DOSSIÊ: PSICOLINGUÍSTICA E NEUROLINGUÍSTICA EM INTERFACES

A longitudinal investigation of connectedness and syntactic complexity in the written production of bilingual children during the COVID-19 pandemic

Uma investigação longitudinal sobre conectividade do pensamento e complexidade sintática na produção escrita de crianças bilíngues durante a pandemia de COVID-19

Cristiane Ely Lemke[1]
orcid.org/0000-0001-9095-4470
crisely02@gmail.com

Larissa da Silva Cury[1]
orcid.org/0000-0002-3184-8982
larissascury@gmail.com.

Janaína Weissheimer[2]
orcid.org/0000-0002-6318-4906
janaina.weissheimer@gmail.com.

Natália Bezerra Mota[3]
orcid.org/0000-0003-2802-2001
nataliamota@neuro.ufrn.br.

Ingrid Finger[1]
orcid.org/0000-0002-9779-8615
ingrid.finger@ufrgs.br.

ABSTRACT: The present study aimed at investigating, in a longitudinal way, connectedness and syntactic complexity in written narratives in Portuguese (L1) and English (L2) produced by 5th and 6th grade children enrolled in a bilingual school. For the evaluation of connectedness (thought organization), we used the computational tool *SpeechGraphs* (MOTA *et al.*, 2014, 2016, 2019); syntactic complexity was verified through the analysis of T-Units and the Subordination Index (HUNT, 1965). Children were asked to write narratives in both languages based on sequences of pictures twice, first in August 2020 and then in August 2021. The longitudinal analysis showed that children wrote more syntactically complex texts in Portuguese, their L1, in both phases of data collection. In addition, they also wrote more connected narratives (long-range recurrence – LSC) and more syntactically complex texts in Portuguese in 2021, in comparison to 2020. With respect to their L2, however, no significant growth was perceived in the connectedness or complexity scores, which could also be interpreted as an effect of the pandemic on the development of students' L2 writing, since children had significantly fewer opportunities to interact in English in online classes, which may have impacted their development of productive skills in their L2.

KEYWORDS: Bilingualism. Written production. Connectedness. Syntactic complexity. Graph analysis.

RESUMO: O presente estudo teve como objetivo investigar, de forma longitudinal, a conectividade e a complexidade sintática em narrativas escritas em português (L1) e inglês (L2) produzidas por crianças de 5ª e 6ª séries matriculadas em uma escola de currículo bilíngue. Para a avaliação da conectividade (organização do pensamento), foi utilizada a ferramenta computacional *SpeechGraphs* (MOTA *et al.*, 2014, 2016, 2019); a complexidade sintática foi verificada por meio de T-Units e do Índice de Subordinação (HUNT, 1965). As crianças escreveram narrativas em ambas as línguas baseadas em sequências de figuras em agosto de 2020 e em agosto de 2021. A análise revelou textos sintaticamente mais complexos em português, em ambas as fases de coleta de dados e narrativas mais conectadas e complexas em português em 2021, em comparação com 2020. Com relação à L2, no entanto, não foi percebido crescimento significativo na conectividade ou complexidade sintática em 2021, como esperado, o que também pode ser interpretado como um efeito da pandemia no desenvolvimento da escrita em L2, uma vez que as crianças tiveram significativamente menos oportunidades de interagir em inglês nas aulas online, o que pode ter impactado no desenvolvimento de habilidades produtivas em sua L2.

PALAVRAS-CHAVE: Bilinguismo. Produção escrita. Conectividade. Complexidade sintática. Análise de grafos.

[1] Federal University of Rio Grande do Sul, PPG Letras, LABICO, IENH, Porto Alegre, RS, Brazil.
[2] Brain Institute, Federal University of Rio Grande do Norte, CNPq, Natal, RN, Brazil.
[3] Institute of Psychiatry – IPUB/Propsam – Federal University of Rio de Janeiro (UFRJ), Rio de Janeiro, RJ, Brazil. Research department at Motrix Lab, Motrix, Rio de Janeiro, Rj, Brazil.

Introduction

Studies on the development of literacy skills in two languages – or biliteracy – involving speakers of L1 Portuguese and L2 English are still very scarce and incipient. Besides, the literature that often guides the work in bilingual schools in Brazil is based on studies carried out in other countries, which involve realities of schools and bilingual subjects that considerably differ from ours. Thus, it is imperative that Brazilian researchers focus more on the investigation of biliteracy development considering our context, in which children are educated in two prestigious languages, taking into account the fact that one of the languages is not present in the family routine and it is learned and practiced mainly in the school context.

Bilingual education contexts provide children with an opportunity to become bilingual through academic development. It is an experience that combines the development of linguistic skills as well as content learning. It is common knowledge that bilingual experiences influence language and cognition (BIALYSTOK, 2017) and the purpose of the present investigation was to find out more about the extent to which the experience of children with the same mother tongue, living in the same area, with a monolingual practice at home, but being educated in two languages at school, may affect their written production in both their L1 and L2.

Recent studies have demonstrated strong positive effects of bilingualism and early biliteracy instruction on children's linguistic and cognitive abilities in several aspects, such as students' cognitive development and academic success (BIALYSTOK, 2007; COLLINS *et al.*, 2014; DE GROOT, 2011; GENESEE *et al.*, 2006; LINDHOLM-LEARY, 2014, 2016, 2018), with a large number of publications suggesting the existence of a transfer of skills between languages in the development of literacy skills in two languages (for an example, see BIALYSTOK; MCBRIDE-CHANG; LUK, 2005).

There are at least two reasons why literacy development may be different for bilingual and monolingual children. The first is that bilingual children normally have distinct levels of proficiency in their two languages, due to the variability in their opportunities of interaction and development of oral skills. In this context, their previous oral skills in each of their two languages may affect their development of reading and writing skills differently in each of these languages. The second is that bilinguals transfer skills acquired from developing reading and writing in one language to reading and writing in the other and the relationship between the writing systems in the two languages determines the extent to which transfer of skills and knowledge may take place (ALVES; FINGER, 2023).

A greater understanding of how literacy development in two languages takes place and how it can be enhanced is still a major question of professionals who work with bilingual education. However, despite the small amount of research in the area, Sparrow, Butvilofsky and Escamilla *et al.* (2014), for example, argue that many advances have already been possible in the last two decades in terms of knowledge and discoveries that could influence pedagogical practices in the classroom.

Studies developed by the Literacy Squared group have been dominant in this area. Hopewell and Butvilofsky (2016), Soltero-González *et al.* (2016), Butvilofsky *et. al.* (2017), Sparrow *et al.* (2014) and Butvilofsky *et al.* (2021), for example, all argue for the importance of giving children the opportunity to develop literacy having their full linguistic repertoire at their disposal. This extensive body of research has been conducted with Spanish/English children, who live in the United States and are Heritage Spanish speakers. The authors are unanimous in saying that most students benefit from a biliteracy experience, which proves to be more effective in the context of those who are exposed to English mainly when they enter school.

The process of simultaneous reading and writing acquisition by bilingual speakers of languages with different scripts has also been investigated. One of these studies, conducted by Yaden and Tsai (2012), analyzed the development of writing in

Cristiane Ely Lemke · *et al.*

AlongitudinalinvestigationofconnectednessandsyntacticcomplexityinthewrittenproductionofbilingualchildrenduringtheCOVID-19pandemic

3/16

11 emerging Chinese/English bilinguals between 4 and 6 years of age who were in the initial literacy process. The results indicated that children transferred knowledge from one language to the other in an appropriate way, both in contexts in which the two languages, English and Chinese, have similar characteristics, as well as in situations in which the two languages present differences. In other words, there was no "confusion" in relation to the languages, despite the exposure to different scripts.

It is interesting to note that there is a more expressive number of studies on biliteracy in the United States and Europe, with studies in the rest of the world and especially in Brazil being scarcer, especially considering the educational scenario that is being formed in the country. The only two studies that we are aware of that compared the linguistic development of children in a bilingual schooling context are the ones by Finger, Brentano and Ruschel (2019) and by Lemke *et al.* (2021). Finger, Brentano and Ruschel (2019) investigated the levels of syntactic complexity from the T-Unit count (HUNT, 1965) in written texts in Portuguese and English produced by a group of second year elementary school children immersed in a bilingual curriculum school in the metropolitan area of Porto Alegre. In the analysis, the authors observed that children produced a greater number of words and T-Units in texts written in Portuguese, compared to texts written in English, possibly because Portuguese is the dominant language in the family and at school. In addition to this result, the analysis revealed a weak positive correlation between the number of words produced in Portuguese and English, as well as a moderate positive correlation in the production of T-Units considering the two languages. For the authors, these results demonstrate that the development of more complex strategies in the production of texts in Portuguese occurs in parallel with the development of syntactic complexity in texts written in English.

Lemke *et al.* (2021), on the other hand, investigated the effects of bilingualism and biliteracy on thought organization and syntactic complexity in

the written production in a group of fifty 11-year--old children (M = 10.7). Speakers of Portuguese as an L1, enrolled in 5th and 6th grades in a bilingual school in the south of Brazil, the students had been exposed to English at school for 10 hours a week for at least five years. The results from both analyses – graph analyses and T-Units – revealed an advantage for the L1 Portuguese written production, as expected, with children obtaining higher connectedness measures and a larger count of T-Units in their mother tongue. The results confirmed the more consistent development in the participants' dominant language, which is the one they use at home and in the community and also the one in which they had received most instruction. Interestingly, despite the predicted L1 advantage in written production, a direct relationship between connectedness measures and syntactic complexity in both languages was found. These results are interpreted as evidence that, as children advance in the development of more complex writing strategies in Portuguese, they seem to progress in their written production in English to the same extent.

In view of the significant empirical gap that characterizes the Brazilian educational context , in which there has been an enormous growth in the number of schools that offer bilingual curricula or programs in Brazil, accompanied by a huge lack of research that takes into consideration the specific reality of the country, the present study aimed at investigating in a longitudinal way, connectedness and syntactic complexity in written narratives in Portuguese (L1) and English (L2) produced by 5th and 6th grade children enrolled in a bilingual school. For the evaluation of connectedness (thought organization), we used the computational tool *SpeechGraphs* (MOTA *et al*., 2014, 2016, 2019), and syntactic complexity was verified through the analysis of T-Units and the Subordination Index (HUNT, 1965). In the next two sections, both approaches to analyzing written production will be detailed.

## 1 Graph analysis of written production

The *SpeechGraphs* computational tool (MOTA

et al., 2014, 2016; MOTA, 2023) has been widely used to analyze thought organization through oral and written reports. It was developed at the Instituto do Cérebro of the Federal University of Rio Grande do Norte and initially used to aid in the diagnosis of individuals with psychosis and other mental disorders. Although the software has been most widely used to analyze oral productions, it has more recently been adopted in the analysis of written reports, as we will see below.

According to Mota *et al.* (2019, p. 4), "a speech graph represents the sequential relationship of spoken words in a verbal report, with each word represented as a node, and the sequence between successive words represented as an edge". The software also calculates a series of attributes for each text file, including nodes and edges (N = nodes and E = edges), which are related to the number of elements, and links between them; short-range recurrences such as the repetitions of links between nodes and small cycles of nodes presented in the graphs, such as parallel edges (PE), repeated edges (RE), loops of one, two and three nodes (L1, L2 and L3); long-range recurrences or connectedness measures (the number of nodes in the LCC = largest connected component, and in the LSC = largest strongly connected component) and others. Figure 1 below shows examples of graphs that represent the written texts, in Portuguese and in English, of a student from our sample in 2020 and 2021.

Figure 1 – Graphs generated by *SpeechGraphs* based on the written production in Portuguese and English of the same student in 2020 and 2021

LSC L1 2020: 13.6

LSC L1 2021: 19.05

LSC L2 2020: 18.92

LSC L2 2021: 19.13
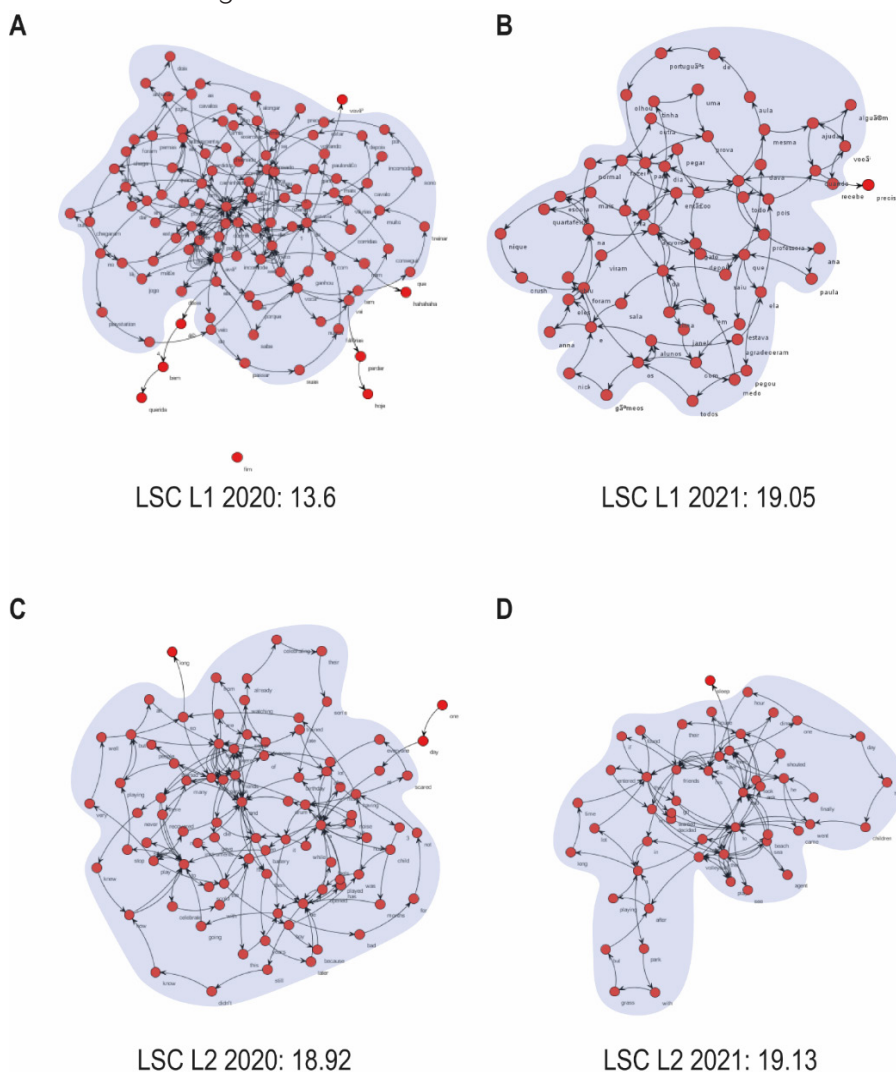
Source: Authors.

As a language analysis tool, *SpeechGraphs* has also been used in studies in other areas with typical individuals. Mota *et al.* (2016) longitudinally followed a group of second graders students from public schools in Brazil using graph theory to analyze student performance in oral narratives based on three affective images (one positive, one negative and one neutral). The more connectedness (long-range recurrences) and the fewer short-range recurrences, the better the performance on non-verbal IQ (ANGELINI *et al.*, 1999; RAVEN, 1936) and Theory of Mind abilities (ToM) (BARON-COHEN; LESLIE; FRITH, 1986). Also, connectedness was predictive of reading performances at the end of the year, tested by a standard national exam (Provinha Brasil)[4], independently from IQ and ToM performances.

Considering the previous results, the authors followed this investigation with the same participants in the following school year (third graders). Mota *et al.* (2019) investigated whether LSC (long-range recurrence) would be a good predictor for measures of short-term or working memory in different domains (verbal and visual-spatial memory abilities). Connectedness (LSC) was associated exclusively with verbal short-term memory performance (measured by a list of memorized pseudowords), pointing to a mechanism during the narrative planning linked to this marker: the storage verbal information with a variety of elements, liking these different elements into a single context, enabling the increased number of different words connected in this oral narrative.

Another important study used graph analysis to investigate connectedness patterns, but this time using written texts, not oral productions. Luz (2023) investigated the texts produced by 181 children, divided into groups of good readers, bad readers and dyslexics. The children were asked to write a story prompted by a comic strip. Based on these productions, children's texts were ranked according to the groups of readers: good, bad and dyslexic. The tool was efficient in these categorizations, establishing a relationship between the groups of readers and the writing samples they produced.

Leandro (2021) also innovated in relation to the use of *SpeechGraphs*, applying it to examine patterns in the oral production of two groups of non-native English speakers. The groups differed in terms of proficiency, being one of them formed by pre-intermediate level learners and the other by proficient bilinguals. Having analyzed the oral production of 68 volunteers, the author argues that graph analysis can be used as an alternative for the evaluation of production in the second language, as it correctly distinguished the participants' levels of proficiency.

In general, the studies mentioned above suggest that the *SpeechGraphs* tool can be effective for a computational analysis of language and, therefore, can be used in a way to better explain the performance and follow the development of children and adults. For this reason, it was selected to be used in the present study.

2 T-Units as linguistic markers of syntactic development

T-Unit is an expression coined by Kellog Hunt in 1965 that is still used today in the analysis of written and oral discourse, in both studies involving the participants' mother tongue as well as a second language. Hunt (1965, p. 20) defines a T-unit as "a main clause with all subordinate clauses attached to it". With the count of T-Units, it is possible to carry out a linguistic analysis on the complexity of texts, produced in the written modality or in the oral modality, once they are transcribed (LOBAN, 1976; O'DONNELL; GRIFFIN; NORRIS, 1967). T-Units were first designed for the study of first language (L1) performance, but they have also been widely used for decades for the investigation of second language (L2) development (GAIES, 1980). T-Units are one of the most popular syntactic complexity measure (MYLLÄRI, 2020; ORTEGA, 2003; WOLFE-QUINTERO; INA-

---

4   Provinha Brasil is a federal diagnostic assessment of literacy skills in Portuguese and in Mathematics taken by children enrolled in the second year of elementary school in public schools in Brazil. The exam takes place in the beginning and end of the school year to allow for the diagnosis and assessment of the evolution of student learning: http://provinhabrasil.inep.gov.br/provinhabrasil/#/.

GAKI; KIM, 1998).

The analysis of T-Units was adopted as a method of evaluating syntactic complexity in written texts produced in English and Portuguese by the participants of the present study. Subordination Index (SI), which is the result of the total number of clauses produced by the students divided by the number of T-Units (HUNT, 1965), was the measure of syntactic complexity that was analyzed.

In the next section, we detail the general and specific objectives and hypotheses of the study. We also present the methodology that was adopted, which followed a longitudinal design. We provide information about participants and recruitment, the instruments that were used, as well as the procedures for data collection and analysis.

3 Methods

The present study investigated, in a longitudinal way, connectedness (long-range recurrence – LSC) and syntactic complexity (Subordination Index – SI) in written narratives in Portuguese (L1) and English (L2) produced by 5th and 6th grade children enrolled in a bilingual schooling context in which they are exposed to 10 hours of classes in English per week in addition to the 20 hours of instruction in Portuguese. For the evaluation of connectedness (thought organization), the computational tool *SpeechGraphs* (MOTA *et al.*, 2014, 2016, 2019) was adopted. On the other hand, syntactic complexity was analyzed through the counting of clauses and T-Units (HUNT, 1965) to obtain the Subordination Index[5].

More specifically, the objective of this study was to verify whether connectedness (long-range recurrence – LSC) and syntactic complexity (Subordination Index – SI) would vary as a function of language (L1, L2) and year of data collection (2020, 2021). In the comparison of connectedness (LSC) in both languages over a year span, our hypotheses were that children would produce texts with higher LSC scores in Portuguese over English in both phases of data collection and that

their productions would demonstrate a growth in LSC scores in both languages in the narratives collected in 2021, in comparison to the texts written in 2020. On the other hand, in the analysis of the syntactic complexity scores (SI) in both languages over a year span, we also expected to find higher SI scores in the narratives written in Portuguese in both phases of data collection and a growth in SI scores in both languages in the written productions collected in 2021, second phase of data collection.

3.1 Participants

This study is part of a larger investigation that is reported in Lemke (2022). Here, we present the analysis of 21 children (16 female) enrolled in 5th grade in 2020 (*mean age*: 10.95 months, *SD*: .30) and in 6th grade in 2021(*mean age:* 11.96 months, *SD:*.30). They are enrolled in a private school, located in a large town in Rio Grande do Sul, Brazil, and students come from families with a good financial situation.

The students that took part in the study come from a very similar language background: they are all speakers of Portuguese from home, therefore Portuguese is considered their L1. Portuguese is also the language of the community and the language they most use at school, being therefore present in their daily and family lives. English is the language they learn at school when they enter kindergarten or first grade. It is not the only language they are exposed, though, since most of the classes (⅔ of school time) is conducted in the national and official language of the country: Portuguese.

English is introduced in the curriculum in kindergarten, being used ⅓ of the time. It is used in the classroom, but mainly with the teachers, not so much among the students, who tend to speak Portuguese when they can choose, especially in the playground and recess. The school offers a bilingual curriculum, with subjects being taught in the L2. Teachers work mainly with projects, integrating content and language, both in the

---

[5]   This research proposal was approved by the Ethics Committee of the Federal University of Rio Grande do Sul under protocol number 5.290.938.

students' L1 and L2. Students are not fluent in English in the first years of the curriculum, and it is usually when they are in the third grade that they start producing more English orally.

Students' L2 age of acquisition tends to be similar, except for those who enter school coming from other schools. In these situations, new students are offered extra classes in order to catch up with the group. Most of the kids have been in school since they were 4 years old and use English at school only, especially during classes. They have access to written materials in English in the classroom and in other areas of the school, as all the signs are written in both languages. The curriculum is also enriched in Science and Math, with a partnership with Cambridge Education, covering aspects and themes in English that go beyond the ones proposed by the Brazilian curriculum. Music, Physical Education, Programming, and Cooking classes are also part of the curriculum that is taught in English.

3.2 Instruments and procedures

In addition to the Informed Consent Term, signed by the parents, and the Assent Form, which expresses the child's agreement to participate in data collection, the study involved the application of two written production tasks, one in English and one in Portuguese, in each of the two moments of data collection: 2020 and 2021. The tasks consisted of writing a narrative based on sequences of pictures adapted from the preparatory material for the Cambridge exams (CAMBRIDGE ASSESSMENT, 2018). In the application of the task, half of the students first received the task in Portuguese and the other half in English. Two weeks later, they were then asked to write the narrative in the other language. The sequence of pictures of the Portuguese and English were the same, applied in a counterbalanced order (Appendix 1). The time allocated for each production corresponded to 40 minutes, a little less than a regular class period. Students were asked to write their texts using

Google Docs, shared with each of them through Google Classroom, at school, during online classes in 2020, and in their regular classes in 2021.

3.3 Data Analysis Procedures

In the analysis using *SpeechGraphs*, the graphs were plotted through images generated by the tool, representing connectedness measures found in the written texts produced by the participants. In addition, based on previous investigations, one specific attribute was analyzed: LSC (largest strongly connected component). LSC is considered a measure of long-range recurrence and reveals all the pairs of nodes that are linked and mutually reachable, considering the direction of the edges. In the present study, the number of nodes in the LSCs was calculated for each narrative separately in Portuguese and in English.

It is important to mention that there was a modification in the protocol in 2021, in comparison to 2020, even though in both moments of data collection, participants had the allocated time of one class period to do the activity. In 2020, there was a limitation in the minimum number of words that students were required to write (200 words), whereas in 2021 we decided not to set a word limit for their texts. The decision of not establishing a minimum number of words was taken in order to let students express their ideas more freely, instead of being concerned with counting words. However, since we felt the need to account for possible differences in the sizes of the narratives produced in 2020 and 2021, LSC was calculated using moving windows[6] of 30 words, to account for verbosity, following the procedure adopted in Mota *et al.* (2018).

Afterwards, the next step was the analysis of the texts of the written production tasks by counting T-Units and calculating the Subordination Index (SI). The index was calculated for the texts of each participant in both Portuguese and English. The analyses of the number of clauses and T-Units were performed by the first and

---

[6] "Each set of a fixed number of words, skipping an also fixed number of words to build the next graph, assuming a certain level of overlap between consecutive graphs. This 'sliding window' approach allows calculating the average graph attributes of a graph with a fixed number of words" (MOTA *et al.*, 2018, p. 88).

second authors[7]. The statistical analyses[8] were performed in *R Studio* (POSIT TEAM, 2022) version 2022.12.0.353.

For this longitudinal analysis, we ran linear mixed-effects models with by-participant random intercepts to verify if LSC and SI scores would vary as a function of language and year (respectively, Model 1 and Model 2). Both models were fit using lmer, a function in the R package lme4 (BATES *et al.*, 2015), and their p-values were calculated via the Satterthwaite degrees of freedom estimate present in the package lmerTest (KUZNETSOVA; BROCKHOFF; CHRISTENSEN, 2017). Visual exploratory analyses led us to further investigate if there was a significant interaction between language and year including the interaction term. We further conducted pairwise comparisons between the variables of interest based on the models' estimated marginal means using emmeans package (LENTH *et al.*, 2023), whose function eff_size was also used to estimate the comparisons' effect sizes. In addition, for both models, diagnosis analyses were performed via a residuals vs. fitted plot and a q-qplot in order to assess the models' assumptions. We also accounted for possible influential cases, but no data point seemed to have an absolute Cook's distance greater than 1 in either model. We adopted a significance level of .05 for all analyses.

4 Results and discussion

The present study aimed at verifying if connectedness (long-range recurrence – LSC) and syntactic complexity (Subordination Index – SI) would vary as a function of language (L1, L2) and year of data collection (2020, 2021). Since there was a difference in the average number of words written by the participants in the two phases of data collection (2020 and 2021 (Table 1), for the present longitudinal analysis, we used moving windows of 30 words to control for verbosity. To verify our hypotheses, the participants' written productions in L1 and in L2 were analyzed in terms of long-range recurrence (LSC) and syntactic complexity (Subordination Index – SI). The descriptive scores of participants in both languages and in both phases of data collection (2020 and 2021) are presented in Table 1.

TABLE 1 – Descriptive statistics

	L1 (2020)	L2 (2020)	L1 (2021)	L2 (2021)
N	21	21	21	21
Word Count – Mean (SD)	220 (79.5)	187 (45.4)	169 (56.4)	117 (28.8)
Word Count – Median (IQR)	209 (62)	179 (60)	179 (61)	118 (31)
LSC – Mean (SD)	17.61 (2.4)	18.53 (2.1)	18.75 (1.45)	19.07 (1.17)
LSC – Median (IQR)	18.08 (3)	19.21 (2.5)	19.27 (1.69)	19.13 (1.54)
SI – Mean (SD)	1.72 (0.23)	1.63 (0.36)	2.17 (0.37)	1.65 (0.23)
SI – Median (IQR)	1.78 (0.29)	1.63 (0.47)	2.11 (0.53)	1.62 (0.32)

Note. n = sample size, WC = word count, LSC = long-range recurrence, SI = subordination index, L1 = Portuguese, L2 = English.

SOURCE: AUTHORS.

---

[7]   To assess inter-rater reliability, we submitted the raters' scores to a 2-way random effects model based on mean-rating with absolute-agreement to calculate the Intraclass Correlation Coefficient (ICC). All coefficients were either greater than .75 or .9, which can be considered good and excellent, respectively (KOO; LI, 2016).

[8]   Data is available at: https://github.com/Larissa-Cury/Lemke-et-al.-2023-.git. Accessed on: Sept. 18, 2023.

Cristiane Ely Lemke · *et al.*

A longitudinal investigation of connectedness and syntactic complexity in the written production of bilingual children during the COVID-19 pandemic

9/16

These results will be addressed in the verification of the hypotheses, which referred to the analysis of LSC and SI in both languages over a year span and which, respectively, predicted higher LSC and SI scores in Portuguese over English written texts in both phases of data collection and a growth in LSC scores in both languages in the narratives collected in 2021, in comparison to the productions from 2020. Results from Model 1 will be shown first.

Provided that the mean of LSC scores in Portuguese narratives in 2020 is our reference[9] level (β_0), our model suggests a non-significant effect of Language (β_1 = .91, *CI* = [- .14, 1.97], *p* = .08), despite the 0.91 increase to the mean of LSC scores in English narratives in 2020. In addition, there was a significant effect of year (β_2 = 1.14, *CI* = [.09, 2.20], *p* = .03), with an increase of 1.14 in Portuguese narratives in 2021 productions' scores and the interaction between language and year was not significant (β_3 = - .60, *CI* = [-2.09, 0.89], *p* = .42). These results are shown in Table 2.

TABLE 2 – Fixed effects estimates and confidence intervals of LSC model with the interaction term **(Model 1)**

| Predictors	estimates	lower	upper	significance
(intercept)	17.61	16.81	18.41	**<0.001**
Language [L2]	0.91	-0.14	1.97	0.08
Year [2021]	1.14	0.09	2.20	**0.03**
Language [L2]:Year [2021]	-0.60	-2.09	0.89	0.42

Note. Model fitted according to the formula: LSC ~ LANGUAGE * YEAR + (1|ID) | Lower and upper columns indicate the 95% confidence interval (CI) boundaries.

SOURCE: AUTHORS.

Figure 2 shows the effect of language and year on students' written LSC. The continuous line represents Portuguese, while the dashed line represents English and the circles connecting them represent their respective estimated means. Error bars represent the 95% CI around the estimated means. It visually illustrates Model 1, from which we conducted pairwise comparisons among the estimated marginal means of our predictors.

Figure 2 – Effect of language and year on students' written LSC
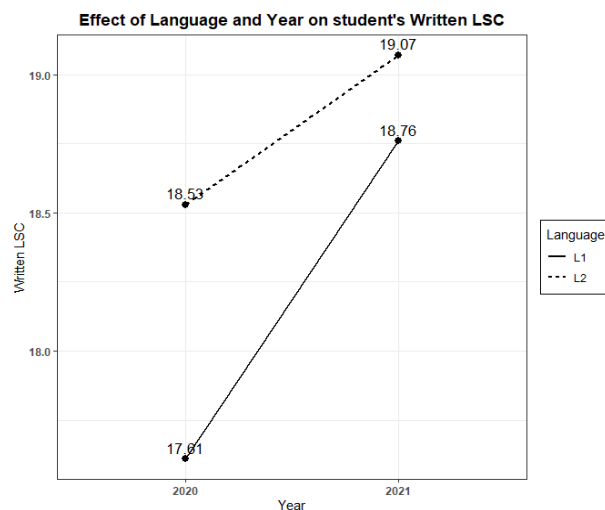
Source: Authors.

---

9   In both Model 1 and Model 2, Language and Year were dummy-coded with x_1 = 0 and x_2 = 0 as the reference levels (L1 and 2020, respectively) and x_1 = 1 and x_2 = 1 as L2 and 2021, respectively.

When comparing language effects for each year, neither the comparison between L1 and L2 in 2020 (t(60)=-1.73, p=.09) nor in 2021 (t(60)=-.59, p=.56) was significant, which does not confirm our initial hypothesis. However, when comparing year effects for each language, while we did not find a significant difference between English estimates between the years (t(60)=-1.02, p=.31), which was against our predictions, we found a significant increase for Portuguese estimates in 2021 (t(60)=-2.16, p=.03), revealing an expected advantage for Written LSC L1 2021, which is in consonance with our initial hypothesis. These results are shown in Table 3 below.

TABLE 3 – Pairwise comparisons of Model 1's estimated marginal means for connectedness (LSC)

Contrasts	mean difference	t-statistic	SE	df	significance	lower	upper	effect size
L1-L2 (2020)	- .91	-1.73	.53	60	.09	-1.07	.08	- .50
L1-L2 (2021)	- .31	-0.59	.53	60	.56	-0.74	.40	- .17
L1 2020-2022	-1.14	-2.16	.53	60	**.03**	-1.20	- .04	- .62
L2 2020-2021	-.54	-1.02	.53	60	.31	-0.87	.28	- .29

Note: Effect sizes correspond to Cohen's d, obtained through the ratio of the observed differences by the model's total SD: sqrt((residual SD)^2 + (students SD)^2) | Lower and upper columns indicate the 95% confidence interval (CI) boundaries for the effect size. All estimates had a standard error (SE) equal to .53 and degrees of freedom equal (df) to 60.

SOURCE: AUTHORS.

All things considered, the analyses indicate that LSC scores may be explained by language and year and that there is not a significant interaction between these variables, as expected. We expected a main effect of language (being Portuguese's LSC gains always higher than English's) and of year (a significant increase in 2021's scores for both languages). As for the 2020-2021 comparisons, there was an overall increase in both languages from one year to the other, which is in consonance with our initial hypothesis, but it was only significant for L1 gains in connectedness, a result that was not expected.

Therefore, our hypotheses were not fully confirmed. In fact, while the analysis revealed that the LSC scores in Portuguese texts in 2021 were indeed significantly higher than in 2020, no difference between LSC scores in English in 2020 and in 2021 was found, contradicting our initial expectation. We believe the small growth in their writing performance in English from 2020 to 2021 might be a consequence of the pandemic, when students were having online classes only, with a reduction of lessons taught in English. In the case of the children that participated in this study, it is important to note that they are mainly exposed to opportunities of practicing productive skills in English at school, contrary to Portuguese, which is a language students use to interact in the family and the community on a daily basis. Therefore, such results suggest that the development of academic skills in English, in comparison to Portuguese, might have suffered a greater impact during the pandemic. The fact that they had fewer classes and a shorter time of exposure to English during online classes may have reduced the children's potential growth in their L2 writing skills.

Our second hypothesis, which investigated SI scores in narratives written in both languages over a year span, predicted higher SI scores in Portuguese over English written texts in both phases of data collection and a growth in LSC scores in both languages in the narratives collected in 2021, in comparison to the productions from 2020. To investigate that, we performed Model 2, which will be discussed below.

Provided that the SI mean scores from the narratives in Portuguese in 2020 is our reference level (β_o), the model suggests a non-significant

Cristiane Ely Lemke · *et al.* **11/16**

A longitudinal investigation of connectedness and syntactic complexity in the written production of bilingual children during the COVID-19 pandemic

effect of Language. In the analysis of the written texts from 2021, however, our model indicates an effect of Year, suggesting that SI mean scores from Portuguese productions' significantly increased by 0.45 in 2021 in comparison to 2020 (β_2=.45, *CI* =[.28,.61], *p*<0.001). The significant negative interaction between language and year (β_3= -.43, *CI* =[-.66, -.20], *p*<0.001) reveals that the effect of year on SI scores is distinct for L2 productions, as shown in Table 4.

TABLE 4 – Fixed effects estimates and confidence intervals of the SI model with the interaction term (Model 2)

| Predictors	estimates	lower	upper	significance
(intercept)	1.72	1.59	1.85	**<0.001**
Language [L2]	-0.09	-0.26	0.07	0.25
Year [2021]	0.45	0.28	0.61	**<0.001**
Language [L2]:Year [2021]	-0.43	-0.66	-0.20	**<0.001**

Note: Model fitted according to the formula: SI ~ LANGUAGE * YEAR + (1|ID) | Lower and upper columns indicate the 95% confidence interval (CI) boundaries.

SOURCE: AUTHORS.

Figure 3 displays a continuous line representing Portuguese and a dashed line representing English. The circles connecting them show their respective estimated means. To further investi gate the obtained effects, pairwise comparisons among the estimated marginal means of our predictors were conducted and this figure visually illustrates our model.

Figure 3 – Effect of language and year on students' written SI
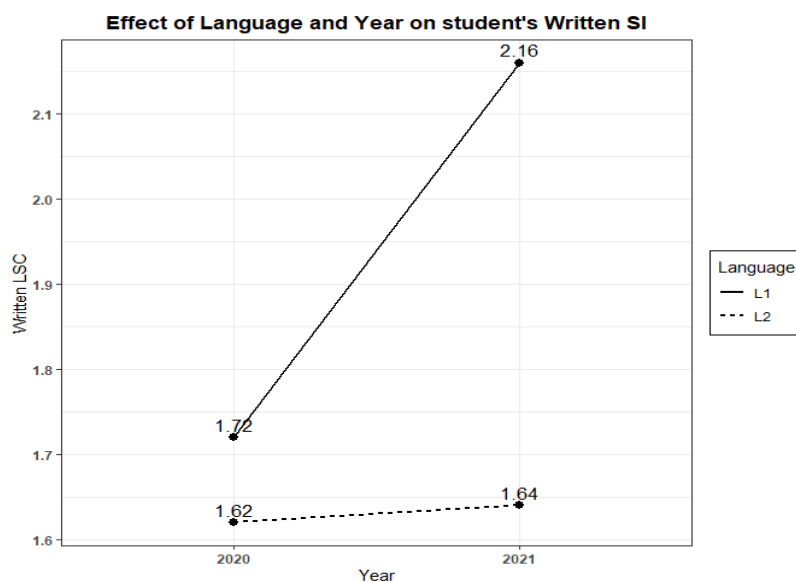
Source: Authors.

In the comparisons between languages in 2020 and 2021, while we did not verify a significant difference between syntactic complexity in Portuguese and English in the narratives produced in 2020, we found an expected advantage for Portuguese texts in 2021 (*t*(60)=6.43, *p*<.001), the students' most dominant language. In addition, students had significantly higher SI scores in Portuguese in 2021, a year after the first data collec-

tion (*t*(60)=- 5.48, *p*<.001). However, no difference was found for SI scores in English narratives in the comparison between texts produced in 2020 and 2021(Table 5).

TABLE 5 – Pairwise comparisons of Model 2's estimated marginal means for syntactic complexity (SI)

Contrasts	mean difference	t-statistic	SE	df	significance	lower	upper	effect size
L1-L2 (2020)	.09	1.15	.08	60	0.25	- .23	.84	.31
L1-L2 (2021)	.52	6.43	.08	60	**< .001**	1.10	2.33	1.71
L1 2020-2021	- .45	- 5.48	.08	60	**< .001**	-2.05	-.86	-1.46
L2 2020-2021	- .02	- .20	.08	60	.84	-.58	.48	-.05

Note: Effect sizes correspond to Cohen's d, obtained through the ratio of the observed differences by the model's total SD: sqrt((residual SD)^2 + (students SD)^2). Lower and upper columns indicate the 95% confidence interval (CI) boundaries for the effect size. All estimates had a standard error (SE) equal to .08 and degrees of freedom equal (df) to 60.

SOURCE: AUTHORS.

Once again, we believe such results may be revealing of a pandemic effect on students' L2 writing development, since children had significantly fewer opportunities to interact in English in comparison to Portuguese L1, which may have impacted their development of productive skills in their L2. An alternative explanation would perhaps be that L2 academic development may occur at a different pace. The investigation of such possible explanations would involve longitudinal studies that assess students' writing development throughout a longer period of time.

Finally, it is also relevant to point out that such results that were found for LSC, revealing an advantage of L2 over L1 in both phases of data collection, might be due to the fact that the analysis of connectedness was done with graphs of 30 words, which is a way of analyzing the data with the possibility of controlling for the variability in number of words that produced. The syntactic complexity scores (SI), on the other hand, were calculated for the children's whole narratives, not considering the variability in the size of the texts. Further analyses need to be conducted to provide better understanding of these group differences. One of the next steps regarding this specific set of data is to calculate these scores using different moving windows as well as the text as a whole.

Conclusion

The present study investigated, in a longitudinal way, connectedness and syntactic complexity in written narratives in Portuguese (L1) and English (L2) produced by 21 children enrolled in the 5th and 6th grades in a bilingual Elementary school. Connectedness was measured with the computational tool *SpeechGraphs* (MOTA *et al.*, 2014, 2016, 2019), whereas syntactic complexity was analyzed through T-Units and the Subordination Index (HUNT, 1965). Children wrote narratives in both languages based on sequences of pictures in two moments, August 2020 and August 2021.

The results of the longitudinal analysis, which intended to verify if connectedness measures (long-range recurrence – LSC) and syntactic complexity scores (subordination index – SI) would vary as a function of language (L1, L2) and year of data collection (2020, 2021), revealed that children wrote more syntactically complex texts in Portuguese, their L1, in both phases of data collection. Such results were expected, since children are immersed in contexts in which Portuguese is the dominant language, even at school, therefore being able to develop better written proficiency in Portuguese.

In addition, participants also wrote more connected narratives, that is, texts had higher LSC (long-range recurrence) measures and were also more syntactically complex in Portuguese in 2021,

in comparison to 2020. We also expected to find a significant growth in these measures, despite the pandemic, since students kept having classes (online and in person). It is interesting to note, however, that there was no significant growth in the connectedness or syntactic complexity scores from 2020 to 2021 in their narratives written in English, a result that was not expected. In trying to understand such results, we consider the effect that the pandemic might have had on the development of students' L2 writing, since during online classes, which was the case for the most part between the data collection phases in the case of the children investigated here, students have significantly fewer opportunities to interact and develop productive skills in English.

Interestingly, we also found greater scores for L2 connectedness (LSC) in comparison to the participants' L1 in both years, 2020 and 2021. Whether this is a methodological artifact or is a revelation that the children might be developing writing skills in parallel in their two languages, we still do not know. However, these findings might bring evidence to the fact that writing in two languages is not harmful; on the contrary, it is something that can and should be done when children are being educated in a bilingual context. The continuation of the present study might give us a clearer perspective of the advancement of both languages in years to come, which is something we plan to pursue. Moreover, a detailed analysis of the process in each year, per grade, can be informative of this development. This is one of the next steps we intend to take.

The possibility of analyzing the development of typical students through a simple and non-invasive tool, capable of providing relevant data on the development of connectedness in monolingual and bilingual children is one of the main contributions of the study. Besides, it broadens our understanding of how bilingual children grow and advance in written productions in L1 and L2.

More research on the topic and within the reality of prestige bilingual schools in Brazil is needed in order to establish connections and to draw a bigger picture of such reality. An attempt to continue this conversation is already in motion, with researchers looking at the development of 5th graders from two different bilingual schools. The data from Costa *et al.* (2022, submitted) is one of the promises of a dialogue between schools to have a broader perspective of bilingual academic development in both L1 and L2.

References

ALVES, U. K.; FINGER, I. *Alfabetização em contextos monolíngue e bilíngue*. Rio de Janeiro: Vozes, 2023.

ANGELINI, A. L. et al. M. *Matrizes progressivas coloridas de Raven*: escala especial. São Paulo: CETEPP, 1999.

BARON-COHEN, S.; LESLIE, A. M.; FRITH, U. Mechanical, behavioural and intentional understanding of picture stories in autistic children. *British Journal of Developmental Psychology*, Hoboken, v. 4, p. 113-125, 1986.

BATES, D. *et al.* fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, Los Angeles, v. 67, n. 1, p. 1-48, 2015.

BIALYSTOK, E. Cognitive effects of bilingualism: how linguistic experience leads to cognitive change. *International Journal of Bilingual Education and Bilingualism*, Oxfordshire, v. 10, n. 3, p. 210-223, 2007.

BIALYSTOK, E.; MCBRIDE-CHANG, C.; LUK, G. Bilingualism, language proficiency, and learning to read in two writing systems. *Journal of Educational Psychology*, Washington, DC, v. 97, n. 4, p. 580-590, 2005.

BIALYSTOK, E. The bilingual adaptation: how minds accommodate experience. *Psychological Bulletin*, Washington, DC, v. 143, n. 3, p. 233-262, 2017.

BUTVILOFSKY, S. A. *et al.* Beyond monolingual reading assessments for emerging bilingual learners: expanding the understanding of biliteracy assessment through writing. *Reading Research Quarterly*, Newark, v. 56, n. 1, p. 53-70, 2021.

BUTVILOFSKY, S. A. *et al.* Shifting deficit paradigms of Latino emerging bilingual students' literacy achievement: documenting biliterate trajectories. *Journal of Latinos and Education*, Oxfordshire, v. 16, n. 2, p. 85-97, 2017.

CAMBRIDGE ENGLISH LANGUAGE ASSESSMENT. *Cambridge English first for schools*: handbook for teachers. 2018. https://www.cambridgeenglish.org/exams-and-tests/starters/ Accessed on: Sept. 22, 2023.

COLLINS, B. A. *et al.* Dual language profiles of Latino children of immigrants: stability and change over the early school years. *Applied Psycholinguistics*, Cambridge, v. 35, n. 3, p. 581-620, 2014.

DE GROOT, A. M. B. *Language and Cognition in bilinguals and monolinguals*: an introduction. New York: Psychology Press, 2011.

ESCAMILLA, K. *et al. Biliteracy from the start:* Literacy squared in action. Philadelphia: Caslon Publishing, 2014.

FINGER, I.; BRENTANO, L. S.; RUSCHEL, D. E quando a alfabetização ocorre simultaneamente em duas línguas? Reflexões sobre o biletramento a partir da análise de textos de crianças bilíngues. *Revista Virtual de Estudos da Linguagem*, [*s. l.*], v. 17, n. 33, p. 180-205, 2019.

GAIES, S. T-Unit analysis in second language research: applications, problems and limitations. *TESOL Quarterly*, Hoboken, v. 14, n 1, p. 53-60, 1980.

GENESEE, F. *et al*. *Educating English language learners*. New York: Cambridge University Press, 2006.

HOPEWELL, S.; BUTVILOFSKY, S. Privileging bilingualism: using biliterate writing outcomes to understand emerging bilingual learners' literacy achievement. *Bilingual Research Journal,* Oxfordshire, v. 39, n. 3-4, p. 324-338, 2016.

HUNT, K. *Grammatical structures written at three grade levels*: NCTE Research Report, n. 3. Champaign: National Council of Teachers of English, 1965. Available at: https://files.eric.ed.gov/fulltext/ED113735.pdf. Accessed on: Sept. 18, 2023.

KOO, T. K.; LI, M. Y. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, [*s. l.*], v. 15, n. 2, p. 155-163, 2016. Available at: http://dx.doi.org/10.1016/j.jcm.2016.02.012. Accessed on: Sept. 18, 2023.

KUZNETSOVA, A.; BROCKHOFF, P. B.; CHRISTENSEN, R. H. B. lmerTest package: tests in linear mixed effects models. *Journal of Statistical Software*, Los Angeles, v. 82, n. 3, p. 1-6, 2017.

LEANDRO, D. C. *Planejamento pré-tarefa, memória operacional e produção oral em inglês como L2*: um estudo exploratório usando análise de grafos. 2021. Dissertação (Doutorado em Letras) – Universidade Federal do Rio Grande do Norte, Natal, 2021. Disponível em: https://repositorio.ufrn.br/handle/123456789/32216?mode=-full. Acesso em: 18 set. 2023.

LEMKE, C. E. *Effects of bilingualism and biliteracy on thought organization and syntactic complexity in bilingual children.* 2022. Dissertação (Doutorado em Letras) – Universidade Federal do Rio Grande do Sul, Porto Alegre, 2022.

LEMKE, C. E. *et al*. The effects of early biliteracy on thought organisation and syntactic complexity in written production by 11-year-old children. *Language Teaching Research Quarterly*, Vancouver, v. 26, p. 1-17, 2021. Available at: https://eurokd.com/doi/10.32038/ltrq.2021.26.01?vId=416&aId=391. Accessed on:Sept. 22, 2023.

LENTH, R. V. *et al*. Emmeans: estimated marginal means, aka least-squares means. *In*: CRAN. [*S. l.*], Aug. 17, 2023. Available at: https://CRAN.R-project.org/package=emmeans. Accessed on: Sept. 18, 2023.

LINDHOLM-LEARY, K. J. Bilingual and biliteracy skills in young Spanish-speaking low-SES children: impact of instructional language and primary language proficiency. *International Journal of Bilingual Education and Bilingualism*, Oxfordshire, v. 17, n. 2, p. 144-159, 2014.

LINDHOLM-LEARY, K. J. Bilingualism and academic achievement in children in dual language programs. *In*: NICOLADIS, E.; MONTANARI, S. (ed.). *Bilingualism across the lifespan*: factors moderating language proficiency. Washington, DC: APA Books, 2016. p. 203-223.

LINDHOLM-LEARY, K. J. Implications of research for dual language at the early childhood level. *In*: ARIAS, M. B.; FEE, M. (ed.). *Profiles of Dual Language Education in the 21st Century*. Avon: Multilingual Matters, 2018. p. 73-85.

LOBAN, W. *Language development*: kindergarten through Grade Twelve. Washington, DC: NCTE Committee on Research Report, 1976.

LUZ, J. P. *Análise de grafos aplicada a produções textuais de alunos do ensino fundamental e seu potencial preditivo da dislexia do desenvolvimento.* 2023. Dissertação (Mestrado em Letras) – Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, 2023. Disponível em: http://tede2.pucrs.br/tede2/handle/tede/8158. Acesso em: 18 set. 2023.

MOTA, N. B.; COPELLI, M.; RIBEIRO, S. Graph theory applied to speech: insights on cognitive deficit diagnosis and dream research. *In*: POIBEAU, T.; VILLAVICENCIO, A. *Language, cognition, and computational models.* New York: Cambridge University Press, 2018. p. 81-98.

MOTA, N. B. *et al*. A naturalistic assessment of the organization of children's memories predicts cognitive functioning and reading ability. *Mind, Brain and Education*, Hoboken, v. 10, n. 3, p. 184-195, 2016.

MOTA, N. B. *et al*. Graph analysis of dream reports is especially informative about psychosis. *Scientific Reports*, London, v. 4, n. 3691, p. 1-7, 2014.

MOTA, N. B. *et al*. The maturation of speech structure in psychosis is resistant to formal education. *NPJ Schizophrenia*, Brentwood, v. 4, n. 25, p. 1-10, 2018.

MOTA, N. B. *et al*. Verbal short-term memory underlies typical development of thought organization measured as speech connectedness. *Mind, Brain and Education*, Hoboken, v. 14, n. 1, p. 51-60, 2019.

MOTA, N. B. How can computational tools help to understand language patterns in mental suffering considering social diversity. *Psychiatry Research*, Amsterdam, v. 319, n. 114995, 2023.

MYLLÄRI, T. Words, clauses, sentences, and T-Units in learner language: precise and objective units of measure? *Journal of the European Second Language Association,* London, v. 4, n. 1, p. 13-23, 2020.

O'DONNELL, R. C.; GRIFFIN, W. J.; NORRIS, R. C. Syntax of Kindergarten and Elementary School Children: a transformational analysis. *NCTE Research Report*, St. Louis, v. 8, p. 1-123, 1967.

ORTEGA, L. Syntactic complexity measures and their relationship to L2 proficiency: a research synthesis of college-level L2 writing. *Applied Linguistics*, Oxford, v. 24, n. 4, p. 492-518, 2003.

POSIT TEAM. *RStudio*: integrated development for R. Boston: Posit Inc., 2022. Available at: https://posit.co/products/open-source/rstudio/. Accessed on: Sept. 23, 2023.

Cristiane Ely Lemke · *et al.* **15/16**

AlongitudinalinvestigationofconnectednessandsyntacticcomplexityinthewrittenproductionofbilingualchildrenduringtheCOVID-19pandemic

RAVEN, J. C. *Mental tests used in genetic studies*: the performance of related individuals on tests mainly educative and mainly reproductive. London: University of London, London, 1936.

SOLTERO-GONZÁLEZ, L. *et al.* Effects of a paired literacy program on emerging bilingual children's biliteracy outcomes in third grade. *Journal of Literacy Research,* Thousand Oaks, v. 48, n. 1, p. 80-104, 2016.

SPARROW, W. *et al.* Examining the longitudinal biliterate trajectory of emerging bilingual learners in a paired literacy instruction model. *Bilingual Research Journa*l, Oxfordshire, v. 37, n. 1, p. 24-42, 2014.

WOLFE-QUINTERO, K.; INAGAKI, S.; KIM, H. Y. *Second language development in writing:* Measures of fluency, accuracy, and complexity. Honolulu: University of Hawaii at Manoa, 1998.

YANDEN, D.; TSAI, T. Learning how to write in English and Chinese: young bilingual Kindergarten and first grade children explore the similarities and differences between writing systems. *In*: BAUER, E.; GORT, M. (ed.). *Early biliteracy development*: exploring young learners' use of their linguistic resources. New York: Routledge, 2012. p. 55-83.

Cristiane Ely Lemke

PhD in Letras, with emphasis in Psycholinguistics, from the Federal University of Rio Grande do Sul (UFRGS), Master's in Applied Linguistics (UNISINOS). Member of the Laboratory of Bilingualism and Cognition (LABICO) at UFRGS.

Larissa da Silva Cury

PhD student at the Post Graduation Program of the Federal University of Rio Grande do Sul (UFRGS), under the supervision of professor Ingrid Finger, her academic advisor. She is a member of the Laboratory of Bilingualism and Cognition (LABICO) at UFRGS. She holds a Summa Cum Laude distinction in Licentiate in Arts: Portuguese and English Languages Degree from The Federal University of Rio de Janeiro (UFRJ). Her biggest research interest concerns the Psycholinguistics of Bilingualism. She is also interested in Statistics and programming languages.

Janaína Weissheimer

Associate Professor at the Department of Modern Foreign Languages at UFRN, a permanent member of the Graduate Program in Language Studies and coordinator of AprendiLab (Learning and Reading Lab) at the Brain Institute at UFRN. She holds a PhD in English from UFSC (2007), was a visiting scholar at the Kutas Cognitive Electrophysiology Lab at the University of California San Diego UCSD (2014-2015) and is currently a visiting scholar at the Bilingualism Mind and Brain Lab at the University from California in Irvine (2023), with a CAPES/PRINT scholarship.

Natália Bezerra Mota

A computational psychiatrist and current professor at the Institute of Psychiatry (IPUB) at the Federal University of Rio de Janeiro, UFRJ. Having experience in multiple aspects of computational neuroscience and psychiatry research and practice with Post-Doctorate, Ph.D., and Master in Neuroscience and Bachelor in Medicine (residence and clinical practice in Psychiatry) at the Federal University of Rio Grande do Norte (UFRN).

Ingrid Finger

Ingrid Finger is an Associate Professor at the Modern Languages Department and the Graduate Program in Linguistics and Literature at UFRGS, where she coordinates the Bilingualism and Cognition Lab (LABICO). PhD in Linguistics (Applied Linguistics) from the Catholic University of Rio Grande do Sul (PUCRS) Visiting Scholar at the Brain and Language Lab, Georgetown University in 2010 –2011, working with Prof. Michael T. Ullman at the Department of Neuroscience, and at the City University of New York (CUNY) in 1998, working with Prof. Gita Martohardjono. Visiting scholar at the Bilingualism Mind and Brain Lab at the University from California in Irvine (2022). She is a CNPq researcher and integrates the National Science for Education Network in Brazil.

Endereço para correspondência:

CRISTIANE ELY LEMKE

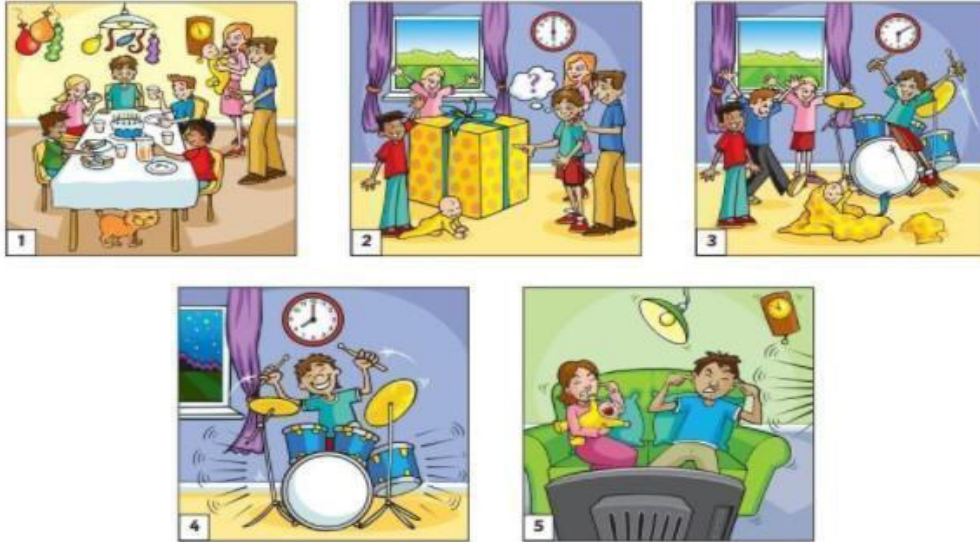Rua Afonso Lauer, 462, Centenário

Sapiranga, RS – Brasil

93800-416

Os textos deste artigo foram revisados pela Texto Certo Assessoria Linguística e submetidos para validação das autoras antes da publicação.

Appendix 1

ATIVIDADE DE ESCRITA

Observe as cinco figuras. Escreva sobre esta história. Escreva 200 palavras ou mais.

FLYERS SPEAKING. Picture Story

WRITING ACTIVITY

Look at the five pictures. Write about the story. Write 200 words or more.