

# The effects of early biliteracy on thought organisation and syntactic complexity in written production by 11-year-old children

Authors: Cristiane Ely Lemke, Janaina Weissheimer, Natália Bezerra Mota, Luciana de Souza Brentano, Ingrid Finger (2021)

Por Stefanie Martin  
ACESIN, 2022

# Organização

1

Visão geral bilinguismo (a partir da aula da Ingrid Finger);

2

Apresentação do paper.

Por Stefanie Martin  
ACESIN, 2022

# Bilinguismo: como era, como é

Saer (1922)

2 monolíngues: o duplo monolíngue.

Mackey (1962)

O bilinguismo não é uma variável categórica. Há vários tipos de bilíngue.

O momento em que nos tornamos bilíngues é impossível de determinar.

DeLuca et al. (2020)

O bilíngue é um continuum. O bilinguismo afeta a morfologia do cérebro, nossa cognição e nossas funções executivas.

# Primeiros estudos sugerindo consequências negativas

SAER ET AL. (1922-1924)

domínio igual das 2 línguas (Hipótese do duplo monolíngue) - Saer, 1922 e 1994)

"bilíngues são confusos e deficientes (possuem retardo mental)" (Goodenough, 1926)

Acreditava-se que os bilíngues eram inferiores aos monolíngues em termos cognitivos: "a melhora de uma língua acontecia em detrimento da outra" (Baker, 2006).

Falante nativo como modelo ideal.

# Bilinguismo: Mitos

## Alfabetização bilíngue

Atrapalha o desenvolvimento da fala: MITO

Atrapalha a alfabetização na L1: mito

Confunde a criança, atrapalhando o seu desenvolvimento: MITO

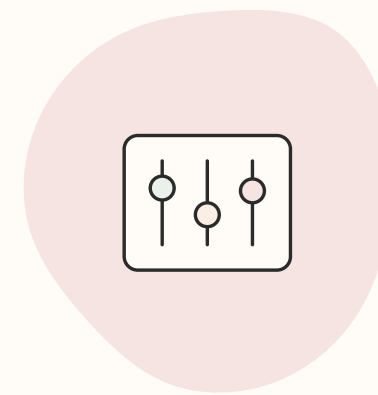
## Vantagem bilíngue

atenção, tolerância/ interação social, planejamento, memória...

FUNÇÕES EXECUTIVAS

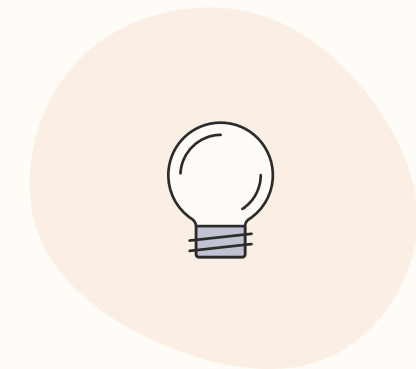


# CÉREBRO BILÍNGUE



ATIVACÃO

mais trabalho



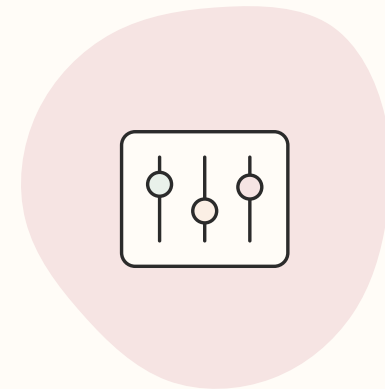
TEMPO

mais dados, maior  
ativação, mais tempo

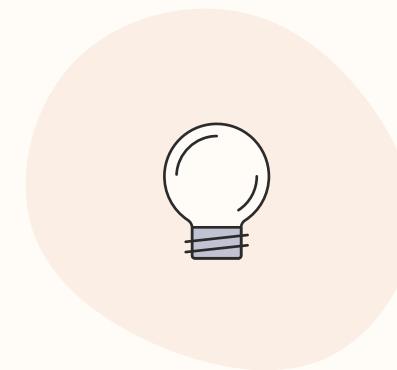
**Ativação neural maior no bilíngue.**

Coativação linguística: ativação paralela das 2 línguas.

Essa coativação também ocorre nos bilíngues tardios e/ou muito proficientes  
(coativação bimodal)



NEUROPLASTICIDADE




PRE-DISPOSIÇÃO  
GENÉTICA

é uma pré-disposição,  
não uma sentença.

**A importância das intervenções**

L1 <> L2



Ativação paralela e  
competição entre as  
línguas

cria a expertise.

Envelhecimento

Evita a deteriorização mental.

Demências

O bilinguismo não evita, mas  
ajuda no retardo do  
aparecimento (~10a) dos  
sintomas (reserva cognitiva).

Saúde

cérebro mais "forte" em  
função da ativação.



# Bilinguismo e Funções Executivas



## Controle inibitório

ignorar distração

focar

resistir a uma resposta  
automática

## Memória de trabalho

reter a informação na mente  
e manipulá-la

## Flexibilidade cognitiva

trocar de perspectiva  
mudar o foco da atenção

## Funções Executivas

~30 anos: pico de maturação/  
estabilidade da FE.

# Funções Executivas e bilinguismo

Melhor capacidade de lidar com aspectos emocionais

Sucesso educacional

Autoestima na vida adulta

Maior habilidade de lidar com stress na vida adulta

Menor índice de uso de cocaína em populações mais vulneráveis

Menor manifestações de agressão e bullying

# Bilinguismo e Sucesso Acadêmico

Preditor de:

desenvolvimento de habilidades de leitura, escrita, vocabulário e matemática no 1º ano (educação infantil) (McClelland et al., 2007; Blair & Razza, 2007).

Níveis de compreensão leitora no 3º ano (Guajardo & Cartwright, 2016)

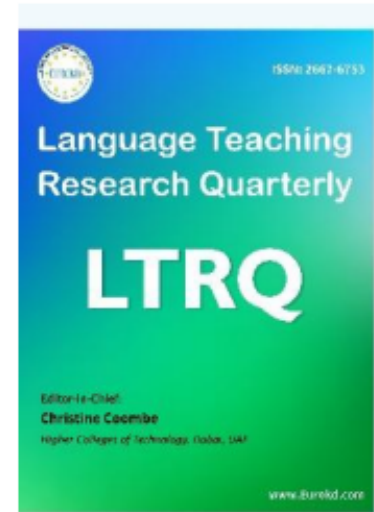
Sucesso em matemática e leitura aos 21 anos (McClelland et al. 2013).

Finalização de curso superior aos 25 anos (McClelland et al. 2013).

# CONSEQUÊNCIAS DO BILINGUISMO

VISÃO PESSIMISTA

VISÃO OTIMISTA:  
habilidades cognitivas e sociais



# Language Teaching Research Quarterly

2021, Vol. 26, 1–17



## The Effects of Early Biliteracy on Thought Organisation and Syntactic Complexity in Written Production by 11-Year-Old Children

Cristiane Ely Lemke<sup>1\*</sup>, Janaína Weissheimer<sup>2</sup>, Natália Bezerra Mota<sup>3</sup>, Luciana de Souza  
Brentano<sup>4</sup>, Ingrid Finger<sup>5</sup>

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Por Stefanie Martin  
ACESIN, 2022

# Organização

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Análise de Grafos e T-Units

5

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Resultados

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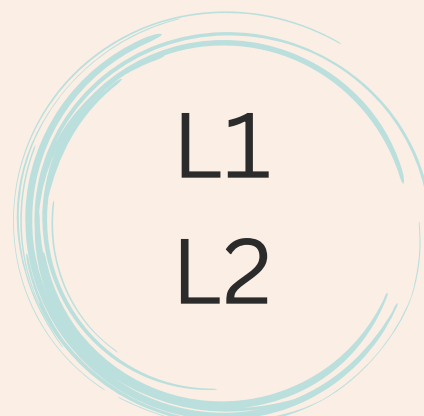
Discussão e conclusões

# Introduction

- The majority of the **world's population is bilingual** (García & Cepeda, 2016; Kroll & Dussias, 2017).
- **Brazil:** BP official language, but ~300 daily used (274 indigenous ones, IBGE, 2012; 56 immigration ones (Altenhöfen) + LIBRAS (recognised since 2002).
- Increased the number of **bilingual schools** in Brazil (in recent years).
- **Lack of legislation** regulating it.
- **Lack of studies** which investigate language processing and teaching methods considering Brazilian context (biliteracy: reading and writing).
- **Goals:** to better understand bilingual children's reading and writing development in order to design instructional pedagogies that contribute to supporting their growth as readers and writers considering Brazilian bilingual schools' context.
- To investigate the effects of biliteracy on the production in BP and English in a group children enrolled at a bilingual school in the south of Brazil.

# Biliteracy (Brazil)

- (in many bilingual schools) Children may find themselves in a situation they **struggle** to learn how to read and write in a language they do not speak or use.
- In this scenario, **we do not know if** these kids are as good as (at reading and writing) those ones who are only exposed to Portuguese.
- It fosters doubts as to **whether schools** should have children learn to read and write in their L1 first and then in their L2, **or if** it is not detrimental to have them develop in both languages at the same time.
- **What does the previous literature say about it? (evidence)**



Wong et al., 1986.



Edelsky, 1986; Hudelson, 1984; Dworin, 2003; Fu, 2003; García, 2006, Salem, Oregon, Francis et al., 2006; Kuo & Anderson, 2007; Kabuto, 2011; Soltero-González et al., 2016; Ahmadi & Mohammadi, 2019.



...Introduction

# Interdependence Hypothesis

(Cummins, 1981, 2017)

## Other aspects

**Transfer across languages is bidirectional**, and instruction based only on one of the students' languages will minimise the contexts in which language development occurs.

**Linguistic distance** (writing systems, levels of transparency).

These aspects should be taken in consideration in the design of instruction methodologies.

But Petito et al. (2013) showed beneficts (Spanish L1 (transparent), English L2 (opaque)).

Williams & Lawrence-Faulhaber (2018): 35-study review - the development of literacy in one language reinforces literacy knowledge and skills in the other one.

# Participants & task & methodology

PB L1, 11 years old, 5th - 6th grade.

Bilingual Brazilian school (south)  
10h a week, at least 5 years.

Create a narrative based on a  
sequence of images (Cambridge  
Assessment, 2018): 1 in PB, 1 in Eng.

**Thought organisation** (connectivity)  
was measured by graph analysis.



Speech Graphs  
(Mota et al., 2014, 2016,  
2019)

**Syntactic complexity**




Assessment of T-Units  
(Hunt, 1965)

# Objectives


## *Specific Objectives*

The specific objectives of the present study are as follows:


- (1) To verify whether there is a difference in the L1 and L2 connectivity attributes (LCC and LSC), generated by the children's written production;
- (2) To verify whether there is a difference in the L1 and L2 syntactic complexity measures (T-Units), generated by the children's written production;
- (3) To explore the correlation between connectivity attributes and syntactic complexity measures in an attempt to verify whether graph analysis can serve as a potential tool to assess bilingual linguistic proficiency.




(1A) We expected to find a significant difference in the L1 and L2 connectivity attributes generated by the children's written production, with an advantage towards the participants' first language. In other words, connectivity measures were expected to be higher in Portuguese than in English texts.




(1B) Despite the L1 advantage in the written production, we expected to find a positive correlation between the connectivity attributes (LCC and LSC) in L1 and L2, signalling a parallel between thought organisation expressed in the written production in the two languages.



(2A) We expected to find a difference in the L1 and L2 syntactic complexity measures (T-Units), generated by the children's written production, with an advantage towards the children's first language.



(2B) Despite the L1 advantage in the written production, we expected to find a positive correlation between measures of syntactic complexity (T-Units) in L1 and L2 texts, indicating that linguistic development occurs in a parallel fashion in the two languages of the bilingual children.



(3) We expected to find a positive correlation between the connectivity attributes (LSC) and syntactic complexity (T-units) in the L1 and L2 written productions, indicating that graph analysis can serve as a potential tool to assess bilingual linguistic proficiency.

## Hypothesis & Results

# Methodology

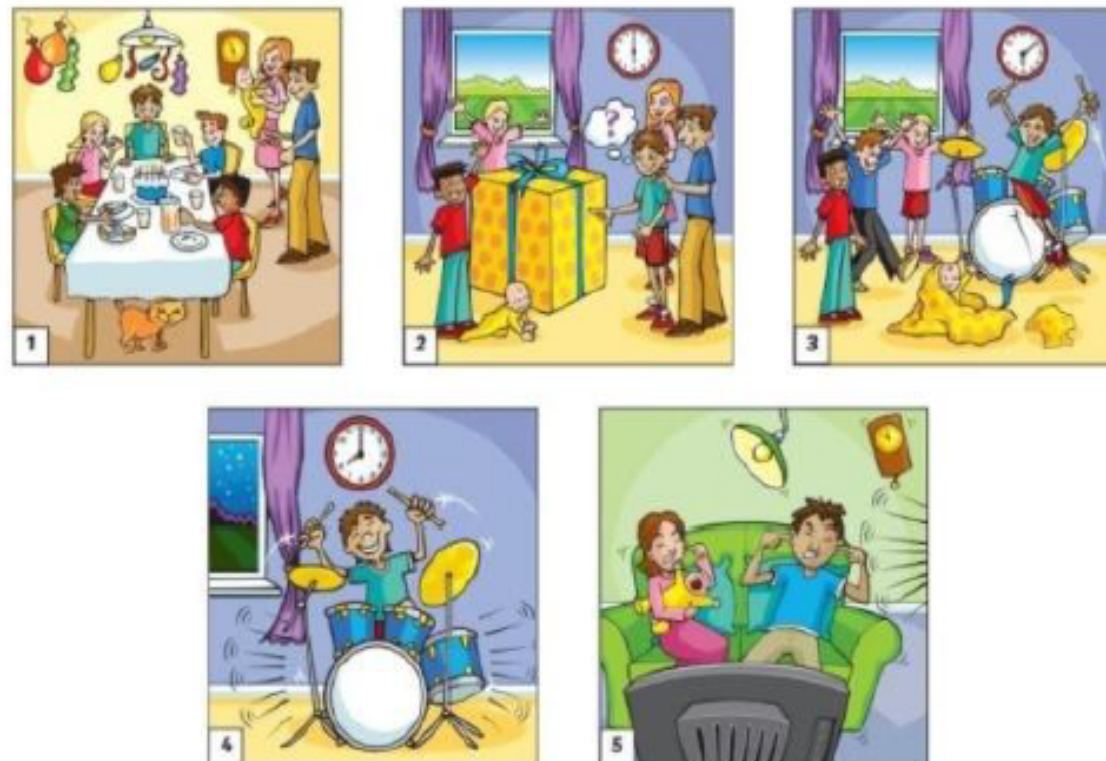
- **Data collection:** online classes, Google Meet
- **3 groups:** one 6th, two 5th grades
- **2 moments:** 2 weeks apart
- **2 languages:** Port, Engl production
- **Narrative:**

**Figure 1**

*Cambridge Assessment, 2018*

## WRITING ACTIVITY

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



FLYERS SPEAKING: Picture Story

## ATIVIDADE DE ESCRITA

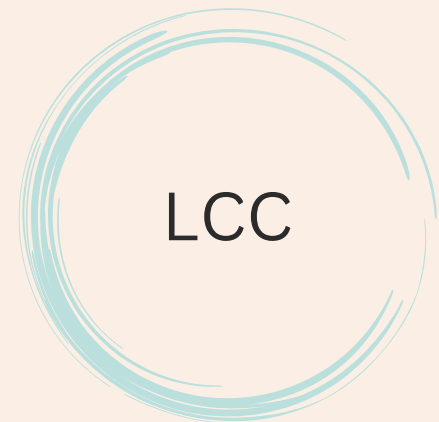
Observe as cinco figuras. Escreva sobre esta história. Escreva 200 palavras ou mais.



FLYERS SPEAKING: Picture Story

# Graph analysis (via Speech Graph)

It has been used to explain cognitive development in healthy children as they progress in their educational path through elementary school.



LCC

Largest Connected Component



LSCC

Largest Strongest Connected Component

# Graph analysis (via Speech Graph)

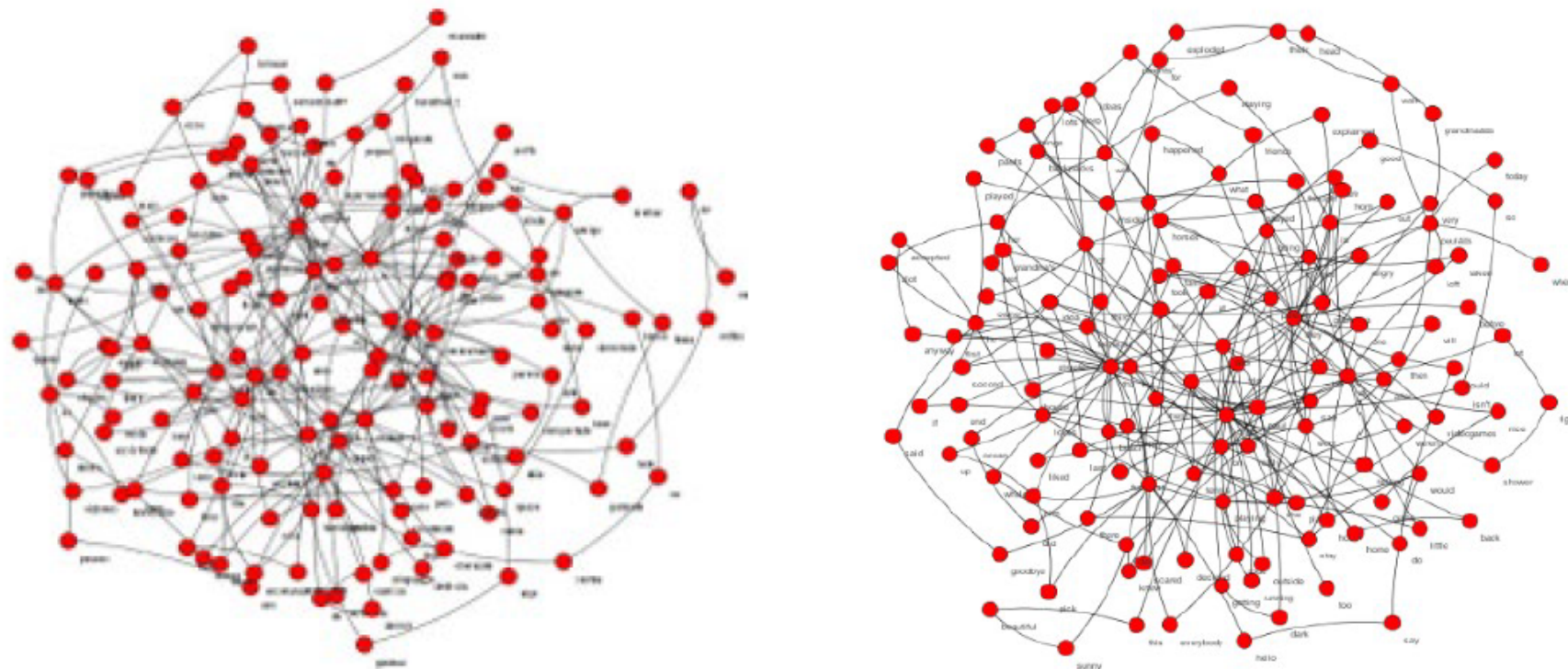
<https://neuro.ufrn.br/software/speechgraphs>

Oral memory tasks with more unique nodes indicates:

- larger vocabulary
- more connections
- less repetitions
- children who scored higher in the cognitive and academic assessments

**Figure 4**

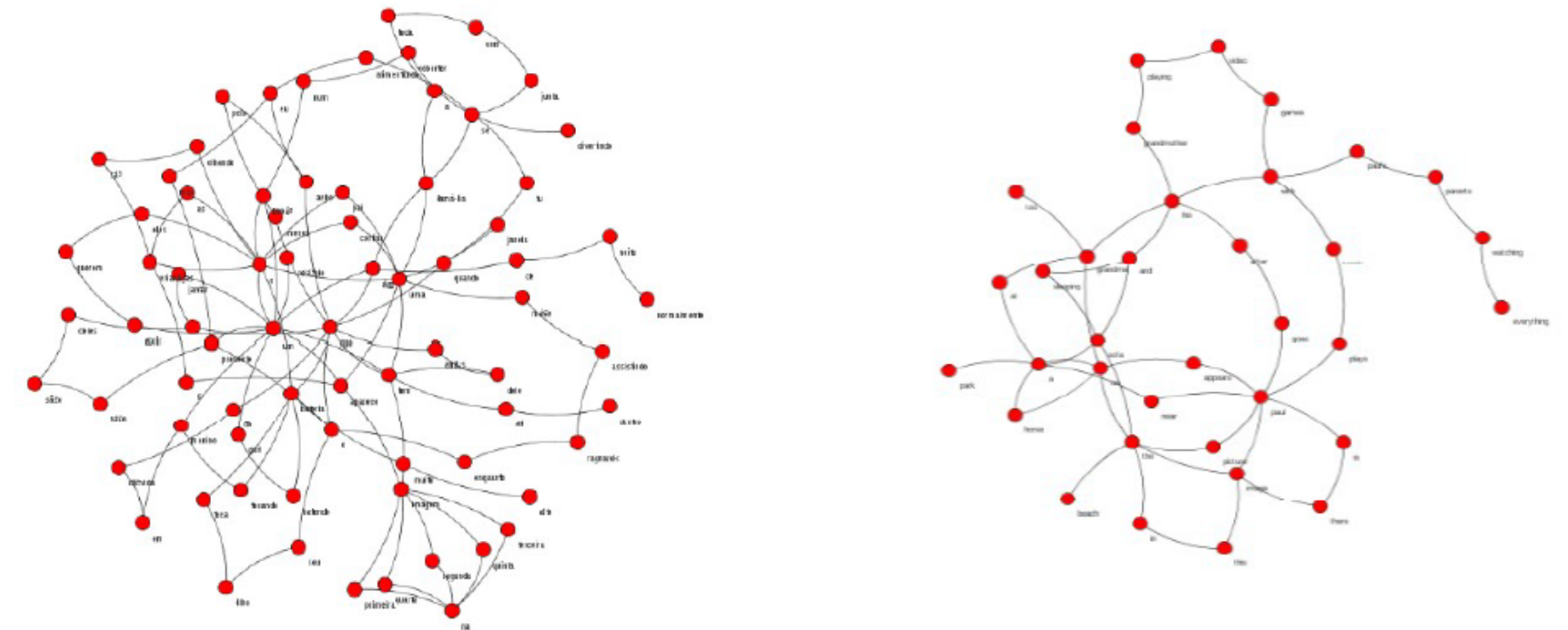
*Connectivity Scores (LSC) of High-connected Texts in L1 and L2 of the Same Participant*



*L1 = 150 L2 = 138*

**Figure 5**

*Connectivity Scores (LSC) of Low-connected Texts in L1 and L2 of the Same Participant*



*L1 = 90 L2 = 41*

# T-Units

To measure the syntactic complexity.

A T-Unit is a main clause and all subordinate clauses that are attached to it.

In this study, T-Units were used to provide us with linguistic information and are related to graph analysis data with the goal of potentialising the use of graphs to investigate the students' written production in both languages.

**Table 1**

*Descriptive Statistics of Measures of Connectivity and Syntactic Complexity*

	L1 Portuguese			L2 English		
	<i>n</i>	M	SD	M	SD	
LSC	50	111.52	38.07849	84.42	25.91871	
LCC	50	116.0	37.9121	88.23	25.59035	
T-units	50	21.80	9.30657	18.6	6.298688	

*Note:* *n* = number of participants; M = mean; SD = standard deviation; LCC= Largest Connected Component; LSC = Largest Strongest Connected Component; T-units = measure of syntactic complexity

# Results and discussion

The results from both analyses (graph and T-Units) revealed an advantage for the L1 Portuguese written production, as expected: higher connectivity and larger count of T-Units in L1.

It indicates a moderate positive correlation between the connectivity (thought organisation) and the levels of syntactic complexity in both languages: parallel between connectivity in both languages.

It demonstrates that, as children advance in the development of more complexity writing strategies in PB, they progress in their written production in English to the same extent.

According to other authors, **literacy development possibly transfers across languages.**

**A direct relationship between thought connectivity measures and syntactic complexity in both languages.**

**As children advance in their written production in Portuguese, they seem to progress in their written in English to the same extent.**





## E QUANDO A ALFABETIZAÇÃO OCORRE SIMULTANEAMENTE EM DUAS LÍNGUAS? REFLEXÕES SOBRE O BILETRAMENTO A PARTIR DA ANÁLISE DE TEXTOS DE CRIANÇAS BILÍNGUES And when literacy happens simu....


Article · September 2019

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<a href="http://dx.doi.org/10.15448/1984-4301.2020.4.37528">http://dx.doi.org/10.15448/1984-4301.2020.4.37528</a>	

SEÇÃO: ARTIGOS

### Biliteracia e educação bilíngue: Contribuições das Neurociências e da Psicolinguística para a compreensão do desenvolvimento da leitura e escrita em crianças bilíngues

*Biliteracy and bilingual education: Neurosciences and Psycholinguistics contributions to the comprehension of reading and writing development in bilingual children*

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[lubrentano@gmail.com](mailto:lubrentano@gmail.com)

**Resumo:** O presente artigo tem como objetivo discutir conhecimentos advindos de pesquisas nas Neurociências e na Psicolinguística sobre alguns dos processos linguísticos e cognitivos envolvidos no desenvolvimento da leitura e da escrita em crianças bilíngues. Para isso, são apresentadas reflexões sobre quatro questões que ilustram dúvidas constantes de pais e educadores que atuam em contextos de educação bilíngue.

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Bolsista produtividade CNPq.  
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[ingrid.finger@ufrgs.br](mailto:ingrid.finger@ufrgs.br)

**Palavras-chave:** Bilinguismo. Biliteracia. Alfabetização em duas línguas. Leitura e escrita em duas línguas.

**Abstract:** This article aims to discuss knowledge from research in Neurosciences and Psycholinguistics about some of the linguistic and cognitive processes

ABRALIN AO VIVO

## Psicolinguística

Da Mente à Escola

Mesa redonda

01.06.2020, 14h

Psicolinguística: da Mente à Escola  
Com Ingrid Finger, Ricardo de Souza e Janaina Weissheimer\_Abralin ao Vivo - Linguists Online  
[youtube.com](https://youtube.com)

## Caminhos das Letras: uma experiência de integração

Lúcia Sá Rebello  
Valdir do Nascimento Flores  
(Organizadores)



Caminhos das Letras: uma experiência de integração | 47

## PSICOLINGUÍSTICA DO BILINGUISMO

Ingrid Finger\*

## ANNUAL REVIEWS

*Annual Review of Linguistics*

## The Advantages of Bilingualism Debate

Mark Antoniou

The MARCS Institute for Brain, Behavior and Development, Western Sydney University, Penrith, New South Wales 2751, Australia; email: [m.antoniou@westernsydney.edu.au](mailto:m.antoniou@westernsydney.edu.au)

Annu. Rev. Linguist. 2019. 5:1.1-1.21

The *Annual Review of Linguistics* is online at [linguist.annualreviews.org](https://linguist.annualreviews.org)

<https://doi.org/10.1146/annurev-linguistics-011718-011820>

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### Keywords

bilingual, advantage, debate, executive functions, dementia, plasticity

### Abstract

Bilingualism was once thought to result in cognitive disadvantages, but research in recent decades has demonstrated that experience with two (or more)

ivíduos têm potencial para adquirir e usar a língua ou as línguas expostos desde a infância. Mas muitos são também capazes de falar em mais de um idioma. Atualmente, o número de pessoas capazes de se comunicar somente em um idioma, sendo que as línguas adicionais que dominamos são aprendidas após a língua materna ter sido adquirida. Essa constatação nas últimas três décadas, a um aumento considerável no inter-

INTERNATIONAL SYMPOSIUM ON BILINGUALISM LECTURE  
(Sponsored by Cambridge University Press)

## Bilingualism: The good, the bad, and the indifferent\*

ELLEN BIALYSTOK  
*York University*

### Cooking Pasta in La Paz: Bilingualism, Bias and the Replication Crisis

Thomas H Bak

*University of Edinburgh, UK*

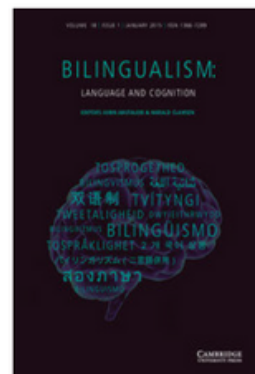
Submission to the special issue of "Linguistic Approaches to Bilingualism" on "Bilingualism and Executive Functions"

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## Bilingualism and cognition

VIRGINIA VALIAN

Bilingualism: Language and Cognition / Volume 18 / Issue 01 / January 2015, pp 3 - 24  
DOI: 10.1017/S1366728914000522, Published online: 27 November 2014

# Bilingualism delays age at onset of dementia, independent of education and immigration status

2013

Suvarna Alladi, DM  
Thomas H. Bak, MD  
Vasanta Duggirala, PhD  
Bapiraju Surampudi, PhD  
Mekala Shailaja, MA  
Anuj Kumar Shukla,  
MPhil  
Jaydip Ray Chaudhuri,  
DM  
Subhash Kaul, DM

Original Article

International  
Journal of  
Bilingualism

## The impact of bilingualism on executive function in adolescents

International Journal of Bilingualism  
1–13  
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SAGE

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York University, Canada

Cari Himel  
Cornell University, USA

Ellen Bialystok  
York University, Canada



Review

## A Bilingual Advantage? An Appeal for a Change in Perspective and Recommendations for Future Research

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<sup>2</sup> School of Psychology, University of Birmingham, Birmingham B15 2TT, UK  
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# Obrigada!

Stefanie Martin  
ACESIN, 2022