the guidelines of the Ethical Committee of the School of Psychology at Padua University, and parents' informed written consent was obtained for all participants. The first-grade children were told they would be involved in activities and their verbal assent was required.

Research Goal

In the light of literature review, the main aim of the present study was to:

- analyze the effect of a training program provided in a listening or written modality focusing on some reading comprehension components, on first-graders' reading and listening comprehension;
- assess the effects of the training immediately after completing the program measuring reading and listening comprehension ability and again five months later. At the follow-up, however, was possible to consider only reading comprehension due to practical constraints imposed by the schools, we were not able to administer all the tasks used in the previous sessions of the training;
- compare changes in the listening and written comprehension group' performance with that of a passive control group of children attending regular classroom reading activities.

Because of the strict relationship between reading and listening comprehension (e.g. Sears & Keogh, 1993), reported also in earlier grade in language with a transparent orthography (e.g. Carretti & Zamperlin, 2010; Florit & Cain, 2011; Tobia & Bonifacci, 2015) we expected to see positive benefits from the listening and written modality training programs on both reading comprehension and listening comprehension.

Sample and Data Collection

The study involved an initial sample of 148 first-graders attending seven classes of three schools in Northern and Central Italy. Participants shared a homogeneous middle-class social background. Three classes involved were administered the oral comprehension training (Listening modality group), two completed the training using written material (sentences and

short texts) accompanied by pictorial information (Written modality group), and two were assigned to the control condition (Passive control group) (see Table 1). Children with intellectual disabilities and those for whom Italian was their second language (about 11% of the sample) were not included in the analysis, but they took part in the training programs with a teacher's help.

Table 1. Characteristics of the three groups

	N	% of females	Age		Word search task		Mental rotation task	
			M	SD	M	SD	M	SD
Listening modality group	51	43	6.96	.18	15.14	5.82	15.63	4.51
Written modality group	46	56	6.67	.32	8.95	4.20	13.92	5.23
Passive control group	33	33	7.10	.31	12.61	4.46	13.85	5.93

A pre-test/post-test design was used to judge the efficacy of the training, and a follow-up was conducted five months after the post-test session, when children are in second grade, to identify any maintenance effects.

Participants were initially assessed using a set of group-administered tasks measuring their ability to recognize words quickly and manipulate spatial information. This was done to obtain some baseline information on the groups. The word search task (adapted from the PRCR-2 battery by Cornoldi et al., 2009) is a paper-and-pencil task consisting of a paragraph in which participants have to see how often the word "elephant" recurs in 35 seconds. The spatial test used was drawn from the Italian version of the Primary Mental Abilities battery -PMA- (Thurstone & Thurstone, 1963): participants had to select one of 4 fragments needed to complete a target figure in order to form a square.

The three groups' performance differed in the word search task, $F(2,126)=16.23$, $MSE=25.61$, $p<.001$, $\eta_p^2=.21$, with the Written modality group showing a worse performance ($p<.001$) than the other two groups (who did not differ). Because of this difference, the performance in the word search task was included as a covariate in the analyses where the effect of the training was assessed. No differences emerged in the spatial task, $F(2, 130)=1.38$, $p=.227$.

To evaluate the effect of the training activities, measures of vocabulary knowledge, listening and reading comprehension were administered. The same tasks were proposed at the post-test.

Finally, maintenance effect on reading comprehension was assessed five months after the end of the training, when the children were in the second grade.

The materials used for both testing and training will be described below.

Vocabulary knowledge. The task was adapted from the verbal subtest in the Primary Mental Abilities battery by Thurstone and Thurstone (1963), and consisted of 32 sets of 5 pictures. Participants were asked to identify the picture corresponding to the word spoken by the teacher. Each correct answer was awarded one point, and the sum of the points gave the total score. The maximum score was 32. Test-retest correlation was $r=.83$

Listening comprehension task. The listening comprehension task was taken from an Italian standardized battery of tests for assessing listening comprehension (Levorato & Roch, 2008), and consisted of a narrative text read by the teacher, followed by the presentation of ten multiple-choice questions, with 4 options in the form of pictures. The task was administered collectively. Each correct answer was awarded 1 point. Two versions of the task were used, one at the pre-test and the other at post-test; to avoid biases due to intrinsic differences in the texts, z-scores computed on national norms were used in our analyses. Alpha coefficients of the two texts and test-retest correlation, as reported by the manual, was respectively .57, .58, and $r=.850$.

Reading comprehension task. The reading comprehension task was taken from the most often-used Italian standardized battery for assessing reading comprehension (Cornoldi & Colpo, 2011). It consisted of 11 items evaluating lexical and morpho-syntactic knowledge, plus a short passage followed by 4 multiple-choice questions with three possible answers. At the post-test stage, the task consisted of a short passage followed by 10 multiple-choice questions, with three possible answers, some in words and some represented by a picture. Alpha coefficients, as reported by the manual, ranged between .61 and .83. Reading comprehension ability was also assessed again five months after completing the training in the same way of the post-test.

In accordance with the test manual, children had the text available when they answered the questions. Each correct answer was awarded one point and the sum formed a total score. In addition, z-scores computed on national norms were used to analyze the efficacy of the training in comparison to the expected performance of children at that grade.

Description of the training. To allow a direct comparison between the modality of training (oral vs written), the two training programs included activities that were mostly comparable in terms of reading comprehension processes involved. The training activities focused on four skills needed to understand a text (in listening or written modality): 1. the ability to identify the main characters, the duration of the story, and the place where it happens; 2. the ability to recognize the

temporal and logical sequence of the facts; 3. the ability to make lexical and semantic inferences; and 4. the ability to distinguish between more and less relevant information.

The first two components (identifying main characters and put in sequence the events of the narrative) are generally trained as part of a class's normal school activities on reading comprehension, and enable readers to extract the text-based information they need to handle higher-level factors involved in understanding a text. The other two components (inferences and monitoring) have been repeatedly demonstrated essential to success in reading comprehension, explaining the development of comprehension (e.g. Cain et al., 2004) and individual differences (e.g. Cain & Oakhill, 2007).

The two training programs however differed in terms of the material used to enhance these four components. The activities for the Listening modality group (adapted from Zamperlin et al., 2014; see Appendix) consisted of texts devised *ad hoc* for the training, drawn from narrative literature for children. In the listening training program, the teacher read the texts aloud and then children had to answer to simple questions orally. In the case of the second group, the written modality group, (adapted from De Beni et al., 2003, see Appendix) children were required to read simple sentences or short texts accompanied by pictorial stimuli so that the reading load would be appropriate for their age.

In addition, both groups were presented with activities designed to improve their vocabulary knowledge, because of its importance for listening comprehension (e.g. Florit et al., 2014; Kim, 2016) and reading comprehension (e.g. Hulme & Snowling, 2009; Lervåg & Aukrust, 2010; Tunmer & Chapman, 2012). The activities on vocabulary knowledge was carried out individually, and focused on categorical and semantic fluency, synonyms and antonyms, and the use of context to understand the meaning of words (for words with double meanings, for instance).

The training activities consisted of 20 sessions lasting about 1 hour each and scheduled twice a week. For both the trained groups, each session was organized as follows: first 10 minutes were spent on introducing the activities of the day afterward participants read or listened to a text and worked on simple exercises for about 20 minutes, then exercises on lexicon were presented for 10 minutes and finally the teacher invited the children to reflect on the activities of the day.

The passive control group carried out regular school activities, already planned for the class, and participated to assessment sessions.

During the children's training, the teachers were monitored individually by two of the authors (BC and CZ), who also advised them as to the best way to conduct the sessions. This enabled us to evaluate the quality of the delivery and the fidelity of the training.

Data analysis

Repeated measures mixed-design ANCOVAs were run on each of the measures of interest with Group (Listening, Written, and Passive Control) as between factor and Session (pre-test, post-test) as within factor, with the task for assessing word recognition as a covariate. Post hoc analyses were corrected for multiple comparisons with Bonferroni's adjustment. The α value was set at .05 for all statistical tests and at .01 for interactions.

The results of the ANCOVA were qualified by assessing the size of the effect using Cohen's d (Cohen, 1988), which expresses the effect sizes of the differences between the groups, and the standardized training gain between post-test and pre-test (e.g. Jaeggi et al., 2011) to compare any improvement in performance in the three groups.

The maintenance of training gains at the 5-month follow-up was examined within each group, analyzing changes across sessions (pre-test, post-test, follow-up), again using the word recognition task as a covariate. This was only done for reading comprehension ability because it proved impossible to administer all the tasks to the classes involved for practical reasons.

Results

First, to seek any differences between the groups receiving the different types of training, separate ANOVA were run on the sample's pre-test performance in all tasks with Group (Listening, Written, and Passive Control) as the between-subjects factor. The results indicated that there were no baseline differences between the groups in terms of vocabulary knowledge ($F < 1$) or reading ($F = 2.44$ $p = .091$) and listening comprehension ($F < 1$).

Table 2. Means and standard deviations for the three groups before and after the training

		Listening modality Group		Written modality group		Passive control group		Group	Session	Group x session
		M	SD	M	SD	M	SD			
Vocabulary	pre-test	25.33	4.31	26.26	2.49	24.79	4.44	$F(1,118)=8.42$, MSE=4.48, $p<.01$, $\eta_p^2=.07$,	$F(2,118)=5.96$, MSE=21.61, $p<.01$, $\eta_p^2=.09$,	$F(2,118)=6.80$, MSE=4.48, $p<.01$, $\eta_p^2=.10$
	post-test	27.88	2.49	29.58	2.32	25.52	4.48			
Listening comprehension (z score)	pre-test	0.18	0.91	0.15	0.90	0.01	1.03	$F(2,116)=5.24$, MSE=1.14, $p<.01$, $\eta_p^2=.08$	$F(1,116)=18.12$, MSE=.46, $p<.001$, $\eta_p^2=.14$	$F(2,116)=5.21$, MSE=.46, $p<.01$, $\eta_p^2=.08$
	post-test	0.96	0.61	1.29	0.99	0.34	0.97			
Reading comprehension (z score)	pre-test	-0.31	1.28	0.52	1.09	-0.18	1.58	ns	$F(2,117)=6.98$, MSE=1.84, $p<.01$, $\eta_p^2=.11$	$F(2,117)=5.83$, MSE=.64, $p<.01$, $\eta_p^2=.09$.
	post-test	0.63	0.79	0.96	0.62	-0.14	1.11			
	follow-up	1.13	0.59	1.14	0.51	0.35	0.88			

First, the immediate effects of the training, in the different test proposed, will be presented.

In Vocabulary knowledge the results showed a main effect of Session with a better performance at the post-test than at the pre-test. The effect of Group was significant too: post-hoc comparisons showed that the Written modality group performed better than the Control group ($p<.01$). The other comparisons were not significant. The effect of the covariate was also not significant. The Group x Session interaction was significant (see Table 2): the interaction was explained by a better performance from pre- to post-test in both the trained groups ($p<.001$), but not in the Control group. The Written and Listening modality groups both performed better than the Control group at the post-test ($p<.001$). No differences emerged between the two training groups. The interaction with the covariate was not significant (see Table 2).

In Listening comprehension, the results showed a main effect of Session, with a better performance at the post-test than at the pre-test stage. The effect of Group was significant too: post-hoc comparisons showed that the Written modality group performed better than the Control group ($p<.01$). The other comparisons were not significant. The effect of the covariate was also not significant. The Group x Session interaction was significant. Both the Listening and the Written modality group did better at the post-test than at the pre-test stage ($p<.001$), outperforming the Control group ($p<.001$), who showed any improvement (see Table 2). No differences emerged between the two training groups.

In Reading comprehension, the results showed a main effect of Group: post-hoc comparisons showed that the Written modality group performed better than the Control group ($p<.01$). The other comparisons, like the effect of the covariate, were not significant. The Group x Session interaction was significant. The Listening modality group did better at the post-test than at the pre-test stage ($p<.001$), while the improvement in the Written modality group was not significant ($p=.016$). Both the trained groups outperformed the Control group ($p<.001$) at the post-test, however, the controls showing no improvement (see Table 2). No differences emerged between the two training groups.

To gain a better understanding of the training gains, each group's improvement in performance from pre-test to post-test was divided by the pre-test standard deviation of the three groups' performance (standardized training gains), as suggested by Jaeggi et al. (2011), for example. The gains in the three tasks were compared with a univariate ANOVA, considering the word recognition task as a covariate. The two trained groups did not differ from one another, both obtaining higher gains than the Control group in the three target measures, i.e. vocabulary knowledge, $F(2,118)=6.80$, MSE=.53, $p<.01$, $\eta_p^2=.10$; reading comprehension, $F(2, 117)=5.57$ MSE=.71, $p<.01$, $\eta_p^2=.09$; and listening comprehension, $F(2, 116)=5.21$, MSE=.96, $p<.01$, $\eta_p^2=.08$ (see Figure 1).

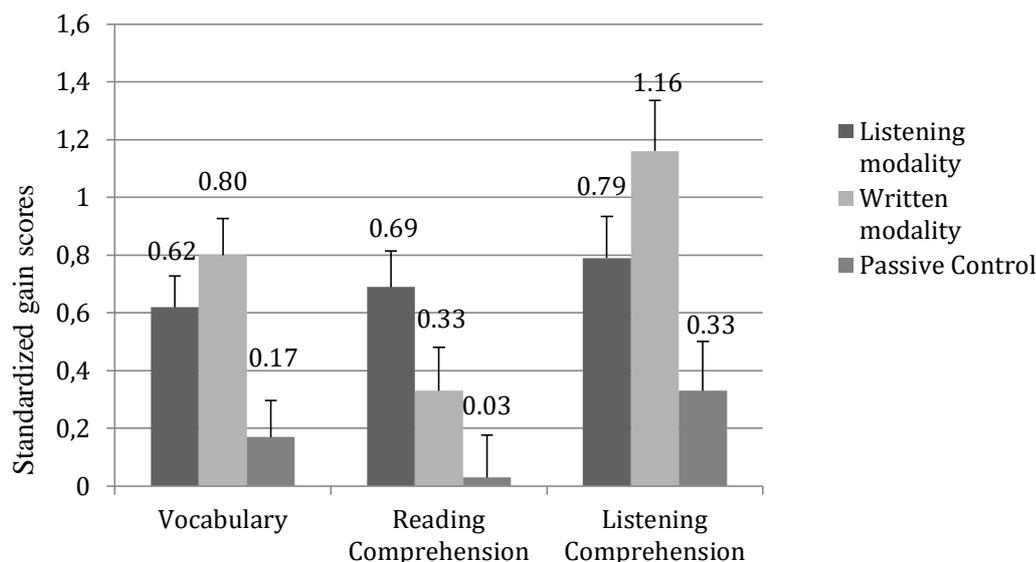


Figure 1. Training effects on vocabulary, reading and listening comprehension. The columns represent the standardized gain scores (post-test minus pre-test, divided by SD at pre-test) for the three groups.

The differences between the three groups at the post-test and follow-up stages were calculated using the measure of effect size, d (Cohen, 1988) computed by subtracting the performance obtained at post-test by each trained group to that of the control group, divided by the pooled standard deviation of the groups considered. Since the previous analyses had shown no differences between the two training groups, Figure 2 only shows the indexes comparing each training group with the control group at the post-test stage. Clearly, the effect size varied from medium to large, confirming the improvement enabled the trained groups to outperform the Control group at the post-test stage.

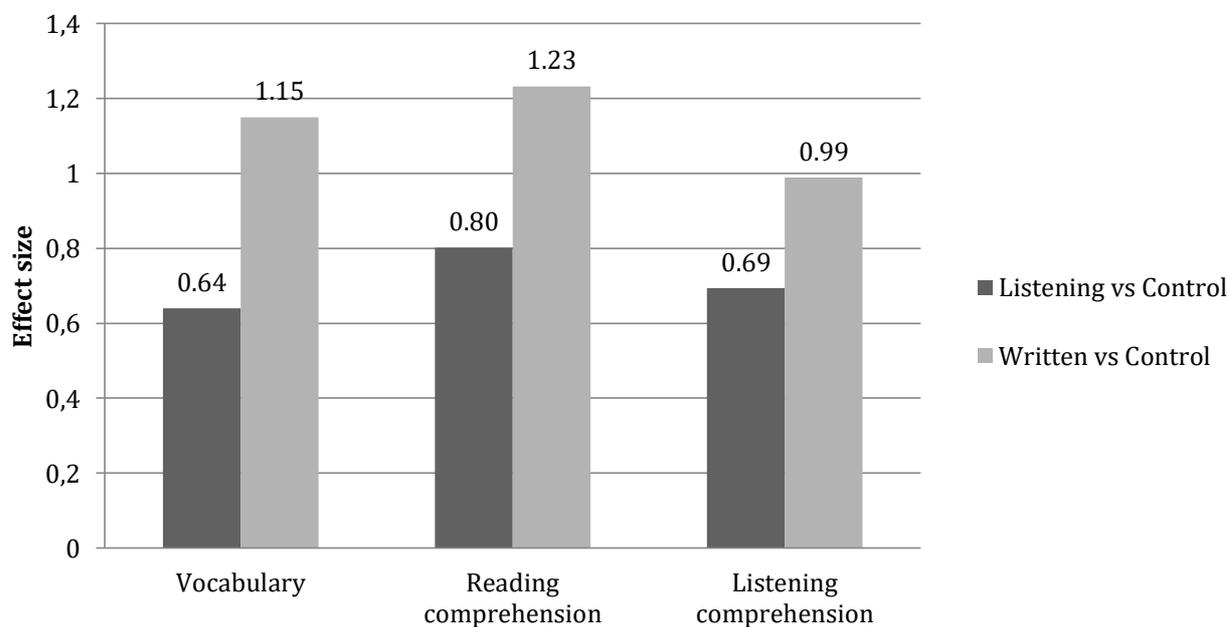


Figure 2. Size of the differences at post-test stage, expressed in Cohen's d .

Furthermore, the maintenance effects at 5 months were considered. Unfortunately, one of the two classes involved in the Written modality training was not available for testing at the follow-up. A comparison was drawn between the children who dropped out and those who did not, considering all the measures assessed at the pre-test stage: the results showed that the children who dropped out performed better in the reading comprehension task at pre-test, $F(1,44)=6.92$, MSE $p < .05$ n_p^2 than those remaining available for testing in the same training condition.

Despite the observation of these variations, we compared for each group separately the performance at the three stages of testing. The results obtained in the class trained with a Written modality showed a further improvement, $F(2,32)=17.64$,

MSE=.56, $p<.001$, $n_p^2=.53$, with a better performance at the follow-up than at the post-test or pre-test stages ($p<.001$). The same was true for the Listening condition group, $F(2,102)=55.69$, MSE=.52, $p<.001$, $n_p^2=.52$, again with a better performance at the follow-up than at either the post-test or the pre-test stages ($p<.001$). For the Control group, there was a significant effect of Session, $F(2,60)=3.64$, MSE=.89, $p=.044$, $n_p^2=.09$, with no differences between the three time-points.

Finally, an analysis of individual differences was conducted. To see if improvements were related to individual differences, a set of Pearson correlations was run between pre-test performance and standardized training gains. This analysis was only run for the trained groups, since the objective was to see how initial performance modulated the gains obtained after the proposed training procedure.

The results are summarized in Table 3. Pre-test performance was generally negatively correlated with gains in each task, suggesting that participants starting from a lower level of performance obtained larger gains at post-test. When considering vocabulary, the correlation for the Listening comprehension group was stronger ($z=-2.34$, $p=.01$) than the one found for the Written modality group.

Table 3. Correlations between pretest performance and standardized training gains at post-test for the trained groups

	Pre-test performance		
	Vocabulary	Listening comprehension	Reading comprehension
Listening modality	-.736**	-.711**	-.758**
Written modality	-.422**	-.543**	-.868**

** $p<.001$

Finally, the participants' growth compared to national norms were analyzed (Figure 3). In particular were considered percentage of participants by groups improving of 0.5 or 1 standard deviation from national norms.

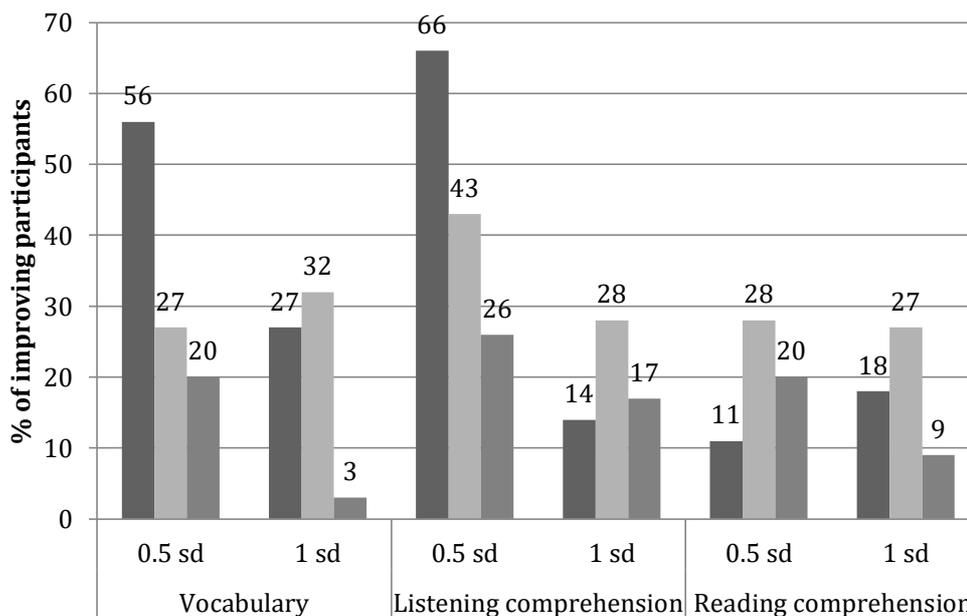


Figure 3. Percentage of participants by groups improving of 0.5 or 1 standard deviation.

Discussion

Our study compared the Listening and Written modality training with a passive control group. Both the training procedures focus on the same language comprehension skills, i.e. the ability to identify key elements in a text (characters, time and place), to distinguish relevant from irrelevant information on the basis of the meaning, to recognize the temporal and logical sequence of the events, and to make lexical and semantic inferences. The training programs thus combined the typical activities involved in reading comprehension exercises, concentrating on the key elements of the narratives, with the more effortful and strategic processing of the text needed to reflect on the most relevant information in the texts, and on the ability to make inferences, all aspects that are crucial to the development of reading comprehension skills (Cain & Oakhill, 2007).

Both the trained groups also worked on vocabulary knowledge, with activities regarding fluency (phonemic and categorical), and awareness of noun categories and meanings of nouns, given the importance of vocabulary in supporting reading comprehension processes (e.g. Tunmer & Chapman, 2012) and listening comprehension (Kim, 2016).

In the Listening modality program, the teacher read the texts aloud and then children had to answer to simple questions orally. In the Written modality program, participants were asked to read simple sentences or short texts, associated with pictures, and they completed activities relating to the four above-mentioned reading comprehension components.

Our results showed that the Listening modality program induced specific improvements in listening comprehension, as well as an improvement in the modality not directly trained: in other words, the Listening modality group's performance also improved in the reading comprehension task. Similar cross-modality effect was found from the Written modality training group, therefore confirming the strict relation between oral and written abilities (Berninger & Abbott, 2010). This suggests that, the comprehension components tackled during the intervention mattered more than modality itself: thus, promoting vocabulary knowledge, as well as inferences, and the ability to distinguish information on the basis of its relevance to text content, positively affected listening and reading comprehension performance (see Lergag et al., 2017).

It should be noted that the z-scores for the reading and listening comprehension tasks were calculated using national norms, so the improvement can be compared with the performance obtained in a large group of children during the same period in the school year. This comparison shows that both groups did better than the expected average performance at the post-test and follow-up stages (in the reading comprehension task). The improvement in the two trained groups' performance also concerned the vocabulary task (an improvement not seen in the passive control group).

Conclusion

This study aimed to assess the feasibility of fostering reading and listening comprehension performance in primary school first-graders by increasing listening comprehension. Based on the well-known SVR model (Hoover & Gough, 1990), transfer effects from a better listening comprehension to reading comprehension, and vice versa, were expected, even in the early years of primary school. This could apply particularly to languages, like Italian, characterized by a transparent phonology and quite transparent morphology. In fact, several authors have recently suggested that the relationship postulated by the SVR model is mediated by the characteristics of the language involved (see Megherbi et al., 2006). In particular, in languages with a transparent orthography the correlation between listening and reading comprehension has been found comparable with the relationship between decoding and reading comprehension, already in the early years of school (see the meta-analysis by Florit & Cain, 2011). In other words, in languages in which it is easy to learn to read (in terms of word recognition), reading comprehension performance is influenced to much the same extent by decoding and oral language skills in the early period of schooling (e.g. Carretti & Zamperlin, 2010). Children learning to read in transparent languages might therefore be ideally placed to benefit from listening comprehension activities and to transfer any benefits to their reading abilities. Of particular interest for school, our analysis on individual differences suggests that training activities were particularly effective in children, of the trained groups, with an initially worse performance: it was the children who started from a lower level of performance at the pre-test who obtained higher gains at post-test and follow-up. These results are consistent with previous findings collected by García-Madruga et al. (2013) and are in line with a compensation effect identified in other training studies (e.g. Carretti et al., 2017; Cornoldi et al., 2015). Furthermore, Solari et al. (2018) found that in early first grade, the relations between the subcomponent skills are different, depending on risk status. For the full sample, fluency was the strongest predictor of reading comprehension, followed by decoding and listening comprehension. When the sample was split (based on early reading skills at the beginning of first grade), fluency, decoding, and listening comprehension each made individual contributions to reading comprehension for not at-risk students. Contrarily for the at-risk students, decoding was only significantly related to reading comprehension via fluency; listening comprehension did not predict significantly reading comprehension for this subsample.

From a theoretical point of view, these results are consistent with the idea that understanding language relies on the same cognitive processes, whatever the medium used to convey it (e.g. Berninger & Abbott, 2010; Kendeou et al., 2014), as suggested by different model of reading comprehension (e.g. Gernsbacher, 1990). The fact that the children working on comprehension abilities in a listening or written modality produced positive effects on both listening and reading comprehension task, clearly supports a close relationship between oral language skills and reading comprehension (e.g. Perfetti et al., 2005; Gernsbacher et al., 1990).

Recommendations

The present findings may have relevant implications for teaching strategies. From an educational standpoint, it is therefore worth emphasizing that activities focusing on some of the processes underlying language comprehension could generate substantial positive effects on reading and listening comprehension, already in children in their first year of primary school.

In this regard it is useful to mention the study by Kim (2016) which applied the construction-integration model of text comprehension as an overarching theoretical framework to listening comprehension. Direct and mediated relations were examined, such as foundational cognitive skills (working memory and attention), language skills (vocabulary and

grammatical knowledge), and higher-order cognitive skills (inference, theory of mind, and comprehension monitoring). Structural equation modeling results showed that listening comprehension is directly predicted by working memory, grammatical knowledge, inference, and theory of mind and is indirectly predicted by attention, vocabulary, and comprehension monitoring.

It is also worth noting that both our training programs were administered by teachers, suggesting that specific activities could be routinely included in school education programs right from the early stages of literacy teaching. In conclusion, the results of our study suggest that activities focusing specifically on certain components relating to language comprehension, delivered in a listening or written modality, could foster both reading and listening comprehension. In addition, the potential benefit does not depend on the training modality used, since both trained groups obtained a marked improvement in their reading and listening comprehension skills, which was maintained at a five-month follow-up in the case of reading comprehension. Considering what emerged in this study and the current literature, future studies should investigate all those processes and activities proposed in oral modalities that could be more effective for the purposes of reading comprehension. Furthermore, it would also be interesting to consider, as analyzed for older children (Bagci & Unveren, 2020), which variables predict good self-efficacy in listening and reading comprehension.

Limitations

Some limitations should be however acknowledged. A first limit refers to the design that was quasi-experimental; we were unable to adopt a strictly randomized protocol because of school constraint. This may produce an overestimation of the effects, however the inclusion of a control group partly smoothes this risk. Maintenance effects were assessed using only one task (the reading comprehension one) and in addition not all the participants were available at follow-up. The latter situation exposes our results to several biases, exacerbated by the fact some of the participants did not participated to follow-up and were those who performed better at pre- and post-test. A note of caution should be added in interpreting the positive findings. A further potential limitation of the present study lies in that it would be difficult to generally apply our results to other educational settings, and to children learning to read in other languages. On the other hand, although language complexity could play a part, we would expect much the same results - probably with greater benefits deriving from listening than from reading programs - in children learning to read in a language with a deep orthography (see Clarke et al., 2010), but in later grades, when automaticity is completely acquired. When reading decoding is hard to learn, reading situations could be less motivating or too required in terms of resources for children, so presenting them with activities based on listening comprehension skills might have a positive impact from both a cognitive and a motivational standpoint.

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Appendix

Session 3, Listening modality group

Aims

- Identify characters, places and times
- Identify the facts and reconstruct the sequences
- Make lexical and semantic inferences
- Expand the vocabulary

Activities

- To listen
- Orally summarize the story
- Understand and use new words

Materials

- 'who' cards: skinny wolf, thief, cat, fat dog
- 'where' cards: lawn, forest, river, farm

1. The teacher tells the fairy tale "The wolf and the dog".

A wolf, hungry and thin, meets a nourished dog. They say goodbye and stop to talk to each other. The skinny wolf asks, "Where do you come from so bright and beautiful? And what did you eat to make yourself so fat? I, who am so much stronger than you, I am dying of hunger". The dog replies: "If you want to feed yourself easily, there is something for you in the place where I live. As long as you do the same service I do to my owner". The very interested wolf asks his dog friend: "What service is it, what do you do for your owner?". The dog replies: "I have to guard the front door well and keep the thieves away during the night". "Uh! But I'm very ready to do this type of service! What do you want it to be for me, now I endure snow and rain in the woods, leading a cursed life. It will be much easier for me to live under a roof and fill my stomach in peace and effortlessly" replies the wolf. "Then come with me to my owner's house", the dog invites him, and together they head for a luxurious home on the edge of the woods. At some point, along the way, the wolf sees a peeling on the dog's neck and asks: "What stuff is that on your neck, my friend?". "Oh ... it's nothing" replies the dog. "But, if you want to tell me ..." says the wolf. "You know" replies the dog, indifferently "sometimes, because of my impetuous nature, they keep me tied to one chain to keep me quiet during the day and be more active and alert at night to unwind my job well. But at dusk, you know, I go around wherever I want; they then bring me bread without me having to ask for it, the owner gives me the bones of his table and the servants throws me a few bites: in short, everyone's leftovers are mine. So, effortlessly, I fill my belly". The wolf looks a little suspicious: "But if you want to go out when you want, are you allowed?". "Well, not really ..." the dog stammers. "Goodbye, dear friend: enjoy your joys as well, I don't barter my freedom for an easy meal, it's too high a price" replies the wolf and goes back to the woods.

2. After listening, the children in groups, receive the cards, with which they choose the protagonist, place and sequence of the story. The teacher verifies the right execution of the work.

3. The children take turns describing one cartoon at a time, thus telling the story in their own words within the group. In the end, the teacher asks each group to tell a part of the story

through one child chose as narrator.

4. The teacher asks: "Does history want to tell us something? Can you teach us something? »And the children formulate an oral answer. The teacher, by a show of hands, lets some answer. In the end concludes by integrating their answers.

5. Finally the work it is on the words of the day. The teacher asks the children to answer some questions orally about the word nourished (pasciuto), skimpy (striminzito), barter (baratto) and then explains their meaning. Example: - Nourished. The teacher asks: "Children, have you understood what the word nourished means? You remember when did you hear it? Who is nourished in the history?". Then teacher gives the explanation: "Nourished means well fed, plump, full".

Session 3, Written modality group

First activity: where we are?

The assignment of the activity is: look carefully at the images and connect, with arrows of different colors, each character to the place where they are. We therefore find two columns, on the right one with some characters: skier, swimmer, doctor and tourist, and on the left some places: hospital, church seen from the outside, swimming pool and mountain.

Second activity: what they say? and where they are?

The assignment of the second activity is: read the comics and copy them next to each character. Then connect the characters to the place where they are with arrows of different colors.

comic 1: yum yum ... what is better in the world?

comic 2: I am satisfied with the harvest! The basket is full!

comic 3: there are sweets for my grandmother in the basket!

comic 4: today the sun heats up a lot but it's worth it!

Below are two columns: on the left there are the characters with empty comics to fill and on the right the places. The characters are: a squirrel with an acorn, a girl with a basket, a gentleman with a rake and a basket full of apples and a fisherman. In the right column you can see a small house, a house with an apple tree nearby, a beach and an oak forest.