

Overcoming reading comprehension difficulties through a prosodic reading intervention: A single-case study

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Nuria Calet , M. Carmen Pérez-Morenilla
and Macarena De los Santos-Roig

University of Granada, Spain

Abstract

Apart from speed and accuracy, prosody has recently been included as another component of skilled reading, as its role in reading comprehension is being increasingly recognized. Prosodic reading refers to the use of prosodic features of language during reading, including suitable pauses, stress and intonation and appropriate phrasing. The aim of this research was to examine the impact of a prosodic reading intervention on the reading comprehension of a fourth-grade primary child with specific reading comprehension difficulties. An AB single-case design was used with baseline (A) and treatment (B) phases. The intervention, in 17 sessions, was based on repeated reading with a focus on expressiveness. Results pointed to improved reading fluency and reading comprehension scores over baseline scores. Nevertheless, more studies are needed to show conclusive evidence for improved comprehension as a result of prosody intervention. The implications of prosodic reading interventions for literacy development are discussed.

Keywords

fluency reading, poor comprehension, prosodic reading, reading comprehension, reading difficulties

I Introduction

Reading comprehension is one of the most important transversal skills for the achievement of success in both school and society (e.g. Gray, 2017; Kamil, 2003; Ricketts et al., 2014). Results for the Progress in International Reading Literacy Study (2016) reveal that reading comprehension levels among students in Spain are below the OECD average (OECD, 2017). Although children with specific reading comprehension difficulties are able to decode texts accurately, they show significant problems in comprehending texts. The fact that approximately 10% of school-age

Corresponding author:

Nuria Calet, Department of Educational and Developmental Psychology, University of Granada (Spain), Campus Univ. de Cartuja, s/n, Granada, 18071, Spain

Email: ncalet@ugr.es

children can be classified as poor comprehenders means that this impairment is as important as dyslexia (Nation et al., 2005). Prevalence studies regarding reading comprehension difficulties indicate that approximately 20% of Spanish children are affected (García et al., 2013). This prevalence rate is higher than for any other primary education problem: dyslexia, for instance, has a prevalence of around 5% (Jiménez et al., 2009). Difficulties in reading comprehension are therefore quite frequent among primary and secondary students and have serious educational consequences. Solving reading comprehension problems in primary education in particular is critical, since the students are likely to experience added difficulties with other subjects such as mathematics and/or science (Pimperton and Nation, 2010).

One of the key components of success in reading is fluency (NICHD, 2000). Current definitions of fluency consider prosody to be another essential marker, in addition to speed and accuracy (Kuhn et al., 2010; Rasinski et al., 2011). Reading with prosody means reading with appropriate changes in intonation while paying attention to syntax and punctuation (Kuhn et al., 2010). Although a growing number of studies show that prosody is a link between fluency and reading comprehension (Álvarez-Cañizo et al., 2015; Calet et al., 2015; Miller and Schwanenflugel, 2006; Valencia et al., 2010; Veenendaal et al., 2014, 2016), prosody has largely been neglected in reading fluency research (e.g. Fuchs et al., 2001). It is not often included within the school curriculum in primary schools, for reasons such as its only recent recognition as a critical dimension of reading fluency and the lack of accessible assessment tools (Kuhn et al., 2010).

Innovative studies of instruction in prosodic reading with primary children support the role of prosody in comprehension (Ardoin et al., 2013; Calet et al., 2017; Kuhn, 2004; LeVasseur et al., 2008). It seems that reading comprehension is facilitated by segmenting the text into meaningful word groups. Consequently, comprehension might be improved through prosodic reading, as it may help segment texts according to syntactic and semantic elements (Kuhn and Stahl, 2003).

Accordingly, some studies have confirmed improvements in reading comprehension when previously segmented texts are used (e.g. Cromer, 1970; O'Shea and Sindelar, 1983). It is thought that this might aid the memory processes needed for reading comprehension (Frazier et al., 2006). In line with this view, in a study of second-grade children, Arcand et al. (2014) demonstrated that segmenting texts into meaningful phrases results in better comprehension, with the authors pointing out that fostering prosody facilitates comprehension, as well as speed and accuracy. Nevertheless, this research was a correlational study, so no causal relationship can be demonstrated. Intervention studies, however, might demonstrate this relationship. Ardoin et al. (2013), for instance, carried out an intervention study of 76 third- and fourth-grade students randomly assigned to either a rate-focused or prosody-focused repeated reading intervention, concluding that repeated reading improved prosodic reading. However, the impact of prosody intervention on comprehension was not assessed and nor was a control group used for this study. In a more recent study of Spanish primary school children, Calet et al. (2017) implemented an intervention study of 22 sessions with second- and fourth-graders with the aim of assessing the role of prosody in reading comprehension. Children were randomly assigned to one of three groups: an automaticity group, a prosody group, or a 'no treatment' control group. Intervention was based on repeated reading with different emphasis. These authors found that focusing on prosody seemed to result in a better repeated reading method, given that prosodic reading not only improved prosodic skills but also speed and accuracy. Regarding reading comprehension, it was found that, while automaticity was also necessary, prosodic reading became more important for upper grades.

Taking the reading level into account is also important in implementing prosody instructions, as it seems that decoding skills are crucial in initial primary grades and that prosodic skills play a key role in upper grades, given that prosodic reading might follow once decoding skills are developed (Chall, 1996; Kuhn and Stahl, 2003). Accordingly, a number of studies confirm that prosodic

reading is more related to comprehension in upper grades (Calet et al., 2015; Rasinski et al., 2009; Valencia et al., 2010). These results also coincide with the simple view of reading (Hoover and Gough, 1990), according to which decoding plays a more significant role in comprehension in initial grades, and oral comprehension in later grades. Thus, grade level should be considered in the relationship between prosodic reading and overall reading competence.

Another aspect to consider is the characteristics of the language. In transparent (as opposed to opaque) orthographies like Spanish, for instance, children soon achieve a high level of accuracy (Seymour et al., 2003). Since Spanish children develop decoding skills at an earlier stage, instruction in prosody is a particularly interesting approach.

Overall, these studies suggest that prosody plays a crucial role in reading comprehension and that prosodic skills must be explicitly and systematically taught, bearing in mind that the usual focus of schools is decoding skills. Nevertheless, previous intervention studies on prosody have been carried out with children whose development is typical (e.g. Ardoin et al., 2013; Calet et al., 2017; González-Trujillo, 2005; Harrison et al., 2018). It would therefore be interesting to carry out interventions with poor comprehenders, given the demonstrated relationship between prosody and reading comprehension. Poor comprehenders often go unnoticed because they read aloud accurately, yet the underlying difficulties they experience have serious educational consequences (Clarke et al., 2010; Hulme and Snowling, 2011). Among methods to enhance reading fluency, repeated reading is the most commonly used given that it is considered the best way to achieve positive effects on reading fluency for students with reading difficulties (e.g. Ardoin et al., 2013; Chard et al., 2002; Meyer and Felton, 1999; NICHD, 2000; Stevens et al., 2017; Therrien, 2004). This was the approach used in the present study.

To sum up, there is a growing body of research that supports the relationship between prosodic reading and reading comprehension (Álvarez-Cañizo et al., 2015; Calet et al., 2015; Klauda and Guthrie, 2008; Miller and Schwanenflugel, 2006; Veenendaal et al., 2014, 2016). Although a growing number of intervention studies demonstrate the role played by prosodic reading in comprehension (e.g. Ardoin et al., 2013; Calet et al., 2017), there is a clear lack of intervention studies of prosody for poor comprehenders, which would suggest that further research is needed.

The aim of this single-case study was to explore the impact of prosodic reading instruction on a fourth-grade primary poor comprehender. This methodology is appropriate because it focuses on the specific needs of the child. It is also appropriate when the target population is heterogeneous – as the intervention can be individualized to focus on concrete difficulties (Rvachew and Matthews, 2017) – and when it is important to empirically explore the aspects that facilitate a positive treatment outcome in a small sample where use of a randomized controlled trial is difficult (Preston et al., 2017). In addition, this methodology offers guarantees regarding effectiveness, thus emphasizing evidence-based practice (Byiers et al., 2012; Horner and Kratochwill, 2012). In the single-case design approach, behaviour has to be monitored several times before and after treatment to ensure that any change can be attributed to the intervention. There is a lack of single-case intervention studies in the literature, despite the fact that this kind of design is specifically useful for persistent reading difficulties (Griffiths and Stuart, 2013).

II Method

I Participant

One fourth-grade child from a middle-class Spanish primary school participated in this study. This participant was 9 years old and had reading comprehension and reading fluency difficulties, as

revealed by several commonly used Spanish standardized reading tests. His scores were below his class average in word and pseudoword reading and in reading comprehension. These reading difficulties led to difficulties with other subjects. The participant, who was attending a special-education class for children with language difficulties, was chosen from among other candidates because of his motivation to participate in the study. Informed consent was obtained from his parents in writing after they were informed of the study requirements and verbally from the participant before the testing commenced.

2 Design

An AB single-case design was used. This design is one of the most widely used in single-case research because of its applicability in clinical settings. The AB design involves comparing various repeated observations made at baseline (Phase A) with their evolution during a psychological intervention (the treatment phase or Phase B).

3 Instruments and materials

The following measures of reading fluency and reading comprehension were administered by a trained research assistant in a quiet room.

a PROLEC- R test (Battery of evaluation of reading processes; revised) (Cuetos et al., 2007). The following subtests from the PROLEC-R test were administered.

- **Word reading:** This task consisted of reading a list of 40 words aloud as quickly and as accurately as possible. These words vary in frequency, length and syllabic structure (CCV, CVV, CVC, CCVC, CVVC and VC, C = consonant and V = vowel). The child received one point for every word read correctly. According to the manual word reading rate was scored by dividing the accuracy score by the total reading time multiplied by 100. Cuetos et al. (2007) reported internal reliability (Cronbach's alpha) of .74.
- **Non-word reading:** This task consisted of reading aloud 40 non-words as quickly and as accurately as possible. The child received one point for every non-word read correctly. The non-word reading rate was scored by dividing the accuracy score by the total reading time and multiplying by 100. Cronbach's alpha as indicated by the manual is .68.
- **Punctuation marks:** The child was asked to read a text aloud using the proper expressivity. The text included 11 punctuation marks (four full stops, two commas, three question marks, and two exclamation marks). Each correctly expressed punctuation mark scored one point, for a maximum possible score of 11. The final score is obtained by dividing the accuracy score by the total reading time and multiplying by 100. Cuetos et al. (2007) reported internal reliability (Cronbach's alpha) of .70.
- **Reading comprehension:** This test consist of two expository and two narrative texts. The child had to silently read the texts and answer a total of 16 inferential-type questions. Each correct answer scored one point. Cronbach's alpha as indicated by the manual is .72.

b ACL test (reading comprehension test) (Catalá et al., 2001). This standardized test of reading comprehension is divided into six reading levels, each corresponding to a Spanish primary school grade (first to sixth grades). For this study, we used level 4. The child had to silently read seven texts (narrative, expositive, and rhetorical) and answer a total of 25 multiple-choice questions. Each correct answer scored one point. Cronbach's alpha as indicated by the manual is .80.

c The Reading Fluency Scale in Spanish (RFSS) (González-Trujillo et al., 2014). This scale was used to measure prosodic reading according to the dimensions volume, intonation, pauses, phrasing and reading quality. Each dimension is scored between 1 and 4 points, for an overall maximum of 20 points. The scale was applied to age-appropriate children's readings texts of approximately 100–200 words each (17 texts in total). The child was asked to read the different texts aloud as well as possible. Readings, which took place in an isolated area, were digitally recorded. To minimize evaluator bias, two previously trained independent raters scored the recordings, assessing whether volume, intonation, pauses, phrasing and reading quality were adequate as the texts were read. Inter-rater agreement was measured using the intra-class correlation coefficient (ICC). The resulting ICC value was in the excellent range (ICC = .93–.97) (Cicchetti, 1994), indicating a high level of agreement. Cronbach's alpha showed reliability of .91.

d Reading comprehension non-standardized test. This test was developed specifically for this research. It consists in reading aloud different texts (approximately 100–200 words each) and answering two questions (one literal and one inferential). There were a total of 17 texts and the child read a different text each session. Answers were scored as 0 for wrong answers and 1 for complete correct answers. The number of words read per minute was also counted. Reading was recorded daily and prosodic reading measurements were also made, using the RFSS (González-Trujillo et al., 2014) described above.

Age-appropriate texts aimed at prosodic reading were used for the intervention, taken from the following books: *La Cuchara Mágica (The Magic Spoon; González-Trujillo, 2015)*; *Chupín (Chupín; González-Trujillo, 2013a)*, *Las Palabras Tristes (The Sad Words; González-Trujillo, 2013b)*; and *El Muñeco Pamuk (The Pamuk Doll; González-Trujillo, 2014)*. Passages of 150–200 words per session were used. Punctuation marks were highlighted and the texts included short and long declarative, exclamatory and interrogative sentences.

III Procedure

Word reading, non-word reading, punctuation marks, and reading comprehension were assessed (through PROLEC-R and ACL standardized tests) before the intervention (pre-test) and immediately after the intervention (post-test). To assess baseline (phase A) comprehension before the intervention, the non-standardized test mentioned above was used to take baseline measurements of correctly read words per minute and prosodic reading. Baseline testing was performed in four sessions over two weeks. In each session the child was asked to read a text and answer two comprehension questions (literal and inferential). The final minutes of each session were devoted to evaluating words per minute and prosodic reading. Once this pre-test phase was completed, the intervention (phase B) was implemented by a trained research assistant.

I The intervention

The intervention, with an intensive and individual format based on repeated readings, was developed specifically for this research. It consisted of a total of 17 sessions conducted over six weeks within the space of two months at the rate of three 45-minute sessions per week.

The intervention was as follows. First, the research assistant read aloud some paragraphs in order to demonstrate the proper model of prosodic reading to the child. Next, the child read the same paragraphs trying to mimic the proper intonation patterns of the research assistant. The research assistant and the child together then re-read the same paragraphs. Finally, after these readings, the child was asked to read a text with similar characteristics and was assessed in

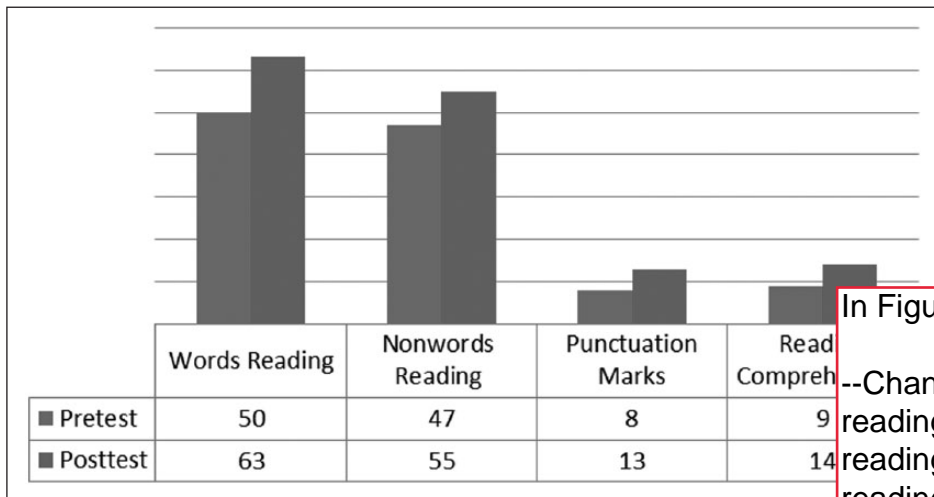


Figure 1. Pre-test and post-test total scores obtained for PROLEC-R subscales.

Notes. The scores are not directly comparable between tests; word reading, non-word reading and punctuation mark scores were calculated by dividing the accuracy score by the total reading time then multiplied by 100; reading comprehension score consisted in the total of correct answers.

prosodic reading, correct words per minute and reading comprehension (answers to reading comprehension questions).

2 Data analysis

Visual and statistical analyses were performed of the longitudinal data using the Mann-Whitney U (MWU) non-parametric test. This test, frequently used in single-case research (Cohen and Edgington, 2015), is a non-overlap-between-phases test which does not require equal sample sizes per phase. The non-overlap-of-all-pairs (NAP) index (Parker and Vannest, 2009) was used to estimate effect size and to complement the visual analysis (Gage and Lewis, 2013; Manóvilov and Solanas, 2013; Sanz and García-Vera, 2015).

Generalized least squares linear regression was performed with words per minute and prosody as the dependent variables. After first-order autocorrelation was assessed (Durbin and Watson, 1951), piecewise linear regression was performed with phases, sessions and phases x sessions as predictors. Several investigators have recommended using linear regression to estimate both changes in slope (trend) and level (mean of data per phase) in order to determine the treatment effect (Center et al., 1985; Gorsuch, 1983). SPSS v.20 was used for the analyses. A statistical package developed in R by Bulté and Onghena (2008) for single-case design randomization tests (SCRT) was used for the graphs.

IV Results

1 Pre-test to post-test changes in normative data: Standardized tests

Figure 1 shows scores obtained before and after the intervention for the PROLEC-R word reading, non-word reading, punctuation mark and reading comprehension subscales. As can be observed, all post-test scores were slightly higher than pre-test scores. The participant's classification in word

In Figure 1:

--Change "words reading" to "word reading"; "nonwords reading" to "nonword reading".

--Change "Pretest" to "Pre-test"; "Posttest" to "Post-test"

I attach you the Figure 1 in a separate page with this changes

Table 1. Pre- and post-test participant's PROLEC classifications and scores compared to control group's means and standard deviations (SD).

		Word reading	Non-word reading	Punctuation marks	Reading comprehension	
Participant	Pre-test	50 ^{MD}	47 ND	8 ^{SD}	9 ^{MD}	
	Post-test	63 ^{MD}	55 ND	13 ^{MD}	14 ND	
Control group (n = 10)		Mean (SD)	130.86 (41.73)	82.11 (21.16)	29.10* (4.55)	12.19 (1.20)

Notes. ND No difficulty; ^{MD} Moderate difficulty; ^{SD} Severe difficulty. * $p < .001$ (participant's post-test vs. control group).

reading and non-word reading were the same before and after training (*moderate difficulty* and *no difficulty*,¹ respectively). Punctuation marks and reading comprehension improved after the intervention, with classification going from *severe difficulty* to *moderate difficulty* and from *moderate difficulty* to *no difficulty*, respectively.

To check if PROLEC-R post-test scores had changed not only in relation to standards, but also in relation to scores from a Control Group (CG), data were collected for 10 age-matched children without reading difficulties at the end of the academic year and the procedure described by Crawford and colleagues (Crawford and Howell, 1998; Crawford et al., 1998) was followed. Results in Table 1 indicated that the child's post-test scores for word reading, non-word reading and reading comprehension were no different from those for the CG, whereas a statistically significant difference was only evident for punctuation marks (Participant's Score = 13, Mean_{CG} = 29.10, SD_{CG} = 4.55; $t(9) = -3.40$, $p < 0.01$).

Regarding ACL test scores for reading comprehension, **Please change "0.01" to ".01"** the intervention, results were similar to those described above. Post-test scores increased over the pre-test scores and the sten score for performance increased from 4 (*moderately low*) to 5 (*within normal limits*).

2 Longitudinal data on words per minute and prosodic reading: Non-standardized test

Figure 2 shows changes produced in words per minute. Visually, a slight increasing trend could be observed between phase A and phase B. While the non-parametric MWU test did not detect any significant change, effect size according to the NAP index was 75% (a moderate effect). Piecewise linear regression supported the impressions gained from the visual inspection. The model was significant ($p = .001$) and accounted for 40% of the variance ($R^2_{change} = .427$, $F_{change} = 14.06$, $p = .001$). Treatment sessions significantly predicted the change in performance ($t = 3.76$, $p = .001$).

The MWU non-parametric test was applied to each dimension of the RFSS (prosodic reading) test, i.e. volume, intonation, pauses and phrasing and reading quality. Results in Table 2 indicated a significant change in all dimensions ($U_{volume} = 4$, $U_{intonation} = 2$, $U_{pauses} = 2$, $U_{quality} = 5$, $p < .001$ for each). NAP effect sizes were 94%, 97%, 70%, 92%, respectively. These values indicate large treatment effects for the intervention.

Figure 3 shows similar results for prosodic reading total scores. Evident level and slope changes were observed between phases. Statistically, the MWU test indicated clear differences (*Baseline Mean* = 7.00, *SD* = .81; *Treatment Mean* = 12.76, *SD* = 2.35; $U = 2$, $p = .001$) and the NAP index indicated a large treatment effect (97%). The regression model, which explained 86% of the variance ($R^2_{change} = .87$, $F_{change} = 128.79$, $p < .001$), detected an improvement in performance through-out interaction phases x treatment sessions ($t = 11.34$, $p < .001$).

Scores for the non-standardized reading comprehension task specially designed for this study (literal and inferential questions) improved somewhat. Performance for the literal questions was

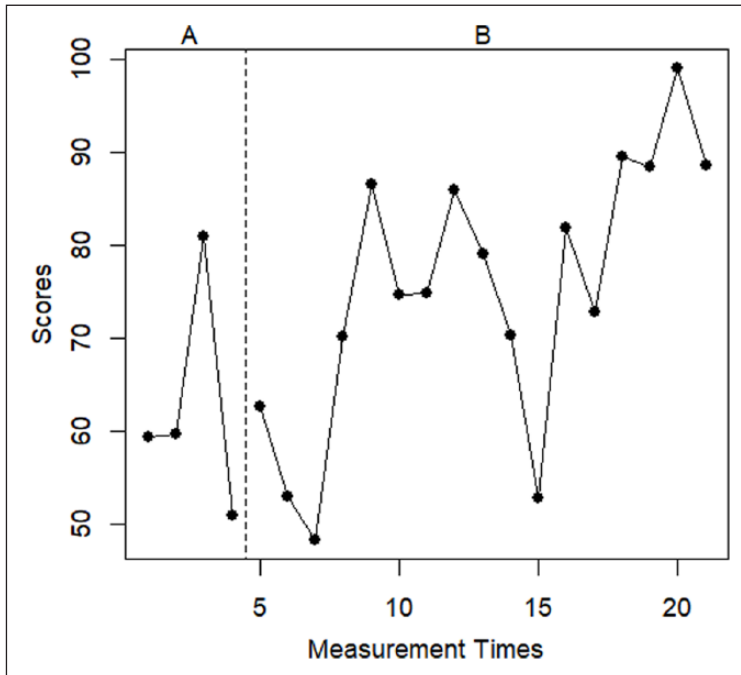


Figure 2. Non-standardized test results for all sessions (words per minute at baseline and treatment phases).

Table 2. Baseline and treatment phases' means and standard deviations (SD) of RFSS (prosodic-reading) scores.

	Baseline	Treatment phase
Volume	2.00 (.00)	2.88 (.33)
Intonation	1.00 (.00)	2.52 (.62)
Pauses	1.00 (.00)	2.29 (.58)
Quality	1.25 (.50)	2.88 (.92)
Total prosody	7.00 (.81)	12.76 (.35)

Note. RFSS = Reading Fluency Scale in Spanish.

unchanged and while performance for the inferential questions improved slightly from 75% to 88%, the X^2 test resulted non-significant.

V Discussion

The purpose of this study was to examine the impact of intervention in prosody on the reading skills of a fourth-grade primary child with reading comprehension difficulties. A single-case multiple-baseline design was used consisting of phases A (baseline) and B (treatment). Single-case designs play a key role in providing useful insights and guidance for practice (Griffiths and Stuart, 2013; Horner and Kratochwill, 2012; Ross and Begeny, 2014); once a particular intervention has been shown to be successful with a specific participant, other practitioners might apply some of the intervention's activities with similar cases.

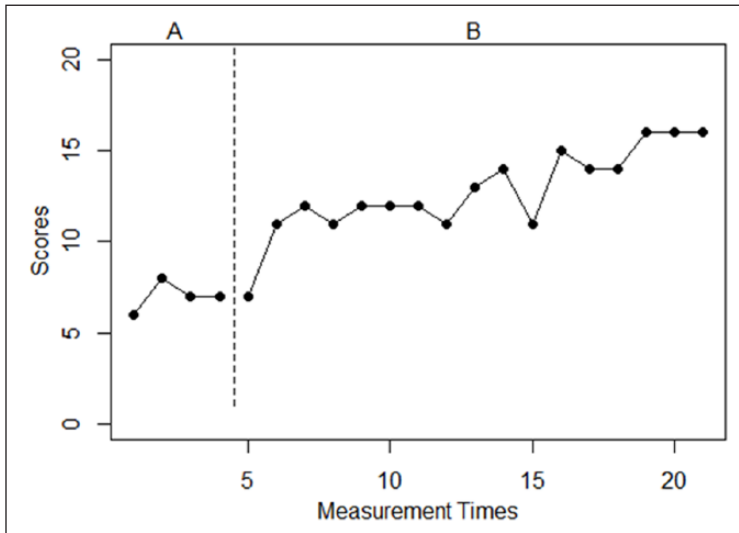


Figure 3. Prosodic Reading results for all sessions (baseline and treatment).

An important finding of this study is that the intervention in prosodic reading not only had an impact on reading rate and prosody but also on reading comprehension. This would suggest that an improvement in prosodic reading can help poor comprehenders to better understand the texts they read. It seems that only an intensive individual and explicit prosodic reading intervention that focused on specific difficulties could improve reading fluency and reading comprehension for our study participant. Nevertheless, it is important to bear in mind that a single-case study cannot be considered as generalizable (Pring, 2005) because it cannot represent a particular group of children. Therefore, the results of this study need to be viewed as tentative and interpreted with caution, as sample size tempers the conclusions that can be made. Moreover, since the results would need to be corroborated by collecting more data at the same two time points (i.e. for the same elapsed time as for our participant) from children developing as normal and with no reading difficulties, no conclusive evidence can be reported for an effect in comprehension.

The improvements we report in the reading rate and prosody as a result of our prosody intervention corroborate results for previous studies in Spain (Calet et al., 2017; González-Trujillo, 2005). Interventions with an emphasis on improving prosodic reading, as well as expressive skills, improve prerequisite speed and accuracy skills. This conclusion concurs with the hypothetical partial independence of automaticity and expressivity, according to which a certain level of automaticity is necessary for expressiveness to occur (Cowie et al., 2002). The longitudinal data show that the improvement was more evident for prosodic reading than for words per minute. This is not surprising, given that the focus of the intervention was prosodic reading. Nevertheless, we note that the child had fewer difficulties with word reading from the outset of the intervention. It is important, nonetheless, to take into account language characteristics. Spanish is a language with a transparent – not opaque – orthography, so children rapidly achieve a high level of accuracy. In fact, after their first year of learning to read, Spanish children typically achieve a reading accuracy of 95% of words, compared with 35% for more opaque languages (Seymour et al., 2003).

As mentioned, significant improvements were found in the components of prosodic reading. A possible reason could be that, since this aspect is little worked on in class, explicit and systematic teaching rapidly results in improvement. It should be noted that specific texts that focused

on prosodic reading were chosen for the intervention, specifically with motivational content that facilitated prosodic reading practice. Álvarez-Cañizo et al. (2018) pointed out that, in contrast with what happens with speed and accuracy, children at earlier primary grades will not have developed adult-like prosody, as they read with more pauses and their melodic contour is flatter. This would suggest that it is important to teach prosodic reading to children from early on. Since Spanish children learn to decode easily, prosody is a key aspect of fluency reading in the intervention. According to the NICHD (2000), around 40% of fourth-grade primary children do not read with fluency or properly understand what they read, so the teaching of reading fluency would seem to be important. It is crucial to promote reading fluency intensively and explicitly, and most especially with children with reading difficulties, given that these children usually learn passively in large-group settings, and, with little or no specialized instruction, their performance is poor (Stevens et al., 2017). For the Spanish language, the teaching of prosody is a particularly useful approach, given that its transparent orthography makes decoding easy (Seymour et al., 2003).

Intonation was the prosody component for which improvements were most significant for our participant, perhaps because intonation may be the most prominent component in speaking. It is interesting to note that previous studies of Spanish show that intonation is the component most related to comprehension (Calet et al., 2015). Other studies support this idea; for example, Ravid and Mashraki (2007) revealed stronger links between intonation and comprehension than between pause structures and comprehension; and Miller and Schwanenflugel (2006), who used spectrographic measures to analyse prosodic reading, found that only pitch changes (or intonation) could account for unique variance in reading comprehension after controlling for rapid and accurate text reading.

Our results would indicate that prosody is a key aspect of reading fluency, given its impact on comprehension. These results corroborate those of previous correlational studies that point to a relationship between prosodic reading and comprehension (e.g. Calet et al., 2015; Kuhn et al., 2010; Valencia et al., 2010) and of previous intervention studies that highlighted the role of prosody (e.g. Ardoin et al., 2013; Calet et al., 2017). The improvements in reading comprehension might be totally or partially mediated by the improvements in reading fluency. Our findings support the idea that prosodic reading may aid comprehension because it might help segment the text according to meaningful word groups. Reading a text with prosody allows children to focus initially on meaning. Recommended for future research is an exploration of the impact of a prosodic reading intervention on reading comprehension in poor comprehenders and a comparison with children developing normally.

Since reading comprehension is a complex construct to measure, two standardized reading comprehension tests (ACL and PROLEC-R) were used for both the pre-test and post-test measures. The ACL test consisted of reading expository, narrative and poetic texts and then answering different test-type question. The PROLEC-R test consisted of just narrative texts and the question to be answered was not a test-type question. In both cases improvement could be observed.

However, the measure of reading comprehension used for the longitudinal data was not very accurate, as it consisted of just two questions (one literal and one inferential) after each session. In this case, there was a slight improvement but only for the inferential question. One possible explanation could be that prosodic reading has more impact on inferential information than literal information, given that inferential information is more complex to process. It also might be that, by paying attention to pauses and intonation during reading, with the resulting proper phrasing of sentences, the child can understand what they are reading more deeply, which, in turn, facilitates the drawing of inferences. This conclusion corroborates that of previous studies that reported that prosodic reading helped with the reading comprehension of difficult texts (Benjamin and Schwanenflugel, 2010). In any case, no significant differences were found. One reason could be

that just two questions were asked, when, perhaps, more questions or more difficult questions should have been included to ensure variability and sensitivity.

Although teaching other reading skills, such as drawing inferences or developing oral vocabulary (Stevens et al., 2017), have been shown to improve reading comprehension, we specifically chose prosodic reading, given its relationship with reading comprehension in the primary years. We also aimed to identify the efficacy of this component for reading comprehension without interference from other factors.

Although the outcomes of the study were positive, it does have some limitations. One of them is the design. Despite the fact that the AB design is one of the non-reversal designs most used by researchers (Riley-Tillman and Burns, 2009; Ross and Begeny, 2014), it is considered pre-experimental because it does not sufficiently control for many factors affecting internal validity (Byiers et al., 2012; Manolov and Solanas, 2013; Vance and Clegg, 2012). Indeed, demonstrating a treatment effect requires the implementation of certain methodological strategies (as in withdrawal or multiple-baseline designs) in accordance with current standards (Kratochwill et al., 2010). Moreover, randomization and replication are necessary to guarantee validity and to ensure that an intervention is evidence-based (Horner and Kratochwill, 2012; Kratochwill and Levin, 2010). Another limitation was the small number of sessions in both phases; Ripoll and Aguado (2014), for instance, reported, for their meta-analysis, a positive relationship between intervention duration and reading comprehension outcomes. In future research, therefore, we will replicate the intervention with poor comprehenders with additional baseline and treatment sessions. For future research, it would also be interesting to conduct a post-test 5 or 6 months after the intervention ends to test long-term gains in reading fluency and reading comprehension.

In conclusion, our study, in providing evidence that prosodic reading – a little-studied aspect of skilled reading – is an important component of reading comprehension, would suggest that teachers need to place more emphasis on teaching expressive reading in the classroom. Nevertheless, given that just one child participated in our study, our results need to be interpreted with care.

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This is correct

Note

1. PROLEC-R classifies children as having ‘severe difficulty’, ‘moderate difficulty’ or ‘no difficulty’.

ORCID iD

Nuria Calet  <https://orcid.org/0000-0002-1700-0387>

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