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Oral and Written Expression in Children With Reading Comprehension Difficulties

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[AQ: 1][AQ: 2][AQ: 3][AQ: 4]

Abstract

Several studies have highlighted that children with reading comprehension difficulties also have problems in tasks that involve telling a story, in writing or verbally. The main differences identified regard poor comprehenders' lower level of coherence in their productions by comparison with good comprehenders. Only one study has compared poor and good comprehenders' performance in both modalities (oral and written), however, to see whether these modalities differently influence poor comprehenders' performance. We qualitatively and quantitatively compared the performance of good and poor comprehenders in oral and written narrative tasks with the aim of shedding light on this issue. Regression analyses were also used to explore the role of working memory and vocabulary in explaining individual differences. Our results showed that the two groups produced narratives of comparable length, with similar percentages of spelling mistakes, whereas they differed in terms of the quality of their narratives, regardless of the modality. These differences were qualified by analyzing the children's use of connective devices, and poor comprehenders were found to use a higher proportion of additive devices than good comprehenders. Regression analyses showed that working memory (particularly in the intrusion errors measure) explained a modest part of the qualitative differences in narrative production. Implications for our theoretical understanding of poor comprehenders' profiles and education are discussed.

Keywords

poor comprehenders, oral expression, written expression, reading comprehension

To understand a written text completely, readers need to build an integrated and coherent mental representation of its meaning (Gernsbacher, 1997). The quality of this mental representation, or "mental model" (Johnson-Laird, 1983) or "situation model" (Kintsch, 1998), depends on several cognitive and metacognitive factors. From the cognitive viewpoint, reading comprehension requires the activation of an adequate (lexical and semantic) background knowledge that enables readers to identify relevant information within the text and infer information that is not explicitly stated. Working memory plays a crucial part in the construction of a mental model because it enables irrelevant information to be excluded and facilitates connections between items of information in the text (van den Broek, 2010). From the metacognitive standpoint, readers need to understand the goal of reading and recognize the characteristics of different text genres to choose appropriate reading strategies. While reading, they should also monitor their level of understanding from time to time. Such control processes ensure the creation of a coherent representation of the text's meaning.

Like reading, writing—in terms of expressing one's own ideas—is a complex activity because many cognitive abilities need to be used in the process. Classical studies on expressive writing (Burnett & Kastman, 1997; Hayes & Flower, 1980) have shown the importance of context and long-term memory, and of several cognitive processes, including planning, transcription, and revision. Writing an essay involves not only producing ideas, but also organizing them consistently with the task's objectives. Ideas have to be generated, assessed, and compared with the writer's aims and the requirements of the task. Objectives may be general and poorly defined at the outset (Bereiter & Scardamalia, 1987), becoming better defined and more specific during the transcription and revision of the essay. In these latter two important phases of expressive writing, other processes relating to orthographic competence and monitoring become crucial too (Swanson & Berninger, 1996). Clearly, all or some of these numerous cognitive processes (planning, producing, organizing and transcribing ideas, and revising the work as a whole) may be sensitive to

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a limited working memory capacity (Berninger & Swanson, 1994; McCutchen, 1996, for review; Swanson & Berninger, 1996).

The above considerations led us to hypothesize a close link between the ability to express ideas in writing and the ability to understand what others have written, given that both abilities are related to an individual's vocabulary knowledge, working memory capacity, and metacognitive control. Consistently with this hypothesis, several studies have demonstrated a two-way relationship between understanding texts and writing narratives (see, e.g., Berninger & Abbott, 2010[AQ: 5]), but reading comprehension level predicted the quality of written expression better than verbal language skills (listening comprehension or oral expression), thus suggesting a distinction between the two. With few exceptions, this pattern was found for children from third to seventh grade. The importance of reading comprehension for developing good written composition skills was also reported in a longitudinal study by Abbott, Berninger, and Fayol (2010), who showed that text comprehension ability had significant longitudinal paths to text composition in children from second to sixth grade.

Judging from these data, the complexity of expressive writing presumably poses a number of difficulties for any child, but especially for children who have problems with the underlying processes (Berninger & Rutberg, 1992; Hooper, 2002), such as comprehension difficulties. The most typical problems seen in poor comprehenders concern the ability to draw inferences, identify-relevant information in a text, connect items of information together, recognize text structure, and monitor their level of reading comprehension (e.g., Cain & Oakhill, 2007). Work on poor comprehenders has generally shown that they perform well in decoding, but have difficulty with semantic aspects of (oral and written) language when it comes, for example, to understanding discourse structure (Bishop & Snowling, 2004). Poor comprehenders might therefore have much the same difficulties in expressing their own ideas verbally or in writing because they find it hard to correlate events and represent their connections in a mental model, a process that is essential to both understanding and producing a story (Arfé & Boscolo, 2006; van den Broek, 1997; van den Broek, Linzie, Fletcher, & Marsolek, 2000).

The written and oral narrative skills of poor comprehenders have been the object of only a few studies. A first study conducted by Cain and Oakhill (1996) explored the ability to develop oral narratives from verbal or visual prompts. Two narrative tasks were presented to 7- and 8-year-old children grouped by reading comprehension level (less-skilled comprehenders and skilled comprehenders), and compared with children matched for reading comprehension age (i.e., the less-skilled comprehenders were paired with chronologically younger children). In one task, the children were asked to tell a story starting from a verbal topic prompt; in the other, they started from a sequence of six pictures. The results showed that, when narrating from topic prompts, the less-skilled comprehenders were more likely than either the age-matched skilled comprehenders or the younger group matched for comprehension age to produce stories in which the main events were causally unrelated. The less-skilled comprehenders' performance improved, however, when they narrated from the sequence of pictures, and they were more likely to produce stories containing a causally integrated sequence of events in this latter condition. Cain and Oakhill's study thus suggested a strong relationship between story comprehension skills and quality of oral story production.

In a subsequent study, Cain (2003) further analyzed this issue by comparing the sequence of pictures with two kinds of verbal topic prompt, that is, a very short title (as in the previous study), and a longer, more informative one, to guide the children's narrative production. In fact, the differences identified in Cain and Oakhill's (1996) earlier study might have stemmed from the fact that the pictures were more informative and provided a skeleton for the narrative's construction. Cain's (2003) later results again demonstrated that poor comprehenders produced narratives with less well-integrated event structures than skilled comprehenders or younger children matched for comprehension age, particularly when short topic titles were used as verbal story prompts, whereas their performance improved when they were given more informative story prompts. In other words, stories generated from more informative titles or sequences of pictures had more coherent event structures than those generated from short topic title prompts. The more informative prompts also had a stronger positive influence on the coherence of the less-skilled comprehenders' stories than on that of the other groups, such that group differences apparent in the short topic title condition were not seen when either more informative titles or picture sequences were used as prompts.

Cragg and Nation (2006) analyzed the case of written narrative. Groups of poor and good comprehenders were asked to write an extended narrative about an event depicted in a sequence of fifteen pictures. After a delay, participants were subsequently asked to recall the story orally. The results of this study showed that poor comprehenders had age-appropriate spelling skills, and their written narratives did not differ from those produced by control children in terms of length or syntactic complexity. But their narratives captured less of the story content, they reported fewer of the main ideas, and their story structure was less sophisticated, suggesting that poor comprehenders were unable to capture the causal meanings in the story. Their oral story recall mirrored their written output.

In a more recent study, Carretti, Re, and Arfé (2013) further analyzed the issue of writing skills in poor comprehenders by asking groups of poor and good comprehenders

to produce two different kinds of written text (descriptive vs. narrative) using two different kinds of prompt (pictorial vs. verbal) in the narrative text condition. Only five pictures were used for the pictorial prompt to make the task less demanding in terms of the amount of information to process, and very informative verbal prompts were used to avoid differences between the two modalities deriving from differences in the amount of information provided. Results showed that poor comprehenders' performance was minimally influenced by the modality of the prompt: They generally performed less well than good comprehenders with both verbal and pictorial prompts. Their performance was affected by the text genre, however; that is, they performed as well as the good comprehenders in the descriptive text condition, but not in the narrative text condition, especially in terms of coherence and structure. A story's structure has to do with the teller's ability to organize a text according to the temporal and causal relationships in the narrative. Low story structure scores thus reflect narratives that simply describe the content of each picture (in the pictorial prompt condition) or list the events (in the verbal prompt condition), instead of reporting causal connections between events. The poor comprehenders in this study obtained low story structure scores both when they had to organize a narrative on the basis of a set of pictures and when they had to write about a familiar event in the verbal prompt condition. The authors concluded that the poor comprehenders' worse performance in the narrative text condition depended on the characteristics of the text genre, where coherence and causality were important elements.

Summarizing the above-mentioned studies, children with poor comprehension skills have written and oral expression difficulties, but their performance is partially influenced by the prompt and particularly by the text genre: They find it harder to produce narrative than descriptive texts, probably because the quality of a narrative text relies on its coherence and cohesion (e.g., Cain, 2003), aspects to which poor comprehenders are usually less sensitive (Perfetti, Landi, & Oakhill, 2005).

Whether or not the oral and written expression modalities differently affect a poor comprehender's performance has never been assessed directly. Most studies considered written and oral expression separately, showing that poor comprehenders fared worse than good comprehenders in both conditions. An exception was the already cited study by Cragg and Nation (2006), who asked poor and good comprehenders to orally recall the main ideas of their written narratives. But in this story recall situation (based on an initially written production) any information not included in the written narratives would be unlikely to find a place in a subsequent oral production, so the oral output was somewhat biased by the previously administered written task.

Another problem concerns the fact that tasks used to elicit narratives have also varied considerably, so no inferences can be drawn on the role of expression modality. Different hypotheses can be advanced on how the written and oral modalities might compare: On one hand, it may be that good and poor comprehenders do not differ as a function of expression modality because the cognitive processes involved in oral and written production are substantially the same, although the two skills have been demonstrated to be separate (Berninger & Abbott, 2010); on the other hand, writing involves not only cognitive skills but also metacognitive processes (e.g., Cornoldi, Del Prete, Gallani, Sella, & Re, 2010), so any differences emerging between good and poor comprehenders could be due to poor comprehenders' well-documented more limited metacognitive aptitude (e.g., Cataldo & Cornoldi, 1998). In other words, the writing process could be more difficult for poor comprehenders because it requires metacognitive knowledge and several metacognitive processes, such as the ability to reflect on narrative aims and structure and to revise the text. These skills are not usually well mastered by poor comprehenders in the context of reading, and this would lead to a lower performance on their written expression too by comparison with good comprehenders. Some of these metacognitive competencies (e.g., revision) are not involved in oral expression, however, so differences between poor and good comprehenders could be less strong.

The first goal of the present study was therefore to analyze the effect of using a written versus an oral modality to produce narratives, considering both quantitative measures (length, spelling mistakes) and qualitative aspects (e.g., adherence to the requirements of the task, richness in general, and in terms of vocabulary, syntax, and text structure). In particular, examining the quality of the text structure enabled us to assess the children's mastery of the elements typical of a narrative, that is, their inclusion of a beginning, which introduces the events and the character; a middle, explaining the initiating events that motivate the protagonist's internal reactions; and an end, reporting the consequences of the events and the conclusion. This enabled us to assess the coherence of the narrative produced by two groups of good and poor comprehenders. Text coherence was qualified by analyzing the texts' cohesion in terms of the type of connectives used. Cohesion is an important aspect of narrative because it maintains local and global links between events, and one way of measuring this characteristic in a text is to focus on the use of connectives, seen as a system for connecting semantic content across propositions (Shapiro & Hudson, 1991).

Following the approach taken by Shapiro and Hudson (1991) and Cain (2003), we distinguished between four classes of conjunctions: *additive, temporal, adversative*, and *causal.* Additive connectives (e.g., "and") and continuative connectives (e.g., "now") were taken to mean an independent relationship between two clauses; temporal connectives (including "then," "later," "first") were

Table 1. Description of the Sample by Group.

	Good Comprehenders		Poor Comprehenders	
	M	*SD*	*M*	*SD*
Age	9.67	0.49	9.50	0.52
Reading comprehension	12.67	0.65	5.25	1.60
Lexical decision task	35.58	6.92	32.92	5.13
PMA Spatial Abilities subscale	15.92	4.23	13.67	3.06
Nonword reading (times)	30.92	14.35	35.25	10.02
Nonword reading (errors)	1.08	0.90	1.50	1.31
Writing speed (number of graphemes)	36.58	6.93	41.50	8.77
Nonword writing (errors)	1.50	1.38	1.50	1.31
WM updating correct recall	22.67	2.81	18.67	5.05
Proportion of intrusion errors	0.36	0.14	0.64	0.36
PMA Vocabulary	23.08	7.57	15.75	8.79

Note. PMA = *Primary Mental Abilities*; WM = working memory.

considered as denoting a temporal relationship between clauses; adversative (e.g., "but") and causal connectives (e.g., "because") were deemed to indicate a dependent relationship between clauses.

Our second aim was to explore the role of certain cognitive measures associated with expressive writing, assessing their contribution to explaining the performance of good and poor comprehenders. In fact, all previous studies on narrative production have focused on describing the characteristics of poor comprehenders' expressive skill, whereas the source of their difficulty was never taken into consideration. Our objective was to start analyzing which cognitive processes are involved in poor comprehenders' narrative difficulties. From a theoretical standpoint, this would shed light on the association between oral and written language skills in studies on individual differences and lead to practical suggestions on how to support the narrative skills of poor comprehenders. We chose to consider working memory, in terms of maintenance (correct recall) and inhibition (intrusion errors), and vocabulary knowledge for their central role in reading comprehension (e.g., Cain, Bryant, & Oakhill, 2004; Oakhill & Cain, 2012) and narrative expression (e.g., Vanderberg & Swanson, 2007; Yeung, Ho, Chan, & Chung, 2013).

Verbal working memory might explain some of the difference between poor and good comprehenders' expressive writing/oral skills, being a weakness of poor comprehenders (see the meta-analysis by, e.g., Carretti, Borella, Cornoldi, & De Beni, 2009) and involved in the writing process (e.g., McCutchen, 1996) and in oral production (Duinmeijer, de Jong, & Scheper, 2012). In particular, both the maintenance and executive components of verbal working memory may be crucial because they enable relevant information to be kept active and to be integrated in a consistent mental model. This clearly emerged from classical studies on reading comprehension (e.g., Daneman & Carpenter, 1980[AQ: 6]), so it probably applies to written/oral production too. Vocabulary knowledge has also emerged as an important factor in a poor comprehenders' profile (e.g., Hulme & Snowling, 2009) and is associated with writing/oral skills (e.g., Babayiğit & Stainthorp, 2011; Berninger, 1999).

Method

Participants

The study involved 12 poor comprehenders (6 males and 6 females), aged 8 to 10 years, and 12 good comprehenders (6 males and 6 females), matched on school grade and type of school. The children were selected from an original sample of 290 children attending the fourth and fifth grades. All children came from families with Italian as their first language. The two groups were selected on the basis of the general criteria proposed by Cornoldi, De Beni, and Pazzaglia (1996) and were matched for estimated IQ, administering the Spatial Relations subscale of the *Primary Mental Abilities* (PMA) test (Thurstone & Thurstone, 1963) and the lexical decision task (Caldarola, Perini, & Cornoldi, 2012). The Spatial Relations subscale of the PMA involves finding one of four possible figures that can be combined with a given model to produce a square within six minutes. The task consisted of 25 items. The lexical decision task (Caldarola et al., 2012) involves silently reading a list of words and nonwords and identifying the words as rapidly as possible.

The two groups differed in a standardized reading comprehension test appropriate for their age, the MT test (Cornoldi & Colpo, 2011), with poor comprehenders obtaining scores below the 25th percentile, whereas good comprehenders obtained scores above the 75th percentile (see Table 1).

The above-mentioned tasks were administered collectively in a session lasting about 1 hour. Then selected participants met the experimenter individually and were

administered several tasks to assess their basic reading and writing skills. In particular, they completed a nonword reading task and a nonword writing task taken from an Italian battery for assessing dyslexia and dysorthographia (Sartori, Job, & Tressoldi, 2007). A writing speed test was also administered to measure automatization of basic writing skills, in which participants were asked to write the syllable "le" continuously for one minute (Tressoldi, Cornoldi, & Re, 2012).

Participants obtained comparable performance on all the reading decoding and writing tasks (see Table 1), as well as in the Spatial Relations subscale, whereas they clearly differed in the reading comprehension task, $F(1, 22) = 220.58$, $p < .001$, $\eta^2 = .90$.

Materials

Oral and written expression. The tasks consisted of cartoon strips adapted from an Italian battery for assessing writing skills (Tressoldi et al., 2012). There were two strips containing five cartoons each, one strip telling the story of a child falling off a tree, the other describing an old lady being robbed by a thief in the street; the two strips were designed to have the same characteristics (in terms of familiarity, number of characters, number of inferences required). Each participant was asked to give a written or verbal account of the story represented in a cartoon strip to enable a friend to understand what happened to the main character (the child or the old lady). The oral narratives were audiotaped and then transcribed.

Performance on the two tasks was measured both quantitatively and qualitatively. First, the number of words produced and the number of spelling mistakes (as a percentage of the total number of words) were recorded and considered as quantitative measures (the latter only applied to the written expression task).

For the qualitative measures, two blinded raters were asked to examine the texts considering five qualitative parameters and using established assessment measures (Re, Cazzaniga, Pedron, & Cornoldi, 2009; Tressoldi et al., 2012), that is,

Adherence: participants' ability to meet the task's requirements; a higher score was therefore assigned to written texts addressed to a fictional friend and describing what happened or what the writer had seen
General impression: the coherence and richness of the ideas presented
Text structure: the organization of the text was judged to be satisfactory when it was arranged into three parts, with a beginning (introducing the event), a middle (explaining what happened), and an end (reporting the outcome)
Lexicon: the appropriateness and variety of the words used
Syntactic structure: sentence construction (use of direct or indirect discourse) and sentence coordination/subordination, that is, the use of connectives, the appropriate use of verb tenses, and the proper agreement between the gender and number of nouns, verbs, and adjectives

The qualitative parameters would provide information on the two typical level of analysis used to assess narratives, that is, the macro structure and the micro structure. In particular, the global impression and story structure parameters provide information on the global coherence of the text, whereas the lexicon and syntactic structure elucidate the micro structure of the written and oral texts.

Based on the standardized procedure in the original manual (Tressoldi et al., 2012), each parameter was assessed on a 5-point scale (1 = *considerably below grade*, 2 = *somewhat below grade*, 3 = *grade-appropriate*, 4 = *somewhat above grade*, and 5 = *considerably above grade*). Two of the authors (blinded to participants' grouping according to their comprehension skills) rated the written and oral narratives. The interrater agreement was almost perfect (according to the guidelines of Landis & Koch, 1977), so the analyses were run on the first author's assessment. Cohen's kappa coefficients are shown in the appendix, along with separate descriptive statistics for each rater.

Text cohesion. To gain a better understanding of the differences between our poor and good comprehenders, their performance on the oral and written production tasks was also assessed in terms of text cohesion. The proportion of connectives used in the narrative was computed, distinguishing between *additive, temporal, adversative* and *causal* words (Cain, 2003; Cain, Patson, & Andrews, 2005; Shapiro & Hudson, 1991), and calculating their proportions in all the propositions in the narrative, where a proposition consisted of a subject and a predicate, as suggested by Cain (2003).

Understanding of cartoon strips. After completing each writing task, participants were asked two questions to ascertain their real understanding of the cartoon strips; one of the questions focused on factual information represented in the cartoon series, the other required an inference about the event. Correct answers were awarded 1 point each.

Working memory updating task. This task was adapted from the relevance-based updating task proposed by Palladino, Cornoldi, De Beni, and Pazzaglia (2001; see also Belacchi, Carretti, & Cornoldi, 2010). It consisted of six lists, each comprising eight highly familiar and concrete object words (Barca, Burani, & Arduino, 2002) easily comparable for size. The task involved participants listening to each list of object words and then selecting the three smallest objects in each list. The number of correctly recalled words and the percentage of intrusion errors (calculated by dividing the number of intrusions by the number of correctly recalled

Table 2. Descriptive Statistics for Oral and Written Expression Tasks by Group.

	Good Comprehenders				Poor Comprehenders			
	Oral		Written		Oral		Written	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Number of words	63.25	20.18	68.67	22.22	58.33	14.24	61.75	31.45
% of spelling mistakes			1.18	1.11			0.68	1.05
Adherence	3.17	0.58	3.25	0.45	3.00	0.43	2.83	0.39
General impression	3.67	0.98	4.00	1.04	2.33	0.49	2.67	0.88
Text structure	3.58	0.90	3.92	1.08	2.58	1.08	2.58	0.67
Lexicon	3.67	1.15	3.82	0.94	2.58	0.52	2.42	0.52
Syntactic structure	3.67	1.23	4.00	1.04	1.92	0.52	2.25	0.97

words and multiplying by 100) were the dependent variables.

Vocabulary. This task, taken from the PMA test (Thurstone & Thurstone, 1963), consisted of 30 words and participants were asked to identify synonyms of each word from among 4 options. The task was timed and participants had 5 minutes to complete as many items as they could. The total number of correct answers was the dependent variable.

Procedure

The writing tasks and the working memory task were administered individually in a session lasting about 45 minutes. The version of the cartoon strip and the oral or written expression modality used for the task were counterbalanced across participants, to avoid effects relating to the material being used.

Results

Quantitative parameters. The differences between the two groups in terms of the number of words produced were analyzed with a mixed-design, repeated-measures ANOVA, with Group as the between-subjects factor and Modality (oral vs. written) as the within-subject factor. No differences emerged between the two groups, $F < 1$, neither the effect of Modality nor the Group × Modality interaction proving significant (for both $F < 1$; see Table 2).

No differences emerged between the two groups for the percentage of spelling mistakes in the written expression task either, $F(1, 22) = 1.31$, $p = .262$, $\eta^2 = .06$.

Qualitative Parameters. The descriptive statistics for the qualitative parameters are shown in Table 2. We first considered the participants' adherence to the task's requirements: no differences emerged in these parameters, the effect of group, $F(1, 22) = 2.71$, $p = .11$, $\eta^2 = .11$, and modality, $F(1, 22) = 3.19$, $p = .09$, $\eta^2 = .12$, and the interaction between them, $F < 1$, were not significant.

For general impression, the results showed a main effect of group, $F(1, 22) = 29.26$, $p < .001$, $\eta^2 = .57$, with the good comprehenders' oral and written production being judged more consistent and richer than that of the poor comprehenders. The effect of modality, $F(1, 22) = 4.63$, $p = .043$, $\eta^2 = .17$, was significant too, the written texts being judged better than the oral narratives. The Group × Modality interaction, $F(1, 22) = 1.16$, $p = .294$, $\eta^2_p = .05$, was not significant.

For text structure, our results showed a main effect of group, $F(1, 20) = 12.68$, $p < .01$, $\eta^2 = .37$, that is, the good comprehenders' narrative followed the typical structure of a story, whereas this was not the case for the poor comprehenders. The effect of modality, $F < 1$, and the Group × Modality interaction, $F < 1$, were not significant.

For lexicon, again there was only a main effect of group, $F(1, 22) = 16.17$, $p < .01$, $\eta^2 = .42$, the good comprehenders' use of lexicon being found more appropriate than that of the poor comprehenders. Neither the effect of modality, $F < 1$, nor the Group × Modality interaction, $F(1, 22) = 1.57$, $p = .22$, $\eta^2_p = .06$, was significant.

For syntactic structure, the analysis yielded only a main effect of group, $F(1, 22) = 25.13$, $p < .001$, $\eta^2 = .53$, the good comprehenders' syntax being considered more appropriate than the poor comprehenders' (see Table 2). The effect of modality, $F(1, 22) = 3.03$, $p = .095$, $\eta^2 = .12$, and the Group × Modality interaction, $F < 1$, were not significant.

Text cohesion. Text cohesion was assessed by analyzing the proportions of connectives used in the oral and written

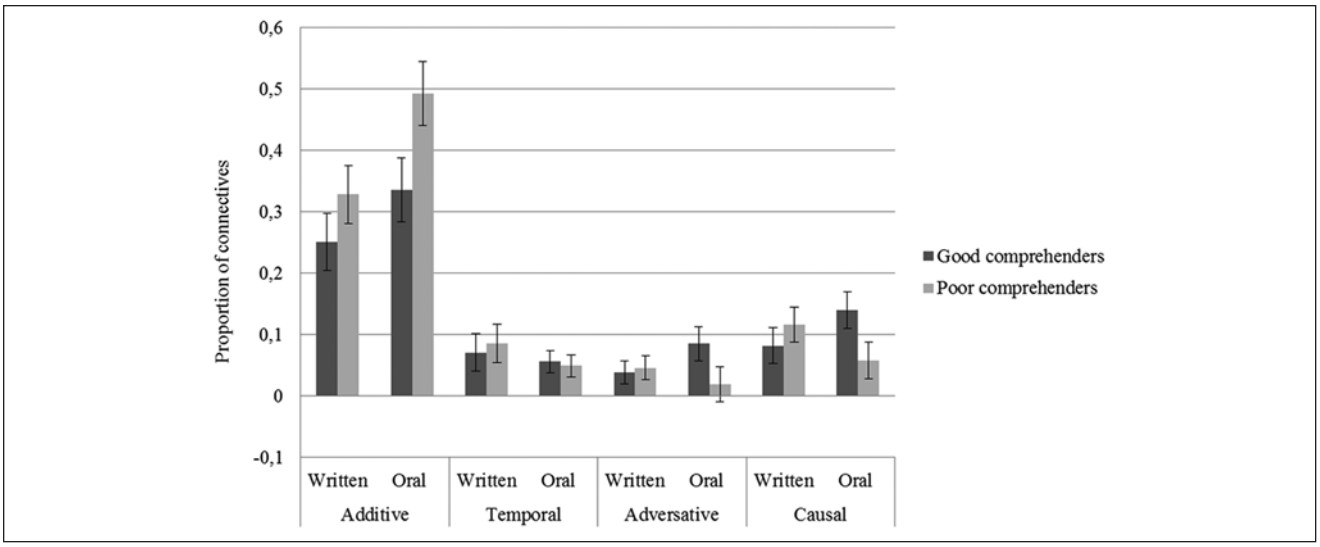

Figure 1. Proportion of connectives in the clauses produced by good and poor comprehenders.

Table 3. Correlations Between Qualitative Indexes and Cognitive Measures (Vocabulary and Working Memory [Recall and Intrusions]).**[AQ: 7]**

	Vocabulary	WM Recall	WM Intrusions
General impression	.300	.324	–.485*
Text structure	.211	.283	–.223
Lexicon	.329	.286	–.415*
Syntactic structure	.278	.338	–.368

Note. WM = working memory.
*$p < .05$.

narratives (see Figure 1). A 2 (groups: good vs. poor) × 2 (modalities: written vs. oral) repeated-measures analysis of variance was run for each type of connective word (additive, temporal, adversative, and causal).

For the additive connectives, our results showed a main effect of modality, $F(1, 22) = 9.45$, $p < .01$, $\eta^2 = .32$, with oral productions containing a higher proportion of additive connectives than written texts, and also of group, $F(1, 22) = 5.22$, $p < .01$, $\eta^2 = .19$, with poor comprehenders using a higher proportion of additive connectives than good comprehenders. The Group × Modality interaction was not significant, $F < 1$.

The analysis on temporal connectives yielded no significant effects: group, $F < 1$; modality, $F < 1$; Group × Modality, $F < 1$. The same applied to the adversative connectives: group, $F(1, 22) = 1.32$, $p = .26$, $\eta^2 = .05$; modality, $F < 1$; Group × Modality, $F(1, 22) = 2.71$, $p = .11$, $\eta^2 = .11$.

For the causal connectives, the Group × Modality interaction was significant, $F(1, 22) = 4.94$, $p < .05$, $\eta^2 = .18$. Post hoc comparisons with Tukey's test showed that the two groups differed marginally ($p = .062$) in the oral modality, with good comprehenders using a higher proportion of causal connectives than poor comprehenders. Good comprehenders also tended to use more causal connectives in the oral condition than in their written texts ($p = .011$). No differences emerged from the other comparisons. There were no significant effects of either group or modality.

Understanding of cartoons. The two groups' performance was compared using a univariate ANOVA and no differences emerged.

Working memory updating. Univariate ANOVA on the number of correctly recalled words and the proportion of intrusion errors showed a significant difference in both these dependent variables, $F(1, 22) = 5.75$, $p < .05$, $\eta^2 = .21$ and $F(1, 22) = 6.16$, $p < .05$, $\eta^2 = .22$, respectively, with poor comprehenders recalling fewer words and making more intrusion errors than good comprehenders.

Vocabulary. Univariate ANOVA on the number of correct answers showed a significant difference between the groups, $F(1, 22) = 4.79$, $p < .05$, $\eta^2 = .18$, again with good comprehenders outperforming poor comprehenders.

Correlations. Since modality did not affect the two groups' performance differently, the qualitative assessments were averaged and correlated with the cognitive measures, so we considered narrative production, regardless of the modality. Although the indexes were generally different

from zero, only the proportion of intrusion errors was associated with the global quality of the text and the richness of lexicon. These correlations can be considered large according to Cohen's (1988) guidelines.

Regression analyses. Hierarchical regression analyses were run to estimate the percentage of variance of the qualitative measures (criterion variables) explained by group, working memory (WM; correct recall and intrusion errors), and vocabulary. The WM measures (correct recall and intrusion errors) were entered in Step 1, the vocabulary measure in Step 2, and the group variable in Step 3 (converted into a dummy variable, 1 for good comprehenders, 0 for poor comprehenders).

In the first step, WM measures (correct recall and intrusion errors) contributed to the explained variance for the general impression measure ($R^2 = .20$, $p < .05$) with the proportion of intrusion errors as a unique predictor ($\beta = -.73$, $p < .05$); no contribution was made by vocabulary. But when the group dummy variable was entered, the contribution of the WM measures was no longer significant, so the group dummy variable ($\beta = .60$, $p < .001$) was the only salient predictor. The model explained 45% of the variance.

As for text structure, only the group dummy variable contributed to explaining the variance ($R^2 = .26$, $\beta = .68$, $p < .01$).

The quality of the groups' lexicon was marginally predicted by WM ($R^2 = .14$, $p = .07$) and group ($R^2 = .22$, $p < .05$); the group dummy variable ($\beta = .58$, $p < .05$) was the only salient predictor, however.

When it came to syntactic structure, the group dummy variable ($\beta = .73$, $p < .001$) was the only salient predictor. The model explained 45% of the variance.

Discussion and Conclusions

Several reports in the literature have suggested that comprehension skills are associated with the ability to tell a story verbally or in writing because much the same cognitive processes are involved (Berninger et al., 2006). In a 1-year longitudinal study, for instance, Babayiğit and Stainthorp (2011) explored the association between reading and writing skills in two cohorts of primary school children. Their results showed that qualitative measures of narrative text writing, assessing the clarity and richness of the text, were associated with reading comprehension skills at different time points. These results led authors to suggest the need for a more comprehensive approach to the study of literacy skills (e.g., Abbott et al., 2010; Juel, 1988; Shanahan, 1984; Shanahan & Lomax, 1986).

This relationship also emerged when individual differences in reading comprehension were considered, poor comprehenders revealing difficulties in both oral (e.g., Cain, 2003; Cain & Oakhill, 1996) and written forms of expression (e.g., Cragg & Nation, 2006), particularly when they had to produce a narrative (Carretti et al., 2013).

The effects of the written and oral modalities had not previously been examined simultaneously, however; the few studies examining these issues generally focused on one modality or the other. An exception was the study by Cragg and Nation (2006), who asked poor and good comprehenders to orally recall the main ideas of their written narratives, but (as mentioned in the introduction) basing the story recall situation on an initially written production meant that the oral output could have been somewhat biased by the previously administered written task.

To further examine the narrative abilities of poor comprehenders, the first goal of the present study was to identify any influence of the written or oral modality of the narrative task on individual differences in reading comprehension. We concentrated on narrative tasks because they had proved harder for poor comprehenders to handle than other kinds of production (Carretti et al., 2013). Two cartoon strips showing familiar characters were presented and participants were asked to tell the story in writing or verbally. To examine the role of certain cognitive processes in accounting for individual differences in narrative production, we also administered a verbal WM task and a vocabulary knowledge test.

Our findings indicate that using the oral or written modality made no difference to the performance of poor comprehenders, whose output was worse than that of good comprehenders, in terms of richness and lexical and syntactic complexity whichever modality they used, confirming the results of previous studies (e.g., Carretti et al., 2013). On the other hand, the two groups did not differ in terms of the length of their narratives, the percentage of spelling mistakes they made, or their adherence to the task's requirements, meaning that poor comprehenders' difficulties are not due to the cognitive effort involved in completing the task or understanding what it requires. In other words, the lower quality of poor comprehenders' written and oral narratives cannot be attributed to differences in their basic writing skills (they did just as well as the good comprehenders in tests measuring their writing speed and spelling). The difference might arguably stem from poor comprehenders having a weaker understanding of the events depicted in the cartoons, but the two groups' comparable performance on answering the comprehension questions demonstrated that this was not the case.

Our results give the impression that part of the difference lies in that narratives produced by poor comprehenders are less cohesive (as our analysis on the connectives they used would suggest). Judging from our findings, poor comprehenders tend to use more additive connectives than good comprehenders, and fewer causal connectives—particularly in the oral modality—and this would explain the generally lower quality of the poor comprehenders' output:

rather than a story (that also involves reporting causal connections between events), their narratives seemed more a list of events with a description of each picture. On the strength of these results, poor comprehenders' lower-quality narrative productions may derive from a weaker ability to represent the story's meaning. In other words, our poor comprehenders were less able to fully understand the events depicted in the cartoons and this affected their narratives. This would be consistent with the idea that comprehension skills transcend expression modality, as suggested by other reports of less-skilled comprehenders having more trouble understanding stories presented in auditory or pictorial formats (e.g., Gernsbacher, Varner, & Faust, 1990). In the case of the present study, however, the poor and good comprehenders' comparable performance on answering the comprehension questions would challenge this explanation. Some caution is warranted, however, because only two questions were asked in the present study, one requiring the recall of factual information and the other an inference. Further studies would be needed to completely disentangle this issue.

As mentioned previously, our analysis on connectives suggested that a poor narrative production is associated with, or derives from a poor use of connectives, and this would fit in with the report from Cain et al. (2005) of poor comprehenders having more difficulty understanding and using connectives. In the Cain et al. study, poor and good comprehenders were shown texts in which some conjunctions had been omitted and asked to choose the appropriate word from among three options. The poor comprehenders' performance was generally worse in terms of the number of correct answers, and they completed the cloze inappropriately, irrespective of the type of conjunction. So there may be a link between their poor understanding and their poor use of conjunctions in oral or written forms of expression, as already suggested by Cain (2003), for instance.

It therefore seems that poor comprehension skills affect people's ability to tell a story in written and oral form, and their difficulty stems partly from the fact that their narratives lack those elements that give a story its structural complexity. It is important to add that a note of caution is warranted in interpreting our results, however, because narrative production was measured using only two tasks (one for the written and one for the oral modality). Obtaining more indicators of the same skills would enable us to be more confident about the general applicability of our findings, so future research should include more tasks to obtain more robust measures and improve their reliability.

Concerning the processes involved in narrative production, our correlation analyses showed that WM measures are associated with the quality measures we considered, as in previous reports (e.g., Swanson & Berninger, 1996; Vanderberg & Swanson, 2007). In particular, the intrusion errors measure, which refers to the ability to inhibit no longer relevant information, contributed to the variance explained in the general impression of the narratives' quality and, marginally, in the vocabulary quality parameters. Inhibition has often been considered an important mechanism in explaining WM performance and individual differences, particularly in relation to reading comprehension (e.g., Cain, 2006; Carretti, Cornoldi, De Beni, & Romanò, 2005; Pimperton & Nation, 2010), so failure to control information may partly explain differences in written/oral expression. The variance explained by the difference between the good and poor reading comprehension groups nonetheless remained the stronger predictor of writing quality, suggesting that other variables not considered in the present study, such as metacognitive components, may have a part to play.

To write a narrative adequately, writers should be able to assess the importance of the events involved and the relationship between them, and to organize this information by providing causal and temporal links. Differences in the organization of a narrative's structure could depend partly on an individual's prior knowledge, but the events narrated in the cartoon used in our study are very common in real life, so their role in explaining any differences should be very small. A possible source of individual differences could relate to people's metacognitive knowledge about story structure. Several studies have suggested that writers are supported by their familiarity with the story structure of narrative (e.g., Scardamalia & Bereiter, 1986**[AQ: 8]**), so a possible reason for the difference between poor and good comprehenders might relate to the former's inadequate knowledge of text structure, which is a common feature of poor comprehenders (e.g., Cain & Oakhill, 1996; Yuill & Oakhill, 1991).

An idea-generating phase is followed by writers transcribing and then revising their texts. Other processes relating to orthographic competence and monitoring become crucial in the latter two, fundamental phases of expressive writing (Swanson & Berninger, 1996). Since orthographic skills are not usually impaired in poor comprehenders (e.g., Cragg & Nation, 1996), the monitoring phase might be critical, given poor comprehenders' tendency not to adopt metacognitive strategies to monitor their level of performance (e.g., Garner, 1981). This has been observed particularly in the context of reading, but an aptitude for metacognition usually has a more general effect, so such a tendency might plausibly be expected to emerge in other learning contexts too. Future research should therefore pay attention to the role of metacognitive knowledge and monitoring in accounting for individual differences between poor and good comprehenders.

From an educational standpoint, it would be important to know what stage of the writing process poses problems

for poor comprehenders to design remediation programs. Some studies have demonstrated that expressive writing performance can be enhanced by providing facilitators designed to improve an individual's text organization (e.g., Re, Caeran, & Cornoldi, 2008). For instance, the method used in the study by Re and colleagues (2008) was based on breaking down the writing process into a series of steps and providing boxes in which children were asked to write their ideas. When children with attention-deficit/hyperactivity disorder were instructed to use this procedural aid when planning how to organize their texts, the quality of their output improved. It would be interesting to assess the utility of this procedure in the case of poor comprehenders too.

In conclusion, our study indicates that reading comprehension and narrative expression are related, and individual differences in comprehension skills are uninfluenced by the use of an oral or written modality (poor comprehenders' performance is poor in both cases). Texts produced by poor comprehenders are characterized by a greater use of additive conjunctions, and this probably explains the lower quality of their output.

Appendix

Descriptive Statistics Separately for the Two Independent Raters and Their Level of Agreement (Cohen's Kappa Coefficient)

		Rater 1		Rater 2		
		M	*SD*	*M*	*SD*	Cohen's κ
Adherence	Written	3.12	0.45	3.12	0.45	1.00
	Oral	2.96	0.55	3.00	0.51	.90
General impression	Written	3.33	1.17	3.33	1.17	.97
	Oral	3.08	0.97	3.00	1.02	.87
Text structure	Written	3.25	1.11	3.29	1.12	.83
	Oral	3.13	1.08	3.08	1.10	.89
Lexicon	Written	3.13	1.03	3.17	1.01	.93
	Oral	3.17	1.01	3.13	1.03	.93
Syntactic structure	Written	3.12	1.33	3.08	1.21	.84
	Oral	2.83	1.27	2.79	1.28	.82

Note. All coefficients are significant at $p < .001$.

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