



DoText Genres Affect Reading Rate? A study on Spanish-Speaking Primary School Children

¿Afectan los géneros textuales a la velocidad de lectura? Un estudio sobre lectores hispanohablantes de educación primaria

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Abstract: An adequate development of reading rate is necessary to gain reading fluency and good comprehension. The aim of this study was to investigate how reading rate develops across different grades and text genres —narrative and expository— throughout primary school. The results show that as the readers advance in terms of school grade, they gain a greater articulatory and elocutionary reading rate. However, students at different grades could vary the way they use their reading rate across text genres, and the direction of this variation could also differ according to the metrics of velocity measurement. Our study suggests that phones, being less sensitive to text characteristics than words and syllables, are the best units for studying the effect of text genres on reading rate. In this sense, early primary students maintained a constant reading rate across text genres, meanwhile advanced readers accelerated when reading the expository text in comparison with the narrative text. We conclude that each genre may demand the students to use their time in a particular way in order to support the cognitive processing of the text and facilitate the reconstruction of meaning. However, this genre specific use of time in reading appears only in the advanced readers.

Keywords: Reading rate- Reading prosody- Narrative text- Expository text- Primary school.

Resumen: Los estudiantes necesitan desarrollar un adecuado nivel de velocidad lectora para lograr una buena fluidez y comprensión lectora. El objetivo de este estudio fue investigar cómo se desarrolla la velocidad lectora en diferentes géneros textuales —narrativo y expositivo— entre los escolares a lo largo de la escuela primaria. Los resultados muestran que a medida que los lectores avanzan en niveles escolares, adquieren una mayor velocidad de articulación y de elocución en la lectura. Sin embargo, los estudiantes de diferentes grados pueden variar la forma en que usan su velocidad lectora en diferentes géneros textuales, y la dirección de esta variación también puede diferir según las métricas de medición de la velocidad. Este estudio sugiere que los fonemas, al ser menos sensibles a las características del texto que las palabras y las sílabas, son las mejores unidades para estudiar el efecto de los géneros textuales sobre la velocidad lectora. En este sentido, los estudiantes de los primeros grados de primaria mantuvieron una velocidad lectora constante en los diferentes géneros textuales, mientras que los lectores avanzados aceleraron al leer el texto expositivo en comparación con el texto narrativo. Se concluye que cada género discursivo puede exigir a los estudiantes que utilicen su tiempo de una manera particular para apoyar el procesamiento cognitivo del texto y facilitar la reconstrucción de su significado. Sin embargo, este uso específico del tiempo acorde a los géneros solo se observa en los lectores avanzados.

Palabras claves: Velocidad lectora- Prosodia lectora- Texto narrativo- Texto expositivo- Educación primaria.

Introduction

The way learners use time in reading texts is a central component of reading acquisition. As learners become fast, they gain better reading fluency, and, in turn, this positively impacts reading comprehension (Cowie et al., 2002; Benjamin & Schwanenflugel, 2010; Álvarez-Cañizo et al., 2020). Thus, reading velocity is considered a fundamental component of reading fluency that indicates the degree of automatization in the decoding of written words. This study examined how reading velocity evolves across text genres in primary school and analyzed Spanish-speaking students' reading rates to gain insights into the relationship between genre and pace in reading development. It explored both articulatory and elocutionary reading rate using metrics of different linguistic sizes —word rate, syllable rate, and phone rate— in order to determine which measure might be most sensitive in capturing the effect of text genres on reading rates.

Research showed a moderate to strong positive correlation between reading velocity and reading comprehension in primary and secondary school students (Baker et al., 2022; García & Cain, 2014;

Reschly et al., 2009; Florit & Cain, 2011. In this sense, slow reading could make it difficult for the readers to hold enough detail in their short-term memory to reconstruct the text's overall meaning (Brown & Hirst, 1983). That is why a reduced reading rate could be an early predictor of reading disability (Tapia Pérez et al., 2018). For example, children with dyslexia or developmental language disorder usually read slower than their neurotypical counterparts (Suárez-Coalla et al., 2016; Jordán et al., 2019). In the same way, speech disorders like clustering and stuttering may show up in abnormalities in reading rate (Franke et al., 2021). In this regard, velocity is a fundamental issue to be described within the developmental study of oral reading fluency. Therefore, obtaining normative data from good readers is imperative for conducting a comprehensive evaluation and establishing clear benchmarks for reading speed within a specific population.

Reading rate acquisition is a complex process that requires many years to be mastered, and institutional nurture plays a significant role here. This process involves a dynamic interplay of students, languages, tasks, and text characteristics (Barth et al., 2014). Regarding student characteristics, the reading rate has been related to the maturation of neuropsychological factors like motor automaticity, rapid automatized naming, speech perception, memory, attention, and affective information (Salazar et al., 2021; Savage & Frederickson, 2005; Wolf & Bowers, 1999), and with processing skills of phonological, syntactic, semantic, pragmatic, and textual components of the linguistic system (Hagoort & Van Berkun, 2007).

Reading rates could also vary according to languages and dialects (Schwab & Avanzi, 2015). For example, Latin American Spanish-speaking students read relatively slower than European Spanish-speaking students (Salceda et al., 2020). Despite the personal capacities and geolinguistic characteristics of the readers, reading velocity is strongly related to their school levels. Salceda et al. (2020) exhibited how the reading aloud velocity of Spanish-speaking students evolves continuously throughout primary education. The study revealed a sequential increase, with expected reading rates of 49, 73, 85, 104, 114, and 124 words per minute for students in the first through sixth grades, respectively. In general, research evidence suggests that reading rate develops in a nonlinear manner across readers' schooling ages: children read faster as they advance in schooling during primary and secondary education; students continue to get faster in terms of their reading speed, even in university education, but at a slower pace than during the previous two educational phases (Brysbaert, 2019; Salceda et al., 2020; Kuhn et al., 2010). Beyond the proven effects of students' cognitive profile, schooling levels, and particularities related to languages and dialects, how students develop their reading rate across tasks and different text genres has yet to be clarified (Barth et al., 2014). So, we need to include texts as a complex unit of meaning to obtain an integral understanding of reading rate acquisition.

Students typically encounter various text genres such as narrative, informational (expository), and argumentative texts across disciplines to acquire knowledge throughout their schooling (Aravena Reyes & Quiroga Moya, 2023). Each genre represents a culturally situated way of organizing meaning within texts, and it can be identified by its recurring structure of meaning, as well as the specific choices of vocabulary and grammatical resources (Martin & Rose, 2008). For instance, narrative texts serve the purpose of portraying authentic or imaginary life experiences through person-oriented dialogue and familiar language. Additionally, the structural composition of such texts is perceived to assist children in discerning and anticipating events, thereby promoting enhanced retention of the story's content (Kirk & Pearson, 1996; Graesser et al., 1980). On the other hand, expository texts are purposefully crafted to adopt an objective approach in describing, informing, explaining, discussing, or arguing about a specific subject matter. As a consequence of this inherent objective stance, these texts tend to incorporate more unfamiliar terminology and necessitate a greater degree of abstract knowledge on the part of the reader (Hall et al., 2005). Therefore, non-fiction, expository, or informative texts possess a higher information density compared to fictional or narrative texts

(McNamara et al., 2012). In fact, expository texts serve as the foundation for constructing scientific knowledge (Aravena Reyes & Quiroga Moya, 2023). Thus, each text genre offers students both an unique opportunity and challenge, requiring them to adopt specific approaches in order to access various ways of constructing meaning (Stamboltzis & Pumfrey, 2000). Reading speed serves as a valuable indicator of the cognitive processes that students employ when engaging with different genres. It provides a window through which we can explore how students navigate and comprehend diverse types of texts.

Numerous studies have demonstrated that students at all grade levels, from primary to university education, typically read expository texts slower than narrative texts both in Spanish and English (Álvarez-Cañizo et al., 2018; Paige et al., 2015; Kocaarslan, 2019; Barth et al., 2014; Haberlandt & Graesser, 1985). On the contrary, other studies like Cervetti et al. (2009), have consciously controlled the degree of readability (through the measurement of the complexity of vocabulary and grammatical structures) of narrative and informational texts, and have revealed that primary school students use a similar reading pace across different text genres. So, from this perspective, it is not the global stages of distribution of information of genres, but the complexity of their vocabulary and lexico-grammatical structures that would affect the reading rate. However, Barth et al. (2014) reclaimed the role of text genre in terms of reading rate, along with other factors; they demonstrated that students in the sixth to eighth grades tend to decelerate their reading pace when they come across texts that are longer, less narrative (more expository), less cohesive, and present relatively greater difficulty. Moreover, they established that skilled readers are adept at adjusting their reading rates based on different text features, their level of understanding, and comprehension goals. Struggling readers, on the other hand, typically do not adapt their reading rates as a strategic choice in order to effectively engage with various features of text; this lack of flexibility in reading rate may be a result of decoding skills that have not yet automatized properly (Barth et al., 2014). In summary, reading acquisition studies suggest that reading rate could be determined simultaneously by the global structure of the text genres and their particular way of using lexico-grammatical resources, the complexity of texts, and students' perceived degree of difficulty and readability. In this sense, students need to learn to use their reading rate in a flexible way to deal with text characteristics in order to become efficient readers. However, it is necessary to review how reading acquisition studies define and measure reading rates.

Reading can be considered as a speech act, and reading pace refers to the rate at which one converts a written text into an oral one. This involves transforming written symbolic representations into phonological units like phones, syllables, and words (Baker et al., 2022). Standardized tests typically measure reading rate using a list of isolated words (Ardoín et al., 2013; Flumer & Tulis, 2013; Samuels, 2006; Fuchs et al., 2001; Hudson et al., 2005) and this indicates only the automaticity of word recognition capacity. Reading connected texts implies word recognition and all other components of the text's genres like managing morphosyntactic and discursive elements in order to understand the texts as a complex unit of meaning. In speech research, traditionally, velocity is measured as elocutionary rate (ER) and articulatory rate (AR) (Schwab, 2015; Amir & Grinfeld, 2011). The first is typically calculated as the number of spoken units (words, syllables, or phones) pronounced per unit of time (minute or second) in the whole speech sample, which may include disfluency, repetitions, or errors. Moreover, this rate measurement considers the overall time of the utterance and does not exclude pauses, which are phonetic compounds with different phonological functions. AR is a more specific way of measuring speech velocity, which takes into account only the portion of speech that is free from pauses and disfluencies like mispronunciations or repetitions. This evaluation accurately evidences the way speakers use their articulatory motor control when pronouncing words, syllables, and phones; this is used predominantly in studying atypical speech like stuttering (Hall et al., 1999). In the reading research literature, reading velocity amounts to ER, and there has been a scarce effort to delve into AR (Franke et al., 2021). However, a complementary

inquiry into AR and ER could offer a better understanding of how readers use time in reading texts. In this regard, it is of great importance to consider the size of the linguistic construct—phones, syllables, and words—that is to be used to measure reading velocity.

Reading acquisition studies predominantly use word-based units like ‘words per minute’ (WPM) or ‘words correct per minute’ (WCPM) to measure reading rate in texts (Brysbart, 2019; Salceda et al., 2020). Indeed, as previously stated, this word rate metric serves as the cornerstone of the idea, that the complexity or difficulty of the texts prompts students to slow down their reading pace. However, several studies have suggested that letters, syllables, or morphemes are more precise than words in measuring reading rate. These finely grained smaller linguistic units demonstrated that the reading rate is not flexible, as the word rate metric showed. However, it remains constant, regardless of the level of text difficulty, ranging from elementary to highly complex technical literature (Carver, 1983; Coke, 1974; Miller & Coleman, 1971–1972). Letters and morphemes have language specificity and may not adequately reflect the phonological process that the readers go through when reading. Syllables can also vary in their complexity across languages (Caravolas & Landerl, 2010) and text genres. Though phone rate is vastly used in assessing oral speech rate (Amir & Grinfeld, 2011), there is a scarcity of studies using this metric to evaluate reading speed across texts of varying genres or complexities. In reading acquisition disorders, phones would not only represent a basic unit of decoding (Hall et al., 1999) or motor control, but they could also be helpful in comparing reading rate across languages of varying degrees of grapheme–phoneme transparency (Seymour et al., 2003). In summary, reading acquisition studies should use different metrics like phones, syllables, and words in a complementary manner in order to achieve a better understanding of how students’ grades and text characteristics interact in determining their reading rate.

In light of the need for further research to understand how reading velocity evolves across different genres throughout primary school education, particularly in Spanish speaking students, and to explore how different velocity measurements behave in this process, the present study had two objectives. First, we pretended to characterize the development of reading rate through school grades. We focused on third-, fifth-, and sixth-grade students in order to generate additional normative data on the elocutionary and articulatory reading rates in Latin American Spanish. Second, we wanted to examine how reading rate develops across text genres. We focused on expository (informational) and narrative texts, and delved into how students in different grades use reading pace in dealing with these texts. Moreover, we wanted to contrast the results obtained through different velocity metrics —word rate, syllable rate, and phone rate— in order to learn whether a specific metric might be more sensitive than others at manifesting the effect of text genres on reading rates.

Methods

Subjects

The participants were 90 primary school students, who were divided equally into three different grade groups: third, fifth, and sixth grade. They were 9.13 ($SD = 0.28$), 11.21 ($SD = 0.51$), and 12.13 ($SD = 0.39$) years old, respectively. All were from lower-middle-class families and were pupils at seven schools in different areas of Montevideo city. Uruguayan Spanish was their first language. None of the participants showed deficiency in isolated written word recognition efficiency, measured by the ‘*Test de eficacia lectora*’, validated in Uruguay (Cuadro et al., 2009): third-, fifth-, and sixth-graders scored 31.39 ($SD = 10.27$), 51.79 ($SD = 7.16$), and 56.67 ($SD = 8.05$), respectively. They all were considered as “good” or “excellent” readers in their respective grades by their class teachers. They neither had any reported speech and language disorder nor any auditory, visual, or cognitive difficulty that could create problems in reading written texts aloud.

Materials

Two texts were used to obtain reading speech samples from each participant: (i) an expository text entitled “*Los árboles*” (The Trees), and (ii) a narrative text called “*El jardín del gigante*” (The Giant’s Garden). Both were designed to minimize the number of words starting with unvoiced plosive, and affricate phonemes /p t k tʃ/—speech sounds that acoustically involve an initial phase of silence as a product of articulatory occlusion—in order to facilitate the detection of a clear prosodic boundary marked by pauses and to enable the calculation of speech articulation rate. Only two words in the expository text and three in the narrative text were started with unvoiced plosive and affricate consonants.

The expository text was more complex than the narrative one in terms of lexico-grammar structures. This information density of the first text, as shown in Table 1, was symbolically reflected in its longer sentences and words, more complex syllabic structures, higher lexical density (type-token ratio), and lower readability score (Fernández-Huerta, 1959) than the other text. Moreover, Spanish Coh-Metrix analysis (Quispesaravia et al., 2016) suggested that the expository text had a higher proportion of nouns (275.73 vs. 229.72 per 1000 words), and adjectives (77.20 vs. 50.67), and a lower proportion of pronouns (22.05 vs. 33.78), verbs (147.05 vs. 216.21), and adverbs (18.38 vs. 87.83) than the narrative text. The noun phrases in the expository were more complex than in the narrative text (modifiers per noun phrase, 0.82 vs. 0.68). However, the expository text contained a higher number of discourse connectors (77.20 vs. 70.94 per 1000 words) than the narrative text, and its degree of referential cohesion was also greater in terms of the average number of overlaps of nouns (0.27 vs. 0.23), content words (0.14 vs. 0.11), and arguments (0.31 vs. 0.25) across sentences. Finally, it should also be noted that the narrative text included a diverse range of speech acts, such as assertive, interrogative, directive, and exclamatory sentences. In contrast, the expository text exclusively employed assertive speech acts within its utterances.

Table 1 Lexico-grammar characteristics of the expository and narrative texts used to collect reading speech samples in this study

Text	NW	WPU	SPW	LPS	TTR	Readability
Expository	266	12.67	2.01	2.40	55.28%	73.32 (somewhat easy)
Narrative	290	7.25	1.96	2.28	46.13%	82.03 (easy)

Note. NW = Number of words; WPU = Words per utterance; SPW = Syllables per word; LPS = Letters per syllable; TTR = Type-token ratio; Readability measured by Fernández-Huerta scale.

Procedure

The students were evaluated in the last quarter of the schooling year. The task of the subjects was to read aloud two texts: expository and narrative. The texts were presented on paper in 12-point Times New Roman font with 1.5 interline spacing. Each participant read individually in a quiet room in the school. Reading samples were recorded using a unidirectional SHURE PG 48 microphone and Audacity program (Audacity Team, 2021) at a sampling frequency of 48 kHz on a laptop computer. The subjects were instructed to read the texts aloud as they normally read in the classroom when asked by teachers. The sequence of presentation of the two texts was counterbalanced among the participants. Before reading the target texts, they read another text in order to become habituated to the task and recording settings. Apart from the reading task, they completed a brief questionnaire providing demographic, social, health, education, and linguistic information. The whole data collection process took approximately 25 minutes per subject.

Ethical Considerations

All of the schools and the parents of the participants gave their informed consent for inclusion before the children participated in this study. Moreover, all of the children gave their informed assent before the recording session began. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of the Catholic University of Uruguay.

Acoustic Analysis

The speech samples were processed using Praat (Boersma & Weenink, 2023). Transcription was performed semi-automatically in several steps. First, a broad alignment was carried out using the EasyAlign plugin (Goldman & Schwab, 2011), based on the original texts read by the participants. Second, a team of trained volunteers verified and corrected these transcriptions—i.e., textgrid objects in Praat—by listening to the corresponding audio; they also segmented the audio transcription into smaller pause groups. Third, the EasyAlign plugin was used again to perform alignment of words, syllables, and phone levels. Fourth, the same team of volunteers checked and manually corrected the boundaries of all pause groups and the containing words. Fifth, two expert phoneticians performed pause group-wise revision of all the transcribed speech samples, focusing on pauses and their boundaries; the confused cases of boundary placement were resolved by mutual discussion among them. Finally, an ad hoc script in Praat was used to determine the correct and incorrect words presented in the transcription of the expository and narrative texts of each subject; this was then verified and corrected manually by the phoneticians.

A set of different reading velocity measurements was performed using ad hoc scripts in Praat. First, four elocutionary rate metrics were calculated based on the overall speech time, i.e., the total time used by the subject to read a text: phones per second (PPS), syllables per second (SPS), words correct per minute (WCPM), and words and word-like items per minute (WPM)—the gross word-like elements have been considered in this measurement without taking into account their correct or incorrect status. Then, another three articulatory rate metrics were measured based on the articulatory time, i.e., the duration of those pause groups that were more than three syllables long and contained no reading errors: phones per second (PPS), syllables per second (SPS), and words correct per minute (WCPM).

Data Analysis

As our research objective was to verify whether the effect of the independent variables like school grade and text type or their interaction could behave differently with velocity metrics, we preferred to conduct a separate analysis of variance (ANOVA) for each of the velocity units. Data of all the velocity metrics were analyzed separately, using R (R Core Team, 2020), with repeated measures ANOVA: velocity metric ~ group (3) + text (2) + group × text. Shapiro–Wilk normality tests showed that there was no significant departure from normality, and the data followed a normal distribution ($p > 0.05$). The equality of variance assumption was also met for each ANOVA model, verified by Levene’s test ($p > 0.05$). For the determination of statistical significance, the alpha level was assumed to be 0.05. Post hoc analysis was performed with Tukey’s p -value adjustment for all ANOVA models. Moreover, the effect size Cohen’s d was calculated for each comparison.

Results

Table 2 presents the descriptive statistics of different metrics of articulatory and elocutionary rates shown by third-, fifth-, and sixth-grade primary school students in reading the narrative and expository texts: phones per second (PPS), syllables per second (SPS), words and word-like items per minute (WPM), words correct per minute (WCPM). Table 3 shows a summary of a series of analyses of variance with repeated measures corresponding to all the speech velocity metrics used in this study. The results revealed a significant main effect of group and text type in all metrics, and the

interaction between these two factors was found to be statistically significant in all units except in elocutionary word rate (WPM and WCPM). These findings indicate that the groups of students could use speed differently in reading the two texts, but the nature of these variations was captured differently depending on the measurement metrics. Effect sizes showed that this relationship among the two variables was captured the best with the phone-based unit (PPS), both in articulatory and elocutionary rate measurements.

Table 2 Descriptive statistics of reading rate of Spanish-speaking primary school children in expository and narrative texts.

Text	Group	Articulatory reading rate			Elocutionary reading rate			
		PPS	SPS	WCPM	PPS	SPS	WPM	WCPM
Expository	3 rd	11.05	4.69	138.19	7.90	3.36	102.44	91.60
		(1.50)	(0.63)	(22.26)	(1.67)	(0.71)	(21.93)	(21.34)
	5 th	14.41	6.11	186.39	10.99	4.68	141.59	131.19
		(1.64)	(0.68)	(22.11)	(1.54)	(0.64)	(19.50)	(21.28)
	6 th	15.00	6.35	193.69	11.58	4.91	147.86	139.85
		(1.34)	(0.55)	(17.22)	(1.50)	(0.63)	(18.10)	(20.94)
Narrative	3 rd	11.14	5.01	152.41	7.92	3.53	110.76	100.93
		(1.31)	(0.59)	(19.61)	(1.43)	(0.64)	(19.64)	(19.16)
	5 th	14.08	6.31	193.82	10.57	4.68	146.40	137.41
		(1.67)	(0.75)	(22.12)	(1.37)	(0.61)	(18.71)	(19.07)
	6 th	14.67	6.58	202.01	11.06	4.90	152.95	145.08
		(1.25)	(0.55)	(17.39)	(1.30)	(0.57)	(17.95)	(18.21)

Note. Means and standard deviations (in parenthesis) are presented. 3rd = third grade; 5th = fifth grade; 6th = sixth grade. PPS = Phones per second; SPS = Syllables per second; WPM = Words and word-like items per minute; WCPM = Words correct per minute.

Table 3 Results of repeated measures ANOVA.

	Articulatory reading rate			Elocutionary reading rate			
	PPS	SPS	WCPM	PPS	SPS	WPM	WCPM
Group	58.73 ** (0.57)	59.17 ** (0.58)	61.55 ** (0.59)	47.83 ** (0.52)	47.39 ** (0.52)	46.54 ** (0.52)	47.65 ** (0.52)
Text	12.51 ** (0.13)	112.96 ** (0.56)	131.75 ** (0.60)	25.42 ** (0.23)	4.99 * (0.05)	60.67 ** (0.41)	57.39 ** (0.40)
Group × Text	6.58 ** (0.13)	2.53 (0.05)	5.99 ** (0.12)	8.08 ** (0.16)	5.28 ** (0.11)	2.09 (0.05)	1.83 (0.04)

Note. F-value and eta square (η^2) (in parenthesis) are presented regarding to the main effects, and interactions of Group and Text type on different articulatory and elocutionary reading velocity metrics. PPS = Phones per second; SPS = Syllables per second; WPM = Words and word-like items per minute; WCPM = Words correct per minute. The degrees of freedom (DF) were the following: Group (2, 87), Text (1, 87), and Group × Text (2, 87). * $p < .05$ and ** $p < .01$.

Post hoc analyses were performed, with Tukey's p -value adjustment, separately for all ANOVA models. Table 4 presents the effect size of different comparisons, and cells with asterisks indicate that the corresponding contrasts were proven to be statistically significant according to the post hoc analysis.

The results showed that in both expository and narrative texts, third-grade students' articulatory and elocutionary reading rates were significantly lower than fifth- and sixth-graders in all measurement units. A large effect size (Cohen's $d = -1.8$ to -2.1) was observed between third- and fifth-graders, whereas it was even larger ($d = -2.2$ to -2.8) between third- and sixth-graders. Though descriptive statistics indicated that sixth-graders read faster than their fifth-grade counterparts, this difference was not statistically significant in any of the velocity metrics. However, a small effect size ($d = -0.3$ to -0.4) was found consistently among them in all the velocity metrics for the narrative and expository texts.

Table 4 Results of Post-hoc analysis.

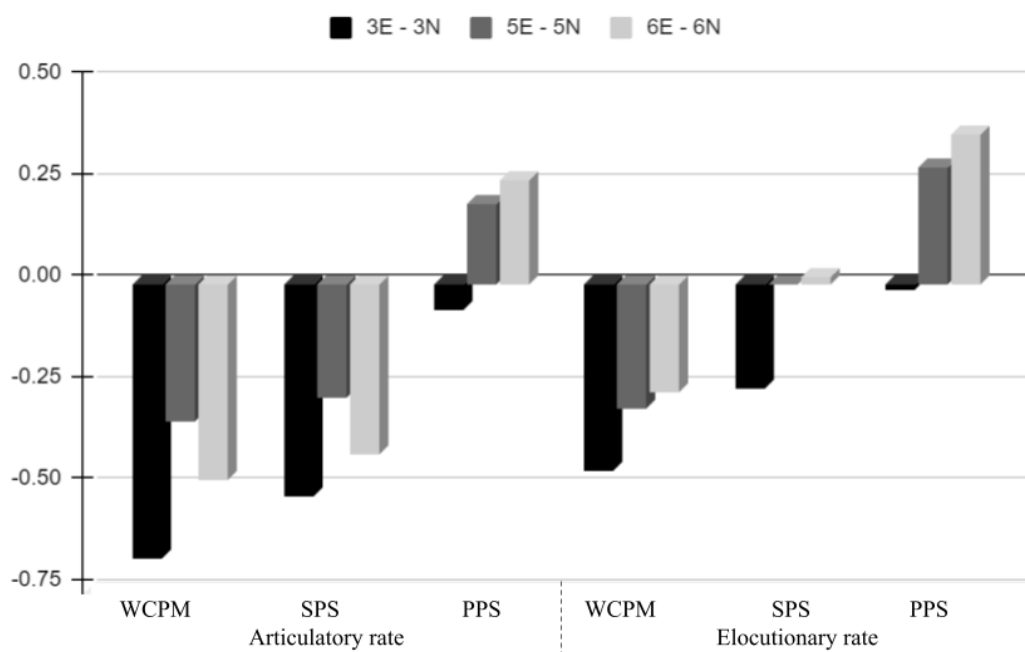
Contrasts	PPS		SPS		WCPM		WPM
	AR	ER	AR	ER	AR	ER	ER
3E-5E	-2.13 **	-1.92 **	-2.16 **	-1.95 **	-2.17 **	-1.85 **	-1.88 **
3N-5N	-1.95 **	-1.89 **	-1.92 **	-1.83 **	-1.98 **	-1.90 **	-1.85 **
3E-6E	-2.77 **	-2.31 **	-2.80 **	-2.30 **	-2.78 **	-2.28 **	-2.25 **
3N-6N	-2.75 **	-2.29 **	-2.75 **	-2.26 **	-2.67 **	-2.36 **	-2.24 **
5E-6E	-0.39	-0.38	-0.38	-0.36	-0.36	-0.41	-0.33
5N-6N	-0.39	-0.36	-0.41	-0.37	-0.41	-0.41	-0.35
3E-3N	-0.06	-0.01	-0.52 **	-0.25 **	-0.67 *	-0.46 **	-0.39 **
5E-5N	0.19 **	0.28 **	-0.27 **	0	-0.33 **	-0.30 **	-0.25 **

6E-6N 0.25 ** 0.37 ** -0.41 ** 0.01 -0.48 ** -0.26 * -0.28 **

Note. Effect size Cohen's *d* is presented corresponding to each contrast. This standardized mean facilitates comparisons among different velocity metrics. N = Narrative text; E = Expository text. 3 = third grade; 5 = fifth grade; 6 = sixth grade. PPS = Phones per second; SPS = Syllables per second; WPM = Words and word-like items per minute; WCPM = Words correct per minute. ** $p < .01$ and * $p < .05$.

The intra-group variations of reading rates across the text types revealed somewhat conflicting tendencies in different measurement units (see Figure 1). In the first place, all three groups read the expository text with a significantly lower word rate (WCPM and WPM) than the narrative text; the same tendency was manifested in articulatory and elocutionary reading velocity. Effect sizes suggest that third-grade students ($d = -0.4$ to -0.6) made a relatively higher shift in word rate across the texts than the other two groups ($d = -0.2$ to -0.4).

Fig. 1. Magnitude of change (effect size: Cohen's *d*) in articulatory and elocutionary reading rates of expository text (E) in reference to the narrative text (N) among third (3)-, fifth (5)- and sixth (6)-grade primary school students. PPS = Phones per second; SPS = Syllables per second; WCPM = Words correct per minute.



In the second place, syllable rates (SPS) demonstrated different tendencies in articulatory and elocutionary measurements. On the one hand, each of the three groups showed a reduced articulatory syllable rate when reading the expository text compared to the narrative text. Notably, the effect size of this syllable rate variation was medium in third-grade students, and small in fifth- and sixth-grade students. On the other hand, only third-grade students showed a significantly lower elocutionary syllable rate in reading the expository text compared to the narrative one, whereas the other two groups used a similar elocutionary syllable rate across the texts. In fact, fifth- and sixth-grade students indicated no effect, whereas third-graders demonstrated a small effect size in the variation in elocutionary syllable rate across the texts.

Finally, phone rate (PPS) analysis showed different tendencies among the three groups that were consistent between articulatory and elocutionary velocity measurements. Though descriptive statistics indicated that third-grade students read the expository text with a lower phone rate (PPS) than the narrative text, these differences were not statistically significant. An opposite tendency was observed among fifth- and sixth-graders. Both groups read the expository text with a significantly faster phone rate than the narrative text. In both cases, small effect sizes were manifested; however, the magnitudes of differences were consistently higher in sixth-graders than in fifth-graders.

Discussion

The aim of the present study was to investigate how reading rate develops across different grade levels and text genres in Spanish-speaking primary school children. We transcribed reading samples based on the acoustic images of speech sound and measured reading rate from 90 Spanish-speaking students from the third, fifth, and sixth grades. We reported both the elocutionary and articulatory reading rate for narrative and expository texts. Most of the previous studies typically used word base units like words (correct) per minute to measure reading rate, but we rather measured reading speed using linguistic constructs of different sizes like word, syllable, and phone in order to examine the effect of text type on reading rate throughout primary school. Now, we proceed on to the discussion of our findings.

Reading Rate across Grade Levels

The first purpose of this study was to evaluate how readers' schooling level affects reading velocity. We found that readers' grades accounted for a large proportion of the variance in reading rate data. On average, older students read faster than younger ones, i.e., students in higher grades showed increased reading articulatory and elocutionary rates than those in lower grades, both in terms of the narrative and expository texts. However, the results of this study showed that in both texts, the magnitude of change in reading speed between third- and fifth-graders was larger than between fifth- and sixth-graders. Although the differences in reading speed between fifth and sixth-graders were not statistically significant, the data consistently showed a difference between these two groups. It is likely that most students already have a relatively stable level in their reading speed by the end of primary school and that their progress in this aspect is slower compared to previous grades. Hasbrouck and Tindal (2017) also reported this kind of relatively similar reading speed, i.e., words correct per minute, between fifth- and sixth-grade English-speaking students. Thus, students' reading rate progresses faster during the early years of primary school and it becomes slower in the later years. However, compared to the Spanish benchmarks established by Salceda et al. (2020), our Uruguayan students at all grade levels showed a relatively higher word rate than their counterparts from Spain and other Latin American countries. This relatively higher reading pace among our Uruguayan students may be attributed to the fact that they were all proficient readers, as evidenced by their reading efficiency scores by TECLE (Cuadro et al., 2009) and their teachers' evaluations in their respective grades. Now, we focus on how these proficient readers used their reading rate across different text genres.

Reading Rate across Text Genres

The second purpose of this study was to examine how text genre—narrative and expository—affects reading articulatory and elocutionary rate. Our findings suggest that text type accounted for a great portion of the variance in reading rate data. However, the effect of texts on reading pace is not straightforward. It could vary according to students' schooling levels, and the direction of this variation could also differ according to the metrics of velocity measurement (see Figure 1). These findings are in line with previous studies (Coke, 1974; Miller & Coleman, 1971–1972) that also found contradictory results when simultaneously using different linguistic units to compare reading rate among various texts. Therefore, word rate, syllable rate, and phone rate may behave differently and

we need to examine them separately to better understand the effect of text genres on reading velocity across different school grades.

Word Rate across Text Genres

Reading development studies typically report velocity results measured in word units like WPM and WCPM. According to these word rate metrics, the results of the present study suggest that students, independent of their schooling grade, read the expository text at a relatively slower pace than the narrative text; the same tendency was observed both in the elocutionary and articulatory reading rate measurements (see Figure 1). These findings are in concordance with previous studies that have used word rate as a measure of reading velocity in order to understand the effect of text genre and complexity (Brysbaert, 2019; Álvarez-Cañizo et al., 2020; Paige et al., 2015) and concluded that readers slow down their word rate as the texts are less narrative (Graesser et al., 1980). In fact, this reduction in reading pace, according to Barth et al. (2014), can be considered as a strategic choice that is made only by efficient readers and not by struggling ones, in order to cope with the information density of the complex expository text. However, the degree of shift that the students make among the texts is not constant, but this reduces as they advance through school (Carver, 1983).

Syllable Rate across Text Genres

As syllables are smaller than words, they represent a more precise unit of analysis of oral reading speed (SPS). Nevertheless, syllable rate data did not present coherent results as word rate metrics, and they showed rather inconsistent trends in elocutionary and articulatory reading rates (see Figure 1). As for the articulatory rate, all three groups of students maintained the same tendency in syllable rate as in word rate; they showed a slower reading rate in terms of the expository text than in the narrative one. As for elocutionary syllable rate, the three groups behaved heterogeneously: third-grade students read the expository text slower than the narrative text, while the other two groups read them at the same pace. Previous studies have demonstrated that high-school and undergraduate students maintain a fixed elocutionary syllable rate across texts of different difficulties (Coke, 1974; Miller & Coleman, 1971–1972). In this sense, our results suggest that the advanced primary school students, like fifth- and sixth-graders, might behave similarly to secondary and tertiary students when reading different texts at the same syllable rate, independent of their complexity. On the contrary, less advanced primary school students like third-graders behave in a different way; as they are yet to be sufficiently good readers, text difficulty negatively affects their syllable reading rate. In summary, the current study suggests that the phenomenon of reading at constant syllable rate across texts is characteristic of advanced readers and it would appear only in elocutionary rate measurement, and not in articulatory measurement.

Phone Rate across Text Genres

As phonemes are the smallest phonological construct and accurately capture the motor control of the decoding process, the present study considered them to be the most accurate unit for measuring the speech production rate when reading. In this study, in contrast to the syllable rate metrics, we found congruent results for articulatory and elocutionary phonetic reading rates: third-graders read expository and narrative texts at a similar phone rate, while fifth- and sixth-graders read expository text faster than narrative text. These results not only differ from those of previous studies, but also present a very different scenario from the word and syllable rate analysis (see Figure 1). Previous studies using letters or mean-length word units have shown that reading speed remains constant across texts of varying complexity, from first-grade texts to technical prose (Carver, 1983; Miller and Coleman, 1971–1972). In contrast, the present study suggests that students may vary the way they use phone rate in reading texts of varying genres throughout elementary school. Only beginner readers, like third-grade students, read at a constant phone rate, while advanced readers, like fifth- and sixth-graders, shift their phone rate, as articulatory and elocutionary word rate and elocutionary

syllable rate, across different text genres. However, these advanced learners, according to phone rate, do not slow down their pace, as indicated by other metrics, but they rather speed it up when reading a complex expository text in comparison with relatively simple narrative text. These phone-rate findings provide a rather novel perspective in terms of reading acquisition literature.

Explanation of Fixed and Variable Phone Rate across Text Genres

The faster reading of expository text compared to narrative text by advanced-grade readers, as indicated by phone-based metrics, can be attributed to several interrelated factors. These include the genre's nature, text complexity, and cognitive strategies employed by the readers. Firstly, the distinctive attributes of narrative text are related to a more subjectively engaging style of meaning construction and the incorporation of elements like dialogue, vivid descriptions, and a diverse range of speech acts, such as assertive, interrogative, directive, and exclamatory sentences (see Section 2.2) (Labov & Waletzky, 1997; Altikriti, 2011). In this sense, readers need to immerse themselves subjectively in the narrative word and this could, in turn, slow down the reading pace. In contrast, expository texts tend to present factual information in a more straightforward manner, using predominantly assertive sentences and containing greater degree of referential cohesion (noun, content words, and argument overlap across sentences) and a higher number of discourse connectors (see Section 2.2) (McNamara et al., 2012; Graesser et al., 2003). This enables the readers to anticipate meaning and speed up their reading rate in the expository text. Thus, each text genre may have its own pace as a distinctive marker; thus, narrative, and expository texts would require the readers to use time in a very different way (Stamboltzis & Pumfrey, 2000; Zwaan, 1994). Beginner readers, like third-grade students, may lack the proper awareness regarding text genres and this induces them to use a similar phone rate across texts. In contrast, advanced readers, like fifth- and sixth-graders, possess better awareness concerning text types and they put a rather adequate shade of reading pace on each of them.

Secondly, the complexity of the text itself may also be responsible, at least partially, for the shifting phone rate by advanced readers. In accordance with the Menzerath–Altmann law, the length of a linguistic construct is inversely related to the length of its individual components (Altmann, 1980; Menzerath, 1954). Studies in spoken language have revealed that the duration of speech sounds tends to shorten, producing increased speech velocity as speakers progress through long phrases, pausal groups, sense units, or utterances (Ladd, 1986; Fónagy & Magdics, 1960; Schwab & Avanzi, 2015; Schwab, 2015; Rothe-Neves et al., 2018). In reading, the sentences, clauses, phrases, words, syllables, and phonemes are linguistics constructs, and each of them takes the subsequent one as its component; as phonemes are the smallest components, the complexity of all other constructs may cascade over their duration. Since expository text generally contains longer and/or more complex linguistic constructs compared to narrative text, proficient readers tend to shorten the length of phonemes more while reading the expository text, and thus they read it at a faster phone rate.

Finally, the shortening of the complex linguistic constructs could be part of the cognitive strategy that proficient readers use to grasp adequate sense units and hold enough detail in their short-term memory to reconstruct, in a cohesive manner, the meaning of the relatively longer stretches of the text (Köhler, 1989; Grégoire, 1899; Rothe-Neves et al., 2018). However, early level primary students, like third-graders, have yet to develop this strategy. As they are beginner readers, they may possess little genre awareness and they are vulnerable to text complexity (Duke & Carlisle, 2011; Best et al., 2006). Although our students had good decoding skills according to their corresponding school year, this competence may not become sufficiently automatized in order to allow them to pay attention to text characteristics (Ramírez-Benítez et al., 2019; Barth et al., 2014).

Reading Prosody Includes Velocity

By conceptualizing speed as a temporal variable, particularly when quantified with phones per second, we have observed that proficient students tend to accelerate their reading when confronted with a more complex genre. This finding highlights the role of speed as a prosodic variable that underpins the reading process. Numerous researchers have demonstrated the significance of various prosodic variables for scaffolding reading comprehension. For example, Álvarez-Cañizo et al. (2020) observed that students tend to employ a more pronounced prosody when reading expository text, characterized by an increased frequency and duration of pauses, along with greater pitch variations. Additionally, Benjamin and Schwanenflugel (2010) reported that reading prosody does not diminish but intensifies when students deal with challenging texts. We believe that students not only rely on intonation and pauses, as demonstrated by previous studies, but also on reading velocity in order to hold an utterance in working memory until a more extensive semantic analysis can be performed (Hossain et al., 2025; Koriati et al., 2002). Compressing the duration of speech sounds, i.e., increased reading rate, is useful, especially when reading texts with long complex sentences and difficult vocabulary, which are typical in expository text in comparison with the narrative text. So, each text genre has a particular way of constructing their information hierarchy and this will be reflected in the different uses of both temporal and melodic variables in reading (Kuhn et al., 2010).

The present study invites us to move beyond the traditional notion of reading rate as a part of reading fluency and to view it as a prosodic variable that helps readers with temporal organization of the texts. In fact, this perspective is coherent with the linguistic view of prosody that involves both melodic and temporal variables like lexical stress, intonation, pauses, rhythm, and speech rate itself (Cutler et al., 1997; Kowal et al., 1983; Nocetti et al., 2019). From this perspective, readers must employ time, along with other prosodic elements, in a creative manner in order to navigate the diverse phonographic, lexical, semantic, and discursive structures present in texts in order to access meaning and reflect on it. Although it is essential to acknowledge the usefulness of the traditional WPM or WCPM metrics as a measurement of rate based on reading a list of words in the early literacy development, this reading skill should be better conceptualized as ‘word recognition speed’. In addition, the term ‘reading speed’ should be reserved for addressing the use of time in reading authentic texts that involve connected speech.

Methodological Issues

Reading research typically reports the elocutionary reading rate (Brysbaert, 2019; Salceda et al., 2020) and there have been few studies that have informed the articulatory reading rate (Franke et al., 2021). The current study has drawn upon both types of speech velocity in reading and found that they might not always produce similar results; congruent findings within word metrics and phone metrics were observed, but not in syllable metrics. This difference is perhaps due to the methods used by the articulatory and elocutionary rates in measuring reading velocity. The articulatory rate only considers the fluent parts of the reading sample, while the elocutionary rate takes into account the entire text, including disfluent marks and pauses (Franke et al., 2021; Schwab, 2015). Therefore, the articulatory and elocutionary rates should not be seen as equivalent, as they reflect slightly different levels of processing written language. On the one hand, the articulatory rate indicates the efficiency of neuromotor control over pronunciation or how efficiently one pronounces written texts. On the other hand, the elocutionary rate shows how fluent someone sounds when reading. This involves not only articulating individual phonological units, but also grouping them with pauses and managing disfluent markers. In the current study, elocutionary rate, particularly in phone metrics, captured the effect of text genres slightly better than the articulatory rate. Future studies should further investigate the behaviors of the articulatory and elocutionary rates to gain a comprehensive understanding of reading speed across texts throughout school.

As the present study observed contradictory results among reading rates measured by different linguistic units, it is suggested that reading acquisition studies should pay attention to carefully choosing an adequate metric for measuring reading pace (Carver, 1983; Coke, 1974; Miller & Coleman, 1971–1972). Word, syllable, and phone rates all function well in terms of showing progress in reading rate across school grades. However, only phone rate is capable of adequately showing, both in articulatory and elocutionary measurement, how students vary their reading pace among text genres. In other words, each text genre may have its own way of using sentences, words, and syllables, and we need to focus on rather smaller units like phones, that are less sensitive to text types, in order to understand the effect of text genres on reading pace. The phone-rate findings presented in this study offer a fresh perspective on reading acquisition literacy, although this phenomenon has been previously demonstrated in other areas, especially, in oral fluency studies involving subjects with atypical speech like clustering and stuttering. For example, Hall et al. (1999) demonstrated that significant group differences between children who stutter and those with typical fluency were evident not in terms of syllable rate, but rather in the context of phone rate. Moreover, this fine-grained unit of reading rate could offer other benefits within literacy studies, especially in terms of understanding reading rate across different languages and tasks.

Practical Implications

The present study draws on the acquisition of reading fluency in terms of reading rate across text genres in primary school. The findings of this research could benefit the reading acquisition process in several ways: instructional practices, curriculum development, and assessment strategies, ultimately enhancing students' reading skills and fostering a deeper appreciation for diverse genres of text. First, educators can consider the impact of text genres in assessing students' reading rate. This approach would provide a more comprehensive reflection of their reading abilities and support intervention when necessary. Reading assessment batteries could also measure the rate in units smaller than words, especially with phone-based metrics. This would facilitate better precision and comparability across texts and languages. Secondly, the reading curriculum should ensure genre diversity by the inclusion of a wide range of genres, like narrative, expository, argumentative, and poetry texts, so that students can have access to different types of culturally situated meaning (Aravena Reyes & Quiroga Moya, 2023; Cocio Seguel et al., 2024). Each text genre has its particular way of structuring meaning and using vocabulary and grammatical resources, and students need to develop specific strategies to deal with them (Mar et al., 2021; Graesser et al., 2003; Zwaan, 1994). Educators could adopt a genre-based didactic approach and tailor their teaching methods and materials according to the characteristics of a specific group in order to provide appropriate scaffolding and support the enhancement of reading skills effectively (Johns, 2008). Finally, teachers can train students in using a flexible reading rate, along with other prosodic elements like intonation and pauses, so that they can engage better with the specific text and reconstruct its meaning.

Limitations and Future Research

The present study, by measuring reading rate with different complementary units, presents a fresh insight on how students develop their reading rate across text genres throughout primary school. However, there are several limitations that need to be acknowledged. Firstly, the current investigation employed a relatively small sample size from a specific region and language, i.e., Uruguayan Spanish-speaking students. Future studies should aim for larger and more diverse samples across different ages and dialects of Spanish and other languages in order to increase the external validity of the results. Secondly, this research evaluated reading rate in subjects who were neurotypical and good readers. Future research could explore how reading rate is used across texts by children with reading disorders like dyslexia, with speech disorders like stuttering or developmental language disorders, or who are struggling readers. In addition, future studies could explore how temporal variables relate to other melodic variables in order to provide proper cognitive scaffolding when dealing with different text genres (Hossain et al., 2025). Finally, the present study produced an acoustic-signal-based

phonetic transcription of reading samples in order to evaluate reading rates across grades and text genres. Although this type of meticulous transcription facilitated a novel perspective regarding the development of reading rate within reading acquisition studies, it was a laborious and time-consuming process. Therefore, it would be interesting to incorporate artificial intelligence technologies in future research in order to explore their effectiveness on reading rate assessment across texts and school grades.

Conclusions

The present study reported the development of reading rate among Spanish-speaking students across text types throughout primary school. The findings suggest that in both the narrative and the expository texts, students become faster as they advance in school, but their progress becomes slower in the later years of the school. We also observed that word rate, syllable rate, and phone rate behave differently in terms of showing the effect of text genres on reading velocity across different school grades. On the one hand, in early primary students like third-graders, both word rate and syllable rate slow down, and phone rate remains constant when reading the expository text in comparison with the narrative text. On the other hand, in advanced primary students like fifth- and sixth-graders, word rate slows down, syllable rate decreases (articulatory reading rate) or remains constant (elocutionary reading rate) depending on type of velocity measurement, and phone rate accelerates when reading the expository text in comparison with the narrative text. Phones, being the smallest units of speech analysis and being less affected by language typology, text characteristics, and other linguistic factors, are the best candidate to draw on the effect of text genre. According to this unit, reading rate, depending on readers' efficiency level, can be fixed or flexible across texts of varying genre and complexity. Students use a relatively similar reading pace across different text types in the early years of primary education. Meanwhile, they would make use of a rather flexible reading rate in reading different text genres in the later years of primary education. Thus, we conclude that efficient readers use time in a creative manner, along with other prosodic components like intonation and pauses, as demonstrated by previous studies. This strategic use of time helps them to engage properly with the text characteristics and provide adequate scaffolding for cognitive processing toward the reconstruction of meaning. In this sense, we believe that reading professionals should emphasize the development of reading fluency across a diversity of text genres through reading curriculum and assessment strategies. This approach would facilitate the exposure of learners to different forms of culturally situated meanings.

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