WISINTAINER, D. S.; MOTA, M. B. Processing figurative and literal phrasal verbs: a study with speakers of English as L2 and L1. *ReVEL*, v. 23, n. 44, 2025. [www.revel.inf.br].

Processing figurative and literal phrasal verbs: a study with speakers of English as L2 and L1

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RESUMO: Verbo frasal é definido como um verbo e uma partícula que é tipicamente homônima com um advérbio ou uma preposição. A polissemia é uma das características importantes dos verbos frasais, já que seus significados variam em uma escala que abrange significados que podem ser puramente composicionais àqueles que são altamente idiomáticos. Em relação aos verbos frasais composicionais, o conjunto do verbo e da partícula é transparente, ou seja, seu significado é totalmente literal. Por outro lado, no caso dos verbos frasais idiomáticos não é possível inferir o significado de toda a combinação a partir do significado de seus elementos individuais. Ou seja, o significado dos verbos frasais idiomáticos é figurativo. Tendo isso em mente, nosso estudo analisou os usos literais e figurativos de verbos frasais por vinte e dois falantes nativos de inglês (L1) e vinte e dois falantes avançados de inglês como L2, que foram solicitados a realizar uma tarefa de leitura automonitorada. Os participantes leram sentenças contendo significados literais de verbos frasais (e.g., break down) e seus significados correspondentes de verbos lexicais (e.g., split), significados figurativos de verbos frasais (e.g., break down) e seus significados correspondentes de verbos lexicais (e.g., erupt). Os resultados revelaram maior tempo de resposta para verbos frasais, comparativamente ao tempo de resposta para verbos lexicais, em ambos os grupos, indicando que verbos frasais apresentam maior custo de processamento e que falantes nativos e não nativos de inglês processam significados literais e figurativos de verbos frasais de maneira semelhante.
PALAVRAS-CHAVE: Verbos Frasais; Processamento; Leitura Automonitorada.

ABSTRACT: Phrasal verb is defined as a verb and a particle which is typically homonymous with an adverb or a preposition. Polysemy is one of the important features of phrasal verbs, since their meanings range on a cline from purely compositional to highly idiomatic. In relation to the compositional phrasal verbs, the arrangement between the verb and the particle are transparent, that is, their meaning is fully literal. On the other hand, in the case of idiomatic phrasal verbs it is not possible to infer the meaning of the whole combination from the meaning of their individual elements. In other words, the meaning of idiomatic phrasal verbs is figurative. Bearing this in mind, our study looked at the literal and figurative uses of phrasal verbs for twenty-two native speakers of English (L1) and twenty-two advanced speakers of English as L2, who were asked to perform a self-paced reading task. The participants read sentences containing literal meanings of phrasal verbs (e.g., break down), and their correspondent meanings of lexical verbs (e.g., split), figurative meanings of phrasal verbs (e.g., break down), and their correspondent meanings of lexical verbs (e.g., erupt). The results revealed longer response times for phrasal verbs in comparison to response times for lexical verbs for both

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groups, it indicates that phrasal verbs present a higher processing cost and native and nonnative speakers of English process literal and figurative meanings of phrasal verbs in a similar manner.
KEYWORDS: Phrasal Verbs; Processing; Self-paced Reading.

Introduction

The term phrasal verb is defined as a verb and a particle which is typically homonymous with an adverb and a preposition, as seen in "**take in**". Polysemy is one of the important features of phrasal verbs: their meanings range on a cline from purely compositional to highly idiomatic (Thim, 2012). In relation to the compositional phrasal verbs, the arrangement between the verb and the particle are transparent, that is, their meaning is fully literal, as seen in "We'd better **take in** the children's toys" meaning "**carry inside**". On the other hand, in the case of idiomatic phrasal verbs it is not possible to infer the meaning of the whole combination from the meaning of their individual elements, that is, the meaning of an idiomatic phrasal verb is figurative, as seen in "I'm not surprised he was **taken in**, he's as gullible as a child" meaning "**deceive**" (Thim, 2012: 11-12). Phrasal verbs are complex and challenging structures for bilinguals to learn, process and use.

As stated by Rodríguez-Puente (2019: 1), phrasal verbs present some problems for nonnative speakers because: (1) their verbal base meanings are different from the meanings of their combinations, as seen in "**give"** vs. "**give up**"; (2) the association of two or three elements results in a new composition, in which the meaning of the individual elements does not express the new sense, as seen in "**fall out"** means "**argue**". These features, especially in the case of phrasal verbs, belong to Germanic languages, such as German and Dutch. On the other hand, Brazilian Portuguese seems to lack these structures "**verb + particle**". What we use is a structure called pleonasm, which expresses repetition of an idea and is seen as useless, as seen in "**entra para dentro"** meaning "**step inside**" (Cunha; Cintra, 2016: 639).

There is evidence that native speakers process figurative phrasal verbs faster than literal phrasal verbs (Matlock; Heredia, 2002). However, some researchers show that comprehension of phrasal verbs (especially those with figurative meanings) is not necessarily problematic for nonnative speakers (Paulmann; Ghareeb-Ali; Felser, 2015). In these terms, the current study aims to contribute to the discussion on whether L1 Brazilian Portuguese speakers of L2 English and native English speakers

are sensitive to the semantic similarity that exists between phrasal verbs and one-word verbs. More specifically, investigating the processing of phrasal verbs can elucidate whether native and nonnative speakers of English show processing advantage for literal (transparent) phrasal verbs or figurative (opaque) phrasal verbs.

In the present study, we aim to address how literal and figurative phrasal verbs are processed. In order to pursue this key question, we designed a self-paced reading experiment to investigate how speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English process phrasal verbs in comparison to one-word lexical verbs.

1. On the nature of phrasal verbs

According to various researchers (e.g., Howarth, 1998; Erman; Warren, 2000; Foster, 2001) at least one third to one-half of language is composed of formulaic language[3]. Thus, formulaic language is widely used and is much more than "strings of words linked together with collocational ties", as stated by Conklin and Schmitt (2008: 73). Wray (2002: 9) defines formulaic language as "a sequence, continuous or discontinuous, of words or other elements, which is, or appears to be, prefabricated: that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation or analysis by the language grammar". Instances of formulaic language include idioms (e.g., kick the bucket), collocations (e.g., high temperature), metaphors (e.g., time is money), and phrasal verbs (e.g., give up). In accordance with Wray (2002), in the present study, phrasal verbs are considered formulaic sequences.

According to Thim (2012), the term phrasal verb was first used by Logan Pearsall Smith's[4] (1925) work **Words and Idioms**. Since then, various definitions of the term phrasal verb have been proposed, including verb-particle construction (VPC), particle verb, and verb-particle combination. Thim (2012:10) states that, historically, phrasal verbs in English are cognate constructions of Germanic languages, sharing semantic and syntactic aspects of formulaic language. Comparing English phrasal verbs to phrasal verbs in German, Thim (2012:10) shows, for instance, that in German the verb construction **aufgeben**, which means **give up** in English, comprises a particle **auf** which is similar to **up** and a verb **geben** is similar

[3] Formulaic language, formulaic sequences, and multiword expressions will be used interchangeably.
[4] Logan Pearsall Smith was an essayist and critic. His work *Words and Idioms* made him an authority on correct English language at that time.

to **give**. Example (1) shows the phrasal verb in German, example (2) shows the English translation word-by-word, and example (3) shows the phrasal verb in English (Thim, 2012: 4):

(1) Alexander **gab** das Cellospielen **auf**.

(2) Alexander **gave** the cello: playing **up**.

(3) Alexander **gave up** playing the cello.

It is noted that there is (some) syntactically and semantically one-to-one correspondences between English and German phrasal verbs. Another example of a phrasal verb in German is **aufmachen**, which means **open** in English. This verb construction consists of a particle **auf** and verb **machen,** similar to **make**. Example (4) shows the phrasal verb in German, example (5) shows the English translation word-by-word, and example (6) shows the phrasal verb in English (Thim, 2012: 4):

(4) Wenzel sagt dass Eva die Tür **aufmachen** wird.

(5) Wenzel says COMP Eva the door **up**: **make**.

(6) Wenzel says that Eva will **open** the door.

In contrast to the examples (1), (2) and (3), it can be observed that there is neither syntactic nor semantic one-to-one correspondences in (4) and (6). Hence, it is possible to conclude that, despite bearing some correspondence, German phrasal verbs function differently from English ones. In German, example (1) shows the particle **auf** after the verb, and in example (4) the particle **auf** comes before the verb. In English, on the other hand, example (3) shows the particle **up** after the verb, and example (6) is not a phrasal verb. In sum, this particle flexibility does not apply to English, in which the particle always comes after the verb and separated from the verb. However, in Old English, the particle may come either before or after the verb. According to Thim (2012), the postposition of the particles is the first syntactic change in English which is connected to the basic change of word order in the history of English.

Regarding the semantic aspect, the developments of particle verbs is very similar in Germanic languages nowadays. In the earliest stages, it was common to find compositional combinations of motion and spatial particles (Thim, 2012: 5). In relation to non-compositional phrasal verbs, their emergence took place through the combination of a verb and an aspectual particle, which having started functioning as a phrasal verb, bears **metaphorization,** as stated by Rodríguez-Puente (2012). Rodríguez-Puente (2012) explains that metaphor is the key point to create non-

compositional meanings. Thus, in order to have opaque meanings at present day, phrasal verbs underwent **metaphorization** more than once throughout the history of the English language.

According to Thim (2012: 13) phrasal verbs can be divided into two types: those with compositional meanings and those with non-compositional meanings. In phrasal verbs with compositional meanings, the verb combines with a particle and the whole construction is transparent from the meaning of its constituents. Moreover, the particle can introduce the concept of a goal or an endpoint to durative situations. For instance, the function of the particle "up" is to emphasize the meaning of the verbal base "finish", when they are combined "finish up", as exemplified by "the girl finished up her meal" means that "she completed eating her meal". In phrasal verbs with non-compositional meanings, it is not possible to infer the meaning of the construction from the meaning of their separate elements, that is their meaning is non-transparent, as seen in "**figure out"** meaning "understand".

There are two classes within the compositional constructions: the directional construction and the aspectual construction. In relation to the directional construction, the arrangement between a verb and a directional particle is transparent, that is, it is possible to determine the meaning of the whole sequence, as seen in "**come in**". The directional particle construction **come in** means **go inside a place**, that is, the particle expresses the direction of the action of the verb.

With regard to the aspectual constructions, as in "**use up**", the particle **up** has a peculiar characteristic which introduces the concept of a goal or an endpoint to durative situations. In sum, the aspectual and the directional constructions can be considered literal combinations.

The non-compositional category is very different from the directional and aspectual construction, especially in terms of the semantic aspect. In the non-compositional constructions, it is not possible to infer the meaning of the whole combination from the meaning of their individual elements, that is, the non-compositional meaning is non-transparent. Non-compositional constructions are also known as either figurative phrasal verbs or idiomatic verb-particle combinations. Another aspect that characterizes these idiomatic constructions is the position of the particle and the verb, in that the particle always comes after the verb, as seen in "**give up"** not "**up give**".

According to Thim (2012), there is a tendency for compositional constructions to appear in split order, "George **ate** the food **up**", while idiomatic combinations show a clear tendency to appear in joined (adjacent) order. For instance, phrasal verbs may be intransitive, as in the following examples taken from Thim (2012: 21):

(7) Your children will **grow up**.

(8) The whole house **blew up**.

(9) My mother **freaked out**.

As stated by Thim (2012), these phrasal verbs are non-compositional constructions and are considered fixed expressions. In transitive phrasal verbs, the object may come either before the particle or after the particle if the object is a full noun phrase, as in examples (10) – (11) and (12) – (13) respectively (Thim, 2012: 22):

(10) I can **put out** the announcement.

(11) They never **blew up** the houses.

(12) I can **put** the announcement **out**.

(13) They never **blew** the houses **up**.

In case the object is a pronoun, it will normally precede the particle as in:

(14) I **put** it **out**.

(15) They **blew** them **up**.

According to Thim (2012: 27), the distinctions between phrasal verbs and prepositional verbs are syntactic, semantic and prosodic, as can be seen in Table 1 as follows.

Phrasal verb	Preposition
a. She **looked up** the number.	She **looked at** the book.
b. (...the number) which she **looked up**.	(...the book) which she **looked at**.
c. *She **looked** carefully **up** the number.	She **looked** carefully **at** the book.
d. She **looked** the number **up**.	*She **looked** the book **at**.
e. She **looked** it **up**.	*She **looked** it **at**.
f. *She **looked up** it.	She **looked at** it.
g. *(...the number) **up** which she **looked**.	(...the book) **at** which she **looked**.
h. *It was **up** the number that she **looked**.	It was **at** the book that she **looked**.
i. Which number did she look **u**p?	Which book did she l**o**ok at?

Table 1: Characteristics of phrasal verbs and prepositional verbs

For example, in (a) and (b) the positional characteristic is similar, but **up** is a particle and **at** is a preposition. In (c) adverbs cannot separate a verb and a particle, as in she looked **carefully** up the number. In (d) long noun phrases and (e) object pronouns cannot separate a verb and a preposition, as in **she looked the book at or she looked it at**, respectively. In (f) object pronouns cannot be inserted at the end of a sentence. In (g) and (h) pied-piping or clefting are only possible with prepositions. Finally, in (i) particles are stressed.

1.1 Representation and processing of formulaic language

According to Van Lancker Sidtis (2015), native speakers know the complex details of formulaic language, such as their meaning and form. On the other hand, nonnative speakers need to encounter formulaic sequences frequently to learn and use them, and this is a way to store these expressions in memory as well (Conklin; Carrol, 2018). With regard to the frequency, Wray (2002) states that the frequent use of formulaic language influences how these expressions are represented in the mental lexicon of a nonnative speaker. A frequency-based approach to formulaic language is supported by a number of studies (e.g., Sosa; Macfarlane, 2002; Bod, 2000, 2001; Arnon; Snider, 2010; Bannard; Matthews, 2008; Tremblay; Derwing; Libben; Westbury, 2011) that suggest that the more frequent formulaic language is, the more likely it is to be represented as a chunk in memory stored as a single unit, which facilitates the initial processing and subsequent recall from working memory.

Besides frequency effects, there is a debate on how these formulaic sequences are processed: if they are processed as a single unit or as individual units. Some studies endorse the compositional approach to formulaic language by claiming that formulaic sequences are decomposed during recognition (e.g., Badecker, 2001; Badecker; Allen, 2002; Juhasz, 2007; Libben, 1998). However, Pollatsek, Hyona and Bertram (2000) argue that formulaic sequences are processed in parallel, meaning that processing takes place via the individual words and via the holistic representation of the compounds.

In fact, different factors influence the processing and representation of formulaic language. Some of these factors are context, saliency, familiarity, semantic issues, compositionality, and idiomaticity. Therefore, in order to understand the key

tenets of processing and representation of formulaic language, the Hybrid Model and the Literal-Salience Resonant Model are next.

Sprenger and collaborators (2006) argue that idioms exist as individual word forms (**lemmas**) and a lexical-conceptual entry as a whole (**a superlemma**). This superlemma entry has three features: it is linked to each of the components of lemmas, defines syntactic properties, and comprises information on the phrase level meaning of the idiom. The activation of the superlemma occurs in encountering the component words of an idiom, which consequently activates the idiomatic meaning. The individual lemmas are also activated, resulting in a domino effect, as can be seen in Figure 1.

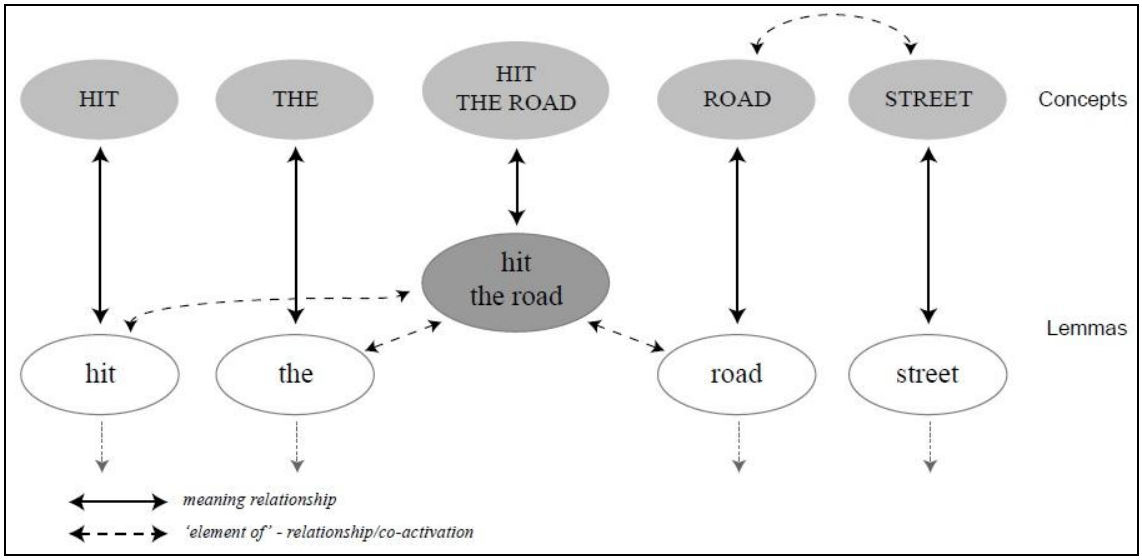

Figure 1: Representation of the idiom hit the road according to the Hybrid model. Source: Sprenger *et al.* (2006: 176)

Sprenger and collaborators (2006) investigated idioms by means of three different experiments by a group of undergraduate students, native speakers of Dutch. In Experiment 1 participants produced idioms or literal phrases. In Experiment 2 participants completed idioms. In Experiment 3 participants completed idioms or named idioms. Their results demonstrate that the component word *road* primed the idiom **hit the road** to a greater degree in comparison to the literal version **clean the road**. This result suggests that the activation takes place in the individual component lemmas and in a whole entry simultaneously. Although this model was originally designed for idiom production, it is widely used in the literature on idiom and phrasal verb processing and representation (e.g., Holsinger; Kaiser, 2013; Tabossi *et al.*, 2009; Titone *et al.*, 2015).

A nonnative speaker model of the processing of literal language is presented by Cieślicka (2006). The author proposes the Literal-Salience Resonant Model of L2 idiom comprehension, which assumes that literal meanings enjoy a more salient status than figurative meanings. That is, literal meanings have a higher salience status in online idiom processing. According to this literal salience major assumption, L2 learners process literal meanings faster than figurative meanings regardless of context, familiarity, and figurative interpretation. Cieślicka's assumption posits that literal meanings will be activated faster than figurative meanings. That is, for L2 learners, literal meanings will always be more salient than figurative meanings. According to Cieślicka (2006: 121) salient meanings are activated first due to the fact that "their representations in the mental lexicon are much more strongly encoded than those of the less salient meanings". Additionally, the author argues that literal salience has do with the way L2 learners acquire the L2 language, that is, they first encounter literal meanings through formal instruction, and then have contact with figurative meanings. Therefore, literal meanings are already established in the mental lexicon, which facilitates the access to them and their subsequent processing.

According to Carrol (2015: 73), the Hybrid Model accounts for the processing and representation of formulaic sequences, such as idioms. In the present study, the Hybrid Model can be applied to examine phrasal verbs to consider each unit and the whole phrase. In relation to the Literal-Salience Resonant Model, it can contribute to the idea that literal meanings are processed faster than figurative meanings for nonnative speakers.

1.2 Evidence from psycholinguistic studies

Evidence suggests that nonnative speakers of English process phrasal verbs differently from and native speakers. For instance, using an online reading task, Matlock and Heredia (2002) investigated the processing of figurative phrasal verbs "**Paul went over the exam with his students**" and their identical verb-preposition combinations used literally "**Paul went over the bridge with his bicycle**". The authors found that, for native speakers and early bilinguals, figurative meaning is highly familiar and always activated before literal meaning. However, for the late bilingual group, literal meaning (verb-preposition combinations) was processed first. These results are in line with Littlemore and Low (2006: 3-4), who

explain that learners may approach figurative language analytically. They call this approach "figurative thinking". The authors suggest that nonnative speakers take more time processing figurative language due to the fact that they try to analyze each component of the figurative multiword item, as seen in "**to figure out**", and this slows down their processing, mainly, in those figurative items which are seen for the first time by nonnative speakers.

On the other hand, Paulmann, Ghareeb-Ali and Felser (2015) favor the figurative meaning first hypothesis (Gibbs, 1980). The authors investigated the cognitive mechanisms underlying the processing of phrasal verbs by monolingual (native English) and bilingual (native Arabic) speakers, in an event related potential study (ERPs). They compared ERPs elicited in response to when and how figurative "**I heard that Mr. Smith ran over the old farmer early this morning**" and literal meanings "**I heard that Mr. Smith ran over the old bridge early this morning**" are accessed. Their results showed that monolinguals and bilinguals used similar processing mechanisms when processing phrasal verbs. In addition, figurative sentence interpretations were favored by bilinguals.

Holsinger and Kaiser (2013) investigated phrasal verbs with idiomatic and literal meanings, as seen in "**look up", "turn in**", by means of a word-by-word self-paced reading task by native speakers of American English. Their results revealed that real-time processing is longer when participants expected literal interpretation when it is an idiomatic sentence in relation to expected idiomatic interpretation when it is a literal sentence. They interpreted these results as evidence that participants favored literal processing in comparison to figurative processing. That is, literal interpretation was the default.

The present study aimed at investigating how speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English process phrasal verbs in comparison to one-word lexical verbs. A secondary aim was to explore whether there were differences in the processing of figurative phrasal verbs and literal phrasal verbs by Brazilian Portuguese speakers of English as L2, compared to native speakers of English. Based on these objectives, the present study addresses the following research questions:

RQ1: Are there any differences in processing the figurative and literal versions of phrasal verbs compared to one-word lexical verbs?

RQ2: What are the effects of language dominance in processing the figurative vs. literal meanings of phrasal verbs? **2. Method**

2.1 Participants

Volunteers who completed all phases of the experiment and fulfilled the required criteria took part in the present study. These participants were divided into two groups:

Group 1 (the experimental group) consisted of twenty-two advanced speakers of English as L2, native speakers of Brazilian Portuguese (eleven females). According to the information they provided in a biographical questionnaire, the participants of this group started to learn English as L2 at around the age of 10. They reported using English at home, at work, and at university on a daily basis. All participants took the Exam English, an online test of grammar and vocabulary, which showed they were at an advanced level of proficiency in English (all scored at levels C1 and C2 of the Common European Framework of Reference for Languages - CEFR). With respect to their education background, six participants were undergraduate students, four participants held a bachelor's degree, three of them were graduate students, and nine of them had a graduate degree (MA or PhD). Eight participants reported having a degree in Linguistics. In relation to time spent abroad, thirteen participants reported having spent at least 2 months abroad and nine of them reported having never been abroad. Thirteen participants also reported knowing at least two languages besides their mother tongue, Brazilian Portuguese. This data is summarized in Table.

	Age	**Age of English learning**	**Level of English**	**Knowledge of other languages**
Range	19 - 60	3 – 17	C1 - C2	1 - 4
Mean	30.2 (8.62)	10.9 (3.67)	-	2.1 (1.14)

Table 2: Summary information on Brazilian Portuguese Speakers of English as L2 – the experimental group. Standard Deviation in brackets

Group 2 (the control group) consisted of twenty-two native speakers of different varieties of English (American, British, Canadian, and New Zealander English - eighteen females). According to the information they provided in a biographical questionnaire, eight participants were from the United Kingdom, twelve were from the United States of America, one participant from Canada, and one from

New Zealand. Considering their education background, one participant was a high school student, eight participants held a bachelor's degree, seven held a master's degree, five were PhDs, and one participant did not answer that question. Nine participants reported having a degree in Linguistics. Most of the native speakers of English reported having little knowledge of Portuguese, and just three participants were fluent in Portuguese. Sixteen participants reported having never been to Brazil. Eighteen participants also reported knowing one language besides their mother tongue. The data is summarized in Table 3.

	Age	**Nationality**	**Knowledge of other languages**	**Knowledge of Portuguese**
Range	19 - 81	USA/UK/ Canada/ New Zealand	0 - 5	No - Fluent
Mean	36.4 (17.58)	-	1.8 (1.43)	-

Table 3: Summary information on Native Speakers of English – the control group. Standard Deviation in brackets

2.2 Instruments

Three instruments for online data collection were used: (1) a Biographical Questionnaire, (2) a Proficiency Test, and (3) a Sentence Processing Task with phrasal verbs and lexical verbs in English. The three instruments were held on an online form on the Google Forms platform.

2.2.1 The biographical questionnaire

After agreeing to participate in this study, the L2 English speakers and native speakers of English filled out an online biographical questionnaire. The questionnaire for the L2 English speakers comprised questions related to their general personal information, their education background, and their learning of English as an L2; besides that, information on whether they had been diagnosed with neurocognitive disorders was collected.

The questionnaire for the native speakers of English included questions related to their general personal information, their education background, their knowledge of languages and their knowledge of Brazilian Portuguese. In addition,

information on whether they had been diagnosed with neurocognitive disorders is also required.

2.2.2 The proficiency test

The proficiency test was a free online grammar and vocabulary level test, which can be found on the website Exam English[5].

There were 15 questions in this test and at the end of the test the participant's level was assessed according to the CEFR (A2 to C2). Participants could choose to have the results sent to their email address. Questions got easier or harder according to the participant's answers. The participants of the experimental group - Brazilian speakers of English as L2 - were selected according to their scores on this grammar and vocabulary test. To be included in the study, the participant had to achieve an advanced level (C1 or C2) of English.

2.2.3 The sentence processing task

The design of the sentence processing task consisted of 6 stages, as shown in Figure 2.

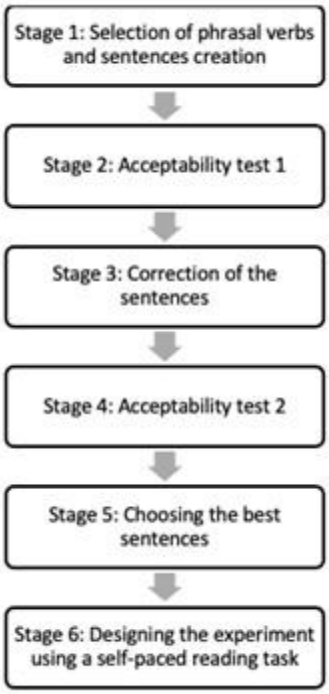

Figure 2: Flow Diagram of the experimental design

[5] http://www.examenglish.com/leveltest/grammar_level_test.htm.

Regarding stage 1, phrasal verbs (PVs) were selected from Garnier and Schmitt (2016). The main criteria to select the PVs was that they have both figurative and literal meanings. From a list of 40 items, 22 PVs were selected. The study of Garnier and Schmitt (2016) provided the frequencies of each meaning of PVs. The lexical verbs were selected from the PHaVe List (Garnier; Schmitt, 2015) and their frequency was verified on the website of the Corpus of Contemporary American English (COCA). The lexical verbs were selected according to their matching with a figurative or literal meaning of each phrasal verb, and the lack of a cognate form in Brazilian Portuguese. Brazilian Portuguese seems to lack phrasal verb structures, as observed in structures like "**verb + particle**". What we use is a structure called pleonasm, which expresses repetition of an idea and is seen as useless, as seen in "**entra para dentro"** meaning "**step inside**" (Cunha; Cintra, 2016: 639).

Means for the frequency of phrasal verbs and one-word lexical verbs can be seen in Table 4.

	Phrasal Verbs	**Lexical Verbs**
Figurative Meaning	3.2 (2.1)	7.4 (13.2)
Literal Meaning	4.8 (4.4)	45.2 (91.5)

Table 4: Means for the frequency of figurative and literal meanings of phrasal verbs and one-word lexical verbs. Standard Deviation in brackets

As shown in Table 4, the lexical verbs that correspond to literal phrasal verbs are much higher in frequency than the lexical verbs that correspond to figurative phrasal verbs.

Means for the length of phrasal verbs and one-word lexical verbs can be seen in Table 5.

	Phrasal Verbs	**Lexical Verbs**
Figurative Meaning	8.4 (1.6)	7 (1.5)
Literal Meaning	8.4 (1.6)	5.9 (1.6)

Table 5: Means for the length of figurative and literal meanings of phrasal verbs and one-word lexical verbs. Standard Deviation in brackets

All sentences were created by the authors, who were aided by other members of the same lab. We created 88 sentences, including a mix of transitive and intransitive PVs. As can be seen in Table 6, each sentence consisted of 12 regions. In creating these, target and control words were always placed in a central area of interest (AOI) preceded by 5 words and followed by 6 words. Following Rayner and

Pollatsek (2006), the target and control words were never presented in initial or final position in a line. Areas 5 and 8 were controlled for the number of characters of the words - area 5 has from 6 to 9 characters and area 8 has from 4 to 7 characters. Area 8 is the post region of interest and, therefore, it is the potential spillover area (SOA).

Areas	**1**	**2**	**3**	**4**	**5**	**6 AOI**	**7**	**8 SOA**	**9**	**10**	**11**	**12**
FPV	I	heard	that	the	actress	**broke down**	in	**tears**	after	her	acceptance	speech.
LVFig	I	heard	that	the	actress	**erupted**	in	**tears**	after	her	acceptance	speech.
LPV	I	heard	that	the	actress	**broke down**	the	**table**	into	three	small	pieces.
LVLit	I	heard	that	the	actress	**split**	the	**table**	into	three	small	pieces.

Table 6: Examples of sentences with phrasal verbs and lexical verbs.Note: FPV means Figurative Phrasal Verb; LVFig means Figurative Lexical equivalent; LPV means Literal Phrasal Verb; LVLit means Literal Lexical equivalent

Stage 2 was to ensure that the sentences were known by native speakers of English, so they were included in an acceptability test where 46 native speaker participants rated each sentence for how acceptable it was on a five-point scale (M = 2.5; SD = 0.2). In stage 3, sentences that scored the lowest for acceptability were corrected, then another acceptability test was designed.

In stage 4, thirty-one native speakers of English rated 88 sentences for how acceptable they were on a five-point scale (M = 3; SD = 0.2). In stage 5, a final list of 80 sentences that scored highest was created. Additionally, 64 filler sentences, selected from Wisintainer's master thesis (2016) and 16 from Felicio's master thesis (2018) were added to the list of sentences. The filler sentences had different syntactic structure and verbs from the experimental sentences, as seen in "**The red car hit the tree**".

Finally, stage 6 consisted of designing the sentence processing task, which comprised 160 sentences in English: 40 sentences contained one-word lexical verbs matched to each phrasal verb meaning (20 literal phrasal verbs and 20 figurative phrasal verbs) and 80 sentences consisted of filler sentences. In addition, 160 yes/no comprehension questions were created to follow every single stimulus. In accordance with Jegerski (2014: 34), comprehension questions serve to ensure that participants are engaged in the task, and they are paying attention to the experimental stimuli. The sentence processing task was programmed on JavaScript language using

JsPsych[6] library (De Leeuw, 2015) and was hosted on the website Cognition[7]. A standard one-word moving-window paradigm was used to build the task.

The stimuli were divided into 2 lists, each list contained 120 sentences - 40 were experimental sentences and 80 were filler sentences. As can be seen in Table 7, each list comprised different experimental items, for example: **list 1** - break down with a figurative meaning/split and **list 2** - break down with a literal meaning/erupt.

Meaning	List 1	Meaning	List 2
Figurative	Break down	Literal	Break down
Literal	Split	Figurative	Erupt

Table 7: Example of the experimental items displayed in the lists

2.3 Data collection procedures

The data was collected remotely, and participants took part in this study using their own computer/laptop. Participants accessed this study through a website page[8]. The present study was submitted to the institutional review board at the Federal University of Santa Catarina and was approved under number 13367319.1.0000.0121.

After choosing to participate in this study, the volunteers were led to a form on Google Forms platform. There, they had to give their email address to receive a version of the Free and Informed Consent Form. After reading and agreeing to participate in this study, participants filled out a biographical questionnaire, performed a proficiency test (only L2 English speakers), and, finally, performed the self-paced reading task.

A standard one-word moving-window self-paced reading task was performed by all participants, and they were instructed before starting the task. The participants completed three practice trials to understand how the main experiment worked. Before each sentence, a fixation cross appeared for 1 second, in order to help the participants to fixate their eyes in the initial point of each sentence on the screen. The words of each sentence were initially masked with hyphens (-) on display. Participants pressed the space bar to unmask the words of the sentence once they read one word a new word is revealed, and the previous one is re-masked. A yes/no

[6] https://www.jspsych.org/
[7] https://www.cognition.run/
[8] https://labling.ufsc.br/estudodani-palavras/Estudo-Danielle-W---EN.html

comprehension question was presented right after the sentence. An example of a trial design is displayed in Figure 3.

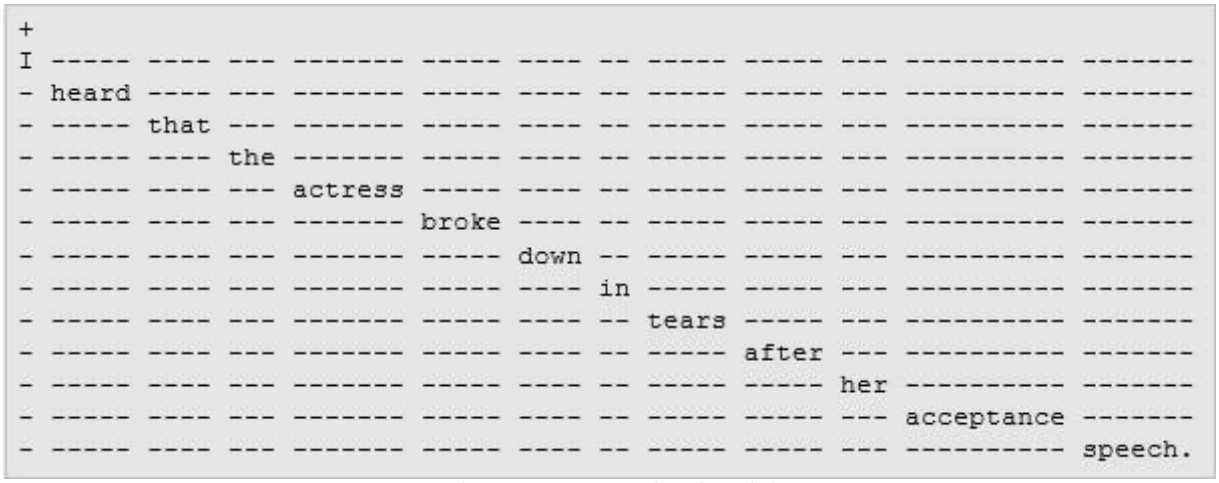

Figure 3: Example of a trial

The words were presented in black font (Monospace, font size 22) on a light gray background. Every target sentence and every filler were followed by a yes-no comprehension question, the answer to which should be given by clicking on Y or N on the keyboard of their computer. There were 120 trials (40 were experimental and 80 were filler sentences). The task was divided into two blocks, each consisting of 60 trials. The order of trial presentation was randomized for each participant and the duration of the optional pause between the two blocks was controlled by each participant (180 seconds optional pause for each participant).

3. Results

All data was analyzed using R (version 3.6.1; R Core Team, 2019) and the R packages lme4 (Bates *et al.*, 2015). Throughout the study, p-values were considered significant at the $\alpha=0.05$ level. We constructed linear mixed effect models with random effects for participants and sentences, looking at magnitude differences between type of verbs (phrasal verbs (PV) vs. lexical verbs (LV), condition (literal vs. figurative) and group (nonnative vs. native speakers of English) as fixed effects. The dependent variables were total reading time and spillover area time for figurative phrasal verbs and their figurative lexical equivalents compared to the differences in reading time for literal phrasal verbs and their literal lexical equivalents. The statistical analysis included both frequency and length of the verbs as covariates. The

self-paced reading task lasted about 29 minutes for nonnative speakers of English and 21 minutes for native speakers of English. Nonnative speakers of English were on average 92% (SD = 4.2%) accurate in answering the comprehension questions, and native speakers of English were on average 95% (SD = 5.3%) accurate in answering the comprehension questions. Reading times slower than 200ms and longer than 3000ms for the whole phrase were excluded. This exclusion corresponded to 3% of the data. Outliers were excluded based on a visual inspection of a raw numerical data. In addition to that, data trimming was applied in accordance with Jergerski (2014: 40), who highlights that less than 200ms reflects unintentional button presses and higher cutoffs should be set at 3000ms. Since the data was not normally distributed, all reading times were log-transformed to reduce skewing.

3.1 Descriptive analysis

Means for the total reading time can be seen in Table 8 and means for the spillover area can be seen in Table 9.

	Figurative (FPV)	**Literal (LPV)**	**Lexical Verb Figurative**	**Lexical Verb Literal**
Total Reading Time:				
Native Speakers of English	707.1(281.2)	723.4(311.3)	388.8(151.8)	400.5(231.1)
Nonnative Speakers of English	951.5(430.7)	953.3(427.9)	575.3(347.7)	548.6(385.04)

Table 8: Native and nonnative reading times (in milliseconds) for figurative and literal phrasal verbs meanings, and lexical verbs equivalents with Standard Deviation in brackets

Mean and standard deviation of the participants' reading times were calculated using only target sentences. The data indicates that both groups read figurative phrasal verbs faster than literal phrasal verbs. Moreover, lexical verbs were read faster than phrasal verbs (see Table 8). The spillover area time data shows that native speakers of English took longer to process lexical verbs than phrasal verbs, and this is a similar behavior for nonnative speakers of English (see Table 9).

	Figurative (FPV)	**Literal (LPV)**	**Lexical Verb Figurative**	**Lexical Verb Literal**

Spillover Area Time:				
Native Speakers of English	348.1(156.5)	367.2(168.9)	380.5(156.1)	395.6(395.2)
Nonnative Speakers of English	482(297.2)	473.6(270.7)	491.2(290.8)	487.8(278.5)

Table 9: Native and nonnative reading times (in milliseconds) for spillover area with Standard Deviation in brackets

3.2 Total reading time

Analysis 1 examined how nonnative and native speakers of English accessed and processed phrasal verbs (the sum reading times of a verb + a particle) in comparison to one-word lexical verbs for the total reading time, as can be found in Table 10.

Total Reading Time			
Fixed effects	***β***	***SE***	***p-value***
Intercept	5.70	8.48	< 2e-16***
Type PV	5.93	3.13	< 2e-16***
Group NNS	3.20	9.00	0.0008***
Frequency	1.32	2.41	0.58
Length	2.34	7.67	0.003**
Type PV: Group NNS	-3.69	2.89	0.20
Random effects	***Variance***	***SD***	
Sentence	0.007	0.08	
Participant	0.084	0.29	
Residual	0.088	0.29	

Table 10: Linear Mixed Effects Model output for type and group for Total Reading Time measure.
Note: Significance values are estimated by the R package lmerTest: ***p< .001, **p< .01, *p≤ .05

In analysis 1, a significant effect was found for type - phrasal verbs between lexical verbs (β=5.93, t=18.9, p< 2e-16). Moreover, there was a significant effect for groups (β=3.20, t=3.56, p< 2e-16). Frequency and length of the verbs were considered as covariates. There was a significant effect of verb length. Figure 4 shows the log reading times for the critical area, which is the two-word region that included the verb and the particle, in the case of a phrasal verb, and the lexical verb region, which included only a one-word verb.

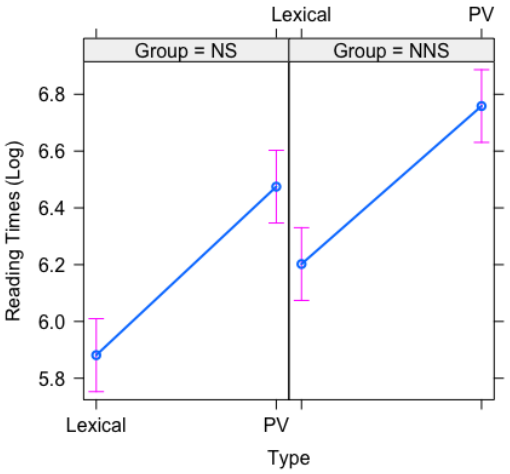

Figure 4: Model fitted L1 and L2 processing time for phrasal verbs and lexical verbs for total reading time. Note: PV means Phrasal Verbs; Lexical means One-word Verbs; NS means Native speakers of English; NNS means Nonnative speakers of English

Lexical verbs were read faster than phrasal verbs for both groups. Since we would not expect any difference on the first word of the phrasal verbs because of the neutral context, we ran a second analysis on only the particles. Analysis 2 compared the lexical verbs, including number of letters as a covariate, to the particles. It is a 2x2 design, with variables: type (PV - particles vs. Lexical) and group (native speakers vs. nonnative speakers), as can be seen in Table 11.

Total Reading Time			
Fixed effects	***β***	***SE***	***p-value***
Intercept	5.79	8.33	< 2e-16***
Type PV	1.37	4.27	0.74
Group NNS	2.92	7.79	0.0004***
Frequency	8.25	2.40	0.97
Length	1.39	8.66	0.11
Type PV: Group NNS	-9.75	3.07	0.0015**
Random effects	***Variance***	***SD***	
Sentence	0.005	0.07	
Participant	0.061	0.24	
Residual	0.097	0.31	

Table 11: Linear Mixed Effects Model output for type (PV - particles vs. Lexical Verbs) and group for Total Reading Time measure. Note: Significance values are estimated by the R package lmerTest: ***p< .001, **p< .01, *p≤ .05

In analysis 2, there was no significant effect for type - particles of phrasal verbs between lexical verbs. On the other hand, a significant effect was found for group (β=2.92, t=3.75, p< 0.001). Moreover, reading times in the particles of phrasal verbs were smaller than reading times in the lexical verbs for the nonnative group, and this difference was significant (β=-9.75, t=-3.16, p< 0.01). Frequency and length of the

verbs were considered as covariates, and they did not affect the processing time. Figure 5 shows the log reading times for the critical area, which was the one-word region that included only the particle, in the case of a phrasal verb, and the lexical verb region, which included a one-word verb.

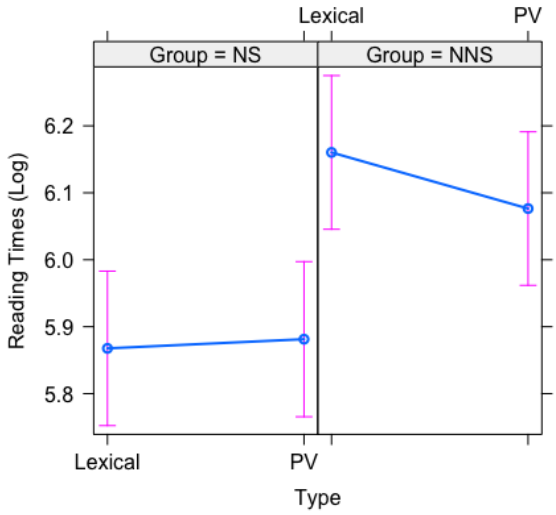

Figure 5: Model fitted L1 and L2 processing time for particles and lexical verbs for total reading time. Note: PV means Phrasal Verbs (only the particles); Lexical means One-word Verbs; NS means Native speakers of English; NNS means Nonnative speakers of English

Native speakers of English processed lexical verbs and particles of phrasal verbs in a similar manner. On the other hand, nonnative speakers of English processed lexical verbs slower than particles of phrasal verbs. Consistently, the phrasal verbs required 2 presses compared to 1 for the lexical verbs, so this lead to longer reading times. Nevertheless, analysis 2 showed that verb length is not a source of difficulty for native speakers of English. As for nonnative speakers of English, verb length played a significant role during the processing of phasal verbs and lexical verbs.

Finally, the effect size between groups was medium (Cohen's d=0.51), showing that phrasal verbs and lexical verbs play a significant role in the reading times for both groups. Post hoc tests using the Bonferroni correction revealed that groups were significantly different (p <2e-16) and that there was a significant difference between phrasal verbs and lexical verbs (p <2e-16).

3.3 Spillover area analysis

Analysis 3 aimed at examining the access to the spillover area of phrasal verbs in comparison to lexical verbs after reading the critical areas for nonnative and native speakers of English. Results are shown in Table 12.

Spillover Area Time			
Fixed effects	***β***	***SE***	***p-value***
Intercept	5.82	0.06	< 2e-16***
Type PV	-0.02	0.02	0.34
Group NNS	0.24	0.09	0.009**
Type PV: Group NNS	0.014	0.02	0.62
Random effects	***Variance***	***SD***	
Sentence	0.008	0.09	
Participant	0.088	0.29	
Residual	0.091	0.30	

Table 12: Linear Mixed Effects Model output for type and group for Spillover Area Time.Note: Significance values are estimated by the R package lmerTest: ***p< .001, **p< .01, *p≤ .05

In analysis 3, there was no significant effect of type - phrasal verbs and lexical equivalents. Moreover, a significant effect was found for group (β=0.24, t=-2.69, p< 0.01). Figure 6 shows the log reading times for the spillover area, the post region of interest, which is the one-word region that includes a noun or an adjective.

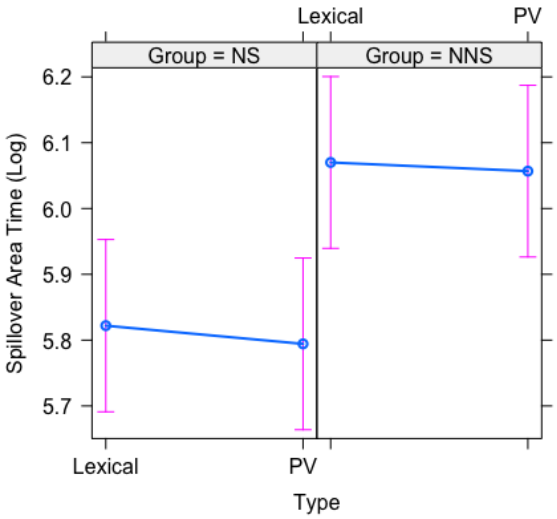

Figure 6: Model fitted L1 and L2 processing time for the spillover area after the reading of the critical areas. Note: PV means Phrasal Verbs; Lexical means One-word Verbs; NS means Native speakers of English; NNS means Nonnative speakers of English

Native speakers of English computed the spillover area of phrasal verbs (PV) and the spillover area of lexical verbs in a similar manner. Likewise, nonnative speakers of English performed the task in a similar manner. Overall, it seems that both groups showed no difficulty to process the post region of the critical areas.

3.4 Native speakers of English

Analysis 4 was computed to explore how native speakers of English processed figurative phrasal verbs in comparison to their lexical equivalents and literal phrasal verbs in comparison to their lexical equivalents for the total reading time. The log reading times for the target and control areas can be seen in Figure 7.

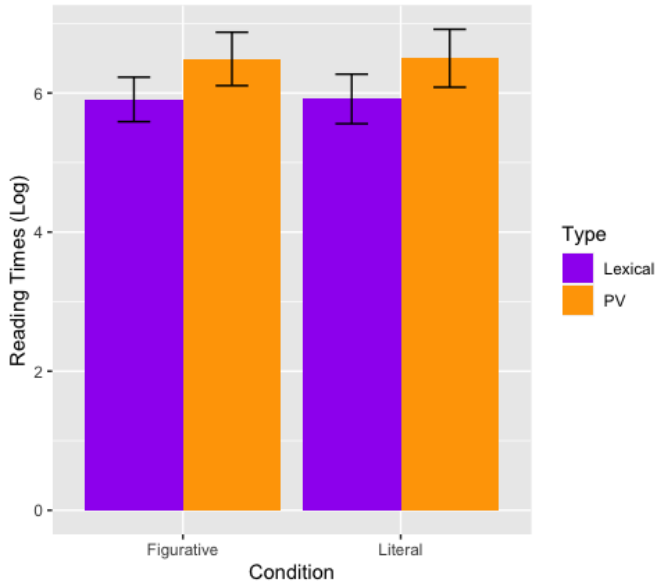

Figure 7: Log reading times at the phrasal verbs and lexical verbs by native speakers of English. Note: PV means Phrasal Verbs; Lexical means Lexical Verbs

Mean reading times and standard error bar values were obtained from the R package ggplot2 (Wickham, 2016). As can be seen in Figure 7, there was no significant effect between figurative and literal meanings of phrasal verbs (PV). Nevertheless, there was a significant effect between figurative phrasal verbs and their lexical equivalents (β=-0.61, t=-16.30, p<2e-16). Moreover, there was a significant effect between literal phrasal verbs and their lexical equivalents (β=-0.60, t=-14.62, p<2e-16). Frequency and length of lexical verbs and phrasal verbs were tested as covariates. However, there was no significant effect throughout the target areas.

3.5 Nonnative speakers of English

Analysis 5 was computed to explore how nonnative speakers of English processed figurative phrasal verbs in comparison to their lexical equivalents and literal phrasal verbs in comparison to their lexical equivalents for the total reading time. The log reading times for the target and control areas can be seen in Figure 8.

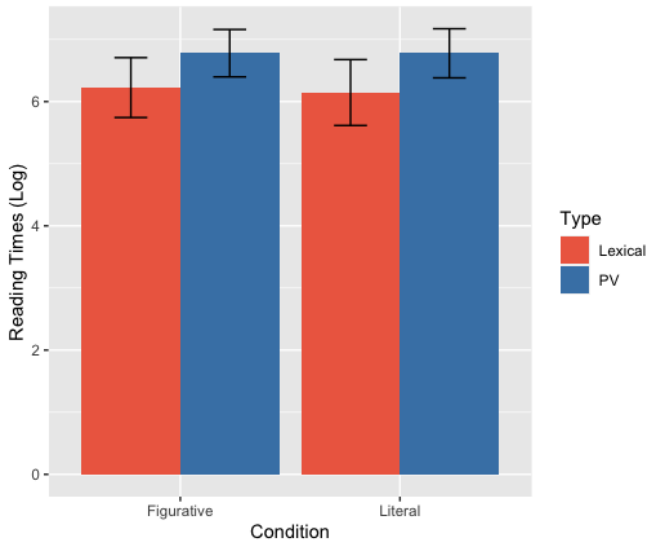

Figure 8: Log reading times at the phrasal verbs and lexical verbs by nonnative speakers of English.
Note: PV means Phrasal Verbs; Lexical means Lexical Verbs

Mean reading times and standard error bar values were obtained from the R package ggplot2 (Wickham, 2016). As can be seen in Figure 8, there was no significant effect between figurative and literal meanings of phrasal verbs (PV). Nevertheless, there was a significant effect between figurative phrasal verbs and their lexical equivalents (β=-0.51, t=-11.35, p<2e-16). Moreover, there was a significant effect between literal phrasal verbs and their lexical equivalents (β=-0.56, t=-11.37, p<2e-16).

Additionally, frequency and length of lexical verbs and phrasal verbs were tested as covariates. There was no significant frequency effect throughout the target area. However, length of one-word verbs and phrasal verbs significantly affected the processing of these verbs (β=3.30, t=3.25, p<0.001).

In conclusion, the statistical analysis yielded five main findings. As expected, the first finding was that native speakers of English read lexical verbs and phrasal verbs faster than nonnative speakers of English. The second finding was that

figurative phrasal verbs were read more slowly in comparison to their lexical equivalents by both groups. The third finding was that literal phrasal verbs were read more slowly in comparison to their lexical equivalents by both groups. The fourth finding was that figurative and literal meanings of phrasal verbs were read in a similar manner by both groups. Finally, the fifth finding was that verb length played a significant role during the processing by nonnative speakers of English.

4. Discussion

The present study investigated whether there are L1 and L2 processing differences of phrasal verbs in comparison to one-word lexical verbs. In addition, we also explored the effect of language dominance in the processing of figurative and literal phrasal verbs. The results of the one-word moving-window self-paced reading task revealed that native speakers of English and nonnative speakers of English process phrasal verbs and lexical verbs in a similar manner. Although a similar manner has been identified, a statistically significant difference between groups emerged from these data set. Moreover, phrasal verbs were computed more slowly than lexical verbs for both groups and this difference is statistically significant too.

The most striking result to emerge from the data is that nonnative speakers of English showed no difference in processing figurative phrasal verbs, as exemplified by "**I heard that the actress broke down in tears after her acceptance speech**" in comparison to literal phrasal verbs, as exemplified by "**I heard that the actress broke down the table into three small pieces**". As expected, lexical verbs (one-word verbs) showed an advantage compared to phrasal verbs. These results suggest that verb length played a role during the processing of phrasal verbs structures. These findings are interpreted as evidence that there is no difference in processing figurative language and literal language by proficient L2 speakers of English.

Interestingly, native speakers of English also showed no difference in processing figurative phrasal verbs, as exemplified by "**I heard that the teacher cut off the parent with a harsh word**" compared to literal phrasal verbs, as exemplified by "**I heard that the teacher cut off the tags of the children's t-shirts**". In addition to that, lexical verbs (one-word verbs) were processed faster than

phrasal verbs. These results point to the likelihood that both figurative and literal meanings are salient.

In summary, participants performed equally well regardless of smaller reading times for native speakers of English in comparison to nonnative speakers of English.

4.1 Processing of phrasal verbs vs. one-word verbs

A dominant bilingual has a high level of proficiency in one of the languages and is able to use it more than the other languages (Gass; Selinker, 2008: 27). Despite being at a high level of proficiency (7 at C1 and 15 at C2), most of nonnative speakers of the present study live in Brazil and speak Brazilian Portuguese as their dominant language. Since Portuguese lacks the construction verb + particle, the prediction was that nonnative speakers of English would show difficulty to process these items especially when they carry an idiomatic meaning. The rationale behind this assumption is based on Cieślicka (2006), who argues that literal meanings are always activated first by nonnative speakers due to the fact that literal meanings are already established in their mental lexicon. In these terms, literal meanings would be easier to access and process compared to figurative meanings. Contrary to these expectations, figurative meanings of phrasal verbs showed no difference in processing compared to literal ones by nonnative speakers. These results are in contrast with Paulmann and colleagues (2015), in that proficient speakers of English seem to favor a figurative interpretation over a literal one.

Matlock and Heredia (2002) found that late bilinguals accessed phrasal verbs more slowly than verb-preposition combinations. The present results, however, show that native and nonnative speakers of English did not favor either figurative meaning or literal meaning of phrasal verbs. This suggests that both meanings - figurative and literal - are salient. Therefore, it seems that, for native and nonnative speakers of English, both figurative and literal meanings are familiar, frequent, conventional, and prototypical as claimed by Giora (2003).

According to the Hybrid Representation Model (Sprenger *et al.*, 2006), the phrase level (*superlemmas*) and the word level (*lemmas*) are activated simultaneously during the access of the phrasal verb. Literal and figurative meanings of phrasal verbs compete with one another and this competition allows speakers to decide which meaning they will choose depending on the information available

during the process. Taking the prediction of the model into consideration, native and nonnative speakers processed figurative and literal meanings in a similar manner because they did not demonstrate difficulty in activating either meaning when they encountered the first word "**broke**" and integrated the particle "**down**", for instance, during the process of the phrasal verb "**broke down**".

In terms of processing, the hybrid model of Libben and Titone (2008), the Constraint-based Model of Idiom Processing may shed some light into the processing of phrasal verbs. The Constraint-based Model proposes that idiomatic aspects, such as compositionality or literality can affect the processing of idioms at different moments during this process. They also point out that the figurative and literal meanings are available until the readers encounter the last word of the idiom (Libben; Titone, 2008: 1116). In these terms, participants of the present study understood the figurative or literal meaning when they encountered the spillover area of these items (e.g., broke down - tears or table) and could select an interpretation, figurative or literal, to integrate the context of the sentence. Nonnative and native speakers of English did not show difficulty in processing either a figurative or literal meaning of phrasal verbs. These results are in contrast with Holsinger and Kaiser (2013: 875), when the authors claimed that literal interpretations are default and idiomatic interpretations are driven by contextual factors.

Various factors affect the processing of phrasal verbs such as syntactic and semantic aspects. In relation to these issues, Tiv *et al.* (2019) investigated adjacent phrasal verbs, as seen in "**eat up** the candy" vs. split phrasal verbs, as seen in "**eat** the candy **up**" by means of recording the eyes movement of English-French bilinguals (L1-L2). Their results showed that L1 readers preferred adjacent phrasal verbs in comparison to split ones, especially the transparent adjacent phrasal verbs; the authors interpreted these results as evidence that the L1 readers favor these items by direct retrieval. Conversely, L2 readers demonstrated more preference for adjacent phrasal verbs compared to split ones. Tiv *et al.* (2019) stated that adjacent phrasal verbs involved more processing cost and that familiarity plays a significant role in their results. In the present study, lexical verbs were read faster than phrasal verbs. In this case, it is possible to argue that lexical verbs were favored, and they were processed by direct retrieval. The present results shows that familiarity and prediction of the meaning of lexical verbs impacted the processing greatly.

As pointed out by Garnier and Schmitt (2016: 31) “polysemy is a key feature of phrasal verbs”. The selection of phrasal verbs that served as stimuli was based on Garnier and Schmitt’s list (2016). The stimuli privileged phrasal verbs which presented both senses - figurative and literal. However, literal phrasal verbs displayed more frequent senses than figurative phrasal verbs. The present results did not reveal a preference to either literal or figurative meanings. One possible explanation can be found in the Lexical Representation Hypothesis model, which supports the idea that idioms are stored and retrieved from the lexicon in the same manner as long words (Swinney; Cutler, 1979). That is, the model assumes that the processing of both meanings - idiomatic and literal - is simultaneous. Thus, idioms are not processed or accessed from a special idiom list, nor any special processing mode. Accordingly, as well as figurative and literal phrasal verbs might be processed similarly.

Another possible explanation for these results is that other factors might have played a role during the processing. One factor might be the method we employed to investigate figurative and literal meanings of phrasal verbs. The fact that the self-paced reading task was used in a word-by-word paradigm might have contributed to the idea of a compositional approach to phrasal verbs. In addition, the self-paced reading task does not allow us to look at the “rereading” times of the critical area (as opposed to the eye-tracking technique, which allows inspection of rereading). Therefore, the results of the present study cannot be interpreted so as to reveal difficulties in processing figurative and literal meanings of phrasal verbs by nonnative and native speakers of English.

Comparing phrasal verbs to one-word verbs demonstrated that results of the present study are consistent with Siyanova-Chanturia and Schmitt (2007). The one-word verbs showed a statistically significant advantage compared to phrasal verbs for both groups. It seems that the length and frequency of these lexical verbs played an important role during L1 and L2 processing. Crucially, more frequent words are processed more quickly than less frequent words (Rayner *et al.*, 2012). According to Siyanova-Chanturia and Schmitt (2007: 121), phrasal verbs seem to be more colloquial than one-word verbs, especially used for spoken informal English. Thus, it appears that there is a preference to use one-word verbs for written discourse. This L1-L2 processing difference may have to do with weak lexical links in L2, which burden L2 lexical processing capacity and slowdown a complete syntactic processing (Hopp, 2018).

5. Conclusion

The present study contributes to the idea, in a broad point of view, put forward by Jiang (2018: 13), that it is essential to examine the factors that affect acquirability to L2 learning and processing in order to understand what is exclusive to a bilingual group and what is not. In the present study we addressed how formulaic sequences, such as phrasal verbs, are processed and represented by Brazilian Portuguese speakers of English as L2.

Our results showed that nonnative and native speakers of English read lexical verbs faster than phrasal verbs. Both groups demonstrated similar behavior in processing figurative phrasal verbs and their lexical equivalents compared to literal phrasal verbs and their lexical equivalents. This performance is interpreted as evidence that both meanings - literal and figurative - are salient in L1 and L2 processing. Additionally, verb length was an important factor during the processing of phrasal verbs and lexical verbs by nonnative speakers of English. Taken together, these results are supported by the Lexical Representation Hypothesis model, which claims the idea that the processing of both meanings - idiomatic and literal - is simultaneous (Swinney; Cutler, 1979).

Although the present study comprised comprehension questions for each experimental sentence, participants' attention to the sentences in the self-paced reading task was not controlled enough. In order to mitigate the lack of attention, future studies could incorporate other techniques, such as naming geometric figures to name while they read sentences, besides comprehension questions. In addition to that, future research should include additional pause blocks.

In the present study, figurative meanings were taken as combinations whose meaning cannot be entirely predicted from their parts. On the other hand, literal meanings were taken as processing transparent meanings (Rodríguez-Puente, 2019). Future research should consider employing a literality test assessment to identify participants' knowledge of this important characteristic of phrasal verbs.

Finally, the self-paced reading was employed to investigate the processing of phrasal verbs. However, our results showed no processing advantage for either figurative phrasal verbs or literal phrasal verbs. Future research should consider employing the eye-tracking technique, which allows inspection of rereading of the critical area.

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