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CARRY ON AND CROSS YOUR FINGERS: A PSYCHOLINGUISTIC APPROACH TO PHRASAL VERBS AND IDIOMS IN ENGLISH

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O presente trabalho em nível de doutorado foi avaliado e aprovado por banca examinadora composta pelos seguintes membros:

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Certificamos que esta é a **versão original e final** do trabalho de conclusão que foi julgado adequado para obtenção do título de Doutor em Inglês: Estudos Linguísticos e Literários, na área de concentração Estudos da Linguagem.

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To my parents, Silvalina and Alicindo, my husband, Bruno, and my father-in-law, Nildo (*in memoriam*), with love and gratitude.

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Knowledge is a viaticum, thought is of primary necessity, truth is nourishment as well as wheat. A reason, by fasting from knowledge and wisdom, becomes puny. (HUGO, Victor, 1862)

RESUMO

O estudo das construções fraseológicas tem há muito atraído o interesse de pesquisadores da área de processamento e representação da linguagem em monolíngues e bilíngues. Exemplos de construções fraseológicas são os *phrasal verbs* e as expressões idiomáticas. Os *phrasal verbs* figurativos referem-se às combinações que são semanticamente opacas, ou seja, combinações cujo significado não pode ser inteiramente previsto a partir dos significados de suas partes (ex., *To give up*). Por outro lado, os *phrasal verbs* literais têm partículas independentemente significativas, ou seja, possuem significados transparentes e podem frequentemente ser substituídos por um antônimo (ex., *To go up*). Expressões idiomáticas são definidas como combinações de várias palavras cujos significados figurativos não estão diretamente relacionados aos significados literais de suas palavras individuais (ex., *Kick the bucket*). A presente tese tem como objetivo investigar como falantes não-nativos e nativos de inglês processam *phrasal verbs* e expressões idiomáticas. A tese relata três estudos: Estudo I investigou como 22 falantes de inglês como L2 (falantes nativos do português brasileiro) e 22 falantes nativos de inglês processam *phrasal verbs* em comparação com verbos lexicais por meio de uma tarefa de leitura automonitorada (*self-paced reading*). Além disso, o Estudo I explorou se há diferenças no processamento de *phrasal verbs* figurativos e *phrasal verbs* literais. O Estudo II baseia-se fortemente em Carrol *et al*. (2016) e investigou expressões idiomáticas em três categorias: expressões idiomáticas somente em inglês (L2), expressões idiomáticas somente em português (L1) e expressões idiomáticas congruentes (as mesmas palavras e significados nos dois idiomas) por meio de uma tarefa de leitura automonitorada. O objetivo principal do Estudo II foi investigar como 22 falantes de inglês como L2 (falantes nativos do português brasileiro) e 22 falantes nativos de inglês processam expressões idiomáticas em comparação com seus controles literais. O Estudo III investigou, por meio de uma tarefa de *priming* semântico mascarado, se 30 falantes de inglês como L2 (falantes nativos do português brasileiro) e 30 falantes nativos de inglês são sensíveis ao processamento implícito de significados figurativos de *phrasal verbs* adjacentes facilitado pelo significado correspondente de verbos de uma única palavra. Com relação aos resultados, os do Estudo I mostram que falantes não-nativos e nativos de inglês processaram verbos lexicais mais rápido do que *phrasal verbs*. Parece que existe uma preferência pelo uso de verbos lexicais para a escrita. Os resultados do Estudo I também revelam que falantes não-nativos e nativos de inglês mostraram não haver diferença no processamento dos significados figurativos e literais dos *phrasal verbs*. Esses resultados são interpretados como evidência de que significados literais e figurativos são igualmente salientes. Os resultados do Estudo II mostram que não há privilégio no processamento de expressões idiomáticas em comparação com seus controles literais por falantes nativos e não- nativos de inglês. Os resultados são interpretados como evidência de que, o método empregado (*self-paced reading*) pode ter contribuído para a falta de evidência quando os participantes se depararam com as expressões idiomáticas. Os resultados do Estudo III apontam que falantes nativos e não-nativos de inglês mostraram um efeito de *priming* menor para itens relacionados e itens não-relacionados em comparação com itens similares. Esses resultados são interpretados como evidência de que os participantes não interpretaram automaticamente os *phrasal verbs* como construção fraseológica e isso aumentou o tempo de reconhecimento dos alvos. Juntos, os resultados dos três estudos sugerem que o processamento de construções fraseológicas é mediado pela modalidade que as expressões idiomáticas e os *phrasal verbs* foram apresentados.

Palavras-chave: Expressões Idiomáticas. *Phrasal Verbs*. Processamento.

ABSTRACT

The study of formulaic language has been of long-standing interest to researchers in the field of monolingual language processing and representation and also in the field of bilingual language processing. Instances of formulaic language comprises phrasal verbs and idioms. Figurative phrasal verbs refer to those combinations that are semantically opaque, that is, combinations whose meaning cannot be entirely predicted from the meanings of their parts (e.g., *To give up*). On the other hand, literal phrasal verbs have independently meaningful particles, that is, they possess transparent meanings, and can often be replaced by an antonym (e.g., *To go up*). Idioms are defined as multiword phrases whose figurative meanings are not directly related to the literal meanings of their individual words (e.g., *Kick the bucket*). The present dissertation aims at investigating how nonnative and native speakers of English process phrasal verbs and idioms. The dissertation reports three studies: Study I investigated how 22 speakers of English as L2 (native speakers of Brazilian Portuguese) and 22 native speakers of English process phrasal verbs in comparison to one-word lexical verbs by means of a self-paced reading task. Moreover, Study I explored whether there are differences in the processing of figurative phrasal verbs and literal phrasal verbs. Study II draws heavily on Carrol *et al.* (2016) and investigated idioms in three categories: English-only idioms (L2), Portuguese-only idioms (L1) and congruent idioms (same words and meanings in both languages) by means of a self-paced reading task. The main objective of Study II was to investigate how 22 speakers of English as L2 (native speakers of Brazilian Portuguese) and 22 native speakers of English process idioms in comparison to novel (literal) phrases. The main objective of Study III was to investigate, by means of a masked semantic priming task, whether 30 speakers of English as L2 (native speakers of Brazilian Portuguese) and 30 native speakers of English are sensitive to the implicit processing of figurative meanings of adjacent phrasal verbs facilitated by the corresponding meaning of one-word verbs. Concerning the results, results of Study I show that nonnative and native speakers of English processed lexical verbs faster than phrasal verbs. Thus, it appears that there is a preference to use one-word verbs for written discourse. Results of Study I also reveal that nonnative and native speakers of English showed no difference in processing of either figurative or literal meanings of phrasal verbs. These results are interpreted as evidence that figurative and literal meanings are equally salient. Results of Study II show that idioms showed no privileged processing in comparison to their literal controls by nonnative and native speaker of English. The results are interpreted as evidence that the method employed (self-paced reading) might have contributed to the lack of evidence when participants encountered idioms. Results of Study III show that native and nonnative speakers of English showed a smaller priming effect for related primes and unrelated primes in comparison to identity primes. These results were interpreted as evidenced that participants did not automatically interpret phrasal verbs as figurative language, and this slowed down the recognition of targets. Together, the results of the three studies suggest that the processing of formulaic language is mediated by the modality in which idioms and phrasal verbs were presented.

Keywords: Idioms. Phrasal Verbs. Processing.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACC – Accuracy

AOI – Area of Interest

AN – Adjective-Noun

BP – Brazilian Portuguese

BNC – British National Corpus

CEFR – Common European Framework of Reference for Languages

COCA – Corpus of Contemporary American English

ERPs – Event Related Potential Study

Frequency_Tar – Frequency of the target words

fMRI – Functional Magnetic Resonance Imaging

FPV – Figurative Phrasal Verbs

IFG – Inferior Frontal Gyrus

L1 – Portuguese-only idioms

L2 – English-only idioms

LabLing – Language and Cognitive Processes Laboratory

LH – Left Hemispheres

LIFG – Left Inferior Frontal Gyrus

LPV – Literal Phrasal Verbs

LTD – Lexical Decision Task

LV – Lexical verbs

M – Mean

MFG – Middle Frontal Gyrus

MTG – Middle Temporal Gyrus

MUC – Memory, Unification, Control

NNCs – Noun Compound Words

NNS – Nonnative Speakers of English

NS – Native Speakers of English

PET – Positron Emission Tomography

PP(s) – Prepositional Phrase(s)

PVs – Phrasal Verbs

SE – Standard Error

RH – Right Hemisphere

RQ – Research Questions

ROIs – Regions of Interest

RT – Response Times

SD – Standard Deviation

SLA – Second Language Acquisition

SPR – Self-Paced Reading

STS – Superior Temporal Sulcus

VN – Verb-(object) Noun

VPC – Verb-Particle Construction

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1 INTRODUCTION

How do we understand language? According to the classical view (e.g., KATZ, 1998, p. 20), we understand language through figurative and literal language. Based on this dichotomy, there are assumptions regarding our understanding of language. For instance, all conventional language is literal and all definitions in the mental lexicon of a language are literal. On the other hand, figurative language is ornamental. From this perspective, metaphor is abnormal as advocated in Aristotle's works, *Poetics* and *Rhetoric* (ORTONY, 1993, p. 3).

However, more recent theorists have changed the view that figurative language is ornamental and only used in poetry. In these terms, the distinction between literal and figurative meaning reflects the influence of pragmatics and cognitive linguistics in our daily communication. Lakoff and Johnson (1980) stated that metaphorical concepts are understood in relation to experiential bases. In this sense, according to Lakoff and Johnson (1980), figurative language can be defined as language in which the meanings of words differ from the primary established meanings regarding the human experience. Similarly, Charteris-Black (2002, p. 108) defined figurative unit as a "short phrase in which the senses of words are different from their established senses".

On the other hand, Giora (2003, p. 33) refers to literal meanings as "what is denoted by individual/compositional words". More importantly, Giora (2003) argues that salient meanings play the most important role in comprehension and production of language, since saliency has to do with frequency, familiarity, prototypicality, and conventionality of the meanings of the words. Consequently, it is not the figurative versus literal split that matters, but the salient versus non-salient continuum that counts when processing the meaning of words or utterances. According to Katz (1998), the creative interplay of language and thought is particularly evident in figurative language. More importantly, the use of such language is not only an essential characteristic of the creativity of language (e.g., *poetry*) but also a linguistic feature used on a daily life basis.

In addition to that, 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[1]. Thus, formulaic language is widely used, and it is much more than "strings of words linked together with collocational ties", as stated by Conklin and Schmitt (2008, p. 73). Formulaic language has been described by different terms. For instance, Keckes (2015, p. 30) states that formulaic language means multiword collocations and they are stored and retrieved holistically rather than separate single units. Wray (2002) 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 (WRAY, 2002, p. 9).

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 dissertation, phrasal verbs and idioms are considered formulaic sequences.

According to Cappelle (2005), figurative phrasal verbs refer to those combinations that are semantically opaque, that is, combinations whose meaning cannot be entirely predicted from the meanings of their parts (e.g., *I give up*). On the other hand, literal phrasal verbs have independently meaningful particles, that is, they possess transparent meanings, and can often be replaced by an antonym (e.g., *Well sir, when you ordered your food, you told me to step on it!*).

Idioms have been defined as multiword phrases whose figurative meanings are not directly related to the literal meanings of their individual words (CIEŚLICKA, 2013). According to Gibbs and collaborators (1989), decomposable idioms (compositional) are highly related to the literal meanings of their constituent words (e.g., *play with fire*). Nondecomposable idioms (noncompositional) have meanings which are arbitrary and unrelated to their compositional analysis (e.g., *kick the bucket*).

Given these considerations, according to Siyanova-Chanturia and Pellicer-Sánchez (2018, p. 1) there are two key points related to formulaic language: (1) native speakers of a language use formulaic sequences in spoken and written discourse because they have a large

[1] Formulaic language, formulaic sequences, and multiword expressions will be used interchangeably.

repertoire; and (2) to reach advanced levels of proficiency, nonnative speakers must use formulaic sequences. A seminal study on Formulaic Language (FL), Wray (2002) provided a path to investigate how formulaic sequences are analyzed, as a whole unit or as individual items. To pursue this question, the general aim of this dissertation is to investigate how nonnative[2] and native speakers of English process phrasal verbs and idioms.

I became interested in phrasal verbs when I was still a student. I did not understand how a verb and a particle could generate another meaning and I had difficulties to use them. When I became a teacher, I realized my students also had difficulty with phrasal verbs. In 2009, I sent an email to professor Mailce Borges Mota (UFSC) talking about my intentions to get into the English Program at UFSC and my experience as a learner/teacher of English who intended to investigate the processing of phrasal verbs in L2. Professor Mailce kindly replied saying that this was a good topic. However, at that time, I could not make it. In 2013, I finally got into the English Program at UFSC, and in 2014 I started my journey into this topic.

Three studies reported in the present dissertation were submitted to and approved by the Institutional Review Board at UFSC (*Comitê de Ética em Pesquisa com Seres Humanos*) under number 13367319.1.0000.0121. It is important to state that, due to COVID-19, I had to adapt and move all the experiments to the remote mode reported in Chapters 7, 8 and 9. The adaptations are described in Chapter 6, Section 6.4.

1.1 BACKGROUND TO THE RESEARCH

The study of formulaic language has been of long-standing interest to researchers in the field of monolingual language processing and representation (e.g., BOBROW; BELL, 1973; SWINNEY; CUTLER, 1979; GIBBS, 1980; CACCIARI; TABOSSI, 1988; GIBBS; NAYAK, 1989; GIBBS; NAYAK; CUTTING, 1989; GLUCKSBERG, 1993; CUTTING; BOCK, 1997; TITONE; CONNINE, 1999; SPRENGER; LEVELT; KEMPEN, 2006), and also in the field of bilingual language processing (e.g., MATLOCK; HEREDIA, 2002; UNDERWOOD; SCHMITT; GALPIN, 2004; CIEŚLICKA, 2006, 2010, 2013; SIYANOVA-

[2] Throughout this study the term nonnative speaker of English will be used interchangeably with the term bilingual. Likewise, the terms English monolinguals and native speakers of English will also be used interchangeably.

CHANTURIA; CONKLIN; SCHMITT, 2011; CIEŚLICKA *et al*., 2014; BLAIS; GONNERMAN, 2012; PAULMANN; GHAREEB-ALI; FELSER, 2015, CARROL *et al*., 2016). From these studies, there is emerging evidence that native speakers process formulaic language faster than non-formulaic language. On the other hand, it is not possible to draw any conclusions about the processing of formulaic language by nonnative speakers yet, since the literature still reports controversial results regarding the factors such as proficiency, idiomaticity, frequency, and familiarity, among others.

Conklin and Schmitt (2012, p. 46) pointed out that formulaic language, an important aspect of language learning and use, helps language users to be more fluent. Fluency relies on the acquisition of relevant associations for each unit of the language input as argued by Ellis (2004, p. 53). Considering formulaic language as an example of a linguistic topic which a language learner would like to master, frequency and familiarity will play a significant role in language learning.

In terms of language use, formulaic sequences are widely used in discourse and this claim has brought up a question: do proficient bilingual speakers master formulaic sequences? If so, the existence of formulaic sequences in the bilinguals' mental lexicon has consequences for how this kind of language is represented and processed. In fact, how does the computation of formulaic sequences take place in the bilingual mind? Is it holistically, word-by-word or both? The present study aims at investigating the online processing of formulaic language by L2 advanced speakers of English (native speakers of Brazilian Portuguese) and native speakers of English. Specifically, this study is concerned with the investigation of the processing of phrasal verbs and idioms through a self-paced reading task and a masked semantic priming task.

1.2 SIGNIFICANCE OF THE RESEARCH

In a broad point of view, this research has to do with the idea, put forward by Jiang (2018, p. 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 a specific point of view, there is still lack of research on how formulaic sequences, such as

idioms and phrasal verbs, are processed and represented by native and nonnative speakers of English, native speakers of Brazilian Portuguese.

As stated by Rodriguez-Puente (2019, p. 1), phrasal verbs and idioms present some problems for nonnative speakers because: (1) their verbal base meanings are different from their combination meanings (e.g., *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 (e.g., *spill + the + beans means reveal a secret*). These features, especially for phrasal verbs, belong to Germanic languages, such as German and Dutch. On the other hand, Brazilian Portuguese seems to lack these structures (e.g., *verb + particle*). What we use is a structure called pleonasm, which expresses repetition of an idea and is seen as useless (e.g., *entra para dentro meaning step inside*) (CUNHA; CINTRA, 2016, p. 639).

In these terms, investigating the processing of phrasal verbs and idioms can 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 and whether native and nonnative speakers of English are sensitive to the implicit processing of phrasal verbs. In addition to that, the results of this study can also contribute to the scope of the literature on idioms processing regarding L1-L2 crosslinguistic factors.

1.3 OBJECTIVES OF THE RESEARCH

The general objective of the present dissertation is to investigate how nonnative speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English process phrasal verbs and idioms. In order to gain insights into the role of formulaic language in the L2 processing, three studies were carried out.

The main objective of Study I was 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 by means of a self-paced reading task. The focus of the study was to compare figurative and literal uses of phrasal verbs for L1 and L2 speakers. The second 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.

Study II draws heavily on Carrol *et al.* (2016) and investigates idioms in three categories: English-only idioms (L2), Portuguese-only idioms (L1) and congruent idioms (same words and meanings in both languages) by means of a self-paced reading task. The main objective of Study II was to investigate how speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English process idioms in comparison to novel (literal) phrases. First, I verified whether Portuguese-only idioms (L1) translated to English show privileged processing by native and nonnative speakers of English. Then, I examined whether the effect of congruency (item exists in both L1 and L2) show any additional facilitatory effects compared to items that only exist in the L1. Finally, I explored whether the L2 speakers of English show advantage in reading English-only idioms (L2).

The main objective of Study III was to investigate, by means of a masked semantic priming task, whether speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English are sensitive to the implicit processing of figurative meanings of adjacent phrasal verbs facilitated by the corresponding meaning of one-word verbs.

1.4 ORGANIZATION OF THE RESEARCH

The present dissertation examines the L1 and L2 processing of phrasal verbs and idioms. To address this issue, the dissertation is organized as follows. The present Chapter 1 introduces the general topic of the investigation, the background of this research, its significance, and its objectives. Chapter 2 gives an overview of the processing and representation of formulaic language. Chapter 3 presents the definitions and models of processing of idioms. Chapter 4 describes the linguistic definition of phrasal verbs. Chapter 5 outlines the factors which contribute to cross-linguistic influence in the processing of formulaic language by bilinguals. Chapter 6 provides an overview of three methodological techniques to investigate idioms and phrasal verbs and presents the challenges to move research online. Chapters 7 presents Study I, Chapter 8 presents Study II, and Chapter 9 presents Study III. In each of these chapters, the participants, the instruments of data collection, the experimental design, the pilot study, and the results, are fully described,

followed by a discussion of the results. Finally, Chapter 10 presents the major findings of the present dissertation, points out its limitations and offers further suggestions for future research as well as pedagogical implications to the L2 processing and learning.

2 THE PROCESSING AND REPRESENTATION OF FORMULAIC LANGUAGE

How do nonnative and native speakers process formulaic language? Do they process it similarly or differently? These questions have been pursued for a long time, and in order to gain some insight into what has happened, it is important to bear the following in mind: there is evidence (e.g., CACCIARI; TABOSSI, 1988; LIBBEN; TITONE, 2008) that native speakers process formulaic language faster than nonformulaic language. However, for nonnative speakers, it is not clear how they process and represent formulaic language. It seems that there are a lot of factors, including compositionality (TITONE; CONNINE, 1999), literality (BECK; WEBER, 2019, 2020), familiarity and frequency of use (TITONE *et al*., 2015), semantic properties of idioms (JOLSAVI *et al.*, 2013), and proficiency (YEGANEHJOO; THAI, 2012) that influence the processing of formulaic language by nonnative and native speakers. Moreover, Katz (1998) states that the creative interplay of language and thought is particularly evident in figurative language. More importantly, the use of such language is not only an essential characteristic of the creativity of language (e.g., *poetry*) but also a linguistic feature used on a daily life basis.

The remainder of this chapter will be organized as follows. Section 2.1 discusses the processing and representation of formulaic language by nonnative and native speakers. Section 2.2 presents models of figurative and literal processing. Section 2.3 comprises several neurophysiological studies on the processing of formulaic language focusing on the difference between figurative and literal language. Section 2.4 presents psycholinguistics studies of formulaic language processing. Finally, section 2.5 presents a summary of this chapter.

2.1 THE PROCESSING AND REPRESENTATION OF FORMULAIC LANGUAGE

According to Conklin and Schmitt (2012, p. 46), formulaic language represents benefits in communication, such as expressing a message or idea clearly/succinctly, realizing functions, expressing social solidarity, and fluency. Fluency in a language requires lexical knowledge, which is made up of a large group of words and conventionalized sequences, such as formulaic language. There is a psycholinguistic explanation for the processing of formulaic sequences put forward by Pawley and Syder (1983), that is, formulaic language provides easy

and quick processing regarding single memorized units, in comparison to sequences of words which are generated creatively. In order to offer easy and quick processing, formulaic sequences are stored in long-term memory as prefabricated chunks of language that can be readily used in language production. Therefore, when the speaker produces formulaic sequences, this counterbalances the production of individual lexical items and syntactic/discourse rules which can overload the working memory (CONKLIN; SCHMITT, 2008), and therefore, affect fluency of speech production. The key point is that, according to Pawley and Syder (1983), this demonstrates that native speakers store formulaic language in long-term memory to compensate the limitation of working memory (CONKLIN; SCHMITT, 2012, p. 47).

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 the 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, concreteness, idiomaticity, and imageability. With regard to idiomaticity, researchers (e.g.,

GRICE, 1989; GIBBS, 1994; FRISSON; PICKERING, 2001; KATZ; FERRETTI, 2001; KATZ, 2005; CARSTON, 2002; SPERBER; WILSON, 1995, 2004; WILSON; CARSTON, 2006; FAUCONNIER; TURNER, 2002; BERGEN, 2005; GIBBS, 2006a; SPIVEY, 2007) have explored the dichotomy of figurative and literal meanings of formulaic language. However, idiomaticity poses some problems when carrying out the studies. According to Gibbs and Colston (2012, p. 22), there is sometimes a difficulty in differentiating literal meanings from figurative meanings. Moreover, the authors question how to determine that figurative language requires special processing compared to literal language (p. 17). Therefore, additional studies to understand the key tenets of processing and representation of formulaic language more completely are required.

The present study does not intend to test individual models of figurative and literal processing. However, I will present various models of figurative and literal processing to shed some light on the factors that underlie the mental processes.

2.2 MODELS OF FIGURATIVE AND LITERAL PROCESSING

Several models have been proposed to explore the processing of figurative and literal meanings of formulaic language, some focusing on native speakers processing, and only one focusing on nonnative speakers processing. Nevertheless, there is still no clear consensus on what engenders the figurative processing advantage over the literal processing. It seems that different ways of looking at figurative and literal meanings might account for the mixed interpretations concerning the processing of formulaic language.

The first model to be presented is the Standard Pragmatic View (GRICE, 1989). The Pragmatic view advocates that general principles or maxims of conversation cope with figurative meanings. Grice suggests that literal meanings are understood faster in comparison to figurative meanings which are always more difficult to be processed. This view claims that semantic information is accessed when a speaker uses literal language. In contrast, pragmatic information is accessed when a speaker uses figurative language. In this view, therefore, figurative language requires more effort to be processed. A contrast model for this view, it is the Direct Access View (GIBBS, 1994). This model assumes that a language user accesses figurative meaning directly without the need to process literal meaning first.

The Graded Salience Hypothesis, first presented by Giora in 1997, proposes that the comprehension of literal and figurative (metaphoric) language is governed by the principle of salience. In this view, salient meanings - meanings that are conventional, frequent, familiar, and enhanced by prior context – are processed first, that is, prior to less salient, novel meanings. Giora (2002, p. 491) explains that "salience is a matter of degree". That is, salient meanings are determined by their frequency of use and their familiarity to a certain community. Moreover, Giora (2002) states that salient meanings will be processed first, less-salient meanings will lag behind and nonsalient meanings will demand extra inferential processes as well as contextual support.

According to the author, there are some factors, mentioned above, which are directly related to salience. These are:

(1) Frequency: frequency refers to probability of occurrence. The more frequent the meaning, the faster it is to be retrieved.

(2) Familiarity: familiarity hinges on the individual experience and the more familiar the meaning, the faster it is to be retrieved.

(3) Conventionality: conventionality has to do with the item being common in a community, being used with regularity, and being implicitly agreed in a certain situation. The more conventional the meaning, the faster it is to be retrieved.

(4) Prototypicality: in prototypicality there is a preference to access a prototypical over a marginal meaning of a category (e.g., *on encountering the word bird, the speaker tends to access sparrow, a prototypical representative, faster than chicken, a marginal representative*.) (GIORA, 2003, p. 16 and 17).

Similarly, to the graded salience model, the Underspecification View (FRISSON; PICKERING, 2001) claims that an underspecified meaning of a word is accessed automatically, regardless of literal or figurative senses. The successful processing of a sense will be dependent on the context. According to this model, the function of the context is to help the language user to identify the specific meaning of a word.

On the other hand, the Constraint Satisfaction View (KATZ; FERRETTI, 2001; KATZ, 2005) posits that linguistic and nonlinguistic features are necessary to comprehend a sentence. In this regard, all pieces of information are important to make sense of what a speaker is communicating.

An alternative view is the Relevance Theory (CARSTON, 2002; SPERBER; WILSON, 1995, 2004; WILSON; CARSTON, 2006). The main assumption of this theory is that human cognition is grasped by the maximization of relevance. Sperber and Wilson explain that a relevant utterance would be (1995, p. 267): "(a) the ostensive stimulus is relevant enough for it to be worth the addressee's effort to process it"; and "(b) the ostensive stimulus is the most relevant one compatible with the communicator's abilities and preferences." With regard to figurative language, the authors state that there is no special processing for figurative meanings.

Other models such as the Conceptual Blending Theory (FAUCONNIER; TURNER, 2002), Embodied Simulation Theory (BERGEN, 2005; GIBBS, 2006a), and Dynamical System View (GIBBS, 2006a; SPIVEY, 2007) approach figurative language as an individual behavior that emerges from body, mind, and environment.

A nonnative speaker model of processing 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) 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" (p.121). 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.

2.3 EVIDENCE FROM NEUROPHYSIOLOGICAL STUDIES

A series of neurophysiological studies has indicated that right and left hemispheres play a role in formulaic language processing. The landmark study to investigate metaphor processing was Bottini and collaborators (1994). They examined the comprehension of unfamiliar figures of speech in sentences using positron emission tomography (PET) in six healthy participants. They found activation in the right middle temporal gyrus, right prefrontal regions, and right precuneus and they concluded that the right hemisphere (RH) plays a role in metaphor comprehension. Since then, this conclusion is a crucial issue intensely investigated (SCHMIDT; SEGER, 2009).

Shibata and collaborators (2012) investigated the neural substrates involved in the comprehension of metaphors and similes using functional magnetic resonance imaging (fMRI) in 24 healthy participants, graduate, and undergraduate students. They were all native Japanese speakers. Their results showed similar cortical activation patterns in the left inferior frontal gyrus (IFG) under metaphor and simile sentence conditions. Also, their results revealed that similes elicit more activation in the medial frontal region which might be related to inference processes, whereas metaphors elicit right hemisphere prefrontal activation more which might be affected by metaphorical comprehension processes. Based on the previous studies using metaphors and similes, their results revealed that, the left IFG may play a key role in the processes of metaphors and similes comprehension, and semantic processing is related to the left IFG activation.

Forgács and collaborators (2012) investigated the processing of familiar and unfamiliar, literal and figurative noun compound words (NNCs) using fMRI. Forty native speakers of German participated in the study. Their results revealed that distantly related familiar NNCs activated right temporoparietal regions probably reflecting combinatorial semantic processing. On the other hand, unfamiliar conditions increased BOLD signal change in left hemispheres (LH) regions, specifically LIFG. According to Forgács and collaborators (2012), their results partly serve as the basis of Hagoort's (2005) neurobiological language model, the Memory, Unification, Control (MUC) framework, which posits that the left inferior frontal gyrus (LIFG) is responsible for the Unification gradient: where the integration of phonology, syntax, and semantics into a complex whole take place. This complex

integration reflects a more demanding meaning making procedure, where meaning is produced, rather than comprehended.

The main purpose of Obert and colleagues' study (2014) was to examine the neural correlates of the processing of context-embedded predicative metaphors versus literal sentences using fMRI. The participants were 19 native French speakers who were instructed to listen to the sentences and decide whether the utterance they heard was literal or metaphorical. Their results did not indicate any significant RH predominance for metaphorical sentences compared with literal ones. They observed the left angular activation as reflecting the involvement of the semantic and/or pragmatic component.

Lai and collaborators (2015) investigated whether it is metaphoricity or novelty that leads to non-specific recruitment of RH areas. They recruited 22 healthy participants to take part in the experiment. The researchers predicted that novel or unfamiliar metaphors, and unfamiliar sentences in general require more resources involving executive processes related to reanalysis, working memory, inhibition, attention, and decision-making. According to them unfamiliarity is related to the notion of difficulty, which also has been operationalized as reaction times (RTs). Moreover, if literal sentences are significantly easier to process, they likely do not engage executive processes to the same extent. Their results revealed that decreasing familiarity resulted in increased activation in both hemispheres with the LH dominant, but with some activation in the RH. They observed that decreased familiarity led to increased activation in both the left and RHs regardless of metaphoricity, with greater activation in the LH. Moreover, they argued that the LH plays a "special role" in processing unfamiliar metaphors and literal language. This might reflect a left lateralized language system according to the authors.

Still regarding Lai and collaborators' (2015) results, they observed that there is activation of some RH regions when familiarity decreased across both sentence types, namely the right IFG, middle frontal gyrus (MFG), and the insula. This pattern suggests that activation in these regions reflects increased general cognitive demands of processing unfamiliar stimuli.

According to Obert and collaborators (2014), the first attempts to elucidate the RH's role in the comprehension of metaphorical stimuli were observed in patients with brain injury. As already mentioned, Bottini and collaborators' study (1994) was the first to demonstrate the

role of the RH in the processing of figurative language in healthy participants. According to Bottini and collaborators (1994) a number of areas were activated in the right hemisphere: the prefrontal cortex, the middle temporal gyrus, the precuneus and the posterior cingulate. They concluded that the interpretation of language involves widespread distributed systems bilaterally with the right hemisphere having a special role in the processing of metaphors.

Forgács and collaborators (2012) point out that several studies have found evidence for a RH involvement also in the processing of short, out of context, two-word expressions, such as novel metaphors or during the semantic combination of two nouns into a highly meaningful phrase. In contrast to this view, Schmidt and Seger (2009) argued that most of the time RH involvement is not attributed to metaphorical meaning per se, but to the bridging of unusual semantic relations in novel expressions. Subramaniam and collaborators (2012) suggested that the left inferior parietal lobule is involved in retrieving the meaning of conventional metaphors and in formulating new meanings, whereas its right-sided counterpart is solely involved in conceptualizing new meanings.

Lai and collaborators (2015, p. 7) observed greater left lateralization in the middle temporal gyrus (MTG) and marginally in the posterior superior temporal sulcus (STS). The authors claimed that these regions are commonly associated with language processing, including semantic, combinatorial/syntactic, and phonological processing. The results of their study are consistent with greater involvement of left-dominant language systems for dealing with more difficult or unfamiliar sentences.

Taken together, all these studies show that the RH and the LH play an important role in the processing of metaphor. Importantly, it could be observed that LH areas and in particular the left IFG are involved in processing unfamiliar stimuli due to general cognitive demands. The studies reviewed thus far in this section vary in terms of participants and target items. Nevertheless, they all examine the literal and figurative language. In view of the fact that the present research will investigate the processing of phrasal verbs and idioms, these findings draw our attention to the nonsalient nature of the metaphors. In addition, it seems that non-salient (not coded, not co-occurring, not conventional, and not familiar) novel items seemed to be better candidates for activating the RH, while salient (coded, familiar, conventional, etc.) items were expected to more likely activate the LH.

2.4 EVIDENCE FROM PSYCHOLINGUISTIC STUDIES

A large number of psycholinguistic studies have examined formulaic language processing by native speakers. However, few contributions have been made concerning nonnative speakers, especially in relation to L2 idiom processing (CIEŚLICKA, 2013). Seminal contributions have been made by Cieślicka, Heredia and Olivares (2014), who investigated the degree of literal and figurative activation in bilingual idiom processing modulated by language dominance, salience and context. Their results suggested that literal meanings of the English idioms were easier to process than figurative meanings and, thus, literal meanings were more salient than figurative ones for the Spanish-dominant bilinguals. Moreover, their results indicated a robust effect of context, regardless of whether the idioms were used literally or figuratively. It seemed that salience and context affected the processing of Spanish-dominant bilinguals.

Another contribution to the discussion on idiom processing is Carrol, Conklin and Gyllstad (2016), who investigated idioms by means of recording eye movements of L1 Swedes and native speakers of English. There were three conditions: (a) Swedish-only idioms (translated to English), (b) English-only idioms, and (c) Congruent idioms (items that exist in both languages). Carrol and collaborators examined how L1 knowledge is activated during online processing. Their results showed that Swedish native speakers spent less time on idioms compared to their controls, especially for Swedish-only idioms and congruent idioms. Carrol *et al*. interpreted these results as an indication that L1 Swedes integrated familiar combinations automatically. For native speakers of English, congruent idioms and English-only idioms were processed faster than their literal phrases. On the other hand, English speakers spent more time on Swedish-only idioms in comparison to their literal phrases. As predicted, Carrol and collaborators considered these results as evidence that native speakers of English showed facilitation for known idioms (Congruent and English-only idioms) compared to unfamiliar idioms (translated Swedish idioms). Overall, Carrol *et al*. claim that L1 knowledge is automatically utilized during the online processing of idioms in L2 and this indicates that exposure and high proficiency point to a nativelike performance.

Regarding the processing of phrasal verbs, evidence suggests that nonnative and native speakers of English process phrasal verbs differently. For instance, using an online

reading task (reaction time), Matlock and Heredia (2002) investigated the processing of figurative phrasal verbs (e.g., *Paul went over the exam with his students*), and their identical verb-preposition combinations used literally (e.g., *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, p.3 and 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 (e.g., *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's study (2015) favors 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 (e.g., *I heard that Mr. Smith ran over the old farmer early this morning*) and literal meanings (e.g., *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.

Another contribution is a masked semantic priming study carried out by Blais and Gonnerman (2012) to investigate the semantic aspect of verb-particle constructions, which ranges from transparent (e.g., *finish up*) to opaque (e.g., *chew out*), and to determine the processing difference between monolinguals and bilinguals. The authors conducted two experiments. The first experiment was an explicit, off-line, similarity rating task to measure participants' explicit knowledge of verb-particle semantics. The results showed that bilinguals rated verb-particle constructions differently in terms of semantic transparency. The second experiment was a masked priming task which measure the semantic processing of verb-particle constructions (e.g., *look up*) and a verb (e.g., *LOOK*). Their results revealed that there was a significant effect of prime and similarity. General results showed that bilinguals and monolinguals demonstrated higher priming for identity primes than for related verb-particle

primes. These results indicated that the participants processed the verb-particle constructions as a whole unit.

Formulaic language, as manifested in metaphors, idioms, and phrasal verbs, is therefore prevalent in language use, and the studies reported in this section demonstrate that frequency and other effects such as familiarity, context, composition, idiomaticity and saliency play a significant role in the processing of this kind of language by nonnative speakers. A key finding related to figurative formulaic language suggests that literal meanings are processed faster than figurative ones by L2 speakers of English (CIEŚLICKA *et al.*, 2014; MATLOCK; HEREDIA, 2002).

2.5 SUMMARY OF THE CHAPTER

In this chapter we have presented some studies which show that native speakers process and represent formulaic language as a single unit in their mental lexicon. For nonnative speakers, formulaic language is processed and represented in unclear ways influenced by various factors. Factors such as frequency, familiarity, idiomaticity play an important role on L2 formulaic language processing. Furthermore, the results of neurophysiological studies show that the right hemisphere (RH) and the left hemisphere (LH) both contribute to the processing of formulaic sequences. It seems that unfamiliar formulaic sequences seemed to be better candidates for activating the RH, while familiar formulaic sequences were expected to activate the LH.

The next chapter will look at idioms, examining how they are processed by native and nonnative speakers.

3 IDIOMS

In the literature on multiword expressions, idioms refer to sequences of (three or more) words that are frequently together, that form a complete syntactic and semantic unit, and whose meanings can be derived from the lexical units or not (JIANG, 2018, p. 210-211). Idioms, such as *play with fire* (to do something dangerous or risky), *bury the hatchet* (to end a conflict or make peace), *kick the bucket* (to die) are sequences of words whose meanings can be interpreted as literal or figurative (p. 212). Researchers have extensively examined idioms on issues related to a) whether figurative and literal meanings are always activated during the processing; b) whether the sequences of words are activated and processed in a compositional or noncompositional manner; and c) whether idioms are acquired word-by-word or the whole unit. Taken together, all these issues can be affected by variables such as familiarity, frequency of usage, idiomaticity, among others. In this chapter I summarize a few influential hypotheses on idioms to understand and discuss questions studied in the L1 and L2 context.

The remainder of this chapter will be organized as follows. Section 3.1 presents definitions on idioms. Section 3.2 summarizes influential models of idiom processing. Section 3.3 presents a summary of this chapter.

3.1 DEFINITIONS OF IDIOMS

Idioms have been defined as “a phrasal unit whose meaning is not obtainable from its syntactic component” (D’ARCAIS, 1993, p. 79), or “fixed expressions whose figurative meanings are not directly related to the literal meanings of their individual words” (e.g., *kick the bucket*) (CIEŚLICKA, 2013, p. 119). Some researchers (e.g., WEINREICH, 1969; FRASER, 1970; KATZ, 1973; CHOMSKY, 1980) have viewed idioms as “frozen metaphors”, single linguistic units, stored and processed similarly to long words with single entries in the mental lexicon. That is, an idiom such as “*kick the bucket”* has the lexical meaning “*die”*. According to Carrol (2015, p. 15), idioms share some form, but they are considered different syntactic structures. Example (1) demonstrates a verb phrase, while example (2) illustrates an idiom:

(1) The old man	kicked	the ball = “The old man kicked the ball”
[NP]	[VP]	[NP]
[det-adj-noun]	[verb]	[det-noun]

(2) The old man	kicked	the bucket = “The old man died”
[NP]	[VP]	
[det-adj-noun]	[verb]	

Additionally, there are a lot of factors that contribute to the difficulty in defining idioms, as stated by Cacciari (1993). Factors such as familiarity, literal plausibility, semantic decomposability are linguistic aspects relevant to the comprehension and definition of idioms (e.g., ABEL, 2003; LIBBEN; TITONE, 2008, TITONE *et al.*, 2015). Familiarity refers to how well-known idioms are to readers and speakers and how often these sequences of words are encountered by them (e.g., TITONE *et al.*, 2015; MICHL, 2019). For example, *kick the bucket* is probably a familiar idiom in comparison to *five o’clock shadow,* an example of a probably less familiar idiom. Literal plausibility refers to the literal interpretation of an idiom (TITONE *et al.*, 2015). For example, some idioms have literal meanings, such as *play with fire,* and meaning that, a speaker can access the meaning of this idiom without idiomatic interpretation (LIBBEN; TITONE, 2008). Semantic decomposability refers to the relation of the individual units to the overall meaning of the idiom (TITONE *et al.*, 2015). For example, in *spill the beans*, the literal meaning of the word “spill” contributes to the figurative interpretation “reveal a secret” (GIBBS; COLSTON, 2012, p. 166).

Moreover, Cacciari (1993, p. 27-28) claims that controversial definitions of idioms might have to do with their analyzability and holistic forms, as well as their idiomatic nature. This idiomatic nature has received a lot of attention in the formulaic language literature, especially because of the dual interpretation of idioms as figurative or literal meanings (TITONE; CONNINE, 1999). As stated by Cacciari (1993, p. 31), a solution for this duality might be the case of a continuum, where literal and figurative meanings would be endpoints. Therefore, an idiom could be labeled according to its level of idiomaticity or literality. Thus,

models of language processing are challenged by idioms because they are not, specifically, considered words.

Idioms have two important features. First, their meanings are not changed by the context. Second, their sequence of words is inflexible and each of these words contributes to figurative meaning (CACCIARI, 2014). Taken together, all these definitions point out that idioms are more or less fixed expressions in which each word unit is highly predictable and syntactically complex (MICHL, 2019).

Next, models related to the processing of idioms will be presented.

3.2 IDIOM PROCESSING

A great deal of psycholinguistic research has been done on idiom storage and processing focusing on three different approaches. In the *noncompostional approach* (e.g., BOBROW; BELL, 1973; SWINNEY; CUTLER, 1979), idioms are represented as long words. In the *compositional approach* (e.g., GIBBS; NAYAK, 1989; GIBBS; NAYAK; CUTTING, 1989), idiomatic word sequences are semantically and syntactically analyzable. In the *hybrid model* (e.g., TITONE; CONNINE, 1999; LIBBEN; TITONE, 2008) claims that features of compositional and noncompositional approaches play an important role in the processing of idioms.

The noncompositional view of idiom processing treats idiomatic phrases as arbitrary strings whose figurative meanings are not directly related to the literal meanings of their individual words (e.g., CIEŚLICKA, 2010; CHOMSKY, 1980; FRASER, 1970, KATZ, 1973). Cieślicka (2010) claims that the first activation is figurative meanings and literal meanings are not involved in the processing. All noncompositional models share the assumption that idioms' meanings are stored and understood by retrieving the meaning of an idiomatic phrase as whole. They are: The Idiom List Hypothesis (BOBROW; BELL, 1973), The Lexical Representation Hypothesis (SWINNEY; CUTLER, 1979), and The Direct Access Model (GIBBS, 1980, 1985).

The Idiom List Hypothesis proposed by Bobrow and Bell (1973) claims that there is evidence for separate idiomatic and literal modes of processing. In order to discover the meaning of an ambiguous sentence, first, a semantic cue such as "mystery" is given to the participant for the sentence "John let the cat out of the bag" as meaning "John told the secret."

As a result, participants can find or avoid the idiomatic meaning of a sentence and, this is the evidence the authors suggested above. The Idiom List Hypothesis holds that idioms are stored in (and accessed from) a special list which is not part of the lexicon. In other words, idiomatic meanings are accessed via a special "idiom mode" (BOBROW; BELL, 1973) and this is not a regular processing like a literal processing mode. Therefore, literal meaning is always processed first on a word string before an idiom mode of processing is conducted.

Unlike the view of the Idiom List Hypothesis, the Lexical Representation Hypothesis model 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, as argued by Bobrow and Bell (1973).

Similar to the Lexical Representation Hypothesis, Gibbs (1980) proposes that figurative meanings are processed before literal meanings. In addition, his hypothesis postulates that context plays an important role in the processing of figurative meanings. The Direct Access Model supports the idea that idiomatic meaning can be understood directly, without computing the literal meaning firstly. In addition to that, Gibbs claims that conventionality is the major factor which facilitates the comprehension of idiomatic meanings. Therefore, a conventional use of idioms would be idiomatic meanings and unconventional would be literal meanings. Thus, the more conventional an idiomatic meaning is, the easier it will be to understand it and use it appropriately. Unconventional meanings, like the literal use of idiomatic expressions, will require extra processing time in order to be accessed. According to Gibbs (1980), the factor of conventionality facilitates the comprehension and usage of either literal or idiomatic expressions.

In contrast to the noncompositional view, the compositional view of idioms states that these formulaic sequences vary with respect to their compositionality, that is the degree to which the literal meanings of their constituent words contribute to their overall figurative interpretation (e.g., CACCIARI; TABOSSI, 1988; GLUCKSBERG, 1993; TABOSSI; ZARDON, 1995; TITONE; CONNINE, 1994). These authors claim that the first activation is literal meaning and their constituent words contribute to the figurative interpretation. These are the most well-known compositional models: The Configuration Model (CACCIARI;

TABOSSI, 1988), The Idiom Decomposition Model (e.g., GIBBS; NAYAK, 1989; GIBBS; NAYAK; CUTTING, 1989), The Phrase-Induced Polysemy Model (GLUCKSBERG, 1993). These models view the processing of idioms as similar to literal language comprehension. For example, the Configuration Model (1988) supports the idea that figurative meaning is recognized via the activation of the "idiomatic key". The idiomatic meaning is accessed while the literal meaning is still being activated. Processing time may vary in accordance with the position of the idiomatic key in a sentence.

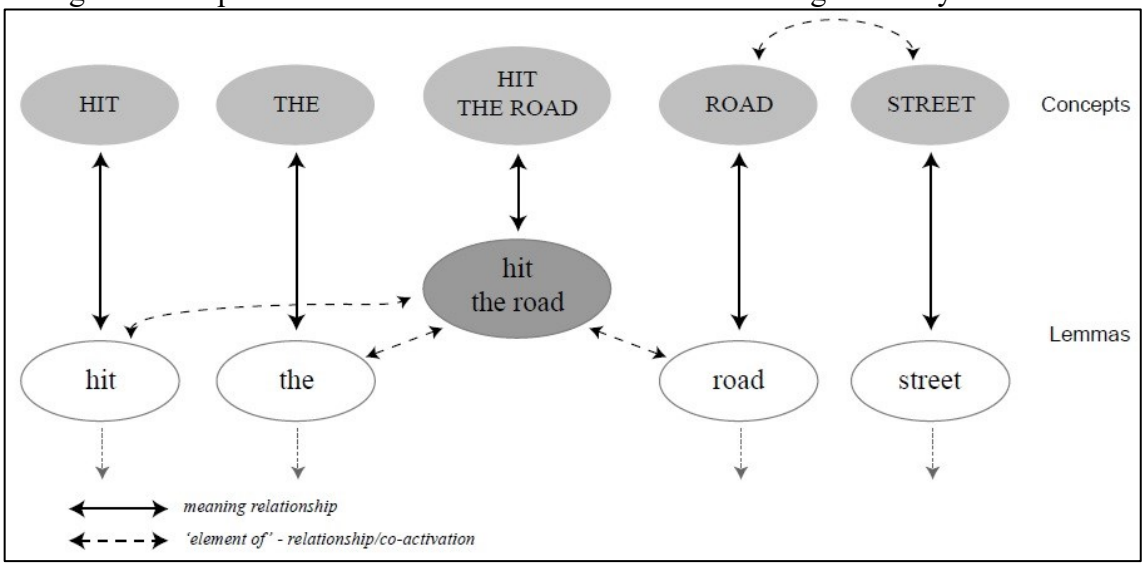
According to the Idiom Decomposition Model (1989), decomposability is a determining factor which helps researchers to better understand the idiom representation. Gibbs and his collaborators (1989) demonstrated that idioms can be classified in three categories. The first category is the decomposable idioms (compositional) which are highly related to the literal meanings of their constituent words (e.g., *play with fire*). The second category is the abnormally decomposable idioms in which the referents of an idiom's words can be identified idiomatically (e.g., *meet your maker*). The third category is the semantically nondecomposable idioms (noncompositional) which comprise arbitrary and unrelated meanings to their compositional analysis (e.g., *kick the bucket*).

This view is similar to the Phrase-Induced Polysemy Model (GLUCKSBERG, 1993, 2001) which classifies idioms as opaque, transparent, or quasi-metaphorical. Opaque idioms are formulaic sequences in which the content of each unit is not related to the whole meaning (e.g., *kick the bucket*). Meanwhile, transparent idioms are formulaic sequences in which there is a correlation between literal word meanings and figurative meaning (e.g., *spill the beans*). Finally, quasi-metaphorical idioms are formulaic sequences in which the message is conveyed by the allusional content, that is, the literal meaning of sequence of the words expresses the idiomatic meaning (e.g., *giving up the ship*). This model, therefore, claims that each individual unit of the idiomatic expression become polysemous because of the frequent use in figurative expressions.

According to Gibbs (1993, p. 61), noncompositional idioms (e.g., *kick the bucket*) present some characteristics such as they do not accept passivization, they have fixed lexical units, and they have highly familiar idiomatic meanings. On the other hand, the nature of decomposable idioms (e.g., *pop the question*) have lexical flexibility, ease of comprehension, ease of learning, and one of the words contributes to the overall figurative interpretation (Gibbs *et al*.,1989).

Finally, the Hybrid Model (TITONE; CONNINE, 1999) supports the idea that idiomatic and literal meanings are initially activated during idiom processing. This postulation makes this model superior to the other models because it restrains the decomposability factor of idioms according to Abel (2003, p. 333). Similar to Titone and Connine's model, 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, and the individual lemmas are also activated similar to a "domino effect" as can be seen in Figure 1. 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 a whole entry simultaneously. Although this model was originally designed for idiom production, it is widely used in the literature on idiom processing and representation (e.g., HOLSINGER; KAISER, 2013; TABOSSI *et al.*, 2009; TITONE *et al.*, 2015).

Figure 1 – Representation of the idiom hit the road according to the Hybrid model.



Source: SPRENGER *et al*. (2006, p. 176)

According to Carrol (2015, p. 73), the Hybrid Model accounts for the processing and representation of formulaic sequences as compositional strings and as whole units. Therefore, the present dissertation will adopt the Hybrid Model to examine phrasal verbs and idioms in order to consider each unit and the whole phrase. As stated by Van Lancker Sidtis (2015, p. 579), formulaic expressions, such as idioms, are stored in memory as a canonical form (*superlemmas*) and also as words (*lexemes*).

3.3 SUMMARY OF THE CHAPTER

Several researchers have proposed different ways of understanding figurative in comparison to literal meanings. For instance, Bobrow and Bell (1973) state that idiomatic meanings are accessed via a special "idiom mode". Swinney and Cutler (1979) propose that figurative and literal meanings are processed in parallel. According to Gibbs (1980;1985), figurative processing occurs directly without literal interpretation. These hypotheses differ in terms of approaches, tasks, and idioms studied (D'ARCAIS, 1993, p. 84).

In order to investigate the processing of idioms, therefore, there are two important criteria that need to be taken into consideration. The first criterion is the selection of idioms in terms of meaning and form. The second criterion is to be sure that the participants are familiar with the selection of idioms (SPRENGER *et al.*, 2019).

The next chapter will look at phrasal verbs, examining their nature.

4 PHRASAL VERBS

The term *Phrasal Verb* was originally used with respect to English alone and it is probably first found in Logan Pearsall Smith's[3] (1925) work *Words and Idioms*. The term was suggested by one of the editors of Old English Dictionary, Henry Bradley (1845-1923). The first major study of the modern English phrasal verb and its history is a short monograph by Arthur Garfield Kenedy (1920) entitled *verb-adverb combination*. Kenedy was the first to set the agenda for all the subsequent research until up today. He started to search for phrasal verbs, in order to compare and contrast their history to other languages. Some of his beliefs still have been reproduced by other researchers, such as phrasal verbs are difficult for nonnative speakers, and phrasal verbs are used in colloquial situations (THIM, 2012).

In the literature on multiword expressions, phrasal verbs have been addressed in different linguistic perspectives, at different times, by researchers with different types of expertise (THIM, 2012). According to Thim (2012) the term phrasal verb was first used by Smith in 1925 as stated above. Since then, various definitions of the term phrasal verb have been proposed, including *verb-particle construction* (VPC), *particle verb*, and *verb-particle combination*. In the present study, the terms verb-particle combination and phrasal verb will be used interchangeably. The goal of this chapter is to account for form and meaning of phrasal verbs in a way to demonstrate how complex their nature is.

The remainder of this chapter will be organized as follows. Section 4.1 provides a comparison between English and German phrasal verbs through semantic and syntactic aspects. Section 4.2 presents semantic, syntactic, and prosodic characteristics of phrasal verbs. Section 4.3 presents a summary of this chapter.

4.1 CONTRAST, COMPARISON AND HISTORY

In order to comprehend the history of phrasal verbs in English as evidence of cognate constructions of Germanic languages, English phrasal verbs will be compared and contrasted

[3] 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 German phrasal verbs (THIM, 2012, p. 10). This comparison has to do with semantic and syntactic aspects of this formulaic language according to Thim (2012). For instance, it is possible to observe in German the verb construction *aufgeben* which means *give up* in English. This phrasal verb comprises a particle *auf* which is similar to *up* and a verb *geben* is similar to *give.* Example (3) represents the phrasal verb in German, example (4) represents the English translation word-by-word, and example (5) represents the phrasal verb in English (THIM, 2012, p. 4):

(3) Alexander gab das Cellospielen auf.

(4) Alexander gave the cello: playing up

(5) 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 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 (6) shows the phrasal verb in German, example (7) represents the English translation word-by-word, and example (8) represents the phrasal verb in English (THIM, 2012, p. 4):

(6) Wenzel sagt dass Eva die Tür aufmachen wird.

(7) Wenzel says COMP Eva the door up: make:

(8) Wenzel says that Eva will open the door.

In contrast to the examples above, it can be observed that there is neither syntactically nor semantically one-to-one correspondences in (6) and (8). Hence, it is possible to conclude that German phrasal verbs function differently from English ones. In German, example (3) shows the particle *auf* after the verb, and in example (6) the particle *auf* comes before the verb. In English, on the other hand, example (5) shows the particle *up* after the verb, and example (8) 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. 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, p. 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). Moreover, the author 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. Taken together, these comparisons and contrasts are only possible because these languages (e.g., *German and English*) have a common ancestry.

4.2 PHRASAL VERBS

Thim (2012) defines a phrasal verb as a verb and a particle which is typically homonymous with an adverb or a preposition. In addition, phrasal verbs comprise a number of idiosyncratic semantic, syntactic and prosodic characteristics which will be presented as follows.

4.2.1 Semantic Characteristics

Polysemy is an important feature of verb-particle combinations, their meanings range on a cline from purely compositional to highly idiomatic (THIM, 2012) for instance:

(9) We'd better *take in* the children's toys.

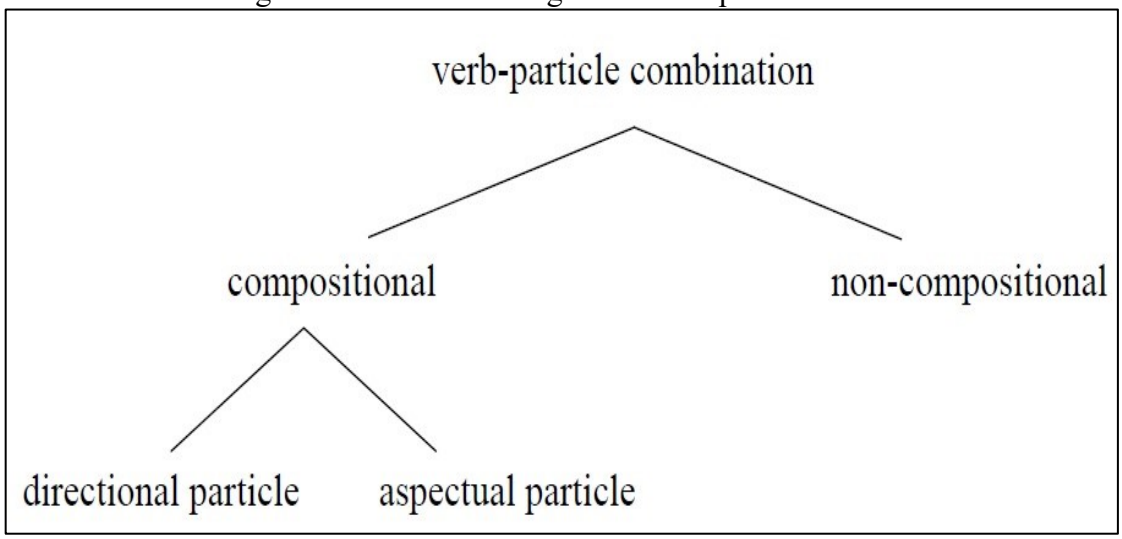
(10) I'm not surprised he was *taken in*: he's as gullible as a child.

These examples were taken from Thim (2012, p. 11 and 12). They demonstrate an explicit difference between the meanings of the verb-particle combinations. In example (9) *take in* means *carry inside*, whereas in example (10) *take in* means *deceive*. Hence, it is possible to observe that this difference goes from compositional meaning (9) to non-compositional one (10).

Figure 2 illustrates the semantic categorization of verb-particle combinations. They 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 (e.g., *finish up*). 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 (e.g., *figure out*).

Figure 2 – Semantic categorization of phrasal verbs.



Source: Thim (2012, p. 13)

4.2.1.1 Compositional constructions

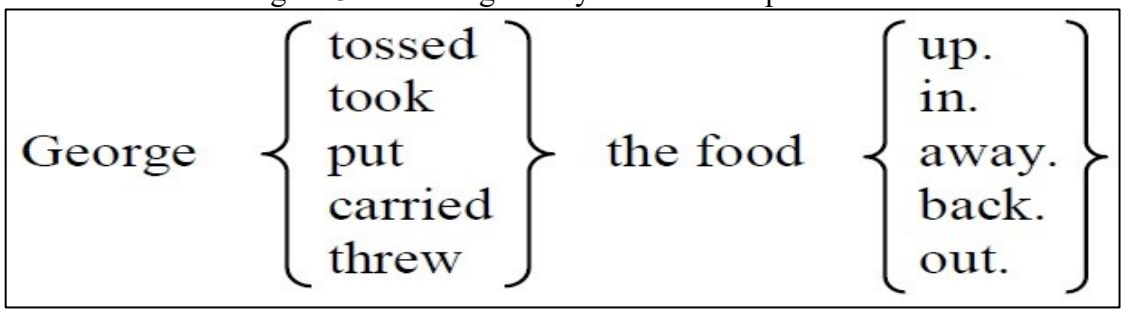
There are two classes within the compositional constructions. They are the directional construction and the aspectual construction. In relation to the directional construction, the arrangement between a verb and a directional particle is transparent, that is, it is possible to determine the meaning of the whole sequence. For instance:

(11) Well it reminds me when I was in a shop on the High Street for many years and a little boy and girl *came in* with a, with an Alsatian dog, a puppy. (BNC)[4]

Example (11) was taken from Thim (2012, p. 14). The directional particle construction *came in* means *go inside a place*, that is, the particle expresses the direction of the action of the verb. The arrangement of such compositional constructions is a process whose flexibility can be illustrated by the correspondence of verbs and particles as shown in Figure 3.

[4] BNC – British National Corpus.

Figure 3 – Exchangeability of verbs and particles.



Source: Thim (2012, p. 14)

Figure 3 shows that it seems possible to combine any verb with any particle, as long as this arrangement does not compromise the comprehension and the particle provides an interpretation of motion through space. Hence, the particle has to express the direction to the verbal action. Goldberg (2016) claims that the default order of a phrasal verb would be <V NP P> because of its caused-motion construction, as illustrated in example (12), taken from Goldberg (2016, p. 126):

(12) *Get* the bag *out* of the car.

With regard to the aspectual constructions, their meaning is usually fully transparent and readily understandable arrangements, for example:

(13) And having another baby to *use* the clothes *up* seems a little extravagant. (BNC)

Example (13) was taken from Thim (2012, p. 16). The particle *up* has a peculiar characteristic which introduces the concept of a goal or an endpoint to durative situations. For example, (Thim, 2012, p. 17):

(14) He *used* our supplies.

(15) He *used* our supplies *up*.

In example (14), there is the verb "*used*", and in example (15) the particle *up* was inserted. The combination *used up* in example (15) shows a change in the meaning of the verbal action which conveys that *he finished our supplies*. That is, the particle *up* expresses the duration of that verbal action. In addition, it is possible to observe some redundancy in example (16), taken from Thim (2012, p. 17):

(16) Chico *finished up* his drink.

In directional constructions do not commonly express this repetition of ideas, for example, **he entered the room in.*

Nevertheless, not all aspectual particles are telic. The two particles *on* and *along*, for example, may function as continuative, and be atelic, for example:

(17) Abraham *talked on*, not noticing her lack of attention. (BNC)

(18) In the end, Mungo reasoned that the old man had probably been *driving along*, had somehow caught a glimpse of him, and had taken a short cut from the road. (BNC)

In sum, the aspectual and the directional constructions convey transparent meanings which can be considered literal combinations.

4.2.1.2 Non-compositional constructions

This category is very different from the other two presented above, especially in terms of the semantic aspect. The non-compositional constructions are not possible to infer the meaning of the whole combination from the meaning of their individual elements, that is their meaning is non-transparent. For instance:

(19) My husband actually said to me that *giving up* smoking was easy because he's done it plenty of times. (BNC)

(20) He could not *make* it *out*, nor could he trust his own memory. (BNC)

These examples were taken from Thim (2012, p. 19). Non-compositional constructions are also known as either figurative phrasal verbs or idiomatic verb-particle combinations. Another aspect that characterizes the idiomatic constructions is the position of the particle and the verb in which the particle always comes after the verb. For instance, example (21) is not possible to occur:

(21) *… and *out* he *made* it.

In the present dissertation, in order to investigate the processing of phrasal verbs, I will adopt the term figurative phrasal verbs.

4.2.2 Syntactic Characteristics

According to Thim (2012), the basic syntactic features of the phrasal verbs are transitivity and serialization, particles and prepositions which are described as follows.

4.2.2.1 Transitivity and serialization

According to Jackendoff (2002, p. 69–73), phrasal verbs may be intransitive, as in the following examples taken from Thim (2012, p. 21):

(22) Your children will *grow up*.

(23) The whole house *blew up*.

(24) My mother *freaked out*.

As stated by Thim (2012), these phrasal verbs are non-compositional constructions and considered fixed expressions. In transitive phrasal verbs, the object may come either before the particle or after if the object is a full noun phrase, as in examples (25) – (26) and (27) – (28) respectively (THIM, 2012, p. 22):

(25) I can *put out* the announcement. (BNC)

(26) They never *blew up* the houses. (BNC)

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

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

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

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

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

Jackendoff (2002) claims that it seems that the position of the object is connected to the size of the object or to provide end-focus on the object, as in the following examples (THIM, 2012, p. 22 and 23):

(31) Lila *looked up* the answer to the question that was on everyone's mind.

(32) *Lila *looked* the answer to the question that was on everyone's mind *up*.

(33) Lila *looked* it *up*.

(34) *Lila *looked up* it.

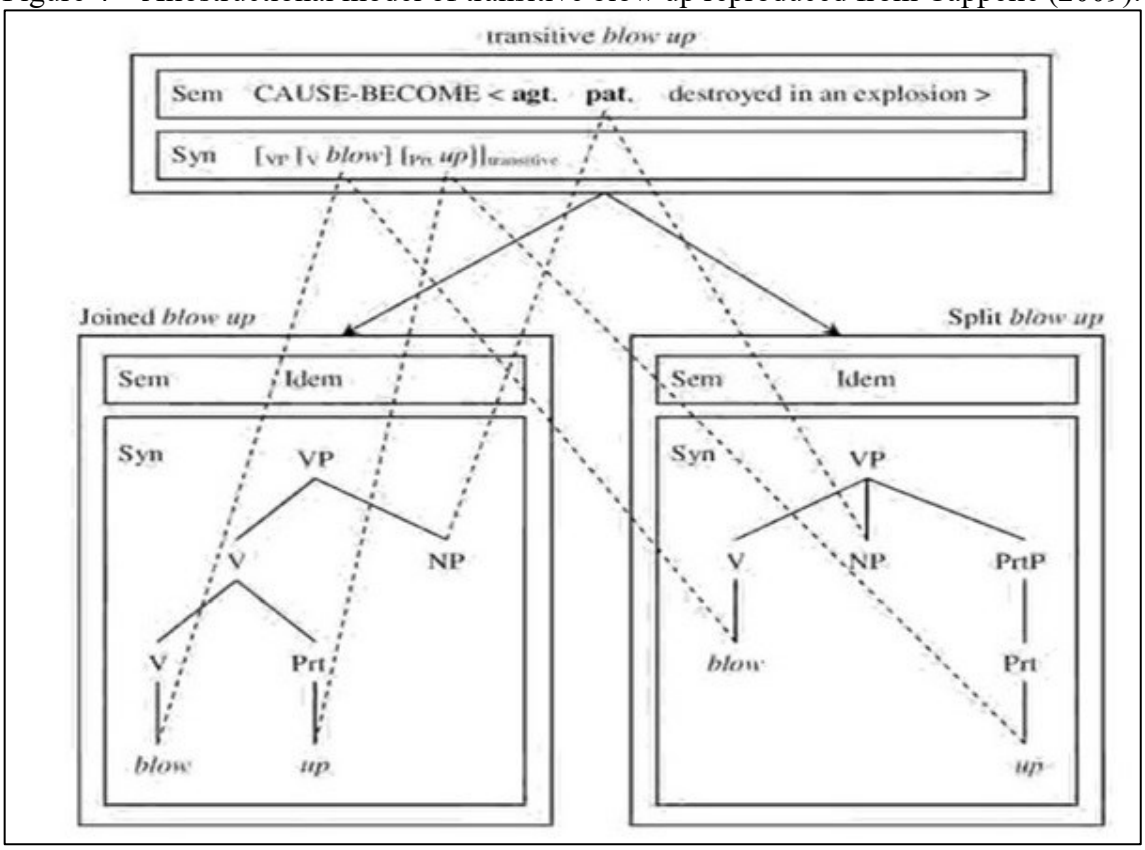
(35) He *left out* hím (not hér).

Following the generative approach, Dehé (2002, p. 77) argues that the neutral order is *verb-particle-object* and that the choice of one order rather than the other depends on the *news value* of the object. Whereas Gries (2003) describes particle placement as a constructional alternation which depends on a number of variables. According to Haiden

(2007), the lexicalist position holds that verb particle constructions are formed in the lexicon and enter the syntactic derivation as a single projecting head.

By contrast, Cappelle (2005) argues in favor of a free variation in an *allostructional* analysis, which is a truth-semantically equivalent, but formally distinct manifestations of abstract represented construction. Similarly, Los and collaborators (2012) will argue that particle verbs have been shown to be phrasal combinations of words that function as lexical units. Their main conclusion as to the grammatical status of particle words is that a particle is a lexical head that projects optionally, as illustrated in Figure 4.

Figure 4 – Allostructional model of transitive blow up reproduced from Cappelle (2009).



Source: Cappelle (2009, p. 188)

Thim (2012) claims that in many cases the syntactic elements depend on the semantics of the phrasal verb. As can be seen in Figure 4, Cappelle (2009) argues that apparently the degree of lexicalization plays a role in the choice between joined (adjacent) and split order, with a tendency for compositional constructions to appear in split order, while idiomatic combinations show a clear tendency to appear in joined (adjacent) order, as in the following examples, respectively:

(36) I *blew up* the tyre or I *blew* the tyre *up*.
(37) They *blew up* when they heard what I had done.

4.2.2.2 Particles and Prepositions

In order to demonstrate the syntactic differences between phrasal verbs and prepositional verbs, I will present a comparison as follows. These two examples *called on* and *switched on* may seem very similar to each other (THIM, 2012, p. 26):
(38) The following day the then Indian Prime Minister, Rajiv Gandhi, *called on* the King and they exchanged views on bilateral matters. (BNC)
(39) The silence returned, and he *switched on* the light. (BNC)

Nevertheless, in example (38) *on* is a preposition and is part of the prepositional verb *call on*, and in example (39) *on* is a particle that pertains to the phrasal verb *switch on*. The distinctions between these two kinds of verbs are syntactic, semantic and prosodic which can be seen in Figure 5. 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 is only possible with prepositions. Finally, in (i) particles are stressed.

Figure 5 – Phrasal Verbs and prepositional verbs compared.

	phrasal verb	prepositional verb
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 úp?*	*Which book did she lóok at?*

Source: Thim (2012, p. 27)

In order to clarify any doubts on the difference between these two verbs, Cappelle (2005) reached the following conclusion:

i. particles have different distributional properties from PPs;
ii. they cannot be simply analyzed as reduced PPs, and;
iii. they do not always have the same meaning as formally related directional PPs. Calling them *prepositions* blinds us to these facts (CAPPELLE, 2005, p. 101).

4.3 SUMMARY OF THE CHAPTER

In this chapter I have presented the definition of phrasal verbs and their semantic and syntactic nature. The next chapter will present and discuss factors that influence the processing and learning of formulaic language by nonnative speakers.

5 FACTORS CONTRIBUTING TO CROSS-LINGUISTIC INFLUENCE: THE PROCESSING OF FORMULAIC LANGUAGE IN L1 AND L2

This chapter presents a body of research related to lexical representation and processing in L1 and L2 to comprehend the mechanisms of formulaic language processing and learning. According to Jiang (2018, p. 144), a word is *a string of letters* of our native language, which is stored in our mental lexicon. Based on Jiang (2018), individual words have an important role to help researchers to grasp how formulaic language is represented and processed. Formulaic language (e.g., *phrasal verbs, idioms, collocations*) is affected by numerous factors, such as transfer from the L1, figurative language, frequency, and they are addressed as follows.

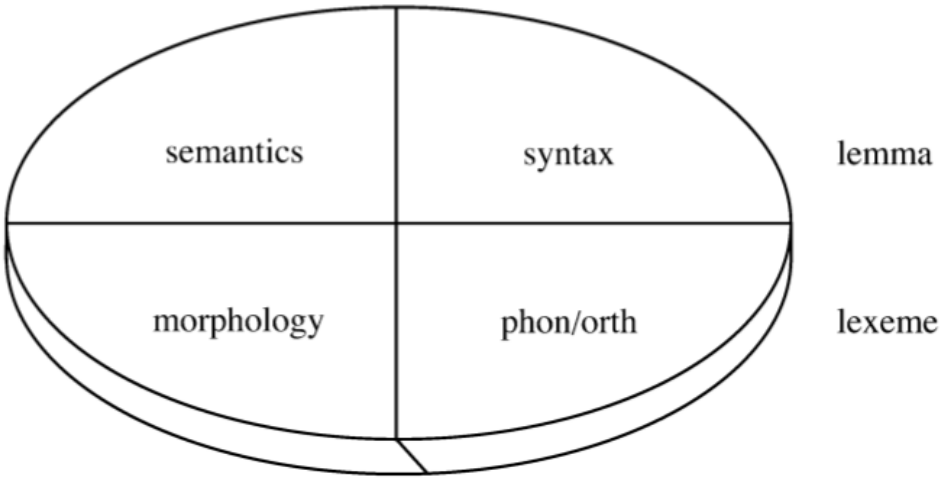
The chapter is organized into three sections. Section 5.1 introduces the basic concepts of lexical representation and processing in L1 and L2. Section 5.2 presents factors contributing to cross-linguistic influence. Section 5.3 presents a summary this chapter.

5.1 LEXICAL REPRESENTATION AND PROCESSING IN L1 AND L2

According to Levelt (1989), users of a language recognize a word in 200ms, and this reflects ease and automatization of word recognition. As stated by Jiang (2018, p. 144 and 145), lexical representation includes various attributes. For example, (1) a word comprises phonological, orthographic, semantic, syntactic, morphological information; (2) the lexical entry might be an abstract representation of a word; (3) The process of retrieving a word is automatic and effortless; (4) In the lexicon, there is interaction between lexical entries, and they are interconnected during lexical processing and (5) the lexical system relates to a conceptual system, that is, a native speaker co-activates the concepts of words automatically without effort in terms of thinking of a word and its concept is quickly available.

And how about L2 speakers? Based on Levelt (1989), Jiang (2000) proposed a psycholinguistic model of vocabulary acquisition in an L2 instructional setting. The model has three stages, which comprises two levels, (1) lemma level and (2) lexeme level, as can be seen in Figure 6.

Figure 6 – Jiang's model of vocabulary acquisition in L2 (Adapted from Levelt, 1989).

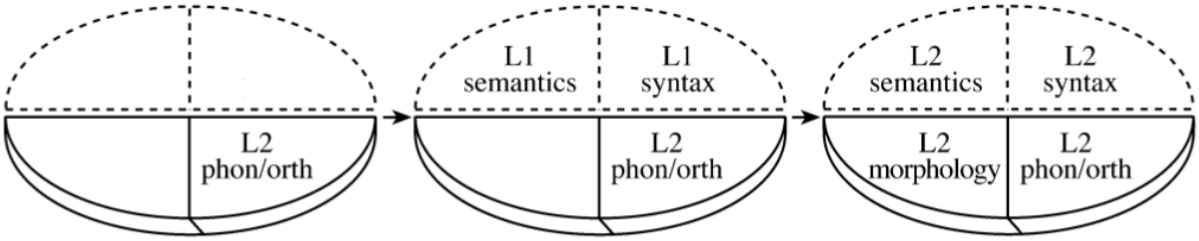


Source: Jiang (2000, p. 48).

As shown in Figure 6, the lemma level includes semantic and syntactic aspects of a word, whereas the lexeme level consists of morphological and phonological/orthographic information about a word. At the first stage, L2 speakers only have phonology and orthography aspects of a word stored in their mental lexicon. That is, L1 word information offers access to the L2 phonology and orthography. Thus, as Jiang claims, repetition will create a link between L1 and L2 until the second stage is reached. At this stage, in order to create a new entry for morphology in L2, the learner copies information from the L1 at the lemma level with L2 information at the lexeme level. Thus, L1-L2 knowledge is associated in a hybrid manner, meaning that L1 lemma mediates the use of L2 words. Finally, at the third stage, the semantic, syntactic, and morphological information of an L2 word are integrated into a new lexical entry, and this takes place through exposure and use. According to Jiang (2000, p. 53), "at this stage, a lexical entry in L2 will be very similar to a lexical entry in L1 in terms of both representation and processing".

Therefore, a full development of lexical competence in L2 can be seen in Figure 7.

Figure 7 – Lexical development in L2: from the formal stage to the integration stage.



Source: Jiang (2000, p. 54).

As depicted in Figure 7, lexical development in L2 happens according to experience and use of L2 vocabulary. At the formal stage, in order to create an L2 entry, L1-based knowledge is copied to create lexical entries that comprise L2 forms and L1 lemmas. At the final stage, L2-based knowledge, such as semantic, syntactic, morphological information is established as a lexical entry. Jiang (2000, p. 54) highlights that these stages have to do with a specific word evolving during the learning process, and that they are not as well-defined as they seem.

In order to gain a better view of the mental lexicon and the processes involved in lexical access of single words and multiwords (e.g., *phrasal verbs, idioms and collocations*), a body of research is presented next.

5.2 FACTORS CONTRIBUTING TO CROSS-LINGUISTIC INFLUENCE: THE PROCESSING OF FORMULAIC LANGUAGE BY BILINGUALS

According to Thomas and colleagues (2014) one of the main areas of interest in relation to bilingualism research is the nature of bilinguals' early linguistic representations in the mind. This topic has been investigated for decades and early research tended to support the notion of a unified system from the outset. Nevertheless, researchers have proposed that bilinguals differentiate their two systems, right from the very beginning (e.g., DE HOUWER, 1990; DÖPKE, 2000; GENESEE, 1989; HULK; MÜLLER, 2000; PARADIS; GENESEE, 1996). This is not to say that the two languages will not interact with one another at some point and in some way. For instance, Müller and Hulk (2001) hypothesize that both languages may influence each other, not necessarily as whole systems, but in specific linguistic areas.

Central to this debate is whether such interactions are expressed by means of transfer. In the 1960's, according to the contrastive analysis, learners' errors were reproduced based on the structure of their native language (L1). In the 1970's, researchers found out that learners' errors were not only from their L1. In fact, Selinker (1972) was the first to introduce the term *Interlanguage* which means a learner's separate linguistic system, in that the learner attempts to produce the target language (SELINKER, 1972, p. 214).

As stated by Thomas and collaborators (2014), transfer is the "incorporation of a grammatical property into one language from the other reflecting a more qualitative expression of cross-linguistic influence" (p. 50). Gathercole and colleagues (2014, p. 64) argue that researchers have concerned themselves with the question of when 'transfer' occurs, in which direction (L1 to L2, but also L2 to L1?), and under what conditions. Previous research has acknowledged that there may need to be some similarity between the two languages for transfer to occur (e.g., KELLERMAN, 1995). Moreover, it has also been acknowledged that language interaction in bilinguals may not always occur within the internal interfaces of a grammar (e.g., within the morphological, syntactic, and semantic modules of the grammar). In contrast, it seems that this language interaction may occur within the external interfaces of the grammar, at the points at which, for example, syntax and pragmatics come together.

According to Thomas and colleagues (2014, p. 50-51), transfer may demonstrate influence over a period of time in a bilingual's grammar (e.g., *code-switching*). This influence may occur systematically, that is, transfer influences bilinguals' patterns of development of their grammar in comparison to monolinguals' grammar. Regarding this issue, researchers have proposed potential conditions for transfer to occur, such as a complex structure, an ambiguity/structural overlap, linguistic typology and non-linguistic influences (e.g., HULK; MÜLLER, 2000; KUPISCH; BERNARDINI, 2008; DÖPKE, 2000; PARADIS; GENESEE, 1996; PARADIS; NAVARRO, 2003). They are addressed as follows.

A complex structure must be sufficiently challenging, even for a monolingual learner to acquire, and vulnerable for cross-linguistic influence. In the same vein, ambiguity/structural overlap during transfer will occur across shared commonalities in the surface structure. However, transfer takes place more likely among broad abstract rules that apply to both systems (e.g., *the category of gender*), and is less likely to occur with lexicon-specific patterns. Linguistic typology has been vastly investigated. A number of studies have

suggested that cross-linguistic transfer is highly likely and more pervasive in closely related language pairs with similar patterns in phonology, morphology or syntax like German and English, Dutch and English than in distant languages like Chinese and English, Arabic and English. It seems that transfer may be linked to language dominance, suggesting that transfer is most likely to occur in those bilinguals who are *balanced* in both languages. Gass and Selinker (2008, p. 27) states that a dominant bilingual is "someone with greater proficiency in one of his or her languages and uses it significantly more than the other language(s)". Moreover, studies of cross-linguistic influence include a measure of external influences (non-linguistic factors) (THOMAS *et al.*, 2014, p. 51-52).

According to Gathercole and colleagues (2014), the clearest evidence for interaction between two languages or more would be the progression for some structures in one of the bilingual's languages in comparison to the general progression one might expect given the general level of exposure by the bilingual child to that language. It might be, for example, that the acquisition of some aspect of one of the languages can amplify the development of a comparable form in the child's other language, resulting in acceleration in the acquisition of that form. Conversely, it might be that when there are differences between the structures in the two languages, this might make their discovery in either language harder, going toward to a greater delay in acquisition than might be expected.

In this regard, Butler (2013) points out a number of factors that promote or hinder transfer. According to the author, one of the most important factors is language distance, or similarities between one L1 and an L2 (p. 127). In addition, it is assumed that ease of acquisition and processing of an L2 has to do with small linguistic differences. For instance, Kellerman (1977, 1983) claims that learners recognize typological distance between languages, and this fact causes transfer. Factors such as the developmental stage, age, sociolinguistic aspects and prototypicality meanings, also influence transfer between languages.

According to Sanoudaki and Thierry (2014) humans have the ability to acquire two or more languages which may differ radically from each other in terms of their syntactic rules. An example of this cross-linguistic variation is the order in which adjectives and nouns can appear. In a given language the order may be fixed, for example adjective-noun (e.g., *blue car*), noun-adjective (e.g., *car blue*), or it may vary (e.g., *blue car or car blue*). Another

example of cross-linguistic variation is the fact that bilinguals have to interpret a lexical form such as *run into* as a figurative phrasal verb and sometimes as a verb + preposition combination (literal phrasal verb).

Paulmann and colleagues (2015) show that comprehension of phrasal verbs is not necessarily problematic in high proficient L2 learners of English. Nevertheless, these results are subject to learning, saliency and frequency which may influence bilinguals' processing mechanisms. Since phrasal verbs are items exclusively from Germanic languages (e.g., English, German, Dutch), they are absent in others (e.g., Spanish, Italian, Portuguese). Consequently, there are problems that learners of English as L2 have with phrasal verbs, due to phonological, morphological, syntactic and semantic issues (CAPPELLE *et al.*, 2010; SIDE, 1990; YULE, 1998).

Sanoudaki and Thierry (2014) assume that the question of whether bilinguals indeed function like monolinguals during syntactic processing of one of their languages remains open. It could be the case that grammatical processing in a bilingual is essentially similar to that of a monolingual during a monolingual interaction. Alternatively, it is possible that processing is in some way affected by knowledge of the syntactic rules of the other language, even though that language is not actively being used. In the phrasal verb example above, this would mean that when a bilingual is in a situation where English is the only language that is being spoken, his/her knowledge of the existence of a phrasal verb, figurative or literal, will depend on the context, familiarity, fluency and knowledge of the language itself. Regarding this issue, there is evidence that the processing of literal and figurative language can be affected by cross-linguistic factors.

According to Matlock and Heredia (2002), some studies on bilingualism and figurative language suggest interesting relationships between proficiency, familiarity, and the comprehension of figurative language in the L2. Previous studies showed that processing capacity and relevant knowledge were the major factors determining complexity level in the bilinguals' interpretations of figurative language. Titone and colleagues' (2015) results showed that bilinguals are sensitive to the same linguistic factors (e.g., *familiarity*) that control idiom processing for monolinguals due to cross-language influence. Likewise, Cieślicka (2015) states that there is a determining factor unique for L2 learners, that is cross-language similarity suggesting that language knowledge or language proficiency is related to the comprehension of nonliteral language. Another contribution to the evidence that

proficiency and familiarity can lead to nativelike formulaic language processing in the L2 is Carrol *et al*. (2016). Carrol and collaborators claim that familiar L1 idiom (translated to English) was easily understood during the online processing by advanced speakers of English as L2.

Another possible explanation for cross-language similarities is that semantic and syntactic aspects are stored in the mental lexicon, and they might affect language processing. For instance, Wolter and Yamashita (2015) investigated collocations items by means of lexical decision task by one group of native speakers of English and two groups of nonnative speakers of English, native speakers of Japanese. There were three conditions: (a) Japanese-only collocations (English translations, e.g., far eye), (b) English-only collocations (e.g., low speed), and (c) noncollocational items. Their results showed no activation when the participants processed collocations in L1 translated to L2. Moreover, the native speakers of English processed Japanese-only collocations faster than the other conditions. They interpreted these surprising results as evidence that there is a difference between how adjective-noun (AN) was processed in comparison to verb-(object) noun (VN). This difference can be accounted for by the concept of valency (TESNIÈRE, 2015), as stated by the authors (p. 1213). Wolter and Yamashita claim that the semantic and syntactic characteristics of verbs are stored in the mental lexicon, thus, speakers primed the verb when they encountered it and predicted a noun to go with this verb. That is why native speakers of English (L1) favored the processing of collocations in Japanese, even though they did not experience this in their L1.

According to Wray (1999, 2000, 2004) learning how to combine words is the biggest challenge for L2 learners. One possible explanation may be that L1 multiword chunks are acquired as a whole unit and only after some exposure speakers learn to segment these structures into small units, as stated by Arnon and Christiansen (2017). One of the options to solve this problem is repeatedly being exposed to sequences of words that co-occur together.

Therefore, a key question concerning the acquisition and learning of language in bilinguals is to what extent the two languages interact and influence one another. The answer to this question is still quite challenging because there are many factors which are involved in language processing, such as the degree to which literal and figurative languages are familiar to bilinguals, the level of language proficiency, and similar language structures. Overall, all

these factors have a direct impact on how bilinguals process literal and figurative language expressions.

5.3 SUMMARY OF THE CHAPTER

Attributes of lexical representation in L1 were presented followed by stages of lexical representation in L2 to highlight the idea that these stages have to do with a specific word evolving during the learning process (JIANG, 2000, p. 54). It is important to note that lexical development in L2 is based on experience and use of L2 vocabulary.

It seems that various factors such as proficiency, familiarity, similarities and differences between languages, and frequency influence the processing and learning in L2.
The next chapter will present methods to investigate the processing of phrasal verbs and idioms in L1 and L2.

6 METHODOLOGICAL TECHNIQUES TO INVESTIGATE FORMULAIC LANGUAGE PROCESSES: CONTRIBUTIONS TO UNDERSTAND SECOND LANGUAGE PROCESSING OF PHRASAL VERBS AND IDIOMS

This chapter presents three methodological techniques to investigate the processing of phrasal verbs and idioms: (1) the eye-movement paradigm, (2) the moving-window paradigm, and (3) the masked priming paradigm. These methods have been used in experimental studies on the processing of L1 and L2 formulaic language. For the purposes of this dissertation, the moving-window paradigm and the masked priming paradigm were used to examine the processing of L2 phrasal verbs and idioms. Moreover, this chapter also presents how planning a data collection design remotely (online) and sticking with the main goals of the present research posed some challenges.

The chapter is organized into five sections. Section 6.1 presents the eye movements recording technique. Section 6.2 presents the self-paced reading task. Section 6.3 describes the semantic priming task. Section 6.4 presents the major challenges to conduct a study in the pandemic scenario of COVID-19. Section 6.5 presents a summary of this chapter.

6.1 EYE-TRACKING TECHNIQUE: THE EYE-MOVEMENT PARADIGM

The eye-tracking method is becoming increasingly popular in applied linguistics, second language acquisition (SLA), and testing to investigate topics that have been traditionally examined with off-line measures (e.g., judgment tasks). Many researchers interested in language processing make use of eye-tracking technology to monitor the eye when reading and when looking at a static scene or video while listening to auditory input. Eye-tracking is primarily used to detect and measure eye movements (saccades) and stops (fixations), as well as movements back in a text when reading (regressions) (CONKLIN; PELLICER-SÁNCHEZ, 2016). According to Rayner (1998), saccades take around 30ms and are about 8 characters long, but it is also possible to see saccades from 2 to 18 or more characters. The stops between saccades are referred to as fixations and last roughly 225ms in silent reading and 275ms in oral reading, but the fixations can last from 100-500ms.

According to Pickering and collaborators (2004), the eye-movement paradigm has two key underlying assumptions. First, the amount of time spent fixating an item reflects the cognitive effort required to process it, meaning that longer durations and more fixations indicate greater processing effort and shorter fixations and or skipping indicate less processing effort. The second supposition is that what is being fixated is what is being considered.

Conklin & Pellicer-Sánchez (2016) stated that eye-tracking data are often examined in terms of early and late measures. Early measures (first fixation duration, first pass reading time) tap into automatic processes and the initial stages of processing (e.g., lower-level processes like word recognition). Late measures (total reading time, fixation count) reflect strategic processing and include revisits and reanalysis that result from difficult processing. Thus, they signal more effortful and/or conscious processing (lexical integration in reading). Some measures are standardly reported, while other measures may only be applicable, or inapplicable, in certain contexts. For example, it is only appropriate to report first fixation duration for single words or for very short regions of interest (ROIs).

Staub and Rayner (2007) explain that "Single Fixation Duration" is the time spent on the region of interest on which only a single fixation was made in the target word. "First Pass Reading Time" or "Gaze Duration" (if the region of interest is a single word) is the sum of all fixation durations made within a region of interest before exiting either to the left or to the right. In addition, "Total Time" or "Total Reading Time" refers to the sum of all fixations durations made within a region of interest. "Regression Path Duration" also known as "Go-Past Time" refers to the sum of all fixation durations which starts with the first fixation within a region of interest up to—but excluding—the first fixation to the right of this region. "Rereading" is calculated as regression path duration for the region of interest minus gaze duration or first pass reading time for this region. "Second Pass Reading Time" is the sum of all fixation durations made on a region of interest after the region was exited and reentered for the first time. "Fixation count" is the number of all fixations made within a region of interest (ROBERTS; SIYANOVA-CHANTURIA, 2013, p. 219-220). Measures such as first fixation duration and gaze duration/first pass reading time are often referred to as early measures while total time and second pass time are late measures (STAUB; RAYNER, 2007).

Conklin and Pellicer-Sánchez (2016, p. 3) argued that there are two significant advantages of eye-tracking over other traditional techniques that measure response times or

reading times. First, eye movements are a natural part of reading and viewing eye-tracking can be done without secondary tasks that are often subject to strategic effects. Second, eye-tracking provides a very rich record of reading behavior. The method allows the researcher to quantify what happens when a word or region is encountered. For example, it is possible to measure how many times, how long and when a word is fixated during reading. Also, the researcher is able to see where readers go back in a text when they are having difficulties. In order to address the issue of idiom processing and understand the measures employed, three studies are described next.

Underwood and collaborators' (2004) study was the first to employ the eye-tracking method to look at idioms processing in English as L1 and L2. The eye-movement paradigm was applied aiming to measure participants' reading times for a full paragraph, which comprised idioms (e.g., *honesty is the best policy*) and novel phrases (e.g., *it seems that his policy of...*). Fixation count and fixation durations were compared between native and nonnative speakers of English. Their results showed that idioms were processed faster than novel phrases for native speakers. On the other hand, fixation durations were longer to idioms in comparison to novel phrases for the nonnative speaker group. Their findings are discussed in light of E-Z Reader Model (RAYNER *et al.*, 2000) and its five stages (familiarity check, lexical access, early saccadic programming, late saccadic programming, and saccadic movement).

Siyanova-Chanturia and colleagues (2011) examined idioms processing in a literal context (e.g., *at the end of the day - in the evening*), idiomatic context (e.g., *at the end of the day - eventually*), and novel phrases context (e.g., *at the end of the war*) by native and nonnative speakers of English. Their results revealed that idioms had fewer and shorter fixations in comparison to novel phrases by native speakers. Moreover, there was no difference between idiomatic meanings and literal ones. For nonnative speakers, idioms and novel phrases were processed in a similar manner. In addition, figurative meanings were processed more slowly than literal ones. Their results highlighted that frequency effects did not affect the processing of literal and figurative uses of idioms by nonnative speakers.

Cieślicka and colleagues (2014) investigated the degree of literal and figurative activation in bilingual idiom processing modulated by language dominance, salience, and context. The stimuli were embedded in neutral preceding context (e.g., *Figurative*

meaning/Literal meaning: Within seconds she realized she was in deep water...) and in supportive preceding context (e.g., *Figurative meaning: Since both of us were equally guilty of causing the overspend, we both knew we were in deep water.../Literal meaning: Extremely useful for rehabilitation from injury are water workouts, especially running in deep water...*). Their results suggested that literal meanings of idioms were easier to process, and thus more salient for Spanish-dominant bilinguals in comparison to English-dominant bilinguals. In addition, a robust effect of context was found, regardless of whether idioms were used literally or figuratively. They interpreted their results as evidence that salience and context affect idiom processing.

In conclusion, there are various benefits to employing the eye-movement paradigm to explore idioms processing and other kinds of formulaic language (e.g., phrasal verbs). Eye-tracking measures allow researchers to examine experimental items in a holistic and/or word-by-word mode analyzing early and late processing. As stated by Siyanova-Chaturia (2013, p. 254), eye-tracking technique is an "invaluable tool" to investigate formulaic language.

6.2 SELF-PACED READING TASK: THE MOVING-WINDOW PARADIGM

The self-paced reading (SPR) method was proposed in the 1970s and was first applied by Juffs and Harrington (1995) in the area of Second Language Acquisition (SLA). According to Jegerski (2014), this method has been employed in the research of L2 processing since 2006 with the development of the Shallow Structure Hypothesis (CLAHSEN; FELSER, 2006). Moreover, SPR is a useful online behavioral methodology for investigating the L1 and L2 processing of formulaic language (e.g., MATLOCK; HEREDIA, 2002; CONKLIN; SCHMITT, 2008; HOLSINGER; KAISER, 2013; BECK; WEBER, 2019, 2020).

In this task, the participants are asked to read sentences, displayed on the computer screen, and their reading times (in milliseconds) are recorded. In addition, it is possible to record participants' reading times in a word-by-word fashion or in a phrase-by-phrase mode. According to Jegerski (2014, p. 31), there are three main configurations to employ a self-paced reading task. The first format refers to the presentation of one visible word/phrase at a time. Participants pressed a button to unmask the words/phrases of the sentence. Once they read one word/phrase a new word/phrase is revealed and the previous one is re-masked. This

is known as the moving-window(s) technique to avoid a cumulative effect. The second format can be a cumulative effect, that is, when the participants press the button to read the word/phrase, the segment remains on the screen, until the sentence is completed. The third format refers to the presentation of words in the center of the screen, every word appears one at a time.

In order to comprehend the relationship between processing and reading time, Just and Carpenter (1980) presented the eye-mind presupposition, which assumes that the amount of time taken to read a word/phrase indicates the amount of time needed to process the word/phrase. Therefore, processing time is used as the time the participant takes to examine the structure (e.g., idioms and phrasal verbs) as it evolves, thus revealing the mental processes such as the time course of the activation, lexical access, and strategies of processing during the reading of the sentences or phrases (JIANG, 2012, p. 10). According to Conklin and colleagues (2018), spillover effects take place when the processing of a critical word carries over to the next.

Another aspect that is important to consider in a SPR task is a distractor to help the researcher to control the participants' attention. In this regard, comprehension questions normally follow some or all of the stimuli to ensure participants are not pressing buttons without paying any attention to what they are reading (JEGERSKI, 2014, p. 34). A plethora of experimental studies have examined formulaic language with a self-paced reading method. However, for the purposes of this dissertation, next, I present three studies that used this technique to explore the processing of phrasal verbs and idioms in L1 and L2.

The first study to be described is Holsinger and Kaiser (2013). They investigated phrasal verbs with idiomatic and literal meanings (e.g., *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 rather than idiomatic interpretation. They interpreted these results as evidence that participants favored literal processing in comparison to figurative processing.

The second study to be described is Beck and Weber (2019). They examined idioms in a literal and idiomatic interpretation depending on the context (e.g., *break the ice with his peers/on the lake*) by means of a phrase-by-phrase self-paced reading task by speakers of English as L2, native speakers of German. Their results showed that L2 readers integrate

linguistic context in idiomatic processing. For literal interpretations, their results are inconclusive. They interpreted these results as evidence that literal meanings are not the priority during the processing of idioms.

Finally, the third study to be described is Beck and Weber (2020). The authors explored idioms in a literal and idiomatic interpretation depending on the context (e.g., *break the ice with his peers/on the lake*) by means of a phrase-by-phrase self-paced reading task by native speakers of English. Their results showed that high-literality idioms were supported by the context, whereas low-literality idioms were not. They interpreted these results as evidence that the processing of idioms is interfered by idiom literality.

By exploiting the use of the moving-window paradigm, researchers are able to explore phrasal verbs and idioms processing analyzing word-by-word or phrase-by-phrase reading times of items. According to Jegerski (2014, p. 43), SPR is cheap, highly portable, and very efficient.

6.3 LEXICAL DECISION TASK: THE MASKED SEMANTIC PRIMING PARADIGM

The lexical decision task (LDT) is also a useful online technique for exploring figurative language processing as a predictor of lexical activation, especially for examining a specific meaning activation. It is assumed that when there is a fast response for a target word that is related to the preceding prime, this is known as the priming effect (GARCÍA *et al.*, 2015, p. 140). According to McDonough and Trofimovich (2011, p. 59), semantic priming is "a general tendency for language users to show facilitation in their processing of words due to a previous experience with words similar in meaning". That is, when the speakers see/hear a word with a familiar and similar meaning, they easily activate the item in their mental lexicon.

In a priming study, there is a prime followed by a target. There are two formats of a priming paradigm: (a) a visible one, that is, participants can visually see the prime and the target, and (b) an invisible priming, meaning that participants are not able to see the prime displayed before the target. Forster and Davis (1984) were the pioneers to come up with the masked priming paradigm. The basic assumption of masking the prime is to avoid the possibility that episodic traces of the prime can affect the decision process (FORSTER; DAVIS, 1984, p. 684). From the viewpoint of theories of lexical access, episodic traces have to do with lexical knowledge that is consciously learned, specifically for L2 speakers (JIANG,

2018, p. 158). The main idea of the masked priming paradigm is that participants automatically activate the meaning relation between prime-targets. To examine phrasal verbs and idioms processing, two studies are presented next.

Gonnerman and Hayes (2005) investigated phrasal verbs by means of lexical decision task applying a masked semantic priming paradigm with native speakers of English. Unrelated (e.g., *cast off/throw*) and related (e.g., *throw up/throw*) items were divided into three categories: (a) prime-target pairs with high similarity and phrasal verbs with low dependency relationship (e.g., *clear off/clear*), (b) prime-target pairs with middle similarity and phrasal verbs with middle dependency relationship (e.g., *look up/look*), (c) prime-target pairs with low similarity and phrasal verbs with high dependency relationship (e.g., *chew out/chew*). The task was employed in the following manner: the participants were first presented with a fixation cross "+" for 1000ms, followed by a mask "#####" for 500ms. The prime was a phrasal verb (e.g., clear off) remained on the screen for 35ms and the target was a related verb (e.g., clear) afterwards presented for 200ms. Their results showed that prime-target pairs with high/mid similarity and less dependency (e.g., *clear off/clear*) were processed faster than prime-target pairs with low similarity and more dependency (e.g., *chew out/chew*). They interpreted these results as evidenced that the factor of verb and particle dependency facilitated the processing of these items.

Blais and Gonnerman (2013) investigated phrasal verbs by means of a lexical decision task applying a masked semantic priming paradigm with nonnative speakers of English, native speakers of French. Identity (e.g., *throw/throw*), unrelated (e.g., *cast off/throw*) and related (e.g., *throw up/throw*) items were divided into three categories: (a) prime-target pairs with high similarity and phrasal verbs with low dependency relationship (e.g., *clear off/clear*), (b) prime-target pairs with middle similarity and phrasal verbs with middle dependency relationship (e.g., *look up/look*), (c) prime-target pairs with low similarity and phrasal verbs with high dependency relationship (e.g., *chew out/chew*). The task was employed following the same procedures of Gonnerman and Hayes (2005). Their results showed that bilinguals responded to identity primes more slowly than to related primes. In addition, phrasal verbs with high/mid similarity and less dependency produced greater facilitation than phrasal verbs with low similarity and more dependency. The authors interpreted these results as evidence that bilinguals processed phrasal verbs as a whole unit.

In summary, the main advantage of the masked priming method is to minimize strategic effects. Thus, this benefit allows researchers to analyze phrasal verbs and idioms processing without the interference of episodic traces of these items. In order to have an overview of all the studies being described in this chapter, Table 1 displays examples of online studies on phrasal verbs and idioms.

Table 1 – Examples of Online Studies on Phrasal verbs and Idioms in English (L1).

Study	Participants	Task	Stimulus Type
Beck & Weber (2019)	L2	Self-Paced Reading	Idioms
Beck & Weber (2020)	L1	Self-Paced Reading	Idioms
Blais & Gonnerman (2013, Experiment 4)	L2	Masked Lexical Decision	Phrasal Verbs
Cieślicka *et al*. (2014)	L1 and L2	Eye-tracking	Idioms
Conklin & Schmitt (2008)	L1 and L2	Self-Paced Reading	Idioms
Gonnerman & Hayes (2005)	L1	Masked Lexical Decision	Phrasal Verbs
Gonnerman & Hayes (2005)	L1	Self-Paced Reading	Phrasal Verbs
Holsinger & Kaiser (2013)	L1	Self-Paced Reading	Phrasal verbs
Matlock & Heredia (2002, Experiment 2)	L1 and L2	Self-Paced Reading	Phrasal Verbs
Siyanova-Chanturia *et al*. (2011)	L1 and L2	Eye-tracking	Idioms
Underwood *et al*. (2004)	L1 and L2	Eye-tracking	Idioms

Source: The author.

6.4 COLLECTING DATA IN A PANDEMIC SCENARIO: MOVING RESEARCH ONLINE

The current project was submitted to the institutional review board at the Federal University of Santa Catarina (UFSC) - CEPSH/UFSC - in May 2019 and was approved in May 2019 under number 13367319.1.0000.0121, in accordance with Conselho Nacional de Saúde (National Health Council) Resolution 510/2016. The data collection was in process when, due to the COVID-19 pandemic, in person activities at UFSC were suspended by the Regulatory Ordinance No. 354/220/Gr published on the 18th of March 2020. Therefore, the face-to-face data collection was stopped. In the face of the new situation, and in order to

pursue the objective of the present research, I had to adapt and move all the experiments to the remote mode.

In order to pursue the objectives of the present dissertation, the experiments that were already going on prior to COVID-19 had to be adapted to the remote (online) mode. Because of this adaptation, I submitted two amendments to the Ethics Committee of the Federal University of Santa Catarina (CEPSH/UFSC). The first amendment was submitted and approved in July/2020, and it had to do with the semantic priming experiment (reported in Chapter 9) and the eye-tracking experiment, both designed to be carried out remotely. However, because of time constraints and data quality, I concluded that the eye-tracking experiment was not possible to be conducted online on account of the lack of accuracy and reliability of the data collection, especially for reading data. For this reason, a second amendment was submitted and approved in February/2021. The objective of this amendment was to ask permission to change the eye-tracking method to a self-paced reading task (reported in Chapters 7 and 8). Therefore, three online experiments were approved to be carried out remotely:

I) Investigating literal and figurative phrasal verbs using a self-paced reading task.
II) Investigating L1 and L2 idioms using a self-paced reading task.
III) Investigating the facilitation of the figurative meanings of phrasal verbs with one-word lexical verbs using a lexical decision task.

It is important to highlight that Study II was originally an eye-tracking study designed to replicate Carrol, Conklin and Gyllstad (2016). Due to COVID-19, the experiment was adapted to a self-paced reading task and it is not a replication anymore. However, Study II draws heavily on Carrol *et al*. (2016), summarized in Chapter 2, Section 2.4.

One of the biggest challenges was to develop a new research design and learn a new skill in a short period of time. All three experiments were programmed on JavaScript language using JsPsych[5] library (DE LEEUW, 2015) and it was hosted on the website Cognition[6]. The JsPsych library is open-source and contains all the source code for the experimenter to generate a description of the experiment and execute it in conjunction with

[5] https://www.jspsych.org/
[6] https://www.cognition.run/

the plugins (DE LEEUW, 2015, p. 2). For studies I and II, a standard one-word moving-window paradigm was used to build the tasks, and for study III, a lexical decision task was built.

Self-paced reading is a useful online behavioral methodology for investigating the processing of formulaic language (CONKLIN; SCHMITT, 2008). With this in mind, processing in this study is used as the time the participant took to examine the structure (e.g., *idioms and phrasal verbs*) as it is evolving, thus revealing the mental process such as the time course of the activation, accessing the words, and strategies of processing during the reading of those items (JIANG, 2012, p. 10). Given that it is possible to record participants reading times in a word-by-word fashion, I used one-word moving-window technique to avoid a cumulative effect and potentially influencing processing behavior through phrase-by-phrase mode (JEGERSKI, 2014, p. 31). In addition, I used the spillover effect to explore the processing of phrasal verbs sentences. According to Conklin and colleagues (2018), spillover effects take place when the processing of a critical word carries over to the next.

Regarding a lexical decision task, it is also a useful online technique for exploring the figurative language processing as a predictor of lexical activation, especially for examining a specific meaning activation. It is assumed that when there is a fast response for a target word that is related to the preceding prime, this is known as the priming effect (GARCÍA *et al.*, 2015, p. 140). In the present research, a masked semantic priming paradigm is adopted following the procedure employed in Blais and Gonnerman (2012).

The second biggest challenge was to recruit participants to take part in the studies. According to Resolution 466/12, which regulates scientific research carried out with human participants in Brazil, participants cannot be financially compensated to take part in studies. With regards to data collection, the experiments were designed to get data from native and nonnative speakers of English. Taking this into consideration, paid platforms such as Prolific, which recruit and pay participants are not allowed to be used for data collection in Brazil because of the restrictions concerning financial compensation. The solution found was to use a free platform, r/SampleSize, a pool on the social media platform Reddit[7]. r/SampleSize is a diverse and viable pool, which allows for online participant recruitment without immediate

[7] https://www.reddit.com/r/SampleSize/

payment (LUONG; LOMANOWSKA, 2021). Native speakers of English were recruited from this free platform and took part in the three experiments. Nonnative speakers of English (native speakers of Brazilian Portuguese) were recruited from different social media around Brazil and abroad.

6.5 SUMMARY OF THE CHAPTER

I have presented three methods to investigate the processing of L1 and L2 formulaic language in this chapter. The eye-tracking technique can help us understand how mental processes such as lexical access and meaning integration in a sentence/text affect the online processing of idioms and phrasal verbs, for example. The self-paced reading method allows researchers to explore the processing of idiom and phrasal verb as it evolves, thus revealing the strategies of processing of these word combinations. The masked semantic priming paradigm shows automatic lexical activation and the prime is not consciously visible, in which cannot affect the processing of a target word.

I also have presented the major challenges to conduct a study in the pandemic scenario of COVID-19. One of the biggest challenges was to develop a new research design using JavaScript language. The second biggest challenge was to recruit participants to take part in the three studies remotely, especially native speakers of English.

The next chapter will present Study I.

7 STUDY I - INVESTIGATING LITERAL AND FIGURATIVE PHRASAL VERBS USING A SELF-PACED READING TASK

This chapter presents Study I, a self-paced reading experiment investigating figurative and literal uses of phrasal verbs. The main objective of Study I is 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. The focus is to compare figurative and literal uses of phrasal verbs for L1 and L2 speakers.

The chapter is organized into six sections. Section 7.1 presents the objective, research questions and hypotheses. Section 7.2 provides information about the participants. Section 7.3 describes the instruments that were used in the study. Section 7.4 provides a summary of the method. Section 7.5 presents the pilot study of Study I. Section 7.6 presents the statistical analysis of the results. Finally, section 7.7 discusses the results of Study I.

7.1 OBJECTIVE, RESEARCH QUESTIONS, AND HYPOTHESES

As stated above, the main objective of Study I is 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. 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, Study I 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?

In order to answer these research questions and based on the literature, the following hypotheses are examined:

Hypothesis 1: Brazilian Portuguese speakers of English as L2 will process figurative phrasal verbs more slowly than literal phrasal verbs compared to one-word lexical verbs. The expectation is that one-word lexical verbs will be processed quickest than phrasal verbs

(literal and figurative meanings) for speakers of English as L2. On the other hand, native speakers of English will process figurative and literal phrasal verbs and one-word lexical verbs similarly.

The rationale for Hypothesis 1 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. Considering phrasal verbs as superlemmas (e.g., *break down*) and each word of the phrase as a lemma (e.g., *break* + *down*), the activation of the superlemma would occur in the encountering of the individual words of the phrasal verbs, which consequently would activate the figurative meaning and the lemmas simultaneously according to Sprenger and collaborators (2006).

Hypothesis 2: Brazilian Portuguese speakers of English as L2 will process figurative phrasal verbs more slowly than literal phrasal verbs. On the other hand, native speakers of English will process figurative phrasal verbs faster than literal phrasal verbs.

The rationale for Hypothesis 2 is based on Matlock and Heredia (2002), who showed that nonnative speakers processed literal meanings (e.g., *verb* + *preposition*) faster than figurative meanings (phrasal verbs) compared to native speakers of English. This result is explained by Littlemore and Low (2006, p.3 and 4), who state that learners may approach figurative language analytically; consequently, this slows down their processing, mainly, in those figurative items which are seen for the first time by nonnative speakers.

Motivated by the contradictory findings in the literature (MATLOCK; HEREDIA, 2002; PAULMANN *et al.*, 2015; WISINTAINER; MOTA, 2017; 2019), Study I is designed to explore whether there are processing differences between the reading of formulaic language and novel language. Study III is also designed to examine whether there are processing differences in L1 and L2 readings of figurative formulaic language. In order to understand these two assumptions on formulaic language, I will take into consideration the Hybrid model (SPRENGER *et al.*, 2006; see section 3.2 in Chapter 3) and the Literal-Salience Resonant Model (CIEŚLICKA, 2006; see section 2.2 in Chapter 2). The Literal-Salience Resonant Model of L2 idiom comprehension assumes that literal meanings enjoy a more salient status than figurative meanings. The Hybrid model considers the processing of

formulaic language as each unit and the whole phrase. Although it is considered to be a model based on production of idioms, it is widely used in the literature on idiom processing and representation (e.g., HOLSINGER; KAISER, 2013; TABOSSI *et al*., 2009; TITONE *et al.*, 2015). Therefore, both models - the Hybrid and the Literal-Salience Resonant - are for idioms; however, they might help to understand and explain what happens when an L2 reader encounters formulaic language as phrasal verbs.

7.2 PARTICIPANTS

In order to recruit participants, calls for participation were posted on different social networking websites inviting nonnative speakers of English, whose L1 was Brazilian Portuguese, as well as native speakers of English. All participants were recruited via the internet through different platforms. Specifically, native speakers of English were recruited from r/SampleSize, a pool on the social media platform Reddit[8].

A group of sixty-five participants took part in this study and they were different from Study II and III, including L2 speakers and native speakers of English. Nevertheless, various participants did not meet the criteria for inclusion in the study. These criteria were: (1) To reach advanced level in English at the Exam English website; (2) To be a native speaker of English (L1); (3) To complete all phases of the experiment; and (4) Not to be diagnosed with neurocognitive disorders. In these terms, one participant did not reach advanced level in English at the Exam English website (see subsection 8.3.2). Five participants did not have English as L1. Three participants reported being diagnosed with neurocognitive disorders. Additionally, twelve participants did not finish all the phases of the experiment. For all these reasons, twenty-one participants were excluded of this study.

The final pool of participants consisted of forty-four volunteers who completed all phases of the experiment and fulfilled the required criteria to take part in the study. These participants were divided into two groups:

Group 1 (experimental group) consisted of twenty-two advanced speakers of English as L2, native speakers of Brazilian Portuguese.

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[8] https://www.reddit.com/r/SampleSize/

Group 2 (control group) consisted of twenty-two native speakers of different varieties of English (American, British, Canadian, and New Zealander English).

The next subsections present details of these two groups in relation to age, gender, age of English learning, nationality, knowledge of languages besides their native language, and knowledge of Portuguese.

7.2.1 The Nonnative Speakers of English

This subsection presents the native speakers of Brazilian Portuguese, who formed the experimental group of Study I. Twenty-two volunteer participants took part in this group (eleven females). According to the information they provided in the biographical questionnaire (see subsection 8.3.1 and APPENDIX A), 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 (see subsection 8.3.2), 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 2.

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

	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)

Source: The author.

7.2.2 The Native Speakers of English

This subsection presents the native speakers of English, who formed the control group of Study I. Twenty-two volunteer participants took part in this group (eighteen females). According to the information they provided in the biographical questionnaire (see subsection 8.3.1 and APPENDIX B), 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.

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

	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)	-

Source: The author.

7.3 INSTRUMENTS OF DATA COLLECTION OF STUDY I

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. All these three instruments were held on an online form on the Google Forms platform. The instruments will be presented next.

7.3.1 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 (see APPENDIX A and APPENDIX B). The questionnaire for the L2 English speakers comprises questions related to their general personal information, their education background, and their learning of English as an L2; besides that, information on whether they have been diagnosed with neurocognitive disorders was collected.

The questionnaire for the native speakers of English includes questions related to their general personal information, their education background, their knowledge of languages and their knowledge of Brazilian Portuguese. Besides that, information on whether they have been diagnosed with neurocognitive disorders is also required.

7.3.2 The Proficiency Test

The proficiency test was a free online grammar and vocabulary level test, which can be found on the website Exam English[9].

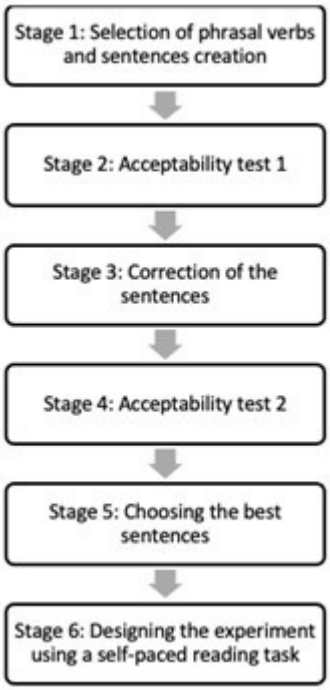
There are 15 questions in this test and at the end of the test the participant's level is assessed according to the CEFR (A2 to C2) and he/she can choose to have the results sent to his/her email address. Questions get easier or harder according to participant's answers. The participants of the experimental 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.

7.3.3 The Sentence Processing Task

The design of the sentence processing task consisted of 6 stages, as shown in Figure 8.

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

Figure 8 – Flow Diagram of the design of Study I.



Source: The author.

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 (see APPENDIX C for the full list). Brazilian Portuguese seems to lack phrasal verb structures (e.g., *verb* + *particle*). What we use is a structure called pleonasm, which expresses repetition of an idea and is seen as useless (e.g., *entra para dentro meaning step inside*) (CUNHA; CINTRA, 2016, p. 639).

Means for the frequency of phrasal verbs and one-word lexical verbs can be seen in Table 4 (see APPENDIX D for the full list).

Table 4 – Means for the frequency of figurative and literal meanings of phrasal verbs and one-word lexical verbs.

	Phrasal Verbs	**Standard Deviation**	**Lexical Verbs**	**Standard Deviation**
Figurative Meaning	3.2	2.1	7.4	13.2
Literal Meaning	4.8	4.4	45.2	91.5

Source: The author.

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.

Table 5 – Means for the length of figurative and literal meanings of phrasal verbs and one-word lexical verbs.

	Phrasal Verbs	**Standard Deviation**	**Lexical Verbs**	**Standard Deviation**
Figurative Meaning	8.4	1.6	7	1.5
Literal Meaning	8.4	1.6	5.9	1.6

Source: The author.

All the sentences were created by the researcher in conjunction with other members of the Language and Cognitive Processes Laboratory (LabLing). 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.

Table 6 – Examples of sentences with phrasal verbs and lexical verbs.

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.

Note: FPV means Figurative Phrasal Verb; LVFig means Figurative Lexical equivalent; LPV means Literal Phrasal Verb; LVLit means Literal Lexical equivalent.

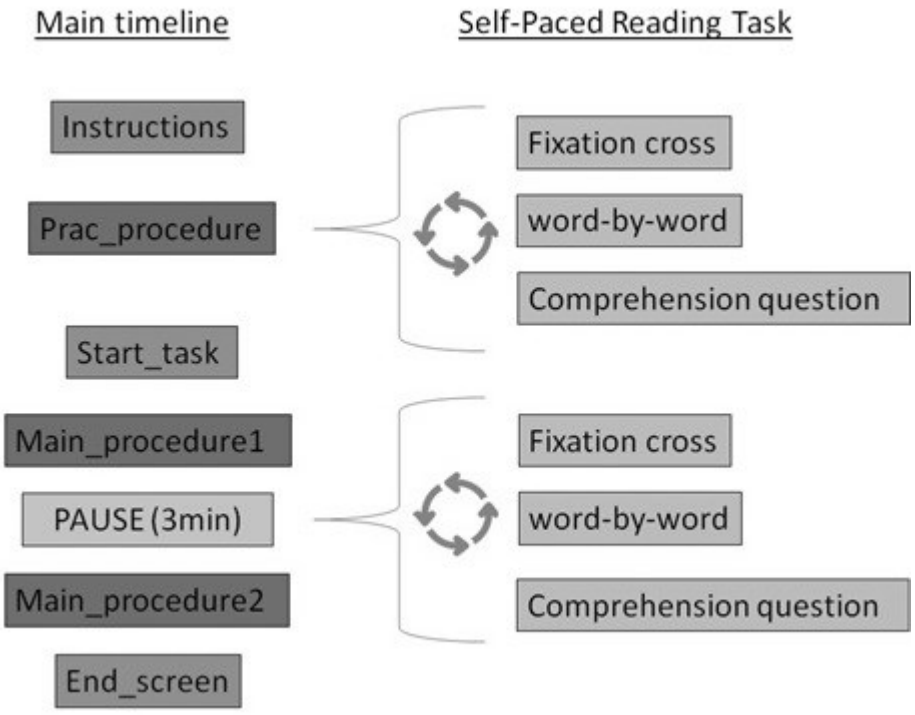
Stage 2 was to ensure that the sentences were known by native speakers of English, so they were included in an acceptability test where 46 native speaker participants rated each sentence for how acceptable it was on a five-point scale (M = 2.5; SD = 0.2). In stage 3, sentences that scored the lowest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

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 (e.g., *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 to that, 160 yes/no comprehension questions were created to follow every single stimulus. In accordance with Jegerski (2014, p. 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[10] library (DE LEEUW, 2015) and was hosted on the website Cognition[11]. A standard one-word moving-window paradigm was used to build the task. The description of the task is designed in the form of a timeline, as can be seen in Figure 9.

[10] https://www.jspsych.org/
[11] https://www.cognition.run/

Figure 9 – The design of the self-paced reading task.



Source: The author

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 (e.g., *list 1 - break down with a figurative meaning/split; list 2 - break down with a literal meaning/erupt;* see APPENDIX F for the full list).

Table 7 – Example of the experimental items displayed in the lists.

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

Source: The author.

7.4 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[12], as can be seen in Figure 10.

Figure 10 – The website page of the study.

Source: The author.

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 (see APPENDIX G for Portuguese version and APPENDIX H for English version). After reading and agreeing to participate in this study, participants

[12] https://labling.ufsc.br/estudodani-palavras/Estudo-Danielle-W---EN.html

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 comprehension question was presented right after the sentence. An example of a trial design is displayed in Figure 11.

Figure 11 – Example of a trial

```
+
I ----- ---- --- ------- ----- ---- -- ----- ----- --- ---------- -------
- heard ---- --- ------- ----- ---- -- ----- ----- --- ---------- -------
- ----- that --- ------- ----- ---- -- ----- ----- --- ---------- -------
- ----- ---- the ------- ----- ---- -- ----- ----- --- ---------- -------
- ----- ---- --- actress ----- ---- -- ----- ----- --- ---------- -------
- ----- ---- --- ------- broke ---- -- ----- ----- --- ---------- -------
- ----- ---- --- ------- ----- down -- ----- ----- --- ---------- -------
- ----- ---- --- ------- ----- ---- in ----- ----- --- ---------- -------
- ----- ---- --- ------- ----- ---- -- tears ----- --- ---------- -------
- ----- ---- --- ------- ----- ---- -- ----- after --- ---------- -------
- ----- ---- --- ------- ----- ---- -- ----- ----- her ---------- -------
- ----- ---- --- ------- ----- ---- -- ----- ----- --- acceptance -------
- ----- ---- --- ------- ----- ---- -- ----- ----- --- ---------- speech.
```

Source: The author.

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).

7.5 PILOT STUDY OF STUDY I

The main goal of Study I was to compare figurative and literal uses of phrasal verbs for L1 and L2 speakers. First, Study I explored whether there are L1 and L2 processing differences between the reading of figurative and literal phrasal verbs compared to one-word lexical verbs. If there are differences between L1 and L2 readers, the hypothesis was that Brazilian Portuguese speakers of English as L2 would process figurative phrasal verbs more slowly than literal phrasal verbs compared to one-word lexical verbs. On the other hand, native speakers of English would process figurative and literal phrasal verbs and one-word lexical verbs similarly.

A second goal was to examine whether there are processing differences between L1 and L2 readings for figurative phrasal verbs compared to literal phrasal verbs. The expectation was that Brazilian Portuguese speakers of English as L2 would process figurative phrasal verbs more slowly than literal phrasal verbs compared to native speakers of English.

In Study I, the online processing of figurative phrasal verbs, literal phrasal verbs and one-word lexical verbs was assessed by means of the recording of reading times of the sentences. In doing this, two reading times were selected to be the areas of interest:

1. Total Reading Time: the sum of reading times made for the area of interest consisting of a phrasal verb (verb + particle) and a one-word verb (lexical verb), as can be seen in Table 8.

Table 8 – Example of a phrasal verb reading time and a lexical verb reading time in milliseconds(ms).

Phrasal Verb	**Verb**	**Particle**	**Total Reading Time**
Broke down	494ms	592ms	1085ms
Lexical Verb			
Split	566ms		566ms

Source: The author.

2. Spillover Area Time: reading times made two words after the critical area of interest, which is the one-word region that includes a noun or an adjective, as can be seen in Table 9.

Table 9 – Example of a spillover area reading time in milliseconds(ms).

	Phrasal Verb		**Spillover area**	
I heard that the actress	broke down	in	tears	after her acceptance speech.
	1085ms		506ms	

Source: The author.

According to Conklin and colleagues (2018), spillover effects take place when the processing of a critical word carries over to the next. With this in mind, the data was analyzed in two different ways: first, figurative phrasal verbs, literal phrasal verbs and their one-word lexical equivalents (Phrasal verbs and lexical verbs analysis) were analyzed; second, the spillover area (spillover area analysis) was analyzed.

Prior to the main study, the pilot study of Study I was carried out to test the instruments and verify the online dynamics of the experiment, since the data collection took place remotely. Next participants, results, contributions, and limitations of the pilot study of Study I will be presented.

7.5.1 Participants of the pilot study of Study I

To explore these objectives, the pilot study of Study I was conducted with eight adult volunteers. These participants were divided into two groups:

I) Experimental group: the experimental group of the pilot study of Study I consisted of four participants (mean age = 26, range = 23-29, 2 females, 2 males) all of which L2 speakers of English, native speakers of Brazilian Portuguese. According to the information provided in the biographical questionnaire, the participants of this group started to learn English as L2 at around the age of 10. According to the Exam English test[13], three of them were at an advanced level of English (C1 and C2) and one participant was at an intermediate level of English (B2). Three participants also reported knowing at least two languages (e.g., Spanish, Korean, and Brazilian Sign Language) besides their native language.

[13] The proficiency test was an online grammar and vocabulary level test, which can be found on the website Exam English - http://www.examenglish.com/leveltest/grammar_level_test.htm.

II) Control group: the control group of the pilot study of Study I consisted of four participants (mean age = 36, range = 25-60, 1 female, 3 males), all of which native speakers of English (of the varieties: 2 speakers of American English, 1 speaker of Australian English, and 1 speaker of British English). According to the information they provided in the biographical questionnaire, participants reported having no knowledge of Brazilian Portuguese, three of them were monolingual, and one reported knowing two languages (e.g., Spanish and Russian) besides her native language.

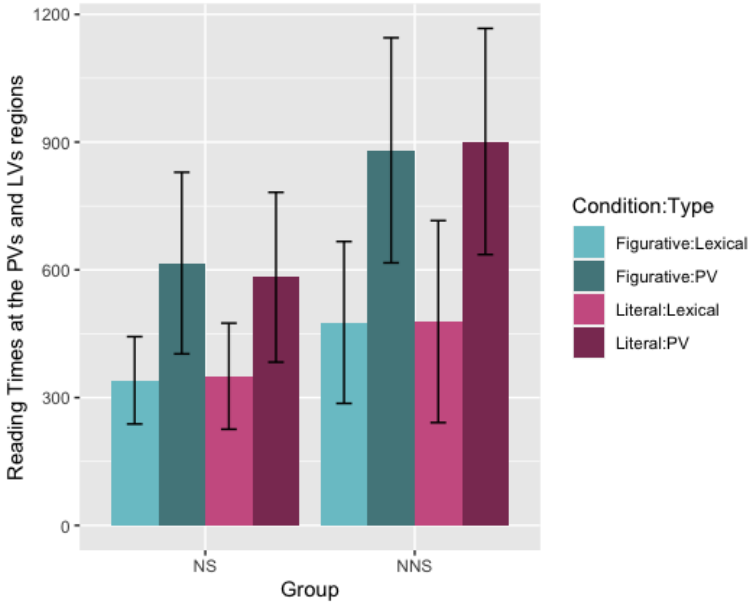
7.5.2 Results, contributions, and limitations of the pilot study of Study I

Once the experiment was completed by the eight participants, the data was imported into Excel spreadsheets, and after cleaning and selecting it, the dataset was analyzed using the R statistical programming environment.

To prepare for a descriptive data analysis, mean and standard deviation of the participants' reading times were calculated using only target sentences. The self-paced reading task lasted about 25 minutes for nonnative speakers of English and 20 minutes for native speakers of English. Participants' reading times varied a lot, for this reason, cutoffs were necessary. Reading times slower than 200ms and longer than 2000ms were excluded. This exclusion corresponds to 4.6% of the data.

The mean reading times for the target and control areas can be seen in Figure 12. Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016).

Figure 12 – Mean reading times at the phrasal verbs and lexical verbs for both groups.

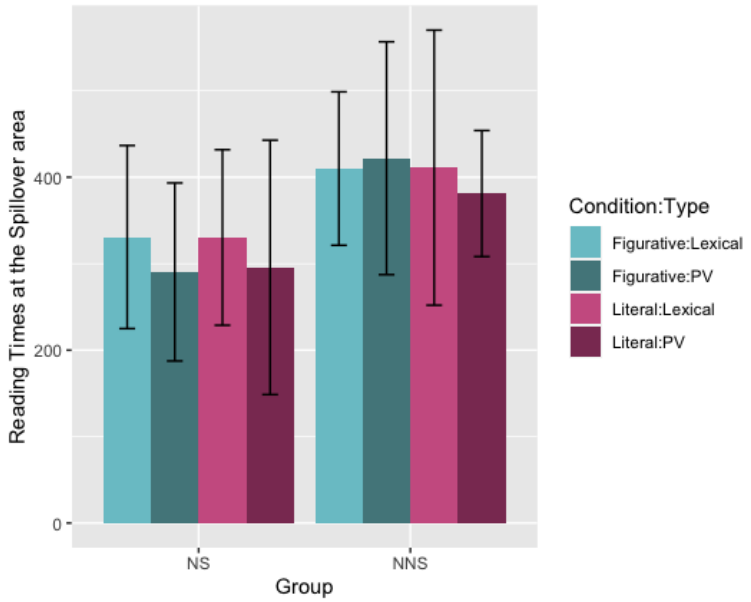


Note: PV means Phrasal Verbs; Lexical means One-word Verbs; NS means Native speakers of English; NNS means Nonnative speakers of English.

As can be seen in Figure 12 native speakers of English spent more time reading figurative phrasal verbs than figurative lexical equivalents. Moreover, they also spent more time reading literal phrasal verbs than literal lexical equivalents. Likewise, nonnative speakers of English spent more time reading figurative phrasal verbs than figurative lexical equivalents. In addition, nonnative speakers spent more time reading literal phrasal verbs than literal lexical equivalents. Overall, both nonnative and native speakers of English performed the self-paced reading task in a similar manner, but these differences are not significant.

The mean reading times computed for the spillover area can be seen in Figure 13. Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016).

Figure 13 – Mean reading times at the spillover area for phrasal verbs and lexical verbs.



Note: PV means Phrasal Verbs; Lexical means One-word Verbs; NS means Native speakers of English; NNS means Nonnative speakers of English.

As demonstrated in Figure 13, native speakers of English computed the spillover area of figurative phrasal verbs faster than figurative lexical equivalents. Moreover, the spillover area of literal phrasal verbs was read more quickly than the spillover area of literal lexical equivalents by native speakers. Conversely, nonnative speakers of English read more slowly the spillover area of figurative phrasal verbs than the spillover area of figurative lexical equivalents. On the other hand, they processed the spillover area of literal phrasal verbs faster than the spillover area of the literal lexical equivalents. Overall, these differences are not significant.

The major contribution of the pilot study of Study I was to make sure that the online experiment worked in different computers and countries. Small changes in the form were made, such as instructions to the participants were made clearer and more objective. There were some limitations, such as, the small number of the participants, and the level of English of the participants. Given that findings of the pilot of Study I are based on a limited number of participants (4 nonnative speakers of English and 4 native speakers of English), the results of this pilot study are representative and will not be discussed in detail here.

The next section will present the statistical analyses of Study I.

7.6 STATISTICAL ANALYSES OF STUDY I

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 are considered significant at the α=0.05 level. I 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 includes 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 corresponds 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, p. 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 are log-transformed to reduce skewing.

7.6.1 Descriptive analysis of Figurative Phrasal verbs, Literal Phrasal verbs, and their lexical equivalents

Means for the total reading time can be seen in Table 10 and means for the spillover area can be seen in Table 11.

Table 10 – Native and nonnative reading times (in milliseconds) for figurative and literal phrasal verbs meanings, and lexical verbs equivalents with Standard Deviation in brackets.

	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)

Source: The author.

Table 11 – Native and nonnative reading times (in milliseconds) for spillover area with Standard Deviation in brackets.

	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)

Source: The author.

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 10). 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 11).

7.6.1.1 Total Reading Time

Analysis 1 is to examine 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 12.

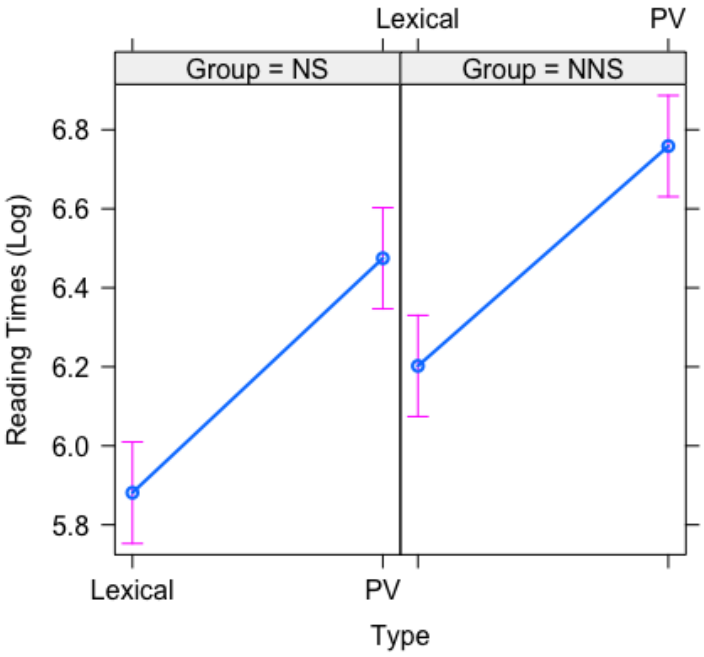
Table 12 – Linear Mixed Effects Model output for type and group for Total Reading Time measure.

	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	

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 are considered as covariates. There was a significant effect of verb length. Figure 14 shows the log reading times for the critical area, which is the two-word region that includes the verb and the particle in the case of a phrasal verb, and the lexical verb region that includes only a one-word verb.

Figure 14 – 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 I would not expect any difference on the first word of the phrasal verbs because of the neutral context, I ran a second analysis to only the particles. Analysis 2 is to compare 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 13.

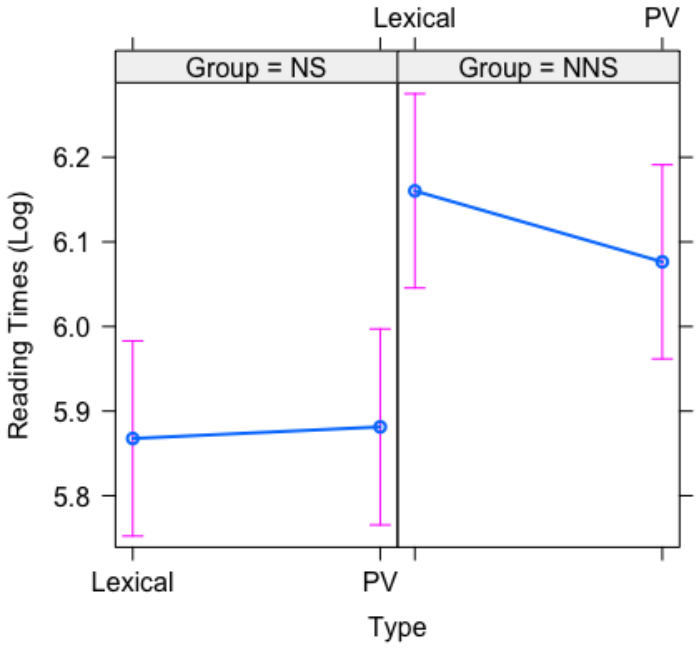
Table 13 – Linear Mixed Effects Model output for type (PV - particles vs. Lexical Verbs) and group for Total Reading Time measure.

	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	

Note: Significance values are estimated by the R package lmerTest: ***p< .001, **p< .01, *p≤ .05

In analysis 2, there was not a 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 are 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 are considered as covariates, and they did not affect the processing time. Figure 15 shows the log reading times for the critical area, which is the one-word region that includes only the particle in the case of a phrasal verb, and the lexical verb region that includes a one-word verb.

Figure 15 – 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 require 2 presses compared to 1 for the lexical verbs so this is always going to lead 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.

Moreover, 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 ($p < 2e\text{-}16$) and there was a significant difference between phrasal verbs and lexical verbs ($p < 2e\text{-}16$).

7.6.1.2 Spillover area analysis

Analysis 3 aims 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 14.

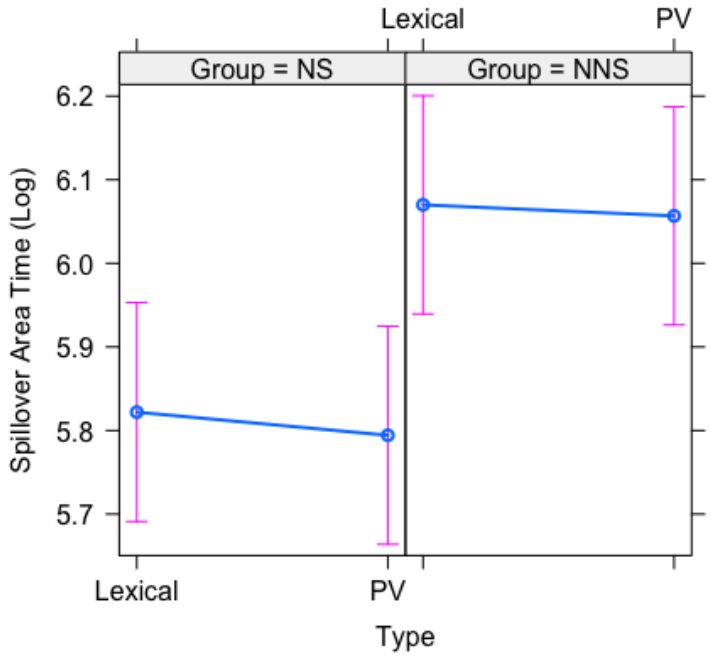
Table 14 – Linear Mixed Effects Model output for type and group for Spillover Area Time.

	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	

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 16 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 16 – Model fitted L1 and L2 processing time for the spillover area after the reading of the critical areas.



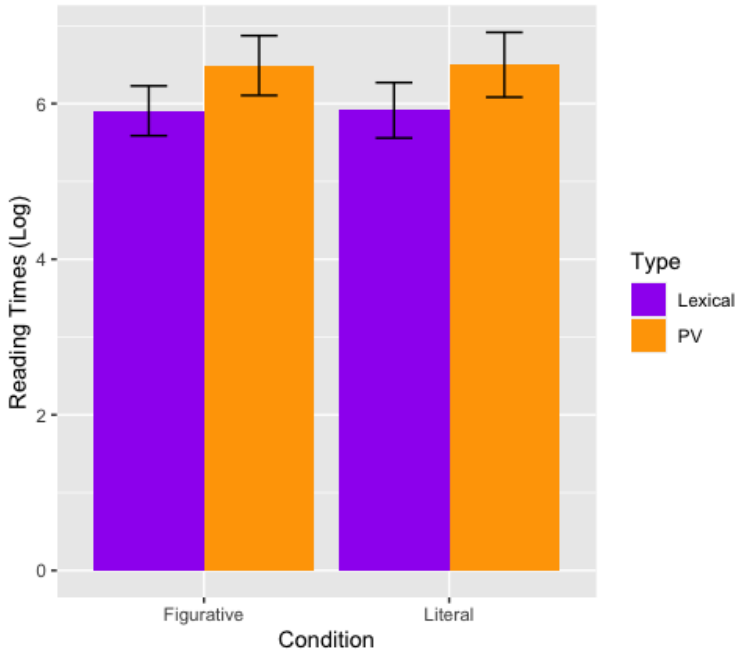
Note: PV means Phrasal Verbs; Lexical means One-word Verbs; NS means Native speakers of English; NNS means Nonnative speakers of English.

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.

7.6.2 Native Speakers of English

Analysis 4 is 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 17.

Figure 17 – Log reading times at the phrasal verbs and lexical verbs by native speakers of English.



Note: PV means Phrasal Verbs; Lexical means Lexical Verbs.

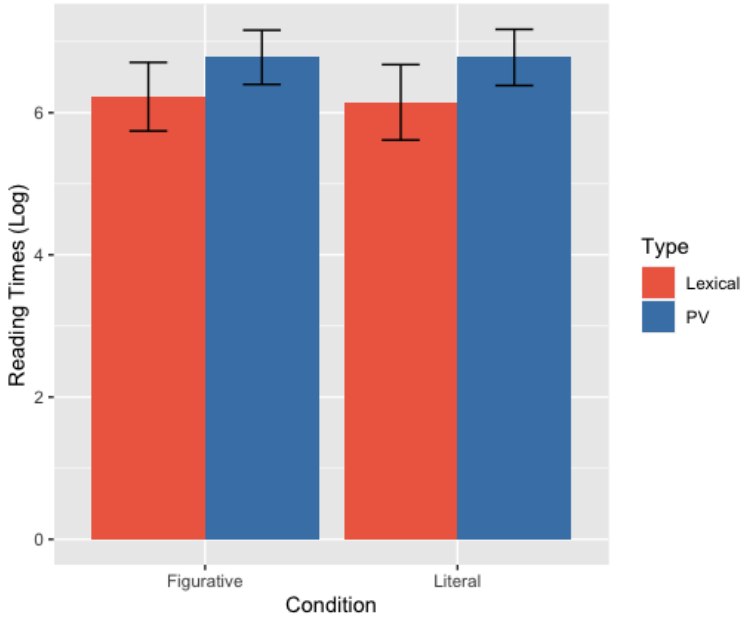
Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 17, there was no significant effect between figurative and literal meanings of phrasal verbs (PV). Nevertheless, there was a significant effect between figurative phrasal 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).

In addition, frequency and length of lexical verbs and phrasal verbs were tested as covariates. However, there was no significant effect throughout the target areas.

7.6.3 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 18.

Figure 18 – 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 18, 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 is that native speakers of English read lexical verbs and phrasal verbs faster than nonnative speakers of English. The second finding is that figurative phrasal verbs were read more slowly in comparison to their lexical equivalents by both groups. The third finding is that literal phrasal verbs were read more slowly in comparison to their lexical equivalents by both groups. The fourth finding is that figurative and literal meanings of phrasal verbs were

read in a similar manner by both groups. Finally, the fifth finding is that verb length played a significant role during the processing by nonnative speakers of English.

These findings are discussed in the next section.

7.7 DISCUSSION OF THE RESULTS OF STUDY I

Study I investigated whether there are L1 and L2 processing differences of phrasal verbs in comparison to one-word lexical verbs. Moreover, I 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 (e.g., *I heard that the actress broke down in tears after her acceptance speech*) in comparison to literal phrasal verbs (e.g., *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. Thus, this suggests 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 (e.g., *I heard that the teacher cut off the parent with a harsh word*) compared to literal phrasal verbs (e.g., *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.

7.7.1 Processing of Phrasal Verbs vs. One-word verbs

As stated earlier in this research, 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, p. 27). Despite being at a high level of proficiency (7 at C1 and 15 at C2), most of nonnative speakers of Study I live in Brazil and speak Brazilian Portuguese as their dominant language. Since Portuguese is their dominant language and lack the construction verb + particle, my prediction was that nonnative speakers of English would show difficulty to process these items especially when they carry an idiomatic meaning. 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 both meanings when they encountered the first word (e.g., *broke*) and integrated the particle (e.g., *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 comprehenders encounter the last word of the idiom (p. 1116). In these terms, participants of Study I 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), when the authors claimed that literal interpretations are default and idiomatic interpretations are driven by contextual factors (p. 875).

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 (e.g., *eat up the candy*) vs. split phrasal verbs (e.g., *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 familiarity plays a significant role in this result. Taking this into consideration, it is possible to argue that lexical verbs of Study I were favored these items by direct retrieval when participants read these verbs, familiarity and prediction of the meaning of them impacted their processing greatly.

As pointed out by Garnier and Schmitt (2016, p. 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 for these results is that other factors might have played a role during the processing. For instance, the method employed to investigate figurative and literal meanings of phrasal verbs. The fact that the self-paced reading task was employed in a word-by-word paradigm might have contributed to the idea of a compositional

approach to phrasal verbs. In addition, self-paced reading task does not allow to look at the "rereading" times to the critical area as when the eye-tracking technique is employed. Therefore, the results of the present Study I did not reveal any difficulty 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 Study I are consistent with Siyanova-Chanturia and Schmitt's (2007) study. 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 the 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, p. 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).

7.7.2 Readdressing the research questions and the hypotheses

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

Hypothesis 1: Brazilian Portuguese speakers of English as L2 will process figurative phrasal verbs more slowly than literal phrasal verbs compared to one-word lexical verbs. The expectation is that one-word lexical verbs will be processed quickest than phrasal verbs (literal and figurative meanings) for speakers of English as L2. On the other hand, native speakers of English will process figurative and literal phrasal verbs and one-word lexical verbs similarly.

Hypothesis 1 was partially supported by the results of the present study. As discussed above, 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, length verb was an important factor during the processing of phrasal verbs and lexical verbs by nonnative speakers of English.

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

Hypothesis 2: Brazilian Portuguese speakers of English as L2 will process figurative phrasal verbs more slowly than literal phrasal verbs. On the other hand, native speakers of English will process figurative phrasal verbs faster than literal phrasal verbs.

Hypothesis 2 was not supported by the results of the present study. Language dominance did not interfere during the processing of phrasal verbs. In fact, native and nonnative speakers of English processed figurative and literal phrasal verbs in a similar manner. Although Brazilian Portuguese lack the structure verb + particle, Brazilian Portuguese speakers of English as L2 did not demonstrate difficulty in processing figurative phrasal verbs as well as literal phrasal verbs. Native speakers of English also showed no difference in reading time. Both literal and figurative meanings are equally salient.

It seems that native and nonnative speakers of English process phrasal verbs in a similar manner. Nonnative and native speakers of English showed no difference in reading time for both figurative and literal meanings of phrasal verbs. Factors such as length of the verbs might have influenced the processing time for nonnative speakers. In conclusion, compared to phrasal verbs, lexical verbs still show a processing advantage, especially in written discourse.

The next chapter will present Study II.

8 STUDY II - INVESTIGATING L1 AND L2 IDIOMS USING A SELF-PACED READING TASK

This chapter presents Study II, which draws heavily on Carrol *et al.* (2016) to investigate idioms in three categories: English-only idioms (L2), Portuguese-only idioms (L1) and congruent idioms (same words and meanings in both languages). The main objective of Study II is to investigate how speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English process idioms in comparison to novel (literal) phrases.

The chapter is organized into six sections. Section 8.1 presents the objective, research questions and hypotheses of Study II. Section 8.2 provides information about the participants. Section 8.3 describes the instruments that were used in this study. Section 8.4 provides a summary of the method. Section 8.5 presents the pilot study of Study II. Section 8.6 presents the statistical analysis of the results. Finally, section 8.7 discusses the results of Study II.

8.1 OBJECTIVE, RESEARCH QUESTIONS, AND HYPOTHESES

The main objective of Study II is to investigate the online processing of idioms in English as L2. Study II draws heavily on Carrol *et al.* (2016), summarized in Chapter 2, section 2.4. Study II investigates the role of L1 knowledge in the online processing of idioms presented in the L2. Firstly, it is verified whether Portuguese-only idioms (L1) translated to English show privileged processing by native and nonnative speakers of English. Secondly, it is examined whether the effect of congruency (item exists in both L1 and L2) shows any additional facilitatory effects compared to items that only exist in the L1. Thirdly, it is explored whether the L2 speakers of English show advantage in reading English-only idioms (L2).

In light of these objectives and following Carrol *et al.* (2016), Study II addresses the following research questions:

RQ1: Do L1 translated idioms show privileged processing by L2 speakers of English?

RQ2: Is additional awareness/experience of the same combinations in the L2 an added benefit?

RQ3: Do L2 only idioms show privileged processing by L2 speakers of English?

In order to answer these research questions and based on the literature the following hypotheses are examined:

Hypothesis 1: The L2 speakers of English will show an advantage in reading L1 translated idioms, since this structure and combination of words will be familiar to them. Native speakers of English will take more time processing L1 translated idioms, as these will be unfamiliar to them.

The rationale for Hypothesis 1 is based on Carrol, Conklin and Gyllstad (2016), who state that L1 knowledge was automatically used during the online processing. On the other hand, native speakers of English had difficulty in processing unfamiliar combinations and integrating their meaning.

Hypothesis 2: Congruent elements will be a facilitator during the reading for the bilingual group. L2 speakers of English will read congruent sequences faster than L2 only idioms and L1 translated idioms, since there may be representations in both languages. Native speakers of English will spend less time processing congruent idioms than L1 idioms and they will process congruent idioms and L2 idioms in a similar manner.

The rationale for Hypothesis 2 is based on studies (TITONE *et al.*, 2015; CARROL *et al.*, 2016) that show that familiar idioms were easily understood during online processing for native and nonnative speakers.

Hypothesis 3: The L2 speakers of English will show difficulty in reading L2 only idioms in comparison to native speakers of English since these will be less well known.

The rationale for Hypothesis 3 is based on Siyanova-Chanturia *et al.* (2011) that claim that nonnative speakers tend to rely on the literal meanings of individual words of formulaic combinations in L2 and this slows down the processing of idioms.

Carrol *et al.* (2016) examined how advanced nonnative speakers process idioms in their L2. Their results indicated that L1 knowledge is automatically used, irrespective of congruency of the idioms, and no disadvantage for known idioms in English was observed in

the L2. Given the scarcity of studies on L2 idiom processing (CIEŚLICKA, 2006, 2013; SIYANOVA-CHANTURIA *et al.*, 2011; TITONE *et al.*, 2015; CARROL *et al.*, 2016), Study II is designed to gain further insight into the L1 and L2 processing of idioms.

8.2 PARTICIPANTS

To recruit participants, calls for participation in the study were posted on different social networking websites inviting nonnative speakers of English, whose L1 was Brazilian Portuguese, as well as native speakers of English. All participants were recruited via the internet through different platforms; specifically, native speakers of English were recruited from r/SampleSize, a free pool on the social media platform Reddit[14].

A group of sixty-nine participants took part in this study and they were different from Study I and III, including L2 speakers and native speakers of English. Nevertheless, various participants did not meet the criteria for inclusion in the study. These criteria were: (1) To reach advanced level in English at the Exam English website; (2) To be a native speaker of English (L1); (3) To complete all phases of the experiment; (4) Not to have knowledge of Portuguese; and (5) Not to be diagnosed with neurocognitive disorders. In these terms, three participants did not reach advanced level in English at the Exam English website (see subsection 9.3.2). Two participants did not have English as L1. Five participants could hold a conversation in Portuguese. Two participants reported being diagnosed with neurocognitive disorders. Additionally, thirteen did not finish all the phases of the experiment. For all these reasons, twenty-five participants were excluded of this study.

The final pool of participants consisted of forty-four volunteers who completed all phases of the experiment and fulfilled the required criteria to take part in the study. These participants were divided into two groups:

Group 1 (experimental group) consisted of twenty-two advanced speakers of English as L2, native speakers of Brazilian Portuguese.

Group 2 (control group) consisted of twenty-two native speakers of different varieties of English (American, Australian, British, Canadian, Ghanaian, and Philippine).

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[14] https://www.reddit.com/r/SampleSize/

The next subsections present these two groups in relation to age, gender, age of English learning, nationality, knowledge of languages besides their mother tongue, and knowledge of Portuguese.

8.2.1 The Nonnative Speakers of English

This subsection presents the native speakers of Brazilian Portuguese, who formed the experimental group of the Study II. Twenty-two volunteer participants took part in this group (ten females). According to the information they provided in the biographical questionnaire (see subsection 9.3.1 and APPENDIX A), the participants of this group started to learn English as L2 at around the age of 11. They reported using English at home, at work and at university on a daily basis. To control for proficiency all participants took the Exam English (see subsection 9.3.2), an online test of grammar and vocabulary, which showed they were at an advanced level of English (all scored at levels C1 and C2 of the Common European Framework of Reference for Languages - CEFR). With respect to their education background, two participants were undergraduate students, three of them held a bachelor's degree, five were graduate students, and twelve participants had a graduate degree (MA or PhD). Five participants reported having a degree in Linguistics. In relation to time spent abroad, four participants reported having spent at least 2 months abroad, eight reported having spent less than two months abroad, and ten of them reported having never been abroad. Fourteen participants also reported knowing at least two languages besides their native language. The data is summarized in Table 15.

Table 15 – Summary information on Brazilian Portuguese Speakers of English as L2 - experimental group. Standard Deviation in brackets.

	Age	**Age of English learning**	**Level of English**	**Knowledge of other languages**
Range	22 - 58	4 – 22	C1 - C2	1 - 4
Mean	34 (9.5)	11.5 (4.7)	-	2 (0.9)

Source: The author.

8.2.2 The Native Speakers of English

This subsection presents the native speakers of English, who formed the control group of the Study II. Twenty-two volunteer participants took part in this group (ten females, two non-binary). According to the information they provided in the biographical questionnaire (see subsection 9.3.1 and APPENDIX B), three participants were from the United Kingdom, fifteen were from the United States of America, one participant from Canada, one from Australia, one from Ghana, and one from Philippines. Considering their education background, one participant had a high school degree, eleven participants held a bachelor's degree, six held a master's degree, and four had a PhD. None of them reported having a degree in Linguistics. Seven participants reported having little knowledge of Portuguese (few words), and fifteen of them reported having no knowledge of Portuguese. All participants reported having never been to Brazil. Twelve participants also reported knowing one language besides their native language. The data is summarized in Table 16.

Table 16 – Summary information on Native Speakers of English - control group. Standard Deviation in brackets.

	Age	**Nationality**	**Knowledge of other languages**	**Knowledge of Portuguese**
Range	18 - 69	USA/UK/Canada/Australia Ghana/Philippines	0 – 3	No - Few words
Mean	27 (11)	-	0.7 (0.9)	-

Source: The author.

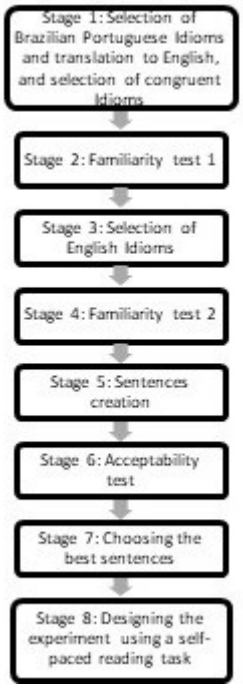
8.3 INSTRUMENTS OF DATA COLLECTION OF STUDY II

Three instruments for data collection were used: (1) a Biographical Questionnaire (see APPENDIX A and APPENDIX B), (2) a Proficiency Test, and (3) a Sentence Processing Task in English comprised of Portuguese-only idioms (L1), English-only idioms (L2) and congruent idioms. These three instruments were held on an online form on Google Forms platform. The Biographical Questionnaire and the Proficiency Test were the same tests employed in Study I (see Chapter 7, Subsection 7.3.1 and Subsection 7.3.2). The Sentence Processing Task will be detailed as follows.

8.3.1 The Sentence Processing Task

The design of the sentence processing task consisted of 8 stages, as can be seen in Figure 19.

Figure 19 – Flow Diagram of the design of Study II.



Source: The author.

In stage 1, Portuguese-only idioms were selected from Urbano (2017). The main criterion to select these idioms was that they should have the form *V-det.-N* (e.g., *descascar um abacaxi - to peel a pineapple*) or *N-prep.-N* (e.g., *abraço de tamanduá - hug of anteater*). From a list of 240 idioms, we initially divided these idioms into 2 lists: 142 Portuguese-only idioms and 98 congruent idioms. Congruent idioms mean to have same form and meaning in both languages - English and Portuguese (e.g., *brincar com fogo - play with fire* means *take foolish risks)*. The congruency of the idioms was checked on various online dictionaries and websites. Then, I removed 64 idioms because either they had more than 3 words in English, or they were not congruent idioms according to the Oxford Dictionary of Idioms (2004). In addition to that, we selected the control items for Portuguese-only idioms and congruent

idioms on the websites *O corpus do português*[15] and Corpus of Contemporary American English (COCA)[16], respectively.

Stage 2 was to ensure that Portuguese-only idioms were familiar to native speakers of Brazilian Portuguese, so these items were included in a familiarity test (see APPENDIX I) where 2 lists were answered by 54 Brazilian participants from different regions of Brazil. The participants had to choose the meaning of the idioms from three options. In order to be considered familiar, Portuguese-only idioms had to be recognized by at least 65% of the participants.

In stages 3 and 4, English-only idioms and their control items were selected from previous studies (CARROL *et al.*, 2016; LIBBEN; TITONE, 2008). I selected 100 items to be normed for familiarity by 48 native speakers of Brazilian Portuguese to be sure that L2 speakers of English know these items. I also included 63 congruent items in a familiarity test in English where the participants rated each item for how familiar it was on a five-point scale (M = 3.2; SD = 0.9) (see APPENDIX J). In doing this, items that scored the lowest for familiarity were removed from the experiment. These idioms were no balanced either for idiom frequency or for idiom length, due to the fact that Portuguese-only idioms were translated to English; thus, some less frequent words were used for the purposes of making sense in a sentence. Finally, a final list of 55 English-only idioms (L2), 70 Portuguese-only idioms (L1), and 41 congruent idioms were selected as stimuli for the experiment (see APPENDIX K).

In stage 5, 332 sentences for idioms and literal control items were created by the researcher in conjunction with other members of the Language and Cognitive Processes Laboratory (LabLing). Context can play an important role in the processing of idioms (CIEŚLICKA, 2013). However, we created the sentences in a neutral context according to the study of Carrol and colleagues (2016). The Portuguese-only idioms was reviewed by one American native speaker to warrant there was no equivalence in English. For this reason, some items were excluded (e.g., *tie a knot*). Before the acceptability test, other sentences were removed from the list of stimuli because of problems in their syntactic structure or because of semantic disruption. In stage 6, 30 native speakers of English rated 229 sentences for how

[15] https://www.corpusdoportugues.org/
[16] https://www.english-corpora.org/coca/

acceptable they were on a five-point scale (see APPENDIX L) (M = 3.1; SD = 1.1). In stage 7, a final list of 180 sentences that scored highest was chosen as stimuli for the experiment: a) 30 English-only idioms sentences (L2) and 30 L2 control sentences; b) 30 Portuguese-only idioms sentences (L1) and 30 L1 control sentences; c) 30 congruent idioms sentences and 30 congruent control sentences.

Target and control items contained a verb + determiner + noun string (e.g., *dropped the ball*), or a determiner + noun string (e.g., *the fairy tale*) were created. The target and control sentences had similar number of words. Following Carrol and colleagues (2016), the controls change word 1 and they have similar word 3 (e.g., *peel a pineapple vs. eat a pineapple*). Thus, it is possible to compare reading times for the same word instead of comparing different words (p. 420) (see APPENDIX M). Examples of each condition can be seen in Table 17. Additionally, 29 filler sentences were selected from Wisintainer's master thesis (2016) and 16 from Felicio's master thesis (2018) to be included in the experiment. The filler sentences had different syntactic structure and length from the experimental sentences (e.g., *The red car hit the tree*).

Table 17 – Example of each condition.

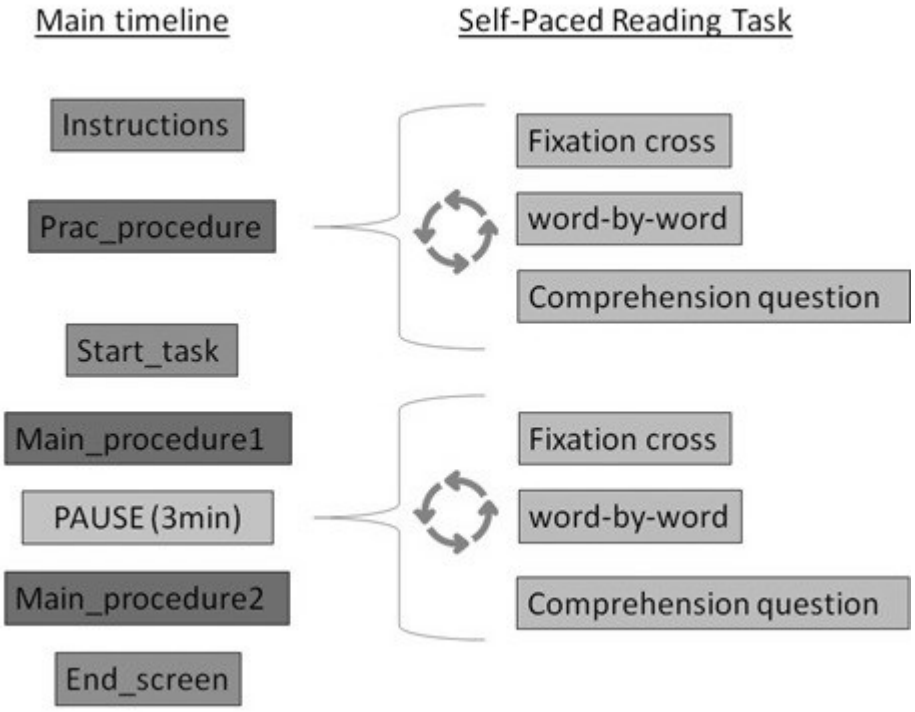
Conditions	Sentences
English-only idioms (L2)	That young man **dropped the ball** and made a lot of problems for us on the new project.
Control	That young man **missed the ball** and it went bouncing out into the middle of a busy road.
Portuguese-only idioms (L1)	He was trying to **peel a pineapple** so everybody helped him to find a way to solve it.
Control	He was trying to **eat a pineapple** so everybody helped him to cut it into small pieces.
Congruent idioms	It was hard for him to **break the ice** when he went to the party last week.
Control	It was hard for him to **crack the ice** when his car windows froze last week.

Source: The author.

Finally, stage 8 was to design the sentence processing task. This experiment consisted of 180 experimental sentences, 45 filler sentences, and 225 yes/no comprehension questions. In accordance with Jegerski (2014, p. 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[17] library and it was hosted on the website Cognition[18]. A standard one-word moving-window paradigm was used to build the task. The description of the task is designed in the form of a timeline, as can be seen in Figure 20.

Figure 20 – The design of the self-paced reading task.



Source: The author.

The stimuli were divided into 2 lists, each list contained 135 sentences - 45 were target sentences, 45 were control sentences, and 45 were filler sentences. As can be seen in Table 18, each list comprised different target and control items (e.g., *list 1 - It was hard for him to break the ice when he went to the party last week; list 2 - It was hard for him to crack the ice when his car windows froze last week.*). The stimuli for the experiment can be seen in APPENDIX N.

[17] https://www.jspsych.org/
[18] https://www.cognition.run/

Table 18 – Example of the experimental items displayed in the lists.

Condition/Type	**List 1**	**Condition/Type**	**List 2**
Idiom Congruent	Break the ice	Control Congruent	Crack the ice

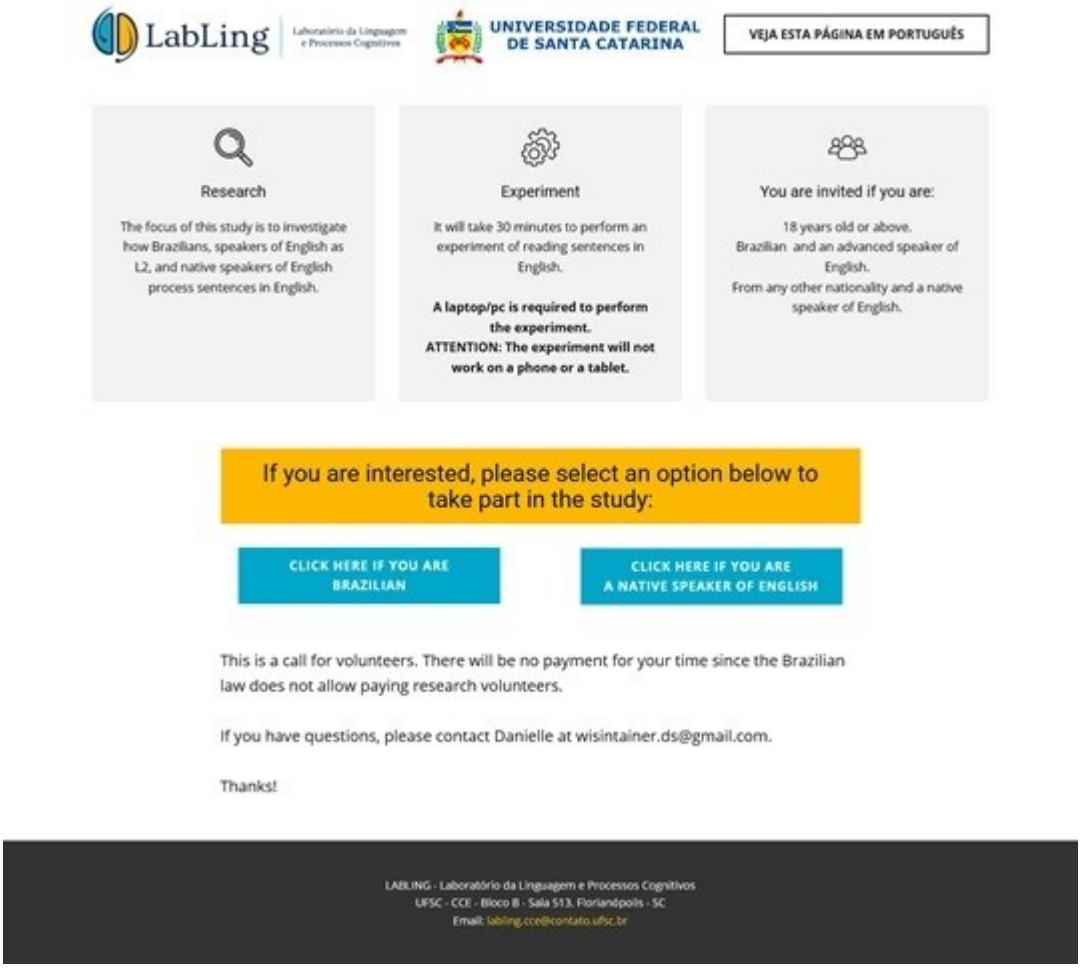
Source: The author.

8.4 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[19], as can be seen in Figure 21.

[19] https://labling.ufsc.br/estudodani-palavras/Estudo-Danielle-W---EN.html

Figure 21 – The website page of the study.



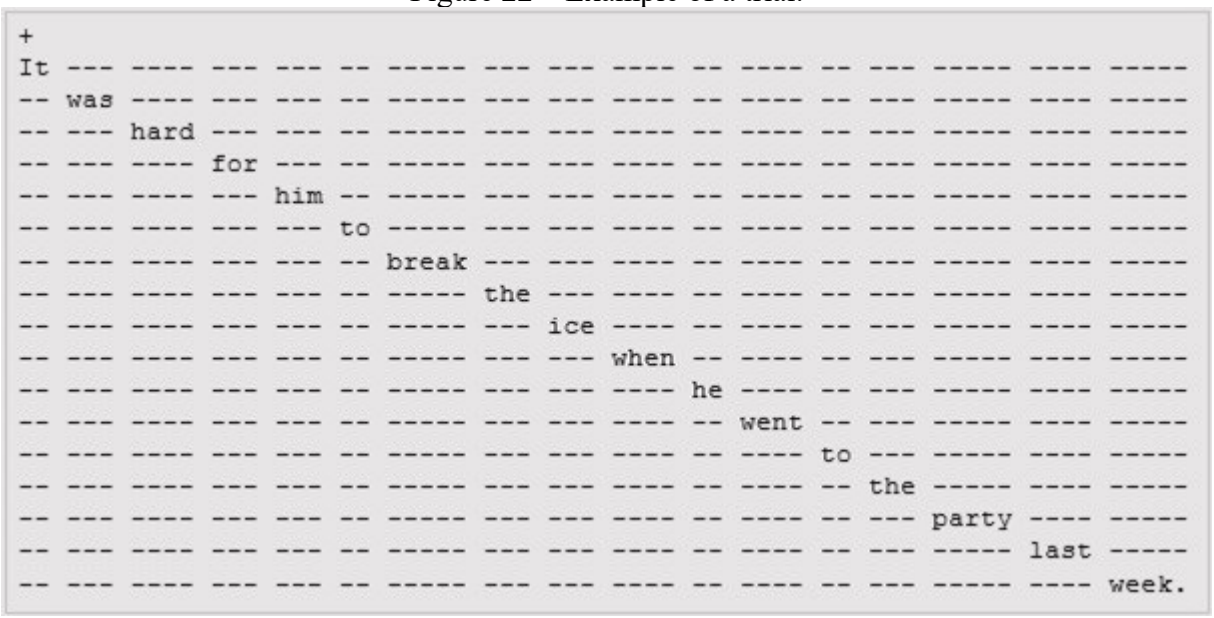
Source: The author.

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 (see APPENDIX G for Portuguese version and APPENDIX H for English version). 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 comprehension question was presented right after the sentence. An example of a trial design is displayed in Figure 22.

Figure 22 – Example of a trial.



Source: The author.

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 135 trials (90 were experimental and 45 were filler sentences), the task was divided into two blocks, one consisting of 67 trials and the other consisting of 68 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).

8.5 PILOT STUDY OF STUDY II

The main goal of Study II is to investigate how speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English process idioms in comparison to novel (literal) phrases. Study II draws heavily on Carrol *et al.* (2016),

summarized in Chapter 2, section 2.4. A first goal was to investigate the role of L1 knowledge in the online processing of idioms presented in the L2. L2 speakers of English were expected to show an advantage in reading Portuguese-only idioms (L1), since this structure and combination of words would be familiar to them. Native speakers of English were expected to take more time processing Portuguese-only idioms (L1), as these would be unfamiliar combinations.

A second goal was to examine whether the effect of congruency (item exists in both L1 and L2) shows any additional facilitatory effects compared to items that only exist in the L1. The prediction was that congruent elements would be a facilitator during the reading for the bilingual group. L2 speakers of English would read congruent sequences faster than English-only idioms (L2) and Portuguese-only idioms (L1) since there may be representations of congruent idioms in both languages.

A third goal was to verify whether English-only idioms (L2) show privileged processing by nonnative speakers. I hypothesized that the L2 speakers of English would not show advantage in reading English-only idioms (L2) in comparison to native speakers of English. Literal meanings of individual words would be more salient than figurative meanings. Thus, literal phrases would be processed faster than idioms.

In the present study, the online processing of idioms and their literal controls was assessed by means of the recording of reading times in a self-paced reading task. In doing this, three reading times were selected to be examined as areas of interest:

1. The phrase-level: the sum of the reading times made in the area of interest consisting of all the words of the idioms, as can be seen in Table 19.

Table 19 – Example of an idiom reading time in milliseconds(ms).

Idiom	**Word 1 - Break**	**Word 2 - the**	**Word 3 - ice**	**Total Reading Time**
Break the ice	286ms	267ms	262ms	814ms

Source: The author

2. The word-level: reading times made in the final word of the idioms (the reading time of the word 3, as can be seen in Table 19.

3. Spillover area: reading times made in the word after the final word of the idioms, as can be seen in Table 20.

Table 20 – Example of a spillover area reading time in milliseconds(ms).

	Idiom	**Spillover area**	
It is hard for him to	break the ice	when	he went to the party last week.
	814ms	261ms	

Source: The author.

With this in mind, the data is analyzed in three different ways: first, I analyzed the phrase level of the idioms (The phrase-level analysis); second, I analyzed the final word of the idioms (The word-level analysis); third, I analyzed the word after the area of interest (The spillover area analysis).

Prior to the main study, the pilot study of Study II was carried out to test the instruments and verify the online dynamics of the experiment, since the data collection took place remotely. Next participants, results, contributions, and limitations of the pilot study of Study II will be presented.

8.5.1 Participants of the pilot study of Study II

To explore these objectives, the pilot study of Study II was conducted with eight adult volunteers. These participants were divided into two groups:

I) Experimental group: the experimental group of the pilot study of Study II consisted of four participants (mean age = 30, range = 24-37, 3 females, 1 male), all of which L2 speakers of English, native speakers of Brazilian Portuguese. According to the information provided in the biographical questionnaire, the participants of this group started to learn English as L2 at around the age of 10. According to the Exam English test[20], three of them were at an advanced level of English (C1 and C2) and one participant was at an intermediate

[20] The proficiency test was an online grammar and vocabulary level test, which can be found on the website Exam English - http://www.examenglish.com/leveltest/grammar_level_test.htm.

level of English (B2). All participants also reported knowing only English besides their native language.

II) Control group: the control group of the pilot study of Study II consisted of four participants (mean age = 35, range = 24-60, 1 female, 3 males), all of which native speakers of English (of the varieties: 3 speakers of American English and 1 speaker of British English). Two participants had fluent knowledge of Brazilian Portuguese and the other two had no knowledge. One participant was monolingual, two reported knowing one language (e.g., British Sign Language and Portuguese) besides their native language, and one reported knowing four languages, but fluent in one language (Portuguese) besides her native language.

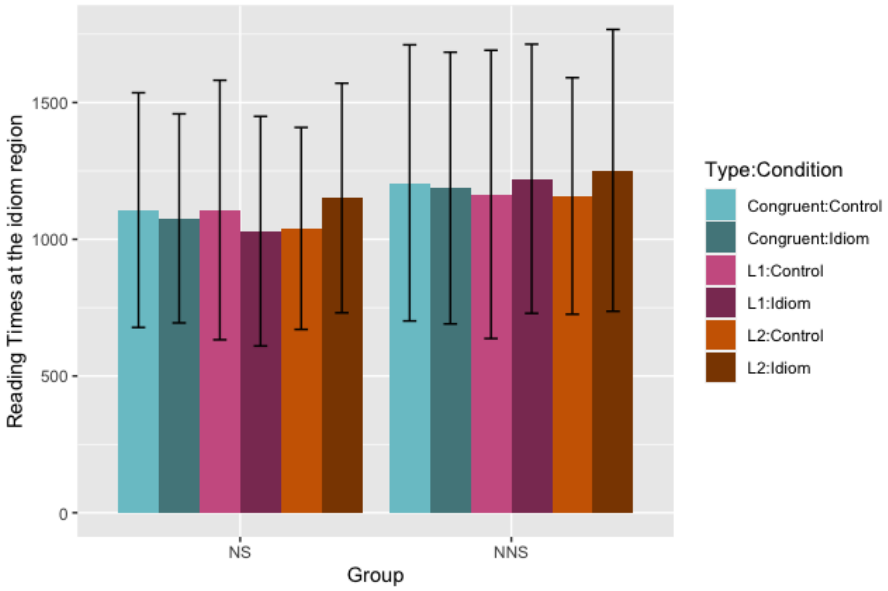
8.5.2 Results, contributions, and limitations of the pilot study of Study II

Once the experiment was completed by the eight participants, the data was imported into Excel spreadsheets, and after cleaning and selecting it, the dataset was analyzed using the R statistical programming environment.

To prepare for a descriptive data analysis, mean and standard deviation of the participants' reading times were calculated using only target sentences. The self-paced reading task lasted about 31 minutes for nonnative speakers of English and 23 minutes for native speakers of English. Participants' reading times varied a lot, for this reason, cutoffs were necessary. Reading times slower than 200ms and longer than 2000ms in the word level (the final word of the idiom/control) and 200-3000ms in the phrase level were excluded (the whole phrase of the idiom/control). This exclusion corresponds to 15% of the data.

The mean reading times for the idiom and control areas can be seen in Figure 23. Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016).

Figure 23 – Mean reading times at the idiom region for both groups.

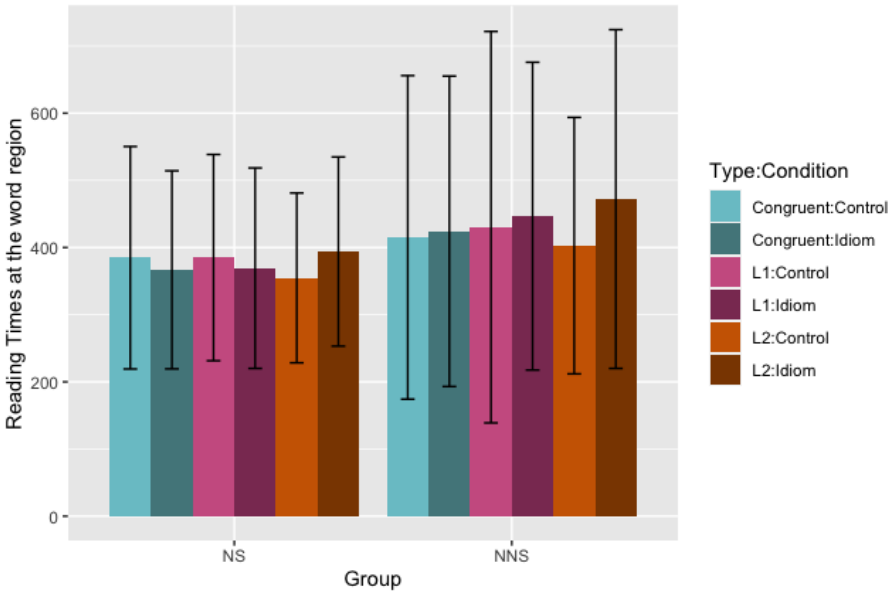


Note: Congruent means Congruent idiom/control; L1 means Portuguese-only idiom/control; L2 means English-only idiom/control; NS means Native speakers of English; NNS means Nonnative speakers of English.

As can be seen in Figure 23, native speakers of English read congruent idioms faster than their controls. They also read Portuguese-only idioms (L1) faster than their controls. Conversely, they read English-only idioms (L2) slower than their controls. For nonnative speakers of English, congruent idioms were read faster than their controls. On the other hand, nonnative speakers read Portuguese-only idioms (L1) slower than their controls. Likewise, they read English-only idioms (L2) slower than their controls. Overall, these differences are not significant.

The mean reading times for the idiom and control areas can be seen in Figure 24. Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016).

Figure 24 – Mean reading times at the word region for both groups.



Note: Congruent means Congruent idiom/control; L1 means Portuguese-only idiom/control; L2 means English-only idiom/control; NS means Native speakers of English; NNS means Nonnative speakers of English.

As shown in Figure 24, native speakers of English integrated the final word of congruent idioms faster than their controls. They also integrated the final word of Portuguese-only idioms (L1) faster than their controls. On the other hand, the final word of English-only idioms (L2) was processed slower than their controls. For nonnative speakers of English, the final word of congruent idioms was read more slowly than their controls. Likewise, the final word of Portuguese-only idioms (L1) was read more slowly than their controls. They also read the final word of English-only idioms (L2) slower than their controls. Overall, these differences are not significant.

The major contribution of the pilot study of Study II was to make sure that the online experiment worked in different computers and countries. Small changes in the form were made, such as instructions to the participants were made clearer and more objective. There were some limitations, such as, the small number of the participants, and the level of English of the participants. Given that findings of the pilot of Study II are based on a limited number of participants (4 nonnative speakers of English and 4 native speakers of English), the results of this pilot study are representative and will not be discussed in detail here.

The next section will present the statistical analyses of Study II.

8.6 STATISTICAL ANALYSES OF STUDY II

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 are considered significant at the α=0.05 level. I constructed linear mixed effect models with random effects for participants and sentences, looking at the interactions between phrase type (English-only idioms, Portuguese-only idioms, Congruent idioms), conditions (idioms vs. control) and group (nonnative speakers of English vs. native speakers of English) as fixed effects. The dependent variables were total reading time (phrase-level) and reading time for the final word of the idioms (word-level). The self-paced reading task lasted about 33 minutes for nonnative speakers of English and 25 minutes for native speakers of English. Nonnative speakers of English were on average 93% (SD = 4.4%) accurate in answering the comprehension questions, and native speakers of English were on average 97% (SD = 2%) accurate in answering the comprehension questions. Reading times shorter than 200ms and longer than 2000ms in the word-level (the last word of the idiom/control) and 200-3000ms in the phrase-level (the whole phrase of the idiom/control) were excluded. This exclusion corresponds to 9% 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, p. 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 are log-transformed to reduce skewing.

8.6.1 Descriptive analysis of idioms and their literal controls

Means for the phrase-level can be seen in Table 21, means for the word-level can be seen in Table 22 and means for the spillover area can be seen in Table 23.

Table 21 – Native and nonnative reading times (in milliseconds) for phrase-level with Standard Deviation in brackets.

	Congruent (Con)		**Portuguese-only (L1)**		**English-only (L2)**	
	Control	**Idioms**	**Control**	**Idioms**	**Control**	**Idioms**
Phrase-level:						
Native Speakers of English	1060.5 (415.9)	1018.5 (352.6)	1040.7 (404.2)	1000.5 (386.1)	1003.7 (347.3)	1010.2 (361.1)
Nonnative Speakers of English	1333.2 (487.5)	1333.6 (497.6)	1316.2 (480.8)	1349.9 (493.5)	1362.2 (473.2)	1351.7 (493.3)

Source: The author.

Mean and standard deviation of the participants reading times were calculated using only target sentences. For the phrase-level, the data indicates that native speakers of English read congruent idioms and Portuguese-only idioms faster than their literal controls. On the other hand, native speakers read English-only idioms slower than their literal controls. Nonnative speakers of English read congruent idioms and their literal controls in a similar manner. Additionally, nonnative speakers read Portuguese-only idioms slower than their literal controls, by contrast, they read English-only idioms faster than their literal controls. Overall, native speakers read idioms faster than nonnative speakers (see Table 21).

Table 22 – Native and nonnative reading times (in milliseconds) for word-level with Standard Deviation in brackets.

	Congruent (Con)		**Portuguese-only (L1)**		**English-only (L2)**	
	Control	**Idioms**	**Control**	**Idioms**	**Control**	**Idioms**
Word-level:						
Native Speakers of English	362.1 (188.3)	343.8 (137.1)	367.6 (162.3)	354.7 (180.5)	335.9 (130.1)	350.5 (156.6)
Nonnative Speakers of English	457.9 (207.4)	450.6 (218.1)	465 (207.8)	474.7 (234.1)	475.1 (226.8)	474.8 (236.9)

Source: The author.

For the word-level, the data shows that native speakers of English integrated the final word of the congruent idioms and Portuguese-only idioms faster than their literal controls. On the other hand, native speakers took longer to integrate the final word of English-only idioms than their literal controls. Nonnative speakers of English integrated the final word of the congruent idioms and English-only idioms faster than their literal controls. Conversely, nonnative speakers integrated the final word of Portuguese-only idioms slower than their literal controls. In general, nonnative speakers took longer to integrate the final word of the idioms in comparison to native speakers (see Table 22).

Table 23 – Native and nonnative reading times (in milliseconds) for spillover area with Standard Deviation in brackets.

	Congruent (Con)		**Portuguese-only (L1)**		**English-only (L2)**	
	Control	**Idioms**	**Control**	**Idioms**	**Control**	**Idioms**
Spillover area:						
Native Speakers of English	376.5 (249.1)	354.4 (155.3)	359.9 (144.9)	383.3 (207.9)	338.3 (126.09)	337.7 (139.3)
Nonnative Speakers of English	460.03 (225)	476.6 (235.1)	500.7 (289.7)	516.7 (300.09)	489.2 (304.2)	511.09 (314.5)

Source: The author.

For the spillover area, the data reveals that native speakers of English read the spillover area of congruent and English-only idioms faster than the spillover area of their literal controls. On the other hand, native speakers read the spillover area of Portuguese-only idioms slower than the spillover area of their literal controls. Nonnative speakers of English read the spillover area of congruent, Portuguese-only, and English-only idioms slower than the spillover area of their literal controls (see Table 23).

8.6.1.1 The phrase-level analysis

Analysis 1 aimed at examining how nonnative and native speakers of English accessed and processed idioms in comparison to their literal controls for the total reading time, as can be found in Table 24.

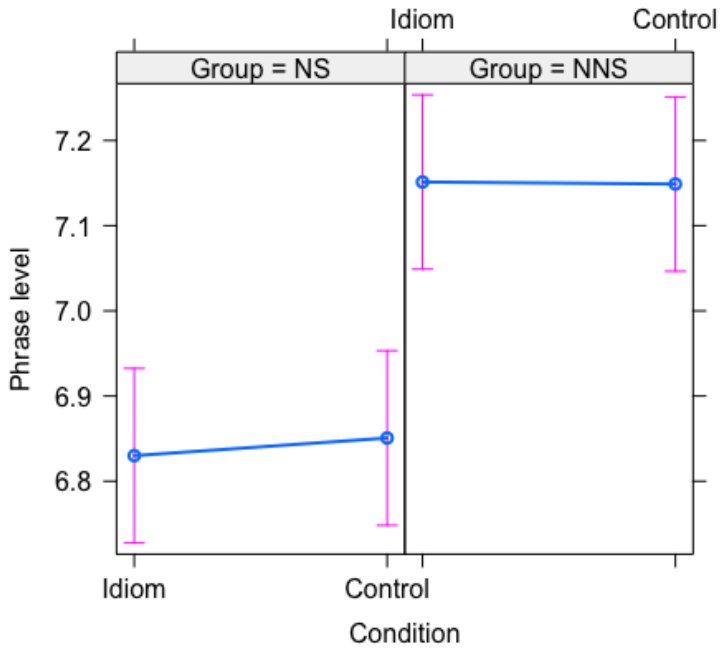
Table 24 – Linear Mixed Effects Model output for conditions and groups for Phrase-level.

		Phrase-Level	
Fixed effects	***β***	***SE***	***p-value***
Intercept	6.71	7.45	< 2e-16***
Condition Control	2.07	1.88	0.27
Group NNS	3.21	7.22	6.15e-05***
Length	9.02	4.19	0.032*
Condition Control: Group NNS	-2.31	1.47	0.11
Random effects	***Variance***	***SD***	
Sentence	0.010	0.10	
Participant	0.056	0.23	
Residual	0.048	0.22	

Note: Significance values are estimated by the R package lmerTest: ***p< .001, **p< .01, *p≤ .05

In analysis 1, there was a significant effect of groups (β=3.21, t=4.4, p<0.001). However, there was no significant effect for condition - idioms and their literal controls. Moreover, there was a significant idiom phrase length effect during the reading time (β=9.02, t=2.1, p<0.05). Figure 25 shows the log reading times for the idioms, which are the three-word regions that include a verb + a determiner + a noun string (e.g., *dropped the ball*), or a determiner + a noun string (e.g., *the fairy tale*); and for their literal controls (e.g., *missed the ball*).

Figure 25 – Model fitted L1 and L2 processing time for idioms and their literal controls for total reading time.



Note: NS means native speakers of English; NNS means nonnative speakers of English.

As can be seen in Figure 25, reading times in the literal controls are similar to reading times in the idioms for native speakers of English (NS). Likewise, for nonnative speakers of English (NNS), there was no difference in encountering either literal controls or idioms. Moreover, the effect size between groups was medium (COHEN'S d=0.72). Post hoc tests using the Bonferroni correction revealed that groups were significantly different (p <2e-16).

8.6.1.2 The word-level analysis

Analysis 2 aimed at examining the integration of the final word of the idioms into the whole phrase in comparison to the integration of the final word of the literal controls for both groups. Results are shown in Table 25.

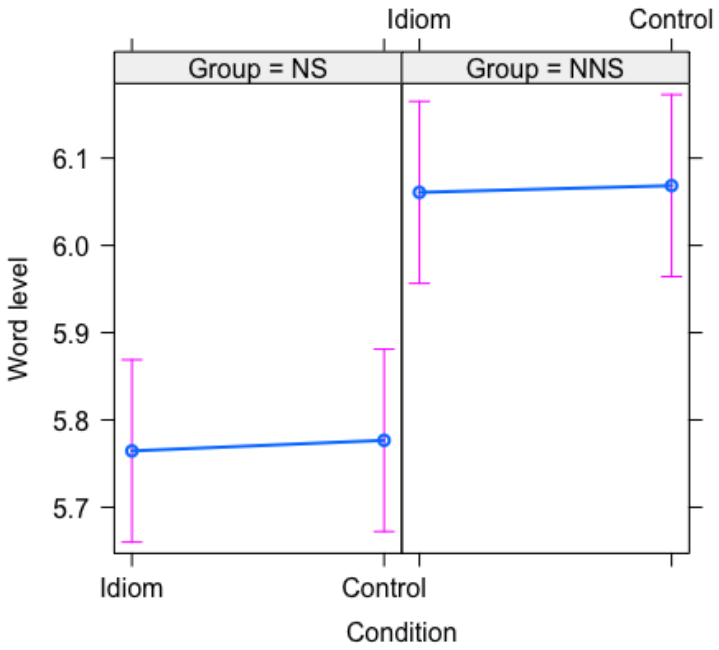
Table 25 – Linear Mixed Effects Model output for conditions and groups for Word-level.

		Word-Level	
Fixed effects	***β***	***SE***	***p-value***
Intercept	5.76	5.32	< 2e-16***
Condition Control	1.21	1.96	0.53
Group NNS	2.96	7.39	0.0002***
Condition Control: Group NNS	-4.43	1.87	0.81
Random effects	***Variance***	***SD***	
Sentence	0.009	0.09	
Participant	0.058	0.24	
Residual	0.07	0.28	

Note: Significance values are estimated by the R package lmerTest: ***p< .001, **p< .01, *p≤ .05

In analysis 2, there was no significant effect of condition. However, there was a significant effect of groups (β=2.96, t=4.00, p<0.001). Figure 26 shows the log reading times for the word-level, which is the one-word region that includes a noun.

Figure 26 – Model fitted L1 and L2 processing time for the word-level.



Note: NS means native speakers of English; NNS means nonnative speakers of English.

As can be seen in Figure 26, there was no difference in encountering either the final word of literal controls or the final word of idioms for native speakers of English (NS). Likewise, for nonnative speakers of English (NNS), reading times in the final word of literal controls are similar to reading times in the final word of idioms. Moreover, the effect size between groups was medium (COHEN'S d=0.58).

8.6.1.3 The Spillover Area Analysis

Analysis 3 aimed at investigating the processing of the spillover area of the idioms in comparison to the processing of the literal controls for both groups. Results are shown in Table 26.

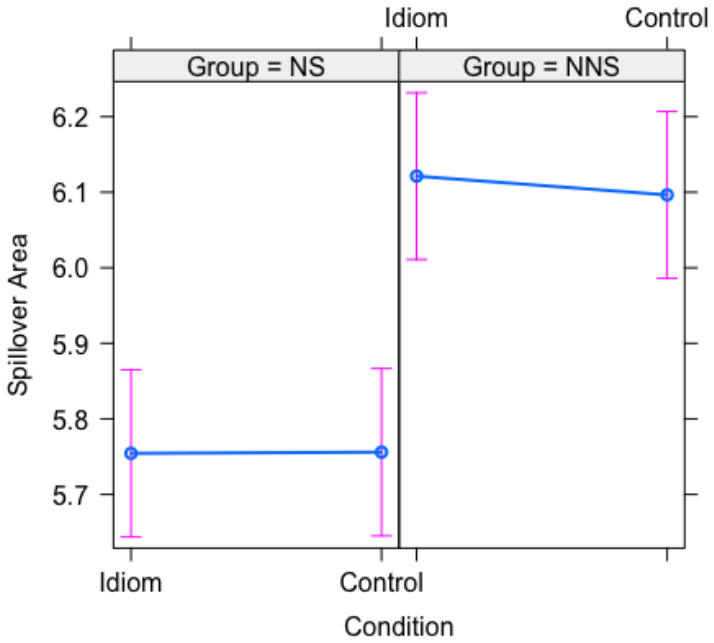
Table 26 – Linear Mixed Effects Model output for conditions and groups for Spillover Area.

	Spillover Area		
Fixed effects	***β***	***SE***	***p-value***
Intercept	5.69	5.90	< 2e-16***
Condition Control	1.63	2.17	0.94
Group NNS	3.67	7.82	2.78e-05***
Length_SOA	1.60	4.50	0.0004***
Condition Control: Group NNS	-2.65	2.10	0.20
Random effects	***Variance***	***SD***	
Sentence	0.010	0.10	
Participant	0.064	0.25	
Residual	0.09	0.31	

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 condition. However, there was a significant effect of groups (β=3.67, t=4.69, p<0.001). Moreover, there was a significant spillover word length effect during the reading time (β=1.60, t=3.54, p<0.001). Figure 27 shows the log reading times for the spillover area, which is the one-word region that appears right after the last word of the idiom/control.

Figure 27 – Model fitted L1 and L2 processing time for the spillover area.



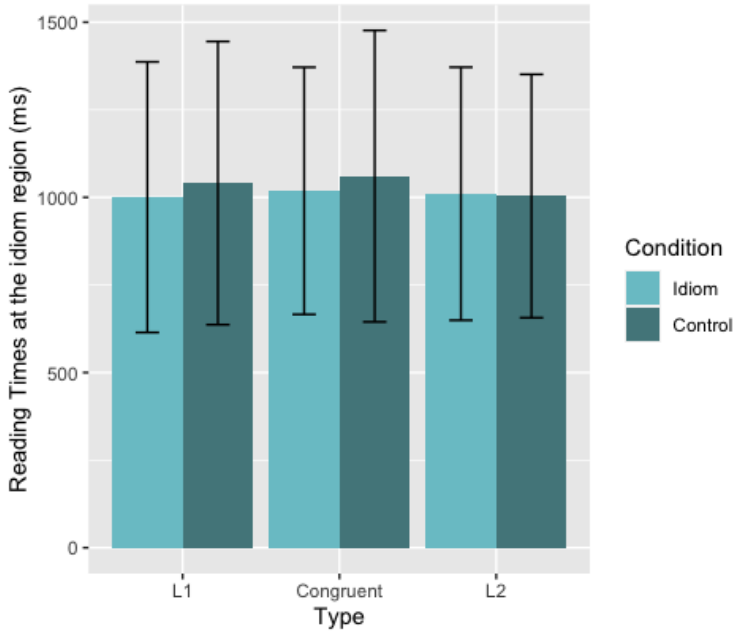
Note: NS means native speakers of English; NNS means nonnative speakers of English.

As can be seen in Figure 27, reading times in the spillover area of literal controls and reading times in the spillover area of idioms are similar for native speakers of English (NS). On the other hand, for nonnative speakers of English (NNS), reading times in the spillover area of idioms are longer than reading times in the spillover area of literal controls. However, these differences are not significant.

8.6.2 Native Speakers of English

Analysis 4 was computed to explore how native speakers of English processed Portuguese-only idioms (L1), Congruent idioms, and English-only idioms (L2) in comparison to their literal controls. The mean reading times for idioms and controls can be seen in Figure 28.

Figure 28 – Reading times at the idiom region by native speakers of English.



Note: L1 means Portuguese-only idioms/controls; Congruent idioms/controls; L2 means English-only idioms/controls.

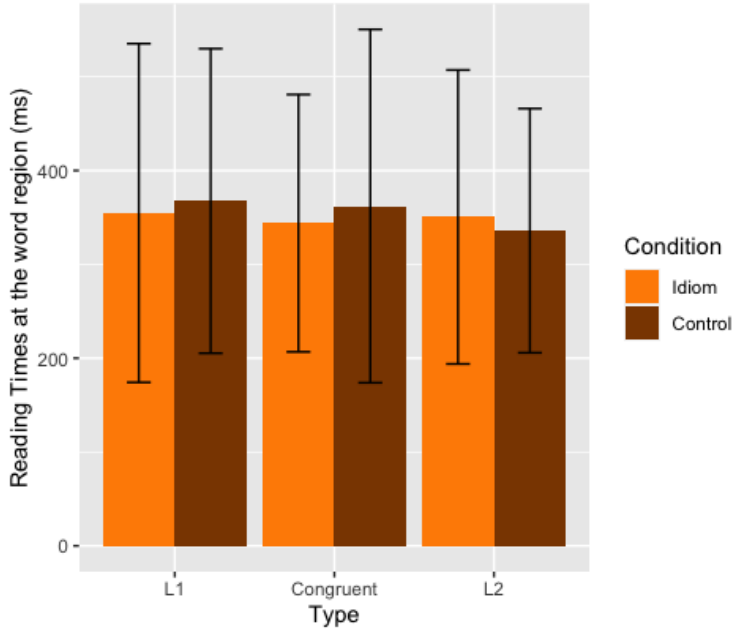
Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 28, there was no significant effect between idioms and their literal controls. For native speakers of English, reading times in

Portuguese-only idioms and congruent idioms were faster compared to their literal controls. Conversely, reading times in English-only idioms were slower than their literal controls. Nevertheless, these differences are not significant.

Overall, this suggests that native speakers of English showed o advantage to process idioms in comparison to their literal controls. These results are in contrast with Carrol *et al.* (2016), where native speakers showed facilitation for the form of congruent idioms in comparison to their literal phrases.

Analysis 5 was computed to investigate how native speakers of English integrated the final word of Portuguese-only idioms (L1), Congruent idioms, and English-only idioms (L2) in comparison to the final word of their literal controls. The mean reading times for idioms and controls can be seen in Figure 29.

Figure 29 – Reading times at the word region by native speakers of English.



Note: L1 means Portuguese-only idioms/controls; Congruent idioms/controls; L2 means English-only idioms/controls.

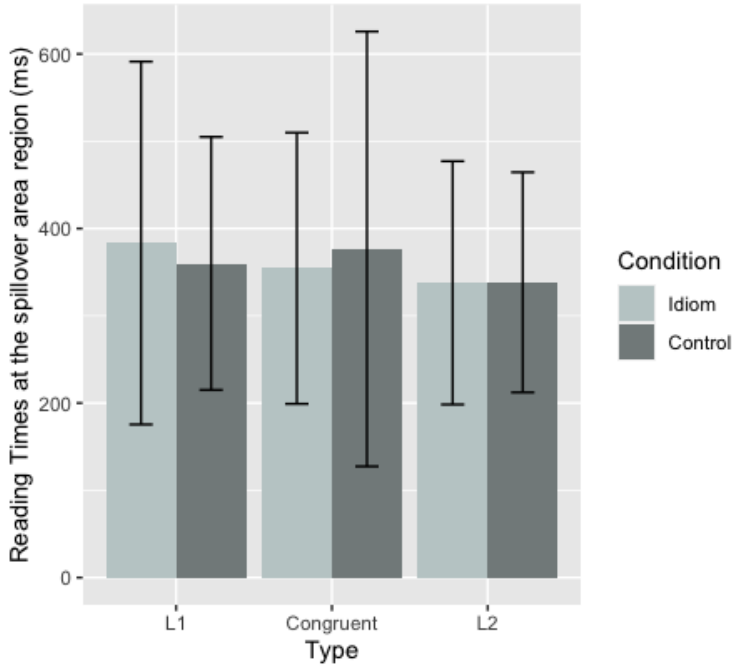
Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 29, no significant effect between the final word of idioms and their literal controls was found. For native speakers of English, reading times in the final word of Portuguese-only idioms and congruent idioms were processed more quickly than their literal controls. On the other hand, reading times in the final

word of English-only idioms were slower in comparison to their literal controls. Nevertheless, these differences are not significant.

Overall, it may appear that native speakers had no difficulty with the integration of the final word of idioms in comparison to the final word of their literal phrases. Nevertheless, it is not possible to measure difficulties or easiness using self-paced reading task; because of this technique does not allow to measure rereading in the critical area. This result cannot be interpreted as an indication that native speakers showed facilitation for the meaning integration of idioms in relation to their literal controls, in contrast with Carrol *et al.* (2016).

Analysis 6 was computed to investigate how native speakers of English integrated the spillover area of Portuguese-only idioms (L1), Congruent idioms, and English-only idioms (L2) in comparison to the spillover area of their literal controls. The mean reading times for idioms and controls can be seen in Figure 30.

Figure 30 – Reading times at the spillover area by native speakers of English.



Note: L1 means Portuguese-only idioms/controls; Congruent idioms/controls; L2 means English-only idioms/controls.

Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 30, no significant effect between the spillover area of idioms and their literal controls was found. For native speakers of English,

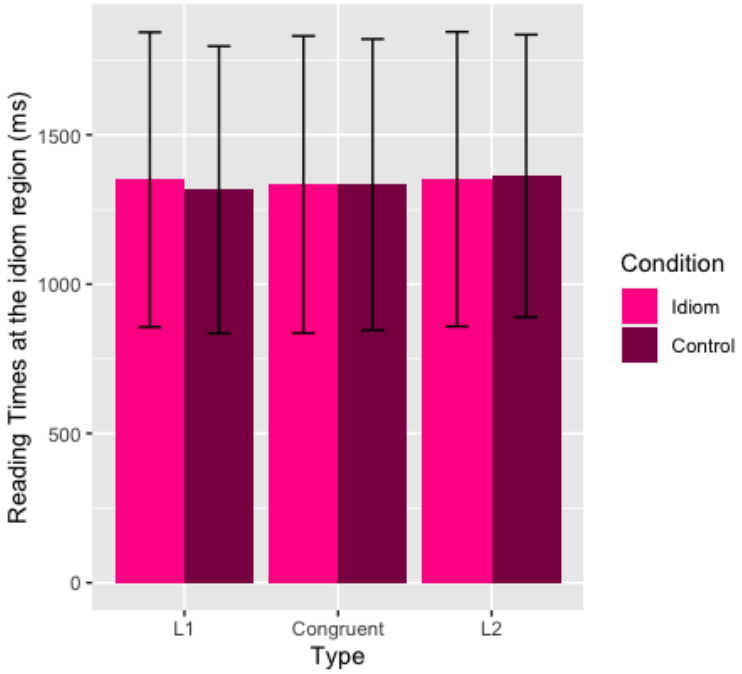
reading times in the spillover area of English-only idioms and their literal controls were similar. Reading times in the spillover area of Portuguese-only idioms and congruent idioms were processed more quickly than their literal controls. Nevertheless, these differences are not significant.

Overall, it seems that native speakers of English had no difficulty to process idioms in comparison to their literal controls.

8.6.3 Nonnative Speakers of English

Analysis 7 was computed to explore how nonnative speakers of English processed Portuguese-only idioms (L1), Congruent idioms, and English-only idioms (L2) in comparison to their literal controls. The mean reading times for idioms and controls can be seen in Figure 31.

Figure 31 – Reading times at the idiom region by nonnative speakers of English.



Note: L1 means Portuguese-only idioms/controls; Congruent idioms/controls; L2 means English-only idioms/controls.

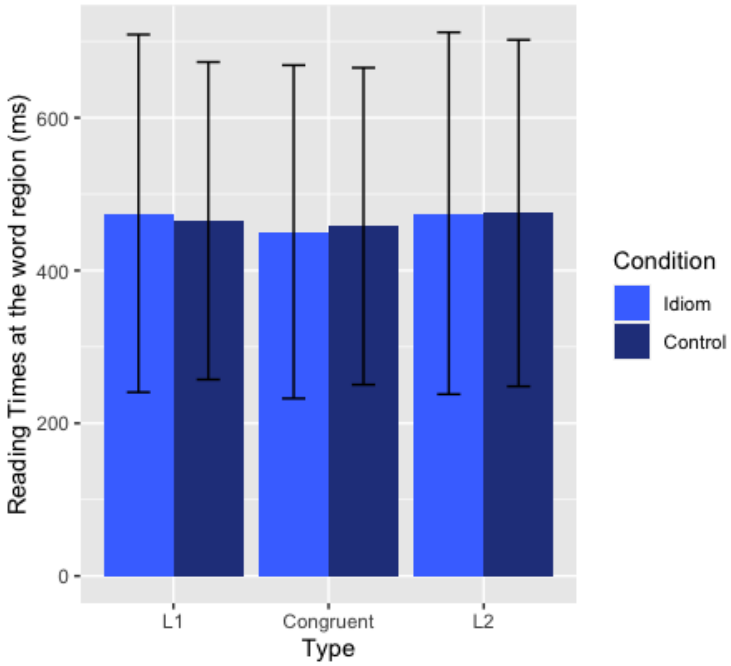
Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 31, no significant effect between

idioms and their literal controls was found. For nonnative speakers of English, reading times in Portuguese-only idioms were slower than their literal controls. On the other hand, reading times in congruent idioms and their literal controls were processed in a similar manner. Conversely, reading times in English-only idioms were faster compared to their literal controls. However, these differences are not significant.

Overall, this suggests that nonnative speakers showed no difference in processing either idioms or their literal controls. They seem not to favor figurative meanings over literal ones. It appears that fluency played a significant role during the processing of idioms, since the group of nonnative speakers are fluent in English (C1 and C2).

In addition, analysis 8 was computed to investigate how nonnative speakers of English integrated the final word of Portuguese-only idioms (L1), Congruent idioms, and English-only idioms (L2) in comparison to the final word of their literal controls. The mean reading times for idioms and controls can be seen in Figure 32.

Figure 32 – Reading times at the word region by nonnative speakers of English.



Note: L1 means Portuguese-only idioms/controls; Congruent idioms/controls; L2 means English-only idioms/controls.

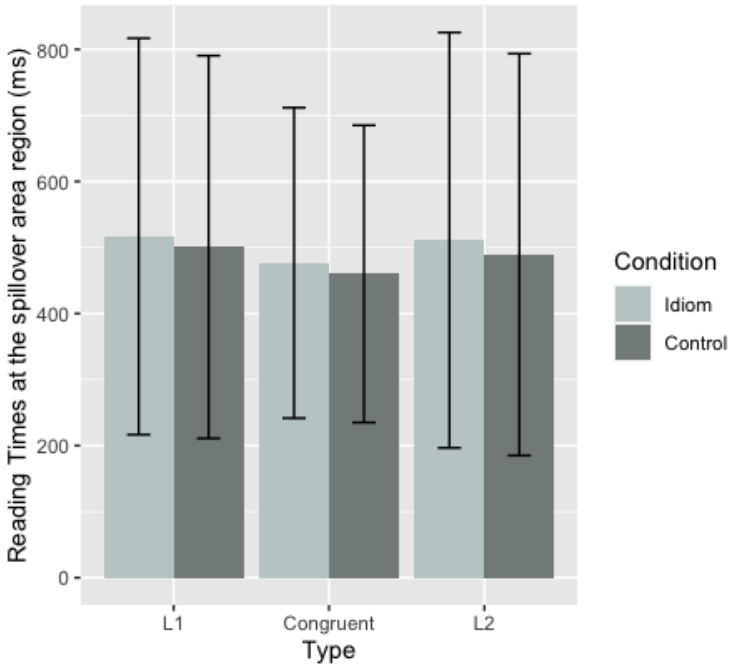
Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 32, no significant effect between the

final word of idioms and their literal controls was found. For nonnative speakers of English, reading times in the final word of Portuguese-only idioms were slower compared to their literal controls. Conversely, reading times in the final word of English-only idioms and congruent idioms were processed more quickly than their literal controls. However, these differences are not significant.

Overall, it may appear that nonnative speakers had no difficulty in integrating the final word of the idioms in comparison to the final word of the literal controls. Thus, perhaps these participants, when reading the final word, understood the figurative information of the idioms, and consequently they activated the comprehension of formulaic language.

Analysis 9 was computed to investigate how nonnative speakers of English integrated the spillover area of Portuguese-only idioms (L1), Congruent idioms, and English-only idioms (L2) in comparison to the spillover area of their literal controls. The mean reading times for idioms and controls can be seen in Figure 33.

Figure 33 – Reading times at the spillover area by nonnative speakers of English.



Note: L1 means Portuguese-only idioms/controls; Congruent idioms/controls; L2 means English-only idioms/controls.

Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 33, no significant effect between the spillover area of idioms and their literal controls was found. For nonnative speakers of

English, reading times in the spillover area of Portuguese-only idioms, congruent idioms, and English-only idioms were slower in comparison to their literal controls. Nevertheless, these differences are not significant.

In conclusion, the statistical analyses show three main findings. As expected, the first finding is that native speakers of English read idioms and their literal controls faster than nonnative speakers of English. The second finding is that native speakers of English read idioms and their literal controls in a similar manner. Finally, the third finding is that nonnative speakers read idioms and their literal controls in a similar manner too.

These findings will be discussed in the next subsection.

8.7 DISCUSSION OF THE RESULTS OF STUDY II

Study II draws heavily on Carrol *et al.* (2016) to investigate whether there are L1 and L2 processing differences of idioms in comparison to literal phrases. Moreover, I also explored the effect of the importance of L1 knowledge in the online processing of idioms presented in the L2. The results of the one-word moving-window self-paced reading task revealed that native speakers of English and nonnative speakers of English demonstrate similar reading/processing patterns when they encounter idioms. Although there were no significant effects for the idiom region (phrase-level) or for the final word region (word-level) in comparison to their literal phrases, native speakers of English read these items faster than nonnative speakers of English, and this difference is significant. These findings will be interpreted with caution.

Curiously, when nonnative speakers of English encountered Portuguese-only idioms (e.g., *peel a pineapple*) no difference in processing was found in comparison to their literal controls (e.g., *eat a pineapple*). Likewise, congruent idioms (e.g., *break the ice*) were read in a similar manner in comparison to their literal controls (e.g., *crack the ice*). Similarly, English-only idioms (e.g., *dropped the ball*.) and their literal controls (e.g., *missed the ball*) were processed in a similar manner. Thus, nonnative speakers demonstrated no difficulty in integrating the meaning of the final word of idioms compared to the final word of their literal controls. These results were interpreted as evidence that nonnative speakers are fluent in

English (C1 and C2), and formulaic language is not an issue during the reading of those sentences.

In contrast to Carrol *et al.* (2016), native speakers of English showed no difference in processing Portuguese-only idioms (e.g., *peel a pineapple*) in comparison to their literal controls (e.g., *eat a pineapple*). Likewise, congruent idioms (e.g., *break the ice*) were read in a similar manner in comparison to their literal controls (e.g., *crack the ice*). Similarly, English-only idioms (e.g., *dropped the ball*.) and their literal controls (e.g., *missed the ball*) were processed in a similar manner. Moreover, native speakers had no difficulty in integrating the meaning of the final word of the idioms in comparison to the final word of their literal controls. One possible explanation is that native speakers processed idioms as literal language.

8.7.1 Processing of idioms in comparison to their literal controls

Many psycholinguistic studies in the broader literature have examined formulaic language processing by native speakers. However, few contributions have been made by nonnative speakers, especially on L2 idiom processing (CIEŚLICKA, 2013). It seems that there are various factors that influence the processing of idioms by nonnative and native speakers, for instance, compositionality (TITONE; CONNINE, 1999), literality (BECK; WEBER, 2019, 2020), familiarity and frequency of use (TITONE *et al.*, 2015), semantic properties of idioms (JOLSAVI *et al.*, 2013), proficiency (YEGANEHJOO; THAI, 2012), L1 influence (CARROL *et al.*, 2016), to mention some.

In Study II, the Brazilian participants, nonnative speakers of English were all at high level of proficiency (5 at C1 and 17 at C2). According to Yeganehjoo and Thai (2012) nonnative speakers were able to activate and process L2 idioms more easily than literal phrases regarding their development of proficiency and exposure to idioms. Carrol *et al.* (2016) also showed that their group of advanced nonnative speaker of English was able to easily activate the figurative meanings of English idioms, especially congruent idioms. However, results of Study II are in contrast with both studies (YEGANEHJOO; THAI, 2012; CARROL *et al.*, 2016). Results of Study II showed no difference in processing idioms in comparison to their literal controls. Another possible explanation for this finding may be that some English-only idioms (e.g., *hold your horses, get the picture, pack your bags*) comprise

high literality, meaning that, they can be used in a figuratively and literality context (BECK; WEBER, 2020). Therefore, perhaps nonnative speakers of English have already had this combination of words established in their mental lexicon by using them in a literal context. Notwithstanding, the evidence found in Study II did not promote the processing of figurative meaning over literal meaning. Nonnative speakers did not foster a salient status to the literal meanings in comparison to figurative meanings, in contradiction with the Literal-Salience Resonant Model (CIEŚLICKA, 2006).

Reading times in congruent idioms demonstrated that Brazilian speakers of English as L2 processed these items and their literal phrases in a similar manner. This suggests that they may have lacked sensitivity to detect idiomatic language to interpret idioms in a specific way. It is plausible that sentences could not help the participants to make sense of figurative meanings entailed in the idioms. Thus, future studies might take into consideration more context and information for the sentences to boost the comprehension of the figurative meanings. These results are in contrast with previous studies (e.g., CARROL *et al.*, 2016, TITONE *et al.*, 2015). It seems that familiarity plays a significant role in the processing of congruent items supporting the idea that the more the speakers have contact with idioms/formulaic language in an L2 the more they will retrieve these items from memory (TITONE *et al.*, 2015, p. 193).

It is important to note that the spillover area of idioms was not processed more quickly than the spillover area of their literal controls by nonnative and native speakers of English. An alternative to explain these results is the hybrid model of Libben and Titone (2008), their Constraint-based Model of Idiom Processing, which suggests that idiomatic aspects, such as compositionality or literality can affect the processing of idioms at different moments during this process. As stated by the authors, the time constraint may affect this process and "global decomposability at a phrase level cannot be determined definitely until the last word is encountered and integrated with previous words" (p. 1117). It may be assumed that when nonnative speakers of English encountered the spillover area of idioms, they are still computing the idiomatic aspects of these items and could integrate the spillover area in an idiomatic mode; native speakers of English do the same path, but faster than the nonnative speakers.

The Hybrid Representation Model (SPRENGER *et al.*, 2006) can account for the performance of the nonnative and native speakers of English in this study. According to the model, the phrase level (*superlemmas*) and the word level (*lemmas*) are activated simultaneously during the first word of the idiom. Literal and figurative meanings of idioms 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 predictions of the model into consideration, nonnative and native speakers processed idioms similar to their literal controls, so they showed no difference in processing, so this revealed equal salience for idioms and their literal controls.

Nonnative speakers of English in this study processed idioms and their literal controls in a similar manner, so these results are in line with those of Siyanova-Chanturia *et al.* (2011), who found that no significant differences were found in the comparisons of figurative vs. literal vs. novel by nonnative speakers. The difference between their results and the results of Study II may be due to the method employed. Although Siyanova-Chanturia *et al.* (2011) did not find any difference between idioms and novel phrases, they provided a broader picture of idiom processing in terms of eye-tracking measures - where rereading and reanalysis occurred. However, results of Study II cannot provide these insights.

In contrast to the previous studies (e.g., SIYANOVA-CHANTURIA *et al.*, 2011; CARROL *et al.*, 2016), native speakers of English showed no difference in processing idioms in comparison to their literal controls. One possible explanation for this behavior is that the native speakers were not familiar with the items selected to take part in the experiment. Moreover, given that they were from different countries, the group was not homogeneous in terms of cultural background. According to Carrol and colleagues (2018, p. 22), there are two key aspects to successfully understand idiomatic language: (1) a set of semantic and inferencing skills to grasp the meaning of the idioms; (2) a detailed knowledge of the conventional idiomatic phrases.

In conclusion, idioms showed no privileged processing in comparison to their literal controls, and this is in contrast with previous findings in the formulaic language literature (CARROL *et al.*, 2016; TITONE *et al.*, 2015; YAMASHITA; JIANG, 2010). Idiom literature showed that when idioms share form and meaning across languages, nonnative speakers showed facilitated processing in congruent items modulated by the familiarity and cross-language overlap. Nevertheless, results of Study II showed no difference in processing of

idioms in comparison to their literal controls by nonnative and native speakers of English. Therefore, it seems that, figurative meanings and literal meanings are equally salient. Further data collection is required to determine exactly how congruent items affect L2 processing as these results were not statistically significant.

The lack of processing difference of idioms compared to literal controls might have to do with the transparency of the Portuguese phrases (e.g., *gave the cake*) might have aided the computation of these items (TIV *et al.*, 2016). It is possible to draw on Beck and Weber (2020) to support results of Study II in terms of literality. Portuguese-only idioms (e.g., *peel a pineapple, jump the fence, give blood*) encompass high literality, which means that these items could be possibly used in literal contexts.

Carrol *et al.* (2016) showed that nonnative speakers of English had facilitation in integrating the form and the meaning of Swedish-only idioms (translated to English), leading to activation of their L1 knowledge. However, results of Study II do not corroborate their findings. It seems that nonnative speakers had no difficulty in processing Portuguese-only idioms in comparison to their literal controls. One possible explanation is that the eye-tracking data shows effects in later measures, for instance, when participants can go past to the unknown phrases and return to reread them. Unfortunately, it is not possible to observe in self-paced reading task, and for this reason results of Study II did not show processing difference between idioms and their literal controls.

Curiously, Barreto and colleagues (2018) investigated Portuguese idioms and literal controls by means of a maze task by native speakers of Brazilian Portuguese. Their results showed that opaque idioms were processed more slowly than transparent idioms. The authors interpreted these results as opaque idioms were less familiar to the participants than the transparent ones demonstrating that familiarity played a significant role in their study. This could not be seen in Study II in relation to the familiarity issue, because no processing difference in encountering either Portuguese-only idioms or their literal controls was found.

8.7.2 Readdressing the research questions and hypotheses

RQ1: Do L1 translated idioms show privileged processing by L2 speakers of English?

Hypothesis 1: The L2 speakers of English will show an advantage in reading L1 translated idioms, since this structure and combination of words will be familiar to them. Native speakers of English will take more time processing L1 translated idioms, as these will be unfamiliar to them.

Hypothesis 1 was not supported by the results of the present study. In contrast to Carrol *et al.* (2016), nonnative speakers of English showed no advantage processing Portuguese-only idioms in comparison to their literal controls. Likewise, native speakers of English had no processing difficulty in processing Portuguese-only idioms in comparison to their literal controls.

RQ2: Is additional awareness/experience of the same combinations in the L2 an added benefit?

Hypothesis 2: Congruent elements will be a facilitator during the reading for the bilingual group. L2 speakers of English will read congruent sequences faster than L2 only idioms and L1 translated idioms, since there may be representations in both languages. Native speakers of English will spend less time processing congruent idioms than L1 idioms and they will process congruent idioms and L2 idioms in a similar manner.

Hypothesis 2 was not supported by the results of the present study. Congruent items did not facilitate the processing in comparison to their literal controls for nonnative and native speakers of English. These results are in contrast with previous studies (CARROL *et al.*, 2016; TABOSSI *et al.*, 2009).

RQ3: Do L2 only idioms show privileged processing by L2 speakers of English?

Hypothesis 3: The L2 speakers of English will show difficulty in reading L2 only idioms in comparison to native speakers of English since these will be less well known.

Hypothesis 3 was not supported by the results of the present study. The L2 speakers of English did not show advantage in reading English-only idioms compared to their literal

controls. Likewise, native speakers f English showed no advantage in processing English-only idioms in comparison to their literal controls.

In conclusion, native and nonnative speakers of English seem to process idioms in a similar manner. Nonnative and native speakers of English processed idioms and their literal controls in a similar manner. In fact, results of Study II showed that the self-paced reading method might have influenced the manner participants processed idioms. Further studies should continue to examine congruent idioms and Portuguese-only idioms using a variety of tests and different methods to better understand moment-to-moment processing of these linguistic items.

The next chapter will present Study III.

9 STUDY III - INVESTIGATING THE FACILITATION OF THE FIGURATIVE MEANINGS OF ADJACENT PHRASAL VERBS WITH ONE-WORD LEXICAL VERBS USING A MASKED SEMANTIC PRIMING TASK

This chapter presents Study III, a masked semantic priming study looking at the facilitation of the figurative meaning of adjacent phrasal verbs[21] by one-word verbs (lexical verbs)[22]. The main objective of the present study is to investigate whether speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English are sensitive to the implicit processing of figurative meanings of adjacent phrasal verbs facilitated by the corresponding meaning of one-word verbs.

The chapter is organized into six sections. Section 9.1 presents the objective, research questions and hypothesis of the study. Section 9.2 provides information about the participants. Section 9.3 describes the instruments that were used in the study. Section 9.4 provides a summary of the data collection procedures. Section 9.5 presents the pilot study of Study III. Section 9.6 presents the statistical analysis of the results. Finally, section 9.7 discusses the results of the study.

9.1 OBJECTIVE, RESEARCH QUESTION, AND HYPOTHESES

The main objective of the Study III is to investigate the online processing of figurative adjacent phrasal verbs and one-word lexical verbs in English as L2. In order to do this, the study examines whether one-word verbs facilitate the implicit processing of the figurative meanings of adjacent phrasal verbs by Brazilian Portuguese speakers of English as L2 and native speakers of English.

Based on this objective, Study III addresses the following research question:

RQ1: Do one-word lexical verbs facilitate the processing of figurative meanings of adjacent phrasal verbs for native and L2 speakers of English?

In order to answer this research question and based on the literature (Blais & Gonnerman, 2012) the following hypotheses are examined:

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[21] Throughout this study, “adjacent phrasal verb” means non-compositional phrasal verb.
[22] Throughout this study, “lexical verb” will be used interchangeably with “one-word verb”.

Hypothesis 1: For native speakers, lexical verbs will facilitate the processing of the corresponding meaning of figurative meanings of adjacent phrasal verbs.

This hypothesis follows from the idea that native speakers of English will respond faster to the related condition (e.g., *phrasal verb/lexical verb related to the phrasal verb meaning*) compared to the unrelated condition (e.g., *phrasal verb/lexical verb not related to the phrasal verb meaning*). The rationale for Hypothesis 1 is based on Gonnerman and Hayes (2005), who states that native speakers activated the related phrasal verb meanings faster than the unrelated meanings, that is, they are sensitive to the semantic aspect of the phrasal verbs.

Hypothesis 2: For nonnative speakers, lexical verbs will not facilitate the implicit processing of figurative meanings of adjacent phrasal verbs.

This hypothesis follows from the fact that, as shown by Wisintainer and Mota (2017, 2019), nonnative speakers of English will take longer to respond to the related condition (e.g., *phrasal verb/lexical verb related to the phrasal verb meaning*) in comparison to the unrelated condition (e.g., *phrasal verb/lexical verb not related to the phrasal verb meaning*).

The rationale for Hypothesis 2 is based on studies (e.g., MATLOCK; HEREDIA, 2002; WISINTAINER; MOTA, 2017, 2019) that show that figurative meanings of phrasal verbs are processed more slowly than literal meanings of phrasal verbs by nonnative speakers of English. This difference is in line with the Literal Salience Hypothesis (CIEŚLICKA, 2006). This hypothesis is also linked to the idea of Study I, which is that Brazilian Portuguese speakers of English as L2 will process figurative phrasal verbs more slowly than literal phrasal verbs.

Motivated by the contradictory findings in the literature (MATLOCK; HEREDIA, 2002; PAULMANN *et al.*, 2015; WISINTAINER; MOTA, 2017; 2019; BLAIS; GONNERMAN, 2012), Study III is designed to examine whether there are processing similarities between figurative meanings of adjacent phrasal verbs and one-word verbs. Blais and Gonnerman (2012) show that there is a significant priming effect whereby the related phrasal verb primes (e.g., *finish up/finish*) are processed faster than the identity primes (e.g., *finish/finish*). Their results indicate that monolinguals and bilinguals processed phrasal verbs as a whole unit in contradiction with the Literal Salience Hypothesis (2006).

9.2 PARTICIPANTS

In order to recruit participants, calls for participation in the study were posted on different social networking websites inviting nonnative speakers of English, whose L1 was Brazilian Portuguese, as well as native speakers of English. All participants were recruited via the internet through different platforms; specifically, native speakers of English were recruited from r/SampleSize, a pool on the social media platform Reddit[23].

A group of one hundred thirty-eight volunteers participated in this study, and they were different from Study I and II, including L2 speakers and native speakers of English. Nevertheless, various participants did not meet the criteria for inclusion in the study. These criteria were: (1) To reach advanced level in English at the Exam English website; (2) To be a native speaker of English (L1); and (3) To complete all phases of the experiment. In these terms, thirteen participants did not reach the advanced level in English at the Exam English website (see subsection 10.3.2). Eight participants did not have English as L1, and fifty-eight did not finish all the phases of the experiment. For this reason, seventy-eight participants were excluded from this study.

The final pool of participants consisted of sixty volunteers who completed all phases of the experiment and fulfilled the required criteria to take part in the study. These participants were divided into two groups:

Group 1 (experimental group) consisted of thirty advanced speakers of English as L2, native speakers of Brazilian Portuguese.

Group 2 (control group) consisted of thirty native speakers of English of different varieties (American, British, Canadian, Scottish and New Zealander English).

The next subsections describe these two groups in relation to age, gender, age of English learning, nationality, knowledge of languages besides their native language, and knowledge of Portuguese.

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[23] https://www.reddit.com/r/SampleSize/

9.2.1 The Nonnative Speakers of English

This subsection presents the native speakers of Brazilian Portuguese, who formed the experimental group of Study III. Thirty volunteer participants took part in this group (20 females). According to the information they provided in the biographical questionnaire (see subsection 10.3.1 and APPENDIX O), the participants of this group started to learn English as L2 at around the age of 10. They reported using English at home, work, and university on a daily basis. All participants took the Exam English (see subsection 10.3.2), 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, three participants had a high school degree, nine participants were undergraduate students, five of them held a bachelor's degree, three were graduate students, and ten participants had a graduate degree (MA or PhD). Nine participants reported having a degree in Linguistics. In relation to time spent abroad, seven participants reported having spent at least 6 months abroad, five reported having spent less than two months abroad, and fifteen of them reported having never been abroad. Three participants had lived in the United Kingdom for more than 2 years. Nine participants also reported knowing at least two languages besides their native language. The data is summarized in Table 27.

Table 27 – Summary information on Brazilian Portuguese Speakers of English as L2 - experimental group. Standard deviation in brackets.

	Age	**Age of English learning**	**Level of English**	**Knowledge of other languages**
Range	18 - 42	5 – 18	C1 - C2	1 - 4
Mean	27 (6.4)	10 (3.5)	-	2 (0.9)

Source: The author.

9.2.2 The Native Speakers of English

This subsection presents the native speakers of English, who formed the control group of the Study III. Thirty volunteer participants took part in this group (ten males). According to the information they provided in the biographical questionnaire (see subsection

10.3.1 and APPENDIX P), four participants were from the United Kingdom, twenty-two were from the United States of America, one participant from Canada, one from New Zealand, and one from Scotland. One participant did not report where he is from. Considering their education background, three participants had a high school degree, three participants held a bachelor's degree, seven held a master's degree, and seven were PhD. Three participants reported having a degree in Linguistics. Regarding their knowledge of Portuguese, two participants were fluent, three participants reported being able to have a simple conversation, eight participants reported having little knowledge (few words), and seventeen of them reported having no knowledge of Portuguese. Twenty-four participants reported having never been to Brazil. Thirteen participants also reported knowing one language besides their native language. The data is summarized in Table 28.

Table 28 – Summary information on Native Speakers of English - control group. Standard deviation in brackets.

	Age	**Nationality**	**Knowledge of other languages**	**Knowledge of Portuguese**
Range	18 - 64	USA/UK/ Canada/ New Zealand/ Scotland	0 - 3	No - Fluent
Mean	34 (12.7)	-	1 (0.8)	-

Source: The author.

9.3 INSTRUMENTS OF DATA COLLECTION OF STUDY III

Four instruments for data collection were used: (1) a Biographical Questionnaire, (2) a Proficiency Test, (3) a Masked Semantic Priming Experiment with figurative phrasal verbs and one-word lexical verbs in English, and (4) a Familiarity Posttest. These four instruments were held on an online form on the Google Forms platform. The Proficiency Test was the same test employed in Study I (see Chapter 7, Subsection 7.3.2). These instruments will be detailed as follows.

9.3.1 The Biographical Questionnaire

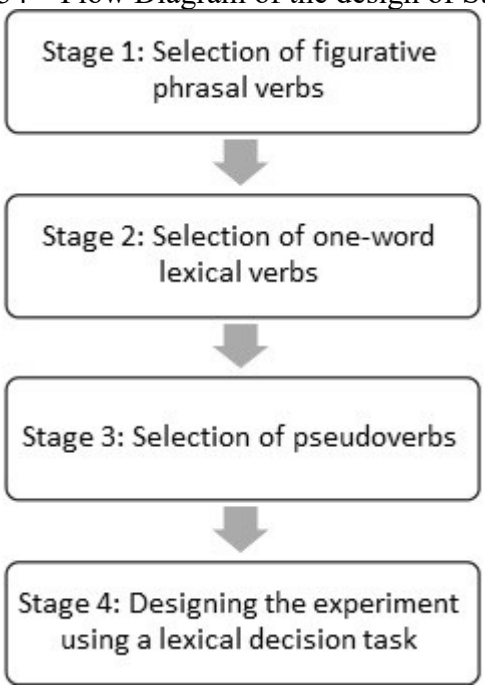
After agreeing to participate in this study, the L2 English speakers and the native speakers of English filled out an online biographical questionnaire (see APPENDIX O and APPENDIX P). The questionnaire for the L2 English speakers comprises questions related to their general personal information, their education background, and their learning of English as an L2.

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

9.3.2 The Masked Semantic Priming Experiment

The design of the masked semantic priming experiment consisted of 4 stages, as can be seen in Figure 34.

Figure 34 – Flow Diagram of the design of Study III.



Source: The Author.

In stage 1 and 2, phrasal verbs (PVs) were selected from Garnier and Schmitt (2015). The main criterion to select the PVs was that they should present figurative meanings and be non-compositional (adjacent) phrasal verbs. From a list of 150 items, 41 PVs were selected. Due to difficulties in pairing frequency and length of the adjacent phrasal verbs and one-word verbs (lexical verbs), a final list of 18 figurative meanings of adjacent phrasal verbs and their corresponding one-word verbs was created. The frequency of each adjacent phrasal verb and each one-word verb was verified on the website of the Corpus of Contemporary American English (COCA). The mean and the standard deviation of figurative phrasal verbs an their corresponding one-word verbs can be seen in Table 29 (see APPENDIX Q for the full list).

Table 29 – Mean of frequency and length of figurative meanings of adjacent phrasal verbs and one-word verbs (lexical verbs).

Verbs	**Frequency**	**Standard Deviation**	**Length**	**Standard Deviation**
Figurative Phrasal Verbs	11111.6	3889.3	7	1.0
One-word Verbs (Lexical Verbs)	11009.9	12069	5	1.6

Source: The author.

After selecting the figurative meanings of adjacent phrasal verbs and one-word verbs, 18 adjacent phrasal verbs were paired with a related target verb (e.g., carry out - ACHIEVE), and for each item an unrelated target was also chosen (e.g., carry out - END). Identity primes (e.g., achieve - ACHIEVE) were also created for each item (see APPENDIX R for the full list). Six different particles were used: up, on, out, over, off, and through. Any differences related to the size of the adjacent phrasal verbs and the one-word verbs will be accounted for by including target length in the statistical analysis. Following Blais and Gonnerman (2013, p. 840), the identity condition was included as a way to examine whether the participant reads only the first word (e.g., carry) in the phrasal verb primes and ignores the particle (e.g., out). Thus, the identity condition will help us to verify whether priming for related and unrelated conditions indicate the whole unit or not. Table 30 shows an example of a prime-target pair for each condition.

Table 30 – Example of each condition.

Condition	Prime	Target
Related	carry out	ACHIEVE
Unrelated	carry out	END
Identity	Achieve	ACHIEVE

Source: The author.

In stage 3, 36 pseudo verbs were selected from Kelly (1988) to reduce the proportion of real prime-target pairs (see APPENDIX S for the full list). In addition, 36 pseudo phrasal verbs were created to match the real words in orthography and structure. Four different particles were used: down, forward, around, and about. These pseudo verbs were employed as non-phrasal verb primes with non-verb targets that were either "related" (e.g., forma down - FORMAND), "unrelated" (e.g., forma down - MERSELT) or "identity" (e.g., formand - FORMAND). In moving the experiment to the remote mode, twenty-seven nouns and twenty-seven nonwords, taken from Bodner and Masson (1997), were included as fillers (see APPENDIX T for the full list). These nouns and nonwords were employed as prime-target fillers (e.g., tour - TOUR/breem - BREEM). Table 31 depicts the mean length of the filler items.

Table 31 – Mean length of pseudo verbs, pseudo phrasal verbs, nonwords, and words.

Filler Items	Length	Standard Deviation
Pseudo verbs	7	0.2
Pseudo phrasal verbs	9	1.5
Nonwords	5	0.8
Words (nouns)	5	0.8

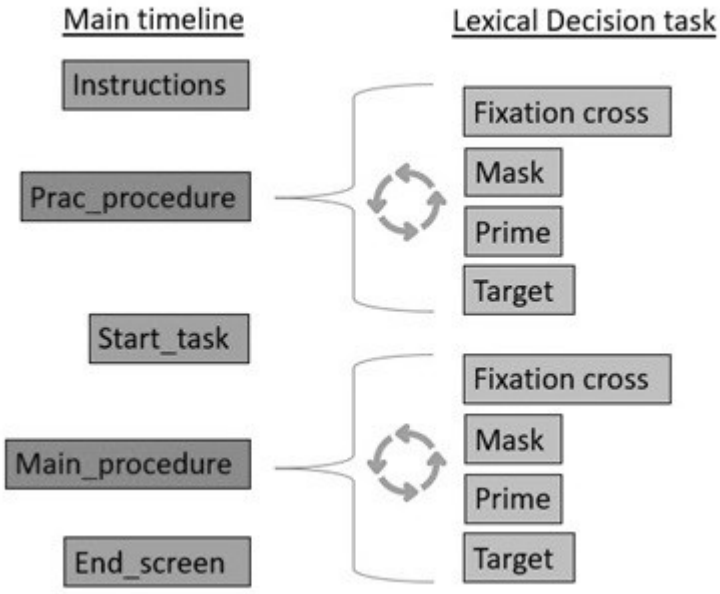
Source: The author.

Finally, in stage 4 the experiment was designed, using a lexical decision task. This experiment consisted of 36 experimental prime-target pairs, 54 pseudo verbs/phrasal verbs prime-target fillers, 27 nonwords prime-target fillers, 27 nouns prime-target fillers. The lexical decision task was programmed on JavaScript language using JsPsych[24] library and it was hosted on the website Cognition[25]. A masked semantic priming paradigm was employed

[24] https://www.jspsych.org/
[25] https://www.cognition.run/

to build the task. The description of the task is designed in the form of a timeline, as can be seen in Figure 35.

Figure 35 – The design of the lexical decision task.



Source: The author.

The stimuli were divided into 6 lists, each list contained 81 items - 9 were experimental prime-target pairs (3 related, 3 unrelated, and 3 identity), 18 were pseudo verbs/phrasal verbs prime-target fillers, 27 were nouns prime-target fillers, and 27 were nonwords prime-target fillers. Each list comprised different experimental prime-target pairs, as presented in Table 32.

Table 32 – Example of the experimental prime-target pairs displayed in the lists.

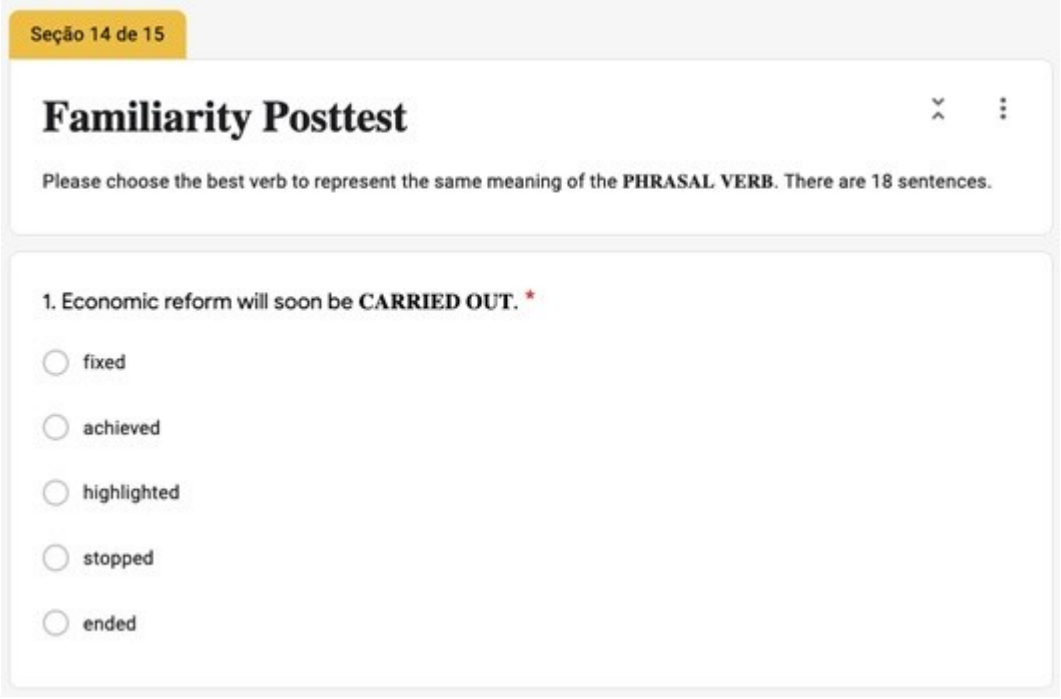
List 1		**List 2**		**List 3**	
Prime	Target	Prime	Target	Prime	Target
Study	STUDY	pursue	PURSUE	catch up	PURSUE
List 4		**List 5**		**List 6**	
Prime	Target	Prime	Target	Prime	Target
break up	STUDY	go over	STUDY	carry on	PURSUE

Source: The author.

9.3.3 The Familiarity Posttest

The familiarity posttest (see APPENDIX U) consisted of those 18 figurative phrasal verbs and 18 one-word verbs employed in the lexical decision task, which were selected from Garnier and Schmitt (2015) (see APPENDIX R). For each of the 18 figurative phrasal verbs, 18 sentences were taken from Garnier and Schmitt's (2015) extra material including these phrasal verbs and lexical verbs. Straight after performing the lexical decision task, the participant was led to come back to the Google Forms, where he/she took the familiarity posttest. The purpose of this test was to determine whether participants were familiar with the figurative meanings of phrasal verbs and whether the one-word verbs matched with the phrasal verbs. Therefore, the participants read 18 sentences and chose the best one-word verb to represent the same meaning of the figurative phrasal verbs. An example of a sentence is displayed in Figure 36 and the summary of the results of the posttest can be seen in Table 33.

Figure 36 – Example of a sentence of the Familiarity Posttest.



Source: The author.

Table 33 – Summary of the results of the Familiarity Posttest for each group.

Group	Correct Answers	Standard Deviation
NS	87%	6.5%
NNS	86%	8.2%

Source: The author.

Note: NS means Native speakers of English; NNS means Nonnative speakers of English.

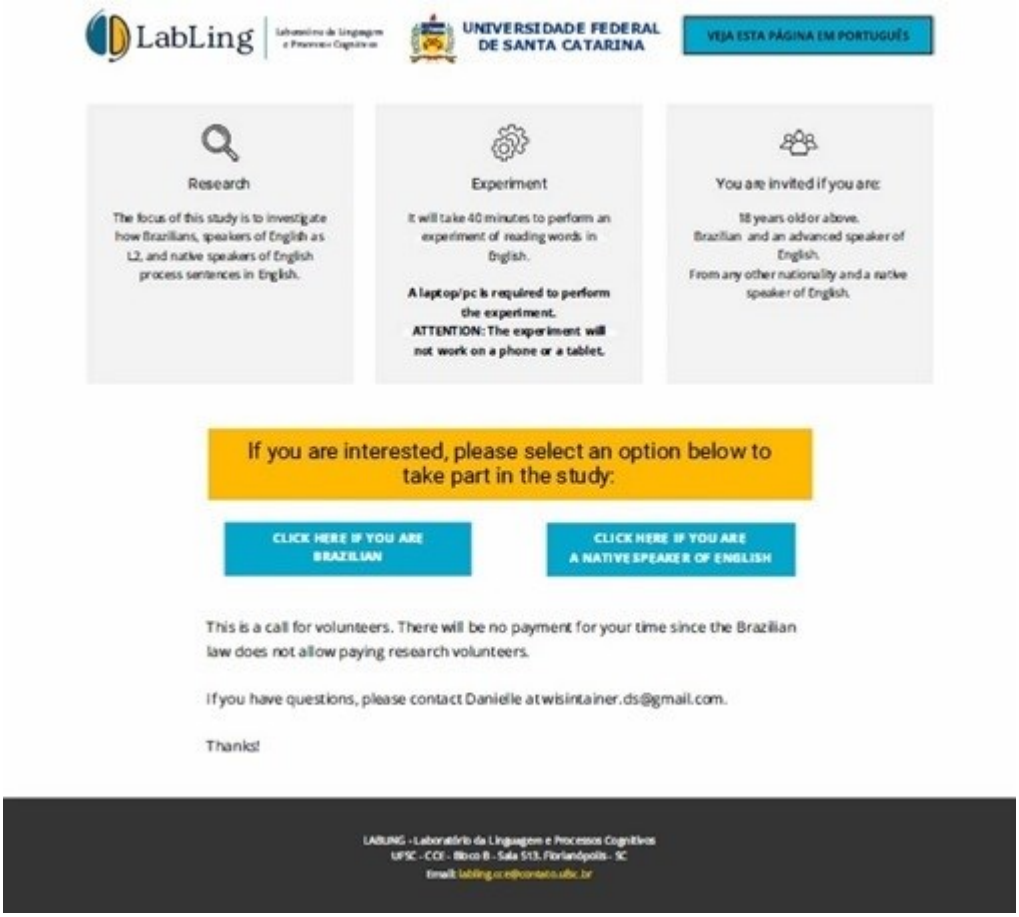
9.4 DATA COLLECTION PROCEDURES

The data were collected remotely, and participants took part in this study using their own computer/laptop. Participants accessed this study through a website page[26], as can be seen in

Figure 37.

[26] https://labling.ufsc.br/estudodani-palavras/Estudo-Danielle-W---EN.html

Figure 37 – The website page of the study.



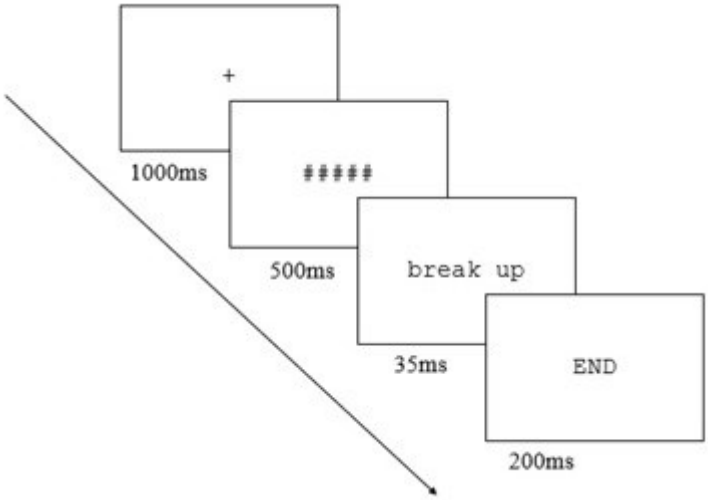
Source: The author.

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 (see APPENDIX V for Portuguese version and APPENDIX W for English version). After reading and agreeing to participate in this study, participants filled out a biographical questionnaire, performed a proficiency test (only L2 English speakers), performed a lexical decision task, and, finally, took a familiarity posttest.

In Study III, a masked semantic priming paradigm was adopted following the procedure employed in Blais and Gonnerman (2012). All participants received instructions before starting the task, and they completed six practice trials to understand how the main experiment worked. After each practice trial, the participant received feedback to ensure that he/she was making the right decision. Each trial consisted of a fixation cross (+) displayed for

1000ms, after which a mask (#####) was displayed for 500ms. Subsequently, the prime appeared briefly for 35ms followed immediately by the target, which remained on the screen for 200ms. Participants made a lexical decision to the target by pressing the “Q” for no or the “P” for yes on their keyboard, from which reaction times were recorded. Following the participant’s response, a 500ms delay took place before the next trial started. An example of a trial design is displayed in Figure 38.

Figure 38 – Example of an experimental trial.



Source: The author.

Primes and targets appeared in black font (Monospace, font size 40) on a white background, with primes in lower case letters and targets in upper case letters. There were 6 lists: each list contained 81 items - 9 were experimental prime-target pairs (3 related, 3 unrelated, and 3 identity), 18 were pseudo verbs/phrasal verbs prime-target fillers, 27 were nouns prime-target fillers, and 27 were nonwords prime-target fillers. The participants could choose a list to perform, and each of them saw stimuli from only one list. In addition, the order of the trial presentation was randomized for each participant.

9.5 PILOT STUDY OF STUDY III

The main objective of Study III is to investigate the implicit processing of figurative meanings of adjacent phrasal verbs and one-word lexical verbs in English as L2. More specifically, the experiment focused on whether one-word verbs facilitate the implicit

processing of the figurative meanings of adjacent phrasal verbs by Brazilian Portuguese speakers of English as L2 and native speakers of English. A masked semantic priming paradigm was adopted following the procedure employed in Blais and Gonnerman (2012).

Hypothesis 1 predicts that native speakers of English will respond to the related targets faster than the unrelated targets. Moreover, they will respond to the identity targets faster than the other conditions.

On the other hand, Hypothesis 2 predicts that Brazilian Portuguese speakers of English as L2 (nonnative speakers of English) will respond to the related targets slower than the unrelated targets. In addition, they will respond to the identity condition faster than the other conditions.

In Study III, the implicit processing of figurative meanings of adjacent phrasal verbs primes was assessed by means of the recording of response times of the targets. Statistical analyses were employed for Prime-Target Type in 3 conditions:

1. Identity condition: prime is a lexical verb and target is also a lexical verb (e.g., *fix/fix*).
2. Related condition: prime is a figurative phrasal verb and target is a corresponding lexical verb (e.g., *sort out/fix*).
3. Unrelated condition: prime is a figurative phrasal verb and target is an unrelated lexical verb (e.g., *check out/fix*).

Prior to the main study, the pilot study of Study III was carried out to test the instruments and verify the online dynamics of the experiment, since the data collection took place remotely. The data collection of Study III started in February 2021. However, because of the lack of accessibility to the native speakers of English (at that time I did not know about the platform Reddit), this data collection was finalized only in September 2021.

Next participants, results, contributions, and limitations of the pilot study of Study III will be presented.

9.5.1 Participants of the pilot study of Study III

To explore the main objective of Study III, the present pilot study was conducted with twenty-four adult volunteers. These participants were divided into two groups:

I) Experimental group: the experimental group of the pilot study of Study III consisted of twelve participants (mean age = 29, range = 20-47, 9 females, 3 males), all of which L2 speakers of English group, native speakers of Brazilian Portuguese. According to the information provided in the biographical questionnaire, the participants of this group started to learn English as L2 at around the age of 15. According to the Exam English test[27], all of them were at an advanced level of English (5 at C1 and 7 at C2). Eight participants also reported knowing at least two languages (e.g., English, Swedish, Spanish, French, Italian, Japanese, Russian, and Brazilian Sign Language) besides their native language.

II) Control group: the control group of the pilot study of Study III consisted of twelve participants (mean age = 35, range = 24-54, 8 females, 4 males), all of which native speakers of English (of the varieties: 4 speakers of American English, 2 speakers of British English, 3 speakers of Canadian English, and 3 speakers of Australian English). One participant reported living in Switzerland. One participant could hold a simple conversation in Brazilian Portuguese (BP), five participants knew few words in BP, and the other six had no knowledge of BP. Three participants were monolinguals, and nine reported knowing at least one language (e.g., German, Italian, Japanese, and British Sign Language) besides their native language.

9.5.2 Results, contributions, and limitations of the pilot study of Study III

Once the experiment was completed by the twenty-four participants, the data was imported into Excel spreadsheets, and after cleaning and selecting it, the dataset was analyzed using the R statistical programming environment.

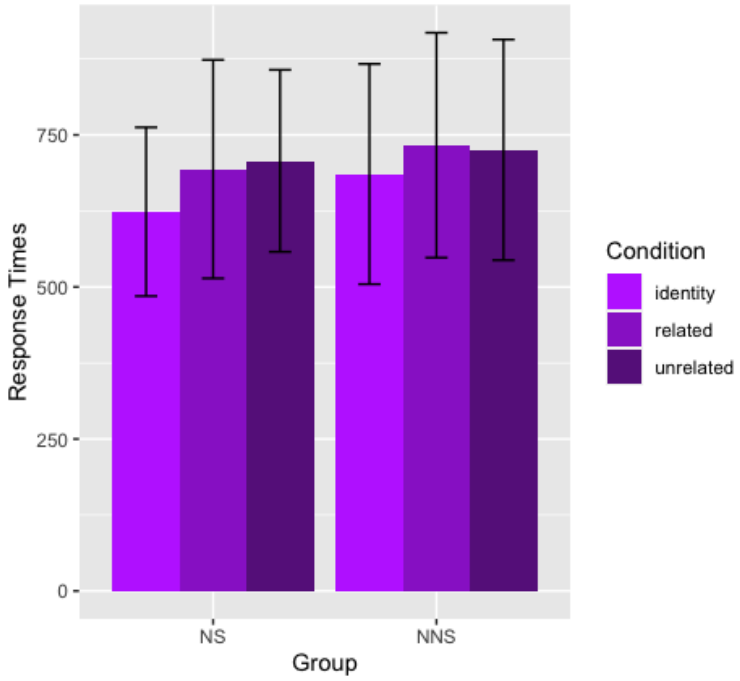
To prepare for a descriptive data analysis, mean and standard deviation of the participants response times were calculated using prime-target pairs. The lexical decision task lasted about 8 minutes for nonnative speakers of English and 6 minutes for native speakers of English. Due to a methodological error, in which three verbs were presented more than once in three lists, six prime-target pairs (list 1: raise/raise, carry on/raise; list 5: spread/spread, shut up/spread; list 6: stop/stop, bring up/stop) were excluded from the analysis. This exclusion

[27] The proficiency test was an online grammar and vocabulary level test, which can be found on the website Exam English - http://www.examenglish.com/leveltest/grammar_level_test.htm.

corresponds to 11% of the data. Regarding the response times, data was trimmed to discard outliers; response times shorter than 300ms and longer than 1200ms were excluded. This exclusion corresponds to 2% of the data.

The mean response times for target words by identity, related and unrelated conditions (Prime type) can be seen in Figure 39. Mean reading times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016).

Figure 39 – Mean response times for target words by prime type for both groups.



Note: NS means Native speakers of English; NNS means Nonnative speakers of English; Identity condition (achieve - ACHIEVE); Related condition (carry out - ACHIEVE); Unrelated condition (carry out - END).

As shown in Figure 39, native speakers of English responded to the identity prime-target pairs faster than related and unrelated prime-target pairs. Related prime-target pairs were responded faster than unrelated prime-target pairs for native speakers of English. Regarding nonnative speakers of English, identity prime-target pairs were responded faster than related and unrelated prime-target pairs. Conversely, related prime-target pairs were responded slower than unrelated prime-target pairs for nonnative speakers of English. Overall, this suggests that the two groups demonstrated different patterns when they implicitly process figurative meanings of adjacent phrasal verbs. However, these differences were not significant.

The major contribution of the pilot study of Study III was to make sure that the online experiment worked in different computers and countries. Small changes in the form were made, such as instructions to the participants were made clearer and more objective. There were some limitations, such as, the small number of the participants. Given that findings of the pilot of Study III are based on a limited number of participants (12 nonnative speakers of English and 12 native speakers of English), the results of this pilot study are representative and will not be discussed in detail here.

The next section will present the statistical analyses of Study III.

9.6 STATISTICAL ANALYSES OF STUDY III

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 are considered significant at the α=0.05 level. I constructed linear mixed effect models with random effects for participants and primes, looking at the interactions between conditions (Prime Type: Identity vs. Related vs. Unrelated) and group (nonnative vs. native speakers of English) as fixed effects. The dependent variable was response times for prime-target pairs. The statistical analysis includes both frequency and length of the verbs as covariates. The lexical decision task lasted about 7 minutes for nonnative speakers and 6 minutes for native speakers of English. Error rates for the 60 participants were averages of 18.3% (SD= 0.50) for the targets and 33.3% (SD= 0.91) for pseudo verbs. Due to a methodological error, in which three targets (lexical verbs) appeared more than once in three lists, six prime-target pairs were excluded from the analysis (*list 1: raise/raise, carry on/raise; list 5: spread/spread, shut up/spread; list 6: stop/stop, bring up/stop*). This exclusion corresponds to 11% of the data. Regarding the response times, data was trimmed to discard outliers; response times shorter than 300ms and longer than 1200ms were excluded. This exclusion corresponds to 7.9% of the data. Outliers were excluded based on a visual inspection. In addition to that, data trimming was applied in accordance with Jiang (2012, p. 70), who claims that below than 300ms does not indicate recognition word process and native speakers take less than 1000ms to recognize a word and give a response, but this high cutoff varies according to the data, especially when nonnative speakers' responses are involved. Since the data was not normally distributed, all response times were log-transformed to reduce skewing.

9.6.1 Descriptive analysis of Figurative Phrasal verbs and lexical verbs

Means for the response times for identity, related, and unrelated conditions by both groups can be seen in Table 34.

Table 34 – Native and nonnative response times (in milliseconds) for identity, related, and unrelated conditions with Standard Deviation in brackets.

	Identity	**Related**	**Unrelated**
Response Times:			
Native Speakers of English	631.3(114.8)	678.1(135.6)	661(124.4)
Nonnative Speakers of English	699.2(170.2)	736.4(174.8)	721(150.1)

Source: The author.

Mean and standard deviation of the participants' response times were calculated using only experimental prime-target pairs. The data indicates that both groups processed related prime-target pairs slower than unrelated prime-target pairs. Moreover, all the participants responded to identity prime-target pairs faster than the other conditions, as shown in Table 34.

9.6.1.1 Response Times

Analysis 1 aimed at examining how both groups - nonnative and native speakers of English - recognized and processed identity, related, and unrelated prime-target pairs. Results are shown in Table 35.

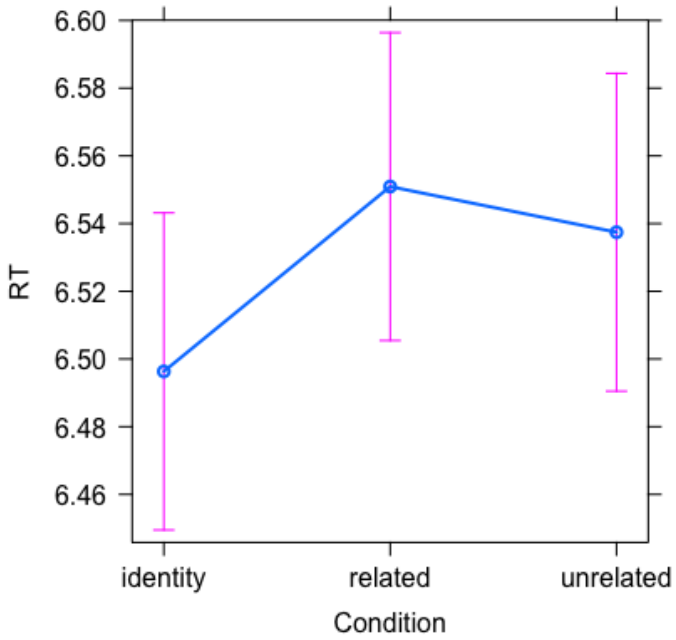
Table 35 – Linear Mixed Effects Model output for conditions for Response Times.

	Response Times		
Fixed effects	***β***	***SE***	***p-value***
Intercept	6.44	3.90	< 2e-16***
Condition related	5.46	1.72	0.002**
Condition unrelated	4.11	1.80	0.026*
Frequency_Tar	-1.41	6.11	0.023*
Length_Tar	1.27	4.88	0.011*
Random effects	***Variance***	***SD***	
Participant	2.406	0.155	
Prime	2.067	0.004	
Residual	2.168	0.147	

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 prime-target condition - related condition between identity condition (β=5.46, t=3.17, p<0.01). Moreover, there was a significant effect for unrelated condition between identity condition (β=4.11, t=2.27, p<0.05). Frequency and length of the target verbs are considered as covariates. There was a significant effect for verb length (β=1.27, t=2.61, p<0.05), and there was a significant effect for verb frequency (β=-1.41, t=-2.30, p<0.05) during the recognition time. Figure 40 shows the log response times for the targets, which is a lexical verb for the different conditions - identity, related, and unrelated. Results are shown in Figure 40.

Figure 40 – Model fitted L1 and L2 processing time for identity, related and unrelated conditions by both groups.



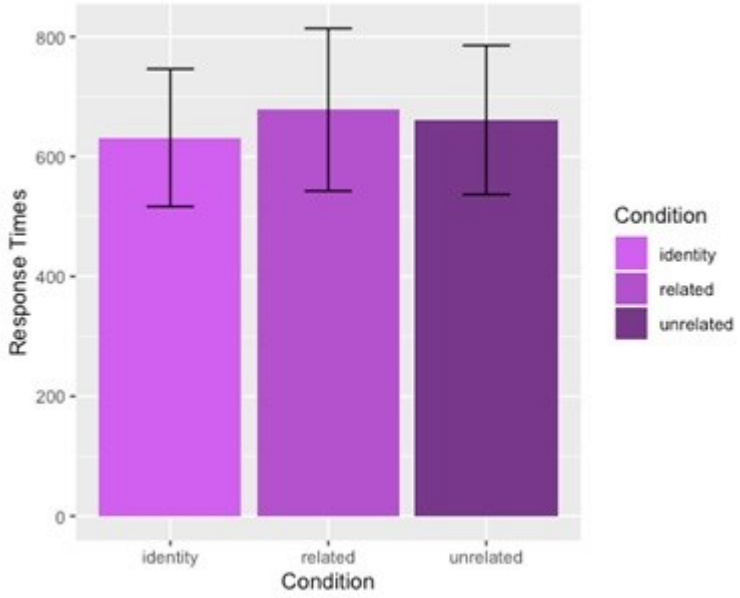
Note: NS means Native speakers of English; NNS means Nonnative speakers of English; Identity condition (achieve - ACHIEVE); Related condition (carry out - ACHIEVE); Unrelated condition (carry out - END).

As shown in Figure 40, response times for related condition and unrelated condition are similar. On the other hand, response times for the identity condition are shorter than the other conditions for both groups, and this difference is significant. Moreover, the effect size between groups was small (COHEN'S d=0.41).

9.6.2 Native Speakers of English

Analysis 2 is computed to explore whether corresponding lexical verbs facilitated the processing of figurative phrasal verbs for native speakers of English. The mean response times for all conditions can be seen in Figure 41.

Figure 41 – Response times for the prime-target pairs by native speakers of English.



Note: Identity condition (achieve - ACHIEVE); Related condition (carry out - ACHIEVE); Unrelated condition (carry out - END).

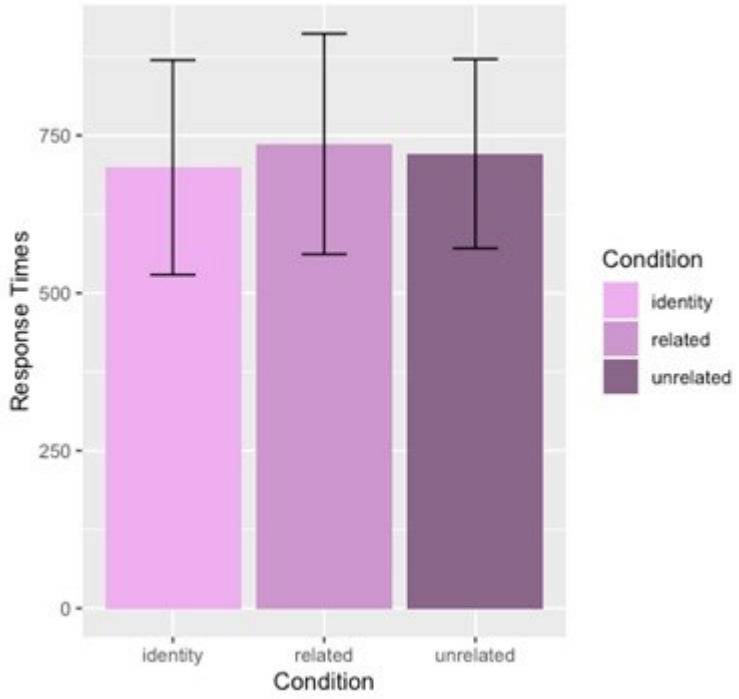
Mean response times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As can be seen in Figure 41, there was no significant effect between related and unrelated conditions. Nevertheless, there was a significant effect between identity and related conditions (β=6.10, t=2.72, p<0.01). There was a marginal effect between identity and unrelated conditions (β=4.36, t=1.87, p=0.06).

Moreover, verb frequency and verb length are considered as covariates. There was no significant effect for either frequency or length verb was found.

9.6.3 Nonnative Speakers of English

Analysis 3 is computed to examine whether corresponding lexical verbs facilitated the processing of figurative meanings of adjacent phrasal verbs for nonnative speakers of English. The mean response times for all conditions can be seen in Figure 42.

Figure 42 – Response times for the prime-target pairs by nonnative speakers of English.



Note: Identity condition (achieve - ACHIEVE); Related condition (carry out - ACHIEVE); Unrelated condition (carry out - END).

Mean response times and standard error bar values were obtained from the R package ggplot2 (WICKHAM, 2016). As shown in Figure 42, no significant effect between conditions was found. Additionally, verb frequency and verb length are considered as covariates. Frequency effect of one-word verbs was tested and significant effect throughout the conditions was found (β=-2.19, t=-2.29, p<0.05). Length of one-word verb was also tested, and this factor seems to affect the processing time of conditions (β=1.88, t=2.41, p<0.05). Therefore, both verb frequency and verb length may be responsible for the shorter priming of unrelated targets in comparison to related ones.

In conclusion, the statistical analysis of Study III show three main findings. As expected, the first finding is that nonnative speakers recognized words more slowly than native speakers, although they have a similar performance. The second finding is that native speakers and nonnative speakers of English recognized and implicitly processed identity conditions faster than related and unrelated conditions. Lastly, the third finding is that verb length and verb frequency seem to affect the recognition of targets by nonnative speakers of English.

These findings will be discussed in detail in the next subsection.

9.7 DISCUSSION OF THE RESULTS OF STUDY III

Study III was designed to investigate whether one-word verbs facilitate the implicit processing of figurative meanings of adjacent phrasal verbs by L1 and L2 speakers of English. In order to do this so, prime type was examined in three conditions: identity condition, related condition, and unrelated condition. The results of the masked semantic priming task revealed that native speakers of English and nonnative speakers of English show a similar manner to process figurative meanings of adjacent phrasal verbs implicitly. Moreover, related targets and unrelated targets were recognized more slowly than identity targets for both groups.

It is interesting to note that nonnative speakers of English showed no difference in processing unrelated prime-target pairs (e.g., *go off/struggle*) in comparison to related prime-target pairs (e.g., *go off/sound*). Identity prime-target pairs (e.g., *sound/sound*) showed an advantage compared to the other conditions. Moreover, frequency and length of the targets seems to influence the recognition time of these items. Taken together, these results suggest that nonnative speakers process lexical verbs differently from adjacent phrasal verbs. These findings were interpreted as evidence that the less frequent and the longer the lexical verbs are the more processing time is required to recognize these verbs.

The most surprising result to emerge from the data is that native speakers of English also showed no processing difference in recognizing unrelated prime-target pairs (e.g., *stand out/start*) in comparison to related prime-target pairs (e.g., *set out/start*). Identity prime-target pairs (e.g., *start/start*) showed an advantage compared to the other conditions. In addition to that, frequency and length of the targets did not affect the processing time of these items. These results did not support for frequency effect. It is possible that the methodological errors might have contributed to the lack of condition effect.

In conclusion, participants had a similar performance regardless of smaller reading times for native speakers of English in comparison to nonnative speakers of English.

9.7.1 Implicit Processing of Figurative Meanings of Adjacent Phrasal Verbs

A growing body of psycholinguistic studies (DAGUT; LAUFER, 1985; HULSTIJN; MARCHENA, 1989; MATLOCK; HEREDIA, 2002; LIAO; FUKUYA, 2004; GONNERMAN; HAYES, 2005; BLAIS; GONNERMAN, 2012, 2013; PAULMANN *et al.*, 2015) shows that native speakers differ from nonnative speakers in the processing of phrasal verbs. These findings have to do with the various factors that affect the processing and learning of multiword units. One way to understand the mental processes involved in the processing of phrasal verbs is to examine implicit and explicit language processes. In the present study, implicit processing is taken as processing that does not involve metalinguistic awareness and this is in line with the definition of implicit and explicit knowledge stated by Ellis (2005, p. 152).

Given the brief presentation of the primes in this study (see Section 9.4), automatic interpretation of figurative phrasal verbs without the metalinguistic awareness was assessed. All participants (native and nonnative speakers of English) showed a smaller priming effect for related primes and unrelated primes in comparison to identity primes. One possible explanation for these results is that participants did not automatically interpret phrasal verbs as figurative language and this slowed down the recognition of targets. For nonnative speakers of English, the Literal Salience Hypothesis (CIEŚLICKA, 2006) supports this finding and might contribute to the idea that nonnative speakers activate the literal meanings before figurative meanings, that is, the former meaning is already established in the mental lexicon, and it is ready to be accessed by L2 speakers. These results are interpreted as evidence that literal language was accessed before figurative language, in line with Bobrow and Bell (1973).

In contrast to earlier findings (BLAIS; GONNERMAN, 2012, 2013), the results of nonnative speakers of English point to the probability that they did not implicitly recognize semantic differences in phrasal verbs, meaning that, nonnative speakers responded to the phrasal verbs as a literal combination of these constructions. A reasonable explanation for this behavior may be that there was competition between literal and figurative meanings.

The results of Study III share some similarities with Herbay and colleagues' (2018) findings, specifically in relation to the semantic aspect of the figurative phrasal verbs. Herbay

and colleagues (2018) investigated bilingual processing of noun phrase length and verb-particle construction (VPC) dependency. Their results showed that participants with poor lexical knowledge processed high dependency VPCs more slowly than low dependency VPCs. With regard to results of Study III, this dependency takes place when the verb is highly dependent on the particle (e.g., *sort out*), that is, in order to express the idea, *find an answer to a problem*, the verb *sort* needs or depends on the particle *out* (Hawkins, 2004). On the other hand, there are phrasal verbs with low dependency (e.g., *finish up*), which means that the verb is not highly dependent on the particle to express the idea of concluding an activity, for instance. In the present study, phrasal verbs possess this characteristic of high dependency, opaque meaning, and non-compositional aspects.

With this in mind, it is possible to argue that the results related to the native speakers of English can also be explained using the semantic characteristic - high dependency of figurative phrasal verbs - as the source of the smallest priming effect for related pairs and unrelated pairs. These results are consistent with Gonnerman and Hayes' (2005) study, in which they investigated phrasal verbs with high (e.g., *throw up/throw*), mid (e.g., *look up/look*), and low (e.g., *finish up/finish*) dependency using a masked priming task with native speakers of English. Their results showed that lexical decisions were facilitated for targets followed by related primes in the mid and low dependency. Thus, they interpreted these results as evidence that dependency in particle constructions influences response times.

9.7.2 Readdressing the research question and hypothesis

RQ1: Do one-word lexical verbs facilitate the processing of figurative meanings of adjacent phrasal verbs for native and L2 speakers of English?

Hypothesis 1: For native speakers, lexical verbs will facilitate the processing of the corresponding meaning of figurative meanings of adjacent phrasal verbs.

Hypothesis 1 was not supported by the results of the present study. Lexical verbs did not facilitate the processing of figurative meanings of adjacent phrasal verbs. These results were interpreted as evidence that might have had a competition between figurative and literal meanings and this slows down the processing of phrasal verbs. The high dependency of figurative meanings of adjacent phrasal verbs also slowed down the activation of these items.

Hypothesis 2: For nonnative speakers, lexical verbs will not facilitate the implicit processing of figurative meanings of adjacent phrasal verbs.

Hypotheses 2 was not supported by the results of the present study. These results indicate that despite being proficient in English, the nonnative group demonstrated difficulties to grasp semantic aspects of phrasal verbs. In addition to that, verb length and verb frequency were important factors during the implicit processing of targets. Nonnative speakers of English might have processed implicit figurative meanings of adjacent phrasal verbs as literal language as stated by Cieślicka (2006).

In conclusion, native and nonnative speakers of English responded to figurative phrasal verbs in a similar manner. All participants implicitly processed phrasal verbs as literal language and were affected by length and frequency effect. Taken together, these results do not point to a representation and processing of phrasal verbs as a whole unit.

The next chapter will present the concluding remarks of this dissertation.

10 CONCLUDING REMARKS

The general objective of this chapter is to outline the main findings of this dissertation. The dissertation reports three studies that investigated online processing of phrasal verbs and idioms in nonnative (native speakers of Brazilian Portuguese) and native speakers of English. More specifically, a self-paced reading task and a masked semantic priming task were utilized to record response times of L1 and L2 participants.

The chapter is organized in three sections. Section 10.1 summarizes the major findings of Study I reported in Chapter 7, Study II reported in Chapter 8, and Study III reported in Chapter 9. Section 10.2 points out limitations of this study and offers further suggestions for future research. Section 10.3 outlines pedagogical implications for L2 processing and learning.

10.1 MAIN FINDINGS

The general aim of this dissertation was to investigate how nonnative and native speakers of English process phrasal verbs and idioms. Three studies were carried out:

The main objective of Study I was 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 by means of a self-paced reading task.

Study II draws heavily on Carrol *et al.* (2016) and investigates idioms in three categories: English-only idioms (L2), Portuguese-only idioms (L1) and congruent idioms (same words and meanings in both languages) by means of a self-paced reading task. The main objective of Study II was to investigate how speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English process idioms in comparison to novel (literal) phrases.

The main objective of Study III was to investigate, by means of a masked semantic priming task, whether speakers of English as L2 (native speakers of Brazilian Portuguese) and native speakers of English are sensitive to the implicit processing of figurative meanings of adjacent phrasal verbs facilitated by the corresponding meaning of one-word verbs.

In light of these objectives, a summary of the major findings of the three studies is outlined next.

Finding 1. One-word verbs were processed faster than phrasal verbs by nonnative and native speakers of English.

Results of Study I show that nonnative and native speakers of English processed lexical verbs faster than phrasal verbs. Comparing phrasal verbs to one-word verbs demonstrated that results of Study I are consistent with Siyanova-Chanturia and Schmitt (2007). It seems that the saliency and frequency of these lexical verbs played an important role during the L1 and L2 processing. According to Siyanova-Chanturia and Schmitt (2007, p. 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.

Finding 2. Idioms were processed in a similar manner in comparison to their literal controls by nonnative and native speakers of English.

Results of Study II show that idioms were processed in a similar manner compared to their literal controls by native and nonnative speakers of English. Idioms showed no privileged processing in comparison to their literal controls, and this is in contrast with previous findings in the formulaic language literature (CARROL *et al.*, 2016; TITONE *et al.*, 2015; YAMASHITA; JIANG, 2010). The results are interpreted as evidence that the method employed (self-paced reading) might have contributed to the lack of evidence when participants encountered idioms.

Finding 3. Figurative meanings of adjacent phrasal verbs were not processed as a whole unit by nonnative and native speakers of English.

Results of Study III show that native and nonnative speakers of English showed a smaller priming effect for related primes and unrelated primes in comparison to identity primes. These results are interpreted as evidenced that all participants did not automatically interpret phrasal verbs as figurative language, and this slowed down the recognition of targets. For nonnative speakers of English, the Literal Salience Hypothesis (CIEŚLICKA, 2006) supports this finding and might contribute to the idea that nonnative speakers activate the literal meanings before figurative meanings, that is, the former meaning is already established in the mental lexicon, and it is ready to be accessed by L2 speakers.

In conclusion, the findings of this dissertation provide contributions to phrasal verb and idiom processing in L2, specifically in addressing questions of figurative and literal

meanings. This data supports the idea that literal processing is default, especially for nonnative speakers of English. However, there is still need to make advances in application of methods and models to interpret formulaic language results. In this regard, future research should take into consideration the limitations of studies conducted here. The most important limitations of this dissertation and suggestions for future research are presented next.

10.2 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

This dissertation was originally planned to be conducted in person at the Language and Cognitive Processes Laboratory (LabLing) at the Federal University of Santa Catarina (UFSC). Due to COVID-19, all in person activities were suspended. For this reason, I had to adapt and move all the experiments to the remote mode. The studies carried out have various limitations that further research should take into consideration to pursue new paths that are waiting to be explored.

Limitation 1. Lack of control of participants' attention.

Although Study I and Study II comprised comprehension questions for each experimental sentence, participants' behavior was not controlled enough for this study, considering this was a self-paced reading task. In order to mitigate the lack of attention, it is suggested to incorporate other techniques such as geometric figures to name while they read sentences, besides comprehension questions. In addition to that, future research should include additional pause blocks.

Limitation 2. Proficiency of participants.

All participants of this study took the Exam English, an online test of grammar and vocabulary, which showed they were at an advanced level of proficiency in English. However, future research should use a more precise test to ensure that nonnative participants have a similar level of English proficiency in skills such as listening and writing too. In addition, to examine proficiency effect during the online processing of idioms and phrasal verbs, it would be important to test different levels of English proficiency as pointed out by Carrol *et al.* (2016).

Limitation 3. Item pool.

Due to move research online, the stimuli of Study III were divided into 6 lists, each list contained 81 items - 9 were experimental prime-target pairs (3 related, 3 unrelated, and 3 identity). It means that the participants read only 3 experimental items for each condition. Future research should take into consideration at least 10 experimental items per list in order to verify a condition effect.

Limitation 4. Figurative and Literal posttest assessment in Study I and Study II.

Here, figurative meanings are understood as combinations whose meaning cannot be entirely predicted from their parts. On the other hand, literal meanings possess transparent meanings (RODRIGUEZ-PUENTE, 2019). This binary factor, discussed briefly in the introduction, poses challenges to nonnative speakers and this critically impacted their processing as shown in the results. For this reason, future research should consider employing a literality posttest assessment to identify participants' knowledge of this important characteristic of idioms and phrasal verbs.

Limitation 5. Design differences might account for the mixed results regarding the processing of formulaic language, for instance, idioms and phrasal verbs.

In this research, self-paced reading was employed to investigate the processing of idioms and phrasal verbs. The present results showed no processing advantage for either idioms or phrasal verbs. For this reason, a different technique, for instance, eye-tracking paradigm would allow participants to reread the critical area, and this would show processing differences between idioms and their literal controls. Future research should consider employing a varied presentation modality by presenting idioms and phrasal verbs auditorily and visually to detect semantic activation of these items.

Pedagogical implications are addressed next.

10.3 PEDAGOGICAL IMPLICATIONS

In this dissertation, findings of Study I, II and III support the following pedagogical implications. Concerning the L2 instructional settings, the findings highlight the fact that nonnative speakers of English, Portuguese Brazilian speakers as L1, did not demonstrate

difficulties in integrating figurative meanings during the processing of phrasal verbs and idioms.

Results of Study I show that nonnative speakers spent more time processing phrasal verbs than lexical verbs. Results of Study III show that nonnative speakers did not automatically interpret adjacent phrasal verbs as figurative language. In this sense, the pedagogical implication is that teachers can motivate learners to increase exposure to formulaic language (e.g., figurative phrasal verbs meanings) in different input modalities to consolidate this knowledge as pointed out by Le-Thi *et al.* (2020).

Moreover, results of Study II show that nonnative speakers processed idioms and their literal controls in a similar manner. For instance, here, the pedagogical implication is that teachers can engage learners with particular characteristics of formulaic language connecting their (abstract) idiomatic meaning to a literal interpretation as argued by Pellicer-Sánchez and Boers (2018).

All in all, the limitations and suggestions presented here are directions to future research to discover new insights about formulaic language processing in L2. Although I pointed drawbacks of this research, findings of the studies reported in this dissertation have the potential to offer contributions to fill in some of the gaps in current research on phrasal verbs and idioms processing in L2.

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APPENDIX A

Biographical Questionnaire (Portuguese Version) – Self-Paced Reading Task

Questionário Biografico

Antes de participar do estudo, por favor, preencha o questionário com suas informações pessoais e informações sobre o seu aprendizado de língua inglesa.

Nome completo *

Texto de resposta curta

Idade

Texto de resposta curta

Sexo

- Feminino
- Masculino

Onde você mora? (Cidade/Estado/País)

Texto de resposta curta

Escolaridade

- Ensino médio incompleto
- Ensino médio completo
- Ensino superior incompleto
- Ensino superior completo
- Pós-graduação incompleta
- Pós-graduação completa

Você tem formação em Linguística ou áreas afins?

- Sim
- Não

Ocupação atual

Texto de resposta curta

Qual é a sua língua materna?

Texto de resposta curta

Quais são as línguas que você fala além da sua língua materna?

Texto de resposta curta

Em qual das línguas adicionais você tem maior fluência?

Texto de resposta curta

Com que idade você começou a aprender inglês?

Texto de resposta curta

Em que contexto você aprendeu inglês? Marque quantas forem adequadas a sua realidade.

- [ ] Em escolas de idiomas
- [ ] Na escola
- [ ] Em casa
- [ ] No país em que a língua é falada como língua nativa
- [ ] Outros…

Caso você tenha estudado inglês em escola de idiomas, indique por quanto tempo.

- ◯ até 6 meses
- ◯ até 1 ano
- ◯ até 2 anos
- ◯ Mais de 2 anos

Atualmente você estuda inglês em escola de idiomas?

- ◯ Sim
- ◯ Não

Com que frequência você usa o inglês?

- ◯ O tempo todo
- ◯ Quase o tempo todo
- ◯ Em certas ocasiões
- ◯ Raramente
- ◯ Nunca

Quais são as atividades em inglês mais frequentes no seu dia a dia? Marque quantas forem adequadas a sua realidade.

- [ ] Leituras no trabalho
- [ ] Pesquisas
- [ ] Assistir filmes, ouvir músicas, jogar video game
- [ ] Leituras de lazer
- [ ] Conversar com amigos e família
- [ ] Outros...

Você possui contato com falantes nativos de inglês?

- ( ) Sim
- ( ) Não

Você já esteve em algum país de língua inglesa?

- ( ) Sim
- ( ) Não

Se sim, por quanto tempo?

- ( ) Menos de 2 meses
- ( ) Entre 2 meses a 6 meses
- ( ) De 7 meses a 2 anos
- ( ) Mais de 2 anos

Como você avalia o seu conhecimento da língua inglesa?

- ( ) Básico
- ( ) Intermediário
- ( ) Avançado

Possui histórico diagnosticado de distúrbios cognitivos ou desordens neurológicas?

- ( ) Sim
- ( ) Não

Se sim, qual ou quais?

Texto de resposta longa

APPENDIX B

Biographical Questionnaire (English Version) – Self-Paced Reading Task

Biographical Questionnaire

Before taking part of the study, please fill out the questionnaire with your personal and L2 learning information:

What is your full name? *

Texto de resposta curta

Your age

Texto de resposta curta

Your sex

- Female
- Male
- Outros...

Where are you from? (country/city)

Texto de resposta curta

What is the highest degree you obtained or you are currently working towards?

- PhD
- Master
- Bachelor
- High School
- Primary School

Do you have a degree in Linguistics or related areas?

- Yes, I do.
- No, I don't.

Current occupation

Texto de resposta curta

What is your mother tongue?

Texto de resposta curta

How many more languages do you speak besides your mother tongue?

Texto de resposta curta

Which of the additional languages do you speak best?

Texto de resposta curta

Have you ever been to Brazil?

Texto de resposta curta

If yes, how good is your knowledge of Portuguese? (Brazilian Portuguese)

- ◯ I know a few words.
- ◯ I can have a simple conversation.
- ◯ I can read a simple book.
- ◯ I can read and speak the language fluently.

Have you been diagnosed with neurocognitive disorders?

- ◯ Yes, I have.
- ◯ No, I haven't.

If yes, which one?

Texto de resposta curta

APPENDIX C

Meanings of Phrasal Verbs

FIGURATIVE AND LITERAL PHRASAL VERBS[28]			
Phrasal Verb	**Figurative Meaning**	**Phrasal verb**	**Literal Meaning**
Break down	Lose control of one's emotions and yield to tears or distress	Break down	Separate apart from a larger piece
Bring in	Ask somebody to do a particular job or task	Bring in	Bring something to a place
Clean up	Make something free from dangerous, unacceptable, or controversial activities or contents	Clean up	Get rid of dirt or mess
Come along	Appear or arrive; come into existence	Come along	Go somewhere with somebody
Come in	Become involved in a situation	Come in	Enter a place or area (room, building)
Come out	Become known or revealed after being kept secret	Come out	Leave a place (room, building, container) or appear from it
Cut off	Interrupt somebody as they are speaking	Cut off	Remove a part of something by cutting it
Give out	Make known openly or publicly; reveal	Give out	Give to each of a large number of people; distribute
Go up	Become higher in value; increase	Go up	Move upward, or from a lower spatial location to a higher one
Hand over	Surrender control or responsibility for something/somebody to somebody else, especially officially	Hand over	Give something to somebody by holding it in one's hand and offering it to them
Look back	Think of something again, reconsider something past	Look back	Look at something/somebody again after having momentarily looked elsewhere

[28] Garnier & Schmitt (2016, p. 38-39)

Look out	Take care of somebody and make sure they are well; protect somebody's interests	Look out	Look outside or at the horizon
Move up	Move to a better position; advance to a higher level/rank	Move up	Move upward, from a lower spatial location to a higher one
Pull back	Withdraw or retreat from an activity or location, especially military	Pull back	Move backwards or make somebody/something move backwards
Reach out	Make an effort to address or communicate with somebody, so as to help them or involve them in something	Reach out	Stretch an arm to hold, touch or get something that is within short distance
Sit back	Deliberately take no action/remain passive about something	Sit back	Rest in a comfortable position against the back of a seat
Take back	Regain possession or control over something	Take back	Take something/somebody to a place they were in before
Take out	Invite to recreational place or social event	Take out	Remove or extract something from a container
Turn around	Make something become better or more successful than it previously was (economy, business)	Turn around	Move so as to face in the opposite direction
Turn over	Surrender possession or control to somebody/something (especially in authority)	Turn over	Change position so that the other side is facing towards the outside or the top, or another direction

APPENDIX D

An overview of the frequency of figurative phrasal verbs, literal phrasal verbs, and their matching lexical verbs

CODE	AOI	FREQUENCY	CODE	AOI	FREQUENCY
FPV	Broke down	1536	LV	Erupted	3704
LV	Split	12179	LPV	Broke down	1185
FPV	Brought in	2492	LV	Requested	1918
LV	Took	217603	LPV	Brought in	4248
FPV	Cleaned up	1827	LV	Cleared	5717
LV	Cleaned	2777	LPV	Cleaned up	6147
FPV	Came along	3969	LV	Arrived	26891
LV	Went	229662	LPV	Came along	1122
FPV	Came in	4257	LV	Joined	21330
LV	Attended	17061	LPV	Came in	19765
FPV	Came out	4929	LV	Became	109652
LV	Came	379164	LPV	Came out	13874
FPV	Cut off	1848	LV	Stopped	57088
LV	Cut	101499	LPV	Cut off	2036
FPV	Gave out	1013	LV	Leaked	2707
LV	Shared	11249	LPV	Gave out	1209
FPV	Went up	9424	LV	Raised	52392
LV	Reached	55908	LPV	Went up	4067
FPV	Handed over	1245	LV	Gave	110382
LV	Handed	11579	LPV	Handed over	1755
LV	Relived	197	FPV	Looked back	7551
LPV	Looked back	4576	LV	Spotted	8096
LV	Cared	8062	FPV	Looked out	3282
LPV	Looked out	6499	LV	Gazed	4090
LV	Improved	2803	FPV	Moved up	2101
LPV	Moved up	1005	LV	Moved	82135
LV	Pulled	54104	FPV	Pulled back	1756
LPV	Pulled back	3767	LV	Withdrew	3948
LV	Approached	10891	FPV	Reached out	3903
LPV	Reached out	4792	LV	Stretched	6174
LV	Rested	3061	FPV	Sat back	1376
LPV	Sit back	2671	LV	Rested	3061
LV	Regained	1194	FPV	Took back	2160
LPV	Took back	3224	LV	Replaced	5015
LV	Invited	7699	FPV	Took out	1920
LPV	Took out	7182	LV	Lifted	12114
LV	Managed	14811	FPV	Turned around	2793
LPV	Turned around	7696	LV	Spun	5331
LV	Surrendered	1214	FPV	Turned over	3709
LPV	Turned over	2119	LV	Flipped	4897

APPENDIX E

Acceptability Test of Phrasal Verbs

Acceptability Test

Hi!
Welcome to the Acceptability Test.

In this task, you will be asked to judge whether individual sentences sound acceptable or not to you, according to the actual use of the language. You need to answer the test intuitively. There is no right or wrong answer. Use the scale to register your answer. You must choose from 1 to 5 which number better represents your opinion concerning each sentence.

Follow this interpretation of the scale:
1-Totally unacceptable. No one would say that!
2- Slightly unacceptable. There are better ways to say that!
3- Slightly acceptable. The sentence is acceptable, but there are better ways to say that!
4- Acceptable. This sentence sounds natural!
5- Perfectly acceptable. Everybody would say that!

Below each sentence, there will be a blank space in case you want to leave comments or suggestions to improve the sentence structure.

Thank you for your participation!

I heard that the actress broke down in tears after her acceptance speech. *

- ( ) 1 - Totally unaceptable. No one would say that!
- ( ) 2 - Slightly unacceptable. There are better ways to say that!
- ( ) 3 - Slightly acceptable. The sentence is acceptable, but there are better ways to say that!
- ( ) 4 - Acceptable. This sentence sounds natural!
- ( ) 5 - Perfectly acceptable. Everybody would say that!

Leave a comment or suggestion below.

Texto de resposta longa

I heard that the company requested the expert to investigate the accident. *

- ( ) 1 - Totally unacceptable. No one would say that!
- ( ) 2 - Slightly unacceptable. There are better ways to say that!
- ( ) 3 - Slightly acceptable. The sentence is acceptable, but there are better ways to say that!
- ( ) 4 - Acceptable. This sentence sounds natural!
- ( ) 5 - Perfectly acceptable. Everybody would say that!

Leave a comment or suggestion below.

Texto de resposta longa

APPENDIX F

Experimental Sentences of Figurative and Literal Phrasal Verbs

SENTENCE	COMPREHENSION QUESTION	ANSWER
1. I heard that the actress broke down in tears after her acceptance speech.	Did the actress break down in tears after her acceptance speech?	**Yes**
2. I heard that the actress split the table into three small pieces.	Did the actress split the table into five small pieces?	**No**
3. I heard that the manager brought in an expert to investigate the accident.	Did the manager bring in an expert to investigate the accident?	**Yes**
4. I heard that the manager took the machine from the wet pavement.	Did the manager take the machine from the dry pavement?	**No**
5. I heard that the people cleaned up the office of the financial committee.	Did the people clean up the office of the financial committee?	**Yes**
6. I heard that the people cleaned the beach of all plastic waste.	Did the people clean the park of all plastic waste?	**No**
7. I heard that the player came along in time for the soccer finals.	Did the player come along in time for the soccer finals?	**Yes**
8. I heard that the player went to the soccer finals with his wife.	Did the player go to the soccer finals with his son?	**No**
9. I heard that the students came in on public service and volunteer programs.	Did the students come in on public service and volunteer programs?	**Yes**
10. I heard that the students attended the specific classes and weekly seminars.	Did the students attend the specific classes and monthly seminars?	**No**
11. I heard that the artists came out as stars when they were kids.	Did the artists come out as stars when they were kids?	**Yes**
12. I heard that the artists came from seats on the left side.	Did the artists come from seats on the right side?	**No**
13. I heard that the teacher cut off the parent with a harsh word.	Did the teacher cut off the parent with a harsh word?	**Yes**
14. I heard that the teacher cut the tags of the children's t-shirts.	Did the teacher cut the tags of the children's coats?	**No**
15. I heard that the director gave out the secret of his favorite recipe.	Did the director give out the secret of his favorite recipe?	**Yes**
16. I heard that the director shared some flyers inside of the embassy.	Did the director share some flyers inside of the classroom?	**No**

17. I heard that the climbers went up the bar in this major competition.	Did the climbers go up the bar in this major competition?	**Yes**
18. I heard that the climbers reached the peak of the highest mountain.	Did the climbers reach the top of the volcano?	**No**
19. I heard that the authors handed over the case to their new lawyer.	Did the authors hand over the case to their new lawyer?	**Yes**
20. I heard that the authors handed a book to their biggest fan.	Did the authors hand a book to their families?	**No**
21. I heard that the children relived the final moments of the crash.	Did the children relive the final moments of the crash?	**Yes**
22. I heard that the children looked back at weird toys and cried desperately.	Did the children look back at weird toys and smile?	**No**
23. I heard that the volunteer cared for pets like they were family.	Did the volunteer care for pets like they were family?	**Yes**
24. I heard that the volunteer looked out in wonder at the big lake.	Did the volunteer look out in wonder at the small lake?	**No**
25. I heard that the marines improved in rank and their pay increased.	Did the marines improve in rank and their pay increase?	**Yes**
26. I heard that the marines moved up the troops to the enemy lines.	Did the politicians move up the troops to the enemy lines?	**No**
27. I heard that the leaders pulled the people from the conflict zone.	Did the leaders pull back the people from the conflict zone?	**Yes**
28. I heard that the leaders pulled back a flag from their angry enemies.	Did the police pull the people from the conflict zone?	**No**
29. I heard that the athletes approached with care to get some support.	Did the athletes approach with care to get some support?	**Yes**
30. I heard that the athletes reached out their legs during the new training.	Did the athletes reach out their arms during the new training?	**No**
31. I heard that the families rested and watched the situation get worse.	Did the families rest and watch the situation get worse?	**Yes**
32. I heard that the families sat back and watched their favorite TV show.	Did the teenagers sit back and watch their favorite TV show?	**No**
33. I heard that the speaker regained the Senate after the final election.	Did the speaker regain the Senate after the final election?	**Yes**
34. I heard that the speaker took back a novel to the old library.	Did the speaker take back a novel to the new library?	**No**

35. I heard that the mother invited her father to a new restaurant.	Did the mother invite her father to a new restaurant?	**Yes**
36. I heard that the mother took out some coins from her torn pocket.	Did the mother take out some coins from her torn bag?	**No**
37. I heard that the minister managed the health crisis with great efficiency.	Did the minister manage the health crisis with great efficiency?	**Yes**
38. I heard that the minister turned around his chair at the important meeting.	Did the minister turn around his chair at the important competition?	**No**
39. I heard that the officer surrendered the rebel to the prison guard.	Did the officer surrender the rebel to the prison guard?	**Yes**
40. I heard that the officer turned over his pancake in the frying pan.	Did the officer turn over his pancake in the saucepan?	**No**
41. I heard that the actress erupted in tears after her acceptance speech.	Did the actress erupt in tears after her presentation?	**No**
42. I heard that the actress broke down the table into three small pieces.	Did the actress break down the table into three small pieces?	**Yes**
43. I heard that the manager requested an expert to investigate the accident.	Did the teenager request an expert to investigate the accident?	**No**
44. I heard that the manager brought in the machine from the wet pavement.	Did the manager bring in the machine from the wet pavement?	**Yes**
45. I heard that the people cleared the office of the financial committee.	Did the people clear the classroom of the financial committee?	**No**
46. I heard that the people cleaned up the beach of all plastic waste.	Did the people clean up the beach of all plastic waste?	**Yes**
47. I heard that the player arrived in time for the soccer finals.	Did the player arrive in time for the volleyball game?	**No**
48. I heard that the player came along to the soccer finals with his wife.	Did the player come along to the soccer finals with his wife?	**Yes**
49. I heard that the students joined the public service and volunteer programs.	Did the students join the private service and new programs?	**No**
50. I heard that the students came in for specific classes and weekly seminars.	Did the students come in for specific classes and weekly seminars?	**Yes**
51. I heard that the artists became the stars when they were kids.	Did the artists become the stars when they were teenagers?	**No**
52. I heard that the artists came out from seats on the left side.	Did the artists come out from seats on the left side?	**Yes**

53. I heard that the teacher stopped the parent with a harsh word.	Did the teacher stop the parent with a kind word?	**No**
54. I heard that the teacher cut off the tags of the children's t-shirts.	Did the teacher cut off the tags of the children's t-shirts?	**Yes**
55. I heard that the director leaked the secret of his favorite recipe.	Did the director leak the secret of his research method?	**No**
56. I heard that the director gave out some flyers inside of the embassy.	Did the director give out some flyers inside of the embassy?	**Yes**
57. I heard that the climbers raised the bar in this major competition.	Did the climbers raise the bar in this insignificant competition?	**No**
58. I heard that the climbers went up the peak of the highest mountain.	Did the climbers go up the peak of the highest mountain?	**Yes**
59. I heard that the authors gave the case to their new lawyer.	Did the authors give the case to their old lawyer?	**No**
60. I heard that the authors handed over a book to their biggest fan.	Did the authors hand over a book to their biggest fan?	**Yes**
61. I heard that the children looked back at final moments of the crash.	Did the pilot look back at final moments of the crash?	**No**
62. I heard that the children spotted the weird toys and cried desperately.	Did the children spot the weird toys and cry desperately?	**Yes**
63. I heard that the volunteer looked out for pets like they were family.	Did the volunteer look out for pets like they were enemies?	**No**
64. I heard that the volunteer gazed in wonder at the big lake.	Did the volunteer gaze in wonder at the big lake?	**Yes**
65. I heard that the marines moved up in rank and their pay increased.	Did the politicians move up in rank and their pay increase?	**No**
66. I heard that the marines moved the troops to the enemy lines.	Did the marines move the troops to the enemy lines?	**Yes**
67. I heard that the leaders pulled back the people from the conflict zone.	Did the police pull back the people from the conflict zone?	**No**
68. I heard that the leaders withdrew a flag from their angry enemies.	Did the leaders withdraw a flag from their angry enemies?	**Yes**
69. I heard that the athletes reached out with care to get some support.	Did the teenagers reach out with care to get some support?	**No**
70. I heard that the athletes stretched their legs during the new training.	Did the athletes stretch their legs during the new training?	**Yes**

71. I heard that the families sat back and watched the situation get worse.	Did the families sit back and watch the situation get better?	**No**
72. I heard that the families rested and watched their favorite TV show.	Did the families rest and watch their favorite TV show?	**Yes**
73. I heard that the speaker took back the Senate after the final election.	Did the artist take back the Senate after the final election?	**No**
74. I heard that the speaker replaced a novel at the old library.	Did the speaker replace a novel at the old library?	**Yes**
75. I heard that the mother took out her father to a new restaurant.	Did the mother take out her father to a new bookstore?	**No**
76. I heard that the mother lifted some coins from her torn pocket.	Did the mother lift some coins from her torn pocket?	**Yes**
77. I heard that the minister turned around the health crisis with great efficiency.	Did the minister turn around the health crisis with lack of capability?	**No**
78. I heard that the minister spun his chair at the important meeting.	Did the minister spin his chair at the important meeting?	**Yes**
79. I heard that the officer turned over the rebel to the prison guard.	Did the actor turn over the rebel to the prison guard?	**No**
80. I heard that the officer flipped his pancake in the frying pan.	Did the officer flip his pancake in the frying pan?	**Yes**

APPENDIX G

Free and Informed Consent Form (Portuguese Version) – Self Paced Reading Task

Termo de Consentimento Livre e Esclarecido

Projeto de Pesquisa: uma investigação psicolinguística sobre o processamento de construções fraseológicas em inglês como L2

Caro (a) Participante,
Eu, Danielle dos Santos Wisintainer, aluna de doutorado do Programa de Pós-Graduação em Inglês: Estudos Linguísticos e Literários da Universidade Federal de Santa Catarina, orientada pela Professora Dra. Mailce Borges Mota, tenho como objetivo desenvolver um estudo sobre o processamento de frases em língua inglesa.

Gostaria de convidá-lo(a) a participar desta pesquisa, que busca investigar como processamos construções fraseológicas em inglês. Os estudos nessa área visam não só compreender o processamento de uma língua estrangeira (LE), mas também desenvolver meios de aperfeiçoar o ensino e aprendizagem da LE.

Se você concordar em participar deste estudo, você será solicitado(a) a preencher um questionário; a fazer um teste de proficiência em inglês; e por último a realizar uma tarefa de leitura auto-monitorada, todos online. São tarefas de natureza exclusivamente científica e sua identidade será totalmente preservada. Você preencherá o questionário com alguns dados pessoais (por exemplo, idade, sexo, etc.) e fornecerá informações sobre o seu aprendizado de inglês como L2. Não será necessário informar seu nome ou qualquer outro dado que possa levar a sua identificação. Você realizará um teste de proficiência para identificar o seu nível de conhecimento de gramática e vocabulário da língua inglesa. A tarefa de leitura auto-monitorada é uma tarefa de leitura de sentenças que apresentará construções fraseológicas em inglês. Nesta tarefa, as sentenças serão divididas em segmentos e será apresentado um segmento por vez. Para passar para o segmento seguinte, você deve pressionar a barra de espaços. Ao finalizar a leitura da sentença, você responderá a uma pergunta de compreensão. Esta tarefa terá duração de 30 minutos. A sua participação neste estudo contribuirá para a pesquisa sobre a aquisição/ensino de línguas estrangeiras.

Em decorrência da participação nesta pesquisa, você pode estar exposto(a) a eventuais riscos, mesmo que baixos, tais como nervosismo, constrangimento, cansaço ou aborrecimento inerentes a qualquer situação de avaliação. Para minimizar a possibilidade destes sentimentos expostos acima e atenuar possível desgaste físico e/ou psicológico, o experimento será dividido em blocos curtos. Recomendamos que você realize o experimento em um lugar que ofereça condições confortáveis, referentes à iluminação, temperatura e ao posicionamento adequado do monitor do computador de acordo com a sua altura.

De acordo com a legislação brasileira, sua participação é absolutamente voluntária e não remunerada. Os pesquisadores estarão à disposição para esclarecimentos, antes, durante e depois da pesquisa. Você tem assegurada a liberdade de desistir de participar a qualquer momento do estudo, sem nenhuma penalização. Você poderá ter acesso ao registro de consentimento sempre que solicitado. Caso a sua participação nessa pesquisa lhe traga alguma despesa, você tem direito a ressarcimento. Caso venha sofrer qualquer prejuízo, material ou imaterial, comprovadamente decorrente de sua participação nesta pesquisa, você será indenizado de acordo com a legislação vigente.

Os dados obtidos neste estudo serão mantidos em sigilo e serão armazenados no repositório do LabLing. Os dados serão acessados apenas pelas pesquisadoras responsáveis através de senha pessoal. Os resultados desta pesquisa serão divulgados em eventos ou publicações científicas sem qualquer identificação dos participantes. Você pode ter acesso aos resultados da pesquisa a qualquer momento entrando em contato com os pesquisadores.

Os procedimentos metodológicos adotados obedecem aos preceitos éticos implicados em pesquisas envolvendo seres humanos, conforme normatizado pela Resolução do Conselho Nacional de Saúde nº 510 de 07 de abril de 2016, que dispõe sobre as normas aplicáveis a pesquisas em Ciências Humanas e Sociais. As pesquisadoras também aderem a esse documento e comprometem-se a conduzir a pesquisa de acordo com o que preconiza a referida Resolução. Você poderá solicitar sua via deste Termo de Consentimento Livre e Esclarecido pelo e-mail wisintainer.ds@gmail.com.

Contatos. Tendo qualquer dúvida sobre a pesquisa, você pode entrar em contato com Danielle dos Santos Wisintainer, pelo e-mail wisintainer.ds@gmail.com ou pelo telefone (48) 99998-0156, ou com a Professora Dra. Mailce Borges Mota através do e-mail mailce.mota@ufsc.br.

Comitê de Ética em Pesquisa (CEP). A pesquisa, da qual faz parte esse questionário, foi avaliada e aprovada pelo Comitê de Ética em Pesquisa com Seres Humanos (CEPSH) da UFSC. O CEPSH é um órgão colegiado interdisciplinar, deliberativo, consultivo e educativo, vinculado à Universidade Federal de Santa Catarina, mas independente na tomada de decisões, criado para defender os interesses dos participantes da pesquisa em sua integridade e dignidade e para contribuir no desenvolvimento da pesquisa dentro de padrões éticos. Caso você tenha alguma dúvida ou reclamação quanto à condução ética dessa pesquisa, você pode entrar em contato com o CEPSH – UFSC. Endereço: Prédio da Reitoria II, 4º andar, sala 401, Rua Desembargador Vitor Lima, nº222, Trindade, CEP 88040-400, Florianópolis-SC. Telefone: (48) 3721-6094. E-mail: cep.propesq@contato.ufsc.br.

Por favor escolha uma das opções *

- ◯ **Declaro que sou maior de 18 anos e que li e compreendi as informações do Termo de Consentiment ...**
- ◯ **Não aceito participar da pesquisa.**

APPENDIX H

Free and Informed Consent Form (English Version) – Self-Paced Reading Task

Free and Informed Consent Form

Research project: a psycholinguistic investigation on formulaic language processing in L2 English

Dear participant,
I am Danielle dos Santos Wisintainer, a PhD candidate at the Graduate Program in English supervised by Professor Dr. Mailce Borges Mota at the Federal University of Santa Catarina. My objective is to develop a study on the processing of sentences in English.

I would like to invite you to participate in my study. The study investigates the processing of formulaic language in English. Studies in this area are intended not only to understand the processing of a foreign language (FL), but also to develop ways to improve the teaching and learning of an FL.

If you agree to participate in this study, you will be asked to fill out a questionnaire; and to perform a self-paced reading task. All tasks are online. They are scientific experiments and your identity will be totally preserved. You will fill out the questionnaire with personal data (for example, age, sex, etc.) and provide information about your L2 learning. It will not be necessary to provide your name or any other information that may lead to your identification. The self-paced reading task is a sentence reading task that will present formulaic language in English. In this task, the sentences will be divided into phrases and it will be presented phrase-by-phrase. In order to read each phrase, you should press the space bar. When you finish to read the sentence, you will answer a yes/no comprehension question. This task will last 30 minutes. Your participation in this study will contribute to research on the acquisition/teaching of foreign languages.
Your participation in the present research may expose you to low risks, such as, nervousness, embarrassment, tiredness and boredom, feelings that are inherent to any testing situation. In order to minimize these feelings that the experiments may cause, the experiments will be divided into short blocks. We recommend that you perform the experiment in a place that offers comfortable conditions regarding lighting, temperature, and proper positioning of the computer monitor according to your height.

Your participation is voluntary and unpaid, as required by the Brazilian law. My supervisor and I will remain at your disposal for any further clarifications, before, during and after the research. You can give up participating in the study at any time, with no penalty. You may have access to the consent form whenever you request it. If you have any financial costs regarding your participation in this research, you are entitled to financial compensation. If you suffer any loss or injury, material or immaterial, regarding your participation in this study, you may request indemnity, according to current legislation.

The data obtained in this study will be kept confidential and will be stored in the LabLing repository. The data will be accessed only by the researchers in charge of the study, through a personal password. The results of this research will be presented in conferences or published as scientific papers without any identification of the participants. You can access the research results at any time by contacting the researchers.

The methodological procedures adopted obey the ethical precepts related to research involving human beings, as determined by Resolution no. 510 of April 7, 2016 released by the National Council of Health. The Resolution provides the norms applicable to research in Humanities and Social Sciences. You may request this Free and Informed Consent Form by wisintainer.ds@gmail.com.

Contacts. If you have any questions about the research, you may contact Danielle dos Santos Wisintainer at wisintainer.ds@gmail.com or (48) 99998-0156, or Professor Mailce Borges Mota at mailce.mota@ufsc.br.

Committee for Ethics in Research with Human Beings (CEPSH). The present study was assessed and approved by the CEPSH at UFSC. CEPSH is an interdisciplinary, deliberating, consultative and educational collegiate body, connected to the UFSC, but independent in decision making, created to defend the interests of research participants in their integrity and dignity and to contribute to the development of research within ethical standards. If you have any questions or concerns regarding the ethical aspects of this research, you may contact CEPSH - UFSC. Address: Prédio da Reitoria II, 4th floor, room 401, Desembargador Vitor Lima Street, n.222, Trindade, CEP 88040-400, Florianópolis-SC. Phone: (48) 3721-6094. E-mail: cep.propesq@contato.ufsc.br.

Please, choose from one of the options below: *

- ○ **I declare that I am over 18 years old and that I read the information this Free and Informed Consen ...**
- ○ **I don't agree to participate in this study.**

APPENDIX I

Familiarity Test of Portuguese Idioms

Teste de Familiaridade

Olá! Seja bem-vindo(a) ao teste de familiaridade.

Neste teste, Você será convidado a escolher o significado de expressões idiomáticas em português brasileiro de acordo com o uso que você faz delas e pelo seu conhecimento. Você precisa responder intuitivamente, não há necessidade de pesquisa externa.
Há quatro opções para responder, você deverá escolher apenas uma opção. Caso você não conheça o significado, escolha a opção "não conheço essa expressão".

Muito obrigada pela participação!

Descascar um abacaxi. *

- ○ Resolver um problema de solução difícil.
- ○ Contrariar um amigo.
- ○ Comer uma fruta.
- ○ Não conheço essa expressão.

Engolir um sapo. *

- ○ Engolir um alimento a seco.
- ○ Aceitar um presente.
- ○ Aceitar uma ofensa sem reagir.
- ○ Não conheço essa expressão.

Levar uma alfinetada. *

- ○ Ser ironicamente criticado.
- ○ Tomar uma injeção.
- ○ Ser picado por um inseto.
- ○ Não conheço essa expressão.

APPENDIX J

Familiarity Test of English Idioms

Teste de Familiaridade

Olá! Seja bem-vindo(a) ao teste de familiaridade.

Neste teste, Você será convidado a julgar expressões idiomáticas em inglês de acordo com o uso que você faz delas e pelo seu conhecimento. Você precisa responder intuitivamente, não há necessidade de pesquisa externa.
Use como critério de julgamento a escala de 1 ao 5. Sendo:
1 - Nunca ouvi esta expressão.
2 - Já ouvi, mas não sei o significado.
3 - Já ouvi, mas tenho dúvidas do significado.
4 - Conheço o significado.
5 - Conheço o significado e utilizo a expressão.

Muito obrigada pela participação!

Bite the bullet *

- ◯ 1 - Nunca ouvi esta expressão.
- ◯ 2 - Já ouvi, mas não sei o significado.
- ◯ 3 - Já ouvi, mas tenho dúvidas do significado.
- ◯ 4 - Conheço o significado.
- ◯ 5 - Conheço o significado e utilizo a expressão.

Leave comments or suggestions below.

Texto de resposta longa

Blow a fuse *

- ◯ 1 - Nunca ouvi esta expressão.
- ◯ 2 - Já ouvi, mas não sei o significado.
- ◯ 3 - Já ouvi, mas tenho dúvidas do significado.
- ◯ 4 - Conheço o significado.
- ◯ 5 - Conheço o significado e utilizo a expressão.

Leave comments or suggestions below.

Texto de resposta longa

Break the bank *

- ◯ 1 - Nunca ouvi esta expressão.
- ◯ 2 - Já ouvi, mas não sei o significado.
- ◯ 3 - Já ouvi, mas tenho dúvidas do significado.
- ◯ 4 - Conheço o significado.
- ◯ 5 - Conheço o significado e utilizo a expressão.

Leave comments or suggestions below.

Texto de resposta longa

APPENDIX K

Meanings of Idioms

ENGLISH-ONLY IDIOMS[29,30,31]	
Idiom	**Meanings**
drop the ball	Make a mistake; mishandle things.
hit the roof	To become extremely angry.
hold your horses	Wait a moment; restrain your enthusiasm.
lose his marbles	Become insane or irrational.
mark his words	Used to tell someone to listen to and remember what one is saying.
cover your tracks	Conceal evidence of what you have done.
pick your brains	Question someone who is better informed about a subject than yourself in order to obtain information.
pop the question	Propose marriage.
pull your leg	Deceive someone playfully; tease someone.
spill the beans	Reveal secret information, especially unintentionally or indiscreetly.
stand his ground	To refuse to be pushed backwards, or to continue in your beliefs in an argument.
take your pick	Choose any one you want.
turn the tables	Reverse your position relative to someone else, especially by turning a position of disadvantage into one of advantage.
waste your breath	Talk or give advice without effect.
watch your step	Be careful.
meet his match	Encounter your equal in strength or ability.
eat your words	Retract what you have said, especially when forced to do so.
burn his bridges	Commit yourself irrevocably.
change her tune	Express a very different opinion or behave in a very different way, usually in response to a change in circumstances.

[29] Oxford Dictionary of Idioms (2004).
[30] Cambridge Dictionary Online: https://dictionary.cambridge.org/
[31] Merriam-Webster Dictionary Online: https://www.merriam-webster.com/

clear the air	Defuse or clarify an angry, tense, or confused situation by frank discussion.
pick a fight	To intentionally start a fight.
follow your nose	Trust to your instincts.
get the picture	Understand a situation.
hit the bottle	Start to drink alcohol heavily, especially in an attempt to escape from one's problems.
pack your bags	Put your belongings in a bag or suitcase in preparation for your imminent departure.
pull the plug	Prevent something from happening or continuing; put a stop to something.
push his buttons	Be successful in arousing or provoking a reaction in someone.
scratch his head	Think hard in order to find a solution to something.
take the cake	Be the most remarkable.
take the floor	Speak in a debate or assembly.

CONGRUENT IDIOMS[32,33,34]

Idiom	**Meanings**
hold the fort	Take responsibility for a situation while someone is absent.
kick the bucket	Die.
keep her head	Remain calm.
lose his head	Fail to remain calm.
use your head	Used to tell someone in a slightly angry way to think more carefully about what they are doing.
call the shots	Take the initiative in deciding how something should be done; be in control.
pick my pocket	To steal small objects, especially money from someone's pockets or bag.
break the ice	Do or say something to relive tension or get conversation started at the start of a party or when people meet for the first time.
hit the road	Set out on a journey; depart.
play with fire	Take foolish risks.
pay the price	To experience the bad result of something you have done.

[32] Oxford Dictionary of Idioms (2004).
[33] Cambridge Dictionary Online: https://dictionary.cambridge.org/
[34] Merriam-Webster Dictionary Online: https://www.merriam-webster.com/

reinvent the wheel	Waste a great deal of time or effort in creating something that already exists or doing something that has already been done.
lift a finger	Make the slightest effort to do something, especially to help someone.
cross your fingers	Hope that your plans will be successful; trust in good luck.
cut your losses	Abandon an enterprise or course of action that is clearly going to be unprofitable or unsuccessful before you suffer to much loss or harm.
make a scene	To behave in a loud, angry way in public.
risk his neck	To do something that puts one in danger of serious injury or death.
save the day	Find or provide a solution to a difficulty or disaster.
bite his tongue	Make a desperate effort to avoid saying something.
keep the peace	Refrain or prevent others from disturbing civil order.
learn his lesson	To understand something because of unpleasant experience, especially when this means you will not it again.
pass the time	To do something to keep busy while waiting.
show my face	To appear somewhere when you are not expected to because you have done something bad.
steal the show	Attract the most attention and praise.
stretch my legs	Go for a short walk, typically after sitting in one place for some time.
swallow your pride	To decide to do something although it will make you feel embarrassed or ashamed.
take a joke	To laugh when someone says something funny about you and not be offended.
tighten your belt	Cut your expenditure; live more frugally.
try your luck	Do something that involves risk or luck; hoping to succeed.
watch the clock	Wait eagerly for the end of working hours.
PORTUGUESE-ONLY IDIOMS[35]	
Idiom	**Meanings**
peel a pineapple - “descascar um abacaxi”	To solve a difficult problem.
swallow a frog - “engolir um sapo”	To be insulted without reacting.

[35] Urbano (2018)

take a pin - “levar uma alfinetada”	To be ironically criticized.
flap wings - “bater as asas”	To escape from someone or something.
throw a ball - “dar um baile”	To be the best at what you do, mainly in competitions.
give a banana - “dar uma banana”	It is an offensive gesture; the right arm bend with hand closed.
turn a coat - “virar a casaca”	To change opinion, especially in a political situation.
sink the boat - “afundar o barco”	To destroy something; to ruin business.
alleviate the rod - “aliviar a barra”	To calm down someone.
clean the rod - “limpar a barra”	To help someone in a difficult situation.
lower the ball - “baixar a bola”	To become humble.
give a cake - “dar um bolo”	When someone does not keep a promise.
miss the trolley - “perder o bonde”	To miss an opportunity.
give the face - “dar as caras”	When someone shows up suddenly.
break the face - “quebrar a cara”	When someone gets into trouble.
make a carnival - “fazer um carnaval”	To mess up.
stifle the case - “abafar o caso”	To hide something from someone.
take a crust - “tirar uma casquinha”	To take advantage.
jump the fence - “pular a cerca”	To cheat on someone.
ear blanket - “cobertor de orelha”	To be a lover.
the vicar's tale - “conto do vigário”	When someone deceives others in relation to money and false advantages.
suck the thumb - “chupar o dedo”	When someone cannot get what he/she wants the most.
wash the mare - “lavar a égua”	To have a great advantage.
line the stomach - “forrar o estômago”	When someone eats something before lunch or dinner.
fold the tongue - “dobrar língua”	To apologize for something, especially in a situation when someone insults others.
hit the hammer - “bater o martelo”	To make a decision.
give a refreshment - “dar um refresco”	To have some free time after working or studying hard.
give blood - “dar o sangue”	When a person makes an effort to get something.
advance the signal - “avançar o sinal”	To behave inappropriately.
the weather closed - “fechar o tempo”	To start a fight.

APPENDIX L

Acceptability Test of Idioms

Acceptability Test

Hi!
Welcome to the Acceptability Test.

In this task, you will be asked to judge whether individual sentences sound acceptable or not to you, according to the actual use of the language. You need to answer the test intuitively. There is no right or wrong answer. Use the scale to register your answer. You must choose from 1 to 5 which number better represents your opinion concerning each sentence.

Follow this interpretation of the scale:
1-Totally unacceptable. No one would say that!
2- Slightly unacceptable. There are better ways to say that!
3- Slightly acceptable. The sentence is acceptable, but there are better ways to say that!
4- Acceptable. This sentence sounds natural!
5- Perfectly acceptable. Everybody would say that!

Below each sentence, there will be a blank space in case you want to leave comments or suggestions to improve the sentence structure.

Thank you for your participation!

That young man missed the ball and it went bouncing out into the middle of a busy road. *

- 1 - Totally unacceptable. No one would say that!
- 2 - Slightly unacceptable. There are better ways to say that!
- 3 - Slightly acceptable. The sentence is acceptable, but there are better ways to say that!
- 4 - Acceptable. This sentence sounds natural!
- 5 - Perfectly acceptable. Everybody would say that!

Leave a comment or suggestion below.

Texto de resposta longa

He was trying to peel a pineapple so everybody helped him to find a way to solve it. *

- 1 - Totally unaceptable. No one would say that!
- 2 - Slightly unacceptable. There are better ways to say that!
- 3 - Slightly acceptable. The sentence is acceptable, but there are better ways to say that!
- 4 - Acceptable. This sentence sounds natural!
- 5 - Perfectly acceptable. Everybody would say that!

Leave a comment or suggestion below.

Texto de resposta longa

APPENDIX M

Experimental Items

English		Congruent		Portuguese	
Idiom	**Control**	**Idiom**	**Control**	**Idiom**	**Control**
dropped the ball	missed the ball	hold the fort	attack the fort	peel a pineapple	eat a pineapple
hit the roof	fix the roof	kicked the bucket	tossed the bucket	swallow a frog	buy a frog
hold your horses	lead your horses	kept her head	threw her head	takes a pin	wears a pin
lose his marbles	count his marbles	lost his head	hung his head	flapped wings	bought wings
mark his words	hear his words	use your head	put your head	threw a ball	kicked a ball
cover your tracks	follow your tracks	called the shots	fired the shots	give a banana	have a banana
pick your brains	use your brains	pick my pocket	search my pocket	turned a coat	applied a coat
popped the question	shouted the question	break the ice	crack the ice	sank the boat	sailed the boat
pull your leg	grab my leg	hit the road	take the road	alleviated the rod	released the rod
spill the beans	drop the beans	playing with fire	cooking with fire	cleaned the rod	bought the rod
stood his ground	kept his ground	pay the price	set the price	lower the ball	catch the ball
take your pick	make your pick	reinvent the wheel	change the wheel	gave a cake	baked a cake
turn the tables	move the tables	lifts a finger	runs a finger	missed the trolley	took the trolley
wasting your breath	losing your breath	cross your fingers	mind your fingers	gave the face	showed the face
watch your step	clean your step	cut your losses	count your losses	break the face	burn the face
met his match	won his match	making a scene	painting a scene	made a carnival	held a carnival
eat your words	know your words	risked his neck	hurt his neck	stifle the case	study the case
burning his bridges	building his bridges	saved the day	ruined the day	take a crust	cut a crust
changed her tune	composed her tune	bite his tongue	burn his tongue	jump the fence	build the fence
clear the air	smell the air	keep the peace	like the peace	ear blanket	warm blanket
pick a fight	have a fight	learned his lesson	finish his lesson	the vicar's tale	the fairy tale
follow your nose	blow your nose	pass the time	use the time	suck the thumb	break the thumb
got the picture	took the picture	show my face	paint my face	wash the mare	saddle the mare
hit the bottle	put the bottle	stole the show	liked the show	line the stomach	clean the stomach
pack your bags	leave your bags	stretch my legs	move my legs	fold the tongue	feel the tongue

pulled the plug	removed the plug	swallow your pride	regain your pride	hit the hammer	used the hammer
push his buttons	sew his buttons	take a joke	tell a joke	gave a refreshment	drank a refreshment
scratched his head	nodded his head	tighten your belt	change your belt	gave blood	donated blood
take the cake	eat the cake	try your luck	fix your luck	advanced the signal	noticed the signal
took the floor	built the floor	watch the clock	mend the clock	the weather closed	the door closed

APPENDIX N

Experimental Sentences of idioms

SENTENCE	COMPREHENSION QUESTION	ANSWER
1. That young man dropped the ball and made a lot of problems for us on the new project.	Did the man drop the ball and make a lot of problems?	Yes
2. The child was painting a scene and you could tell that he was actually a pretty good artist.	Was the woman painting a scene?	No
3. I heard that they held a carnival in the street last summer.	Did they hold a carnival in the street last summer?	Yes
4. They are going to hold the fort while we go out and get some supplies.	Are they going to visit their parents?	No
5. I think he's won his match which is great news because he's been trying so hard recently.	Has he won his match?	Yes
6. He was trying to peel a pineapple so everybody helped him to find a way to solve it.	Did everybody help him?	Yes
7. I think that he'll hit the roof when he gets home because this mess is terrible.	Is his home tidy?	No
8. I wasn't surprised that he hurt his neck like that because he never warms up properly.	Did he hurt his neck?	Yes
9. We really need to study the case histories of our patients.	Do we need to study the case histories of our patients?	Yes
10. I heard that he kicked the bucket and it was a shock.	Was it a shock that he kicked the bucket?	Yes
11. You had better know your words because it's getting very close to the opening night of the show.	Is it getting very close to the opening night of the show?	Yes
12. She really needs to swallow a frog and stop being so stubborn.	Does she need to stop being nice?	No
13. You all need to hold your horses for the next few minutes because it's not quite ready yet.	Do you all need to hold your horses?	Yes
14. He really has ruined the day and I'm not sure I'll be able to forgive him in a hurry.	Has the young girl ruined the day?	No

15. The man tried cut a crust from the bread before eating it.	Did the man try to cut a crust from the bread?	Yes
16. I heard that she kept her head and went on to win the competition.	Did she go on to win the competition?	Yes
17. The mayor will be building his bridges for the city during the next summer.	Will the mayor be building the bridges next summer?	Yes
18. My niece normally takes a pin because she does not follow a standard lifestyle.	Did my nephew normally take a pin?	No
19. The man was starting to lose his marbles but as he was very old now it was not really a surprise.	Was the man starting to lose his marbles?	Yes
20. He had to burn his tongue because the dinner was too hot but they were already late.	Was the dinner cold?	No
21. The groom promised he would not build the fence around the garden before the wedding.	Did the groom make a promise before the wedding?	Yes
22. There is no doubt he lost his head and quit his job after a fight.	Did he lose his head?	Yes
23. I think that she composed her tune when she was traveling on vacation.	Was she travelling on vacation?	Yes
24. I was surprised when he flapped wings and left the meeting angry.	Did he leave the meeting happily?	No
25. You should really mark his words because I think he's right that no good will come of this.	Is he right that no good will come of this?	Yes
26. He really does like the peace so he's really happy that he has the house to himself today.	Does he have the house to himself today?	Yes
27. Every night I need my warm blanket to sleep otherwise I start shivering.	Do I rarely need my warm blanket?	No
28. You should try to use your head since you have a difficult problem to solve.	Is there a difficult problem to solve?	Yes
29. I just wanted to smell the air but my nose is blocked because of the weather.	Is my nose blocked?	Yes
30. My soccer team threw a ball at its first day of competition.	Did my soccer team throw a ball at its last day of competition?	No

31. I think you need to cover your tracks otherwise your boyfriend will discover your betrayal.	Will your mother discover your betrayal?	No
32. I'm glad that he's finished his lesson and now maybe we can head out for something to eat.	Has he finished his lesson?	Yes
33. My sister fell for the fairy tale when she was a little girl.	Did my sister fall for the fairy tale?	Yes
34. It was shocking when he called the shots since he was not the boss here.	Was he the boss here?	No
35. The guy was trying to have a fight for some reason but the bouncers soon threw him out.	Was the guy trying to have a fight?	Yes
36. He said that he would give a banana to all the politicians.	Would he give a banana to all the politicians?	Yes
37. It'd be good to pick your brains when I finally get some time to sit down with you.	Would it be good to have free time?	No
38. It's always nice to use the time if you can do something constructive and worthwhile.	Is it always nice to use the time with something worthwhile?	Yes
39. He is going to break the thumb of his partner if he keeps doing that move.	Is he going to break the leg of his partner?	No
40. There is no doubt they will pick my pocket if I take my wallet to the show.	Will they pick my pocket if I take my wallet to the show?	Yes
41. You should really blow your nose and stop crying to find a solution.	Should you stop smiling?	No
42. I was surprised when he turned a coat even after hearing all those convincing arguments.	Did he turn a coat?	Yes
43. Without warning the man just popped the question and surprised his girlfriend.	Did the man just pop the question and surprise his girlfriend?	Yes
44. I'd like to paint my face if I can at the party because it's fun to join in with the children.	Is it fun to join in with the children?	Yes
45. I will definitely saddle the mare before riding it otherwise I'll fall off.	Did I fall off the mare?	No
46. It was hard for him to break the ice when he went to the party last week.	Was it easy for him to break the ice?	No

47. The president said that she took the picture that proves her innocent of corruption.	Did the president take the picture?	Yes
48. I heard that the director sank the boat and the company declared bankruptcy.	Did the company declare bankruptcy?	Yes
49. He was trying to pull my leg so I couldn't take anything he said too seriously.	Was he trying to pull my leg?	Yes
50. There's no doubt he liked the show and he's been telling anyone that they should go to see it.	Did he dislike the show?	No
51. I will faint if I don't clean the stomach from all the bad things I ate.	Did I eat healthy food?	No
52. She told me she would hit the road at five o'clock for a meeting.	Would she hit the road at eight o'clock?	No
53. I heard that he put the bottle in the recyclable trash bins for sorting.	Did he put the bottle in the recyclable trash bins?	Yes
54. I was worried but then you alleviated the rod so everything got better.	Did everything get better?	Yes
55. It was really hard not to spill the beans after I found out such a juicy piece of gossip.	Did I find out such a juicy piece of gossip?	Yes
56. I'd like to try to move my legs if possible because they'll lock up if I stay in this position.	Will my legs lock up if I stay in the same position?	Yes
57. I think you need to feel the tongue when you are eating something.	Do you need to feel the tongue when you are eating something?	Yes
58. My friend's been playing with fire and it was always likely to get him into trouble.	Has my friend been playing with fire?	Yes
59. You had better leave your bags because they are too heavy to carry around.	Are the bags light to carry around?	No
60. I was happy when my father cleaned the rod and paid all my debts.	Was I angry when my father cleaned the rod and paid all my debts?	No
61. I was impressed when he stood his ground on the matter and showed how passionate he was.	Did he stand his ground on the matter?	Yes

62. You might have to regain your pride after such an embarrassing display in the game last week.	Was an embarrassing display in the game last week?	Yes
63. The president of the company used the hammer to fix the front door of the office.	Did the president of the company use a hammer to fix a chair?	No
64. After quitting my job I had to pay the price of unemployment.	Did I quit my job?	Yes
65. Without warning the man just removed the plug from the socket while we were using the computer.	Did the man remove the plug from the socket?	Yes
66. You should really lower the ball if you want to be recognized by your work.	Should you really lower the ball to be recognized by your work?	Yes
67. You can really just take your pick because there's so many to choose from that it doesn't matter.	Can you take your pick because there's so many to choose from?	Yes
68. I heard that he can tell a joke so if I were you I'd ask him to entertain a few people at the party.	Can he tell a joke?	Yes
69. I heard that he drank a refreshment after working so hard all day.	Did he drink a refreshment?	Yes
70. He is trying to reinvent the wheel in his new book because all that was already known.	Is he trying to reinvent the wheel?	Yes
71. He said his sister can sew his buttons on his shirt after she learned it form their father.	Can his sister wash his shirt?	No
72. I am sorry I gave a cake because I couldn't make it to the meeting.	Could I make it to the meeting?	No
73. They managed to turn the tables and give themselves a real advantage.	Did they manage to turn the tables?	Yes
74. You might need to change your belt because that one looks a bit old and worn out to me.	Do you need to change your pants?	No
75. I heard that he donated blood for a hospital in need.	Did he donate blood for a hospital in need?	Yes
76. He just watches TV and never lifts a finger to clean his bedroom.	Does he just watch TV?	Yes

77. I heard that he nodded his head in agreement but after some days he regretted it.	Did he nod his head in agreement?	Yes
78. I had a great opportunity but I missed the trolley when I didn't finish the project.	Did I finish the project?	No
79. I think that you're wasting your breath so it would seem pointless carrying on the argument.	Would it seem helpful carrying on the argument?	No
80. If you want to fix your luck you should maybe try being a bit less risky in the moves you play.	Should you be a bit less risky in the moves you play?	Yes
81. They were just talking when he noticed the signal and stopped talking.	Did he notice the signal and stop talking?	Yes
82. You all just need to cross your fingers because I really don't know how things are going to be.	Do I know how things are going to be?	No
83. This boy will eat the cake to win the competition of who eats more.	Will the girl eat the cake?	No
84. After two moths away she finally gave the face at the office.	Did she give the face at the office?	Yes
85. You two need to watch your step because the day will come when I lose my patience entirely.	Do you two need to watch your step?	Yes
86. I will need to mend the clock because it's been broken for a while now and we need it to work.	Has the clock been broken?	Yes
87. During the department meeting the door closed because of the strong wind that day.	Did the window close during the department meeting?	No
88. You should maybe just cut your losses because I don't really see this getting better for you.	Should you cut your losses?	Yes
89. The young man built the floor of the house so he will live in with his partner.	Did the young man build the floor of the office?	No
90. I think that you will break the face if you trust every single person.	Will you break the face if you trust every single person?	Yes

91. That young man missed the ball and it went bouncing out into the middle of a busy road.	Did the young man miss the ball?	Yes
92. The child was making a scene and you could tell that his mother was really embarrassed.	Was his mother really happy?	No
93. I heard that they made a carnival when they were suddenly fired.	Were they suddenly fired?	Yes
94. They are going to attack the fort while we exit and run to the gate.	Are they going to the supermarket?	No
95. I think he's met his match which is going to make for an interesting game.	Has he met his match?	Yes
96. He was trying to eat a pineapple so everybody helped him to cut it into small pieces.	Was he trying to eat an apple?	No
97. I think that he'll fix the roof when he gets the time because it looks dangerous.	Will he fix the roof?	Yes
98. I wasn't surprised that he risked his neck like that because he's that sort of person really.	Did he risk his neck?	Yes
99. We really need to stifle the case otherwise he won't be reelected.	Do we need to stifle the case?	Yes
100. I heard that he tossed the bucket away because it was broken.	Did he toss the ball away?	No
101. You had better eat your words because it's pretty clear that you were wrong about everything.	Is it clear that you were wrong about everything?	Yes
102. She really needs to buy a frog to add to her porcelain collection.	Does she need to buy a purse?	No
103. You all need to lead your horses for the next few hundred meters because it'll be safer.	Will it be safer to lead the horses?	Yes
104. He really has saved the day and I'm not sure what we would have done without him.	Has he saved the day?	Yes
105. The man tried to take a crust but the model rejected him.	Did the model reject him?	Yes
106. I heard that she threw her head back and laughed out loud for hours.	Did she cry for hours?	No

107. The mayor will be burning his bridges if he breaks the contract with them.	Will the president be burning his bridges?	No
108. My niece normally wears a pin to add color and sparkle to her outfit.	Does my nephew wear a pin?	No
109. The man was starting to count his marbles but as he had so many he kept losing count.	Did he keep losing count of his marbles?	Yes
110. He had to bite his tongue because the party would be ruined if he said what he really thought.	Did he have to bite his tongue?	Yes
111. The groom promised he would not jump the fence in the wedding vows.	Did the groom make a promise in the wedding vows?	Yes
112. There is no doubt he hung his head in shame and left the room quietly.	Did he leave the room loudly?	No
113. I think that she changed her tune when she started working with us.	Did she change her tune when she started working with us?	Yes
114. I was surprised when he bought wings for his new Halloween costume.	Did he buy wings for his birthday?	No
115. You should really hear his words because I think you'll be amazed at what he has to say.	Will you be angry about what he has to say?	No
116. He really does keep the peace so he's a really useful person to have around.	Is he a really useful person to have around?	Yes
117. Every night I need my ear blanket to sleep since we got together.	Do I rarely need my ear blanket?	No
118. You should try to put your head around the door and listen very carefully.	Should you try to put your head around the door and listen very carefully?	Yes
119. I just wanted to clear the air and let you know how I felt about your behavior.	Did I want to clear the air?	Yes
120. My soccer team kicked a ball to their fans after the competition.	Did my soccer team kick the ball to their fans?	Yes
121. I think you need to follow your tracks in the snow otherwise you won't find home.	Do you need to follow your tracks in the snow to find home?	Yes
122. I'm glad that he's learned his lesson and now maybe we can all continue with our lives.	Has he learned his lesson?	Yes

123. My sister fell for the vicar's tale when she spent money on new business applications.	Did my sister fall for the vicar's tale?	Yes
124. It was shocking when he fired the shots since he didn't seem violent or evil.	Did he seem violent or evil?	No
125. The guy was trying to pick a fight for some reason but the security guard soon threw him out.	Was the woman trying to pick a fight?	No
126. He said that he would have a banana before lunch and dinner.	Would he have an orange before lunch and dinner?	No
127. It'd be good to use your brains when I finally get round to putting a pub quiz team together.	Would it be good to use your computer during the quiz?	No
128. It's always nice to pass the time if you can with some good friends and a nice meal.	Is it nice to pass the time with friends and a nice meal?	Yes
129. He is going to suck the thumb because his team is not going to win the championship.	Is his team going to win the championship?	No
130. There is no doubt they will search my pocket for stolen property and any dangerous goods.	Will they search my pocket for stolen property?	Yes
131. You should really follow your nose and choose what is the best for you.	Should you follow your nose?	Yes
132. I was surprised when he applied a coat before making sure the base coat was dried.	Was I mad when he applied a coat?	No
133. Without warning the man just shouted the question and surprised the politician.	Did the woman shout the question and surprise the politician?	No
134. I'd like to show my face at the party because it's been a while since I saw them.	Has it been a while since I saw them?	Yes
135. I will definitely wash the mare if I win the lottery some time.	Will I wash the dog if I win the lottery some time?	No
136. It was hard for him to crack the ice when his car windows froze last week.	Was it hard for him to crack the ice last week?	Yes
137. The president said that she got the picture and was working to improve the unemployment rate.	Did the president get the picture?	Yes

138. I heard that the director sailed the boat without reviewing basic sailing techniques	Did the teacher sail the boat?	No
139. He was trying to grab my leg so I couldn't run away as quickly but that's a foul.	Was he trying to grab my arm?	No
140. There's no doubt he stole the show and he's been getting lots of praise from anyone who saw it.	Did he steal the show?	Yes
141. I will faint if I don't line the stomach because our dinner is not ready yet.	Is our dinner ready?	No
142. She told me she would take the road around to the left.	Would she take the road around to the left?	Yes
143. I heard that she hit the bottle after she got divorced and lost his job.	Did she hit the bottle after she got divorced and lost his job?	Yes
144. I was worried but then you released the rod so I could finally pass.	Was I calm when you released the rod?	No
145. It was really hard not to drop the beans after I cut myself when I was opening the can.	Did I cut myself when I was opening the can?	Yes
146. I'd like to try to stretch my legs before dinner as it's such a nice day for a walk.	Is it a bad day for a walk?	No
147. I think you need to fold the tongue when you talk about my mother.	Do you need to fold the tongue when you talk about my mother?	Yes
148. My friend's been cooking with fire and it's given the meat a really nice smoky flavour.	Has my friend been cooking with fire?	Yes
149. You had better pack your bags because I don't like the way you run the company.	Do I like the way you run the company?	No
150. I was happy when my father bought the rod to hang the bedroom curtains.	Was I angry when my father bought the rod?	No
151. I was impressed when he kept his ground on the list of approved venues for the local tournament.	Was I sad when he kept his ground on the list of approved venues?	No
152. You might have to swallow your pride after such a clear indication that he was right all along.	Is it a clear indication that he was right all along?	Yes

153. The president of the company hit the hammer and did not increase the employees' salaries.	Did the president increase the employee's salaries?	No
154. After quitting my job I had to set the price high of my cakes.	Did I have to set the price high of my purses after quitting my job?	No
155. Without warning the man just pulled the plug on your budget proposal research projects.	Did the man pull the plug?	Yes
156. You should really catch the ball when the person with the bat hits it.	Should you really catch the ball when the person with the bat hits it?	Yes
157. You can really just make your pick because there's so many to choose from that it doesn't matter.	Can you make your pick because there's so many to choose from?	Yes
158. I heard that he can take a joke so if I were you I'd go ahead.	Can he take a joke?	Yes
159. I heard that he gave a refreshment to himself after the thesis writing process.	Did he give a refreshment to himself after the thesis writing process?	Yes
160. He is trying to change the wheel but it is too heavy for him.	Is he trying to change the shoes?	No
161. He said his sister can push his buttons when asking to go out without finishing her homework.	Can his sister push his buttons?	Yes
162. I am sorry I baked a cake and I forgot to give you a piece.	Did I bake bread?	No
163. They managed to move the tables and give themselves plenty of room in the middle of the hall.	Did they manage to move the chairs?	No
164. You might need to tighten your belt because it looks like you've been spending too much recently.	Do you need to tighten your belt?	Yes
165. I heard that he gave blood to finish his research project.	Did he give blood to finish his research project?	Yes
166. He just watches TV and never runs a finger along the dusty shelf.	Does he always run a finger along the dusty shelf?	No
167. I heard that he scratched his head for some days over that difficult problem.	Did he scratch his arm?	No

168. I had a great opportunity but took the trolley from my apartment to work and got lost.	Did I take the trolley?	Yes
169. I think that you're losing your breath so it would be fine if you wanted to stop for a while.	Are you losing your breath?	Yes
170. If you want to try your luck you should maybe have a go on the lottery this week.	Do you want to try your luck?	Yes
171. They were just talking when he advanced the signal and made a personal question.	Did he make a question about working conditions?	No
172. You all just need to mind your fingers because the knife is really sharp and we don't want an accident.	Is the knife really sharp?	Yes
173. This boy will take the cake with his incredible performance in the talent show.	Will the girl take the cake?	No
174. After two months away she finally showed the face of her baby.	Did she finally show the face of her baby?	Yes
175. You two need to clean your step because the mess those children left behind is incredible.	Did the children make a mess?	Yes
176. I will need to watch the clock because it's not long until I need to leave for an appointment.	Do I need to leave for an appointment?	Yes
177. During the department meeting the weather closed because of the professors' arguing.	Was the weather closed during the game?	No
178. You should maybe just count your losses because it's important to know how much money you have.	Is it important to know how much money you have?	Yes
179. The young man took the floor to present his study on animals in danger of extinction.	Did the man take the floor to present his study?	Yes
180. I think that you will burn the face of the girl with the straightener.	Will you burn the face of the boy?	No

APPENDIX O

Biographical Questionnaire (Portuguese Version) – Lexical Decision Task

Questionário Biografico

Antes de participar do estudo, por favor, preencha o questionário com suas informações pessoais e informações sobre o seu aprendizado de língua inglesa.

Idade *

Texto de resposta curta

Sexo *

- ◯ Feminino
- ◯ Masculino

Onde você mora? (Cidade/Estado/País) *

Texto de resposta curta

Escolaridade *

- ◯ Ensino médio incompleto
- ◯ Ensino médio completo
- ◯ Ensino superior incompleto
- ◯ Ensino superior completo
- ◯ Pós-graduação incompleta
- ◯ Pós-graduação completa

Você tem formação em Linguística ou áreas afins? *

- ◯ Sim
- ◯ Não

Ocupação atual *

Texto de resposta curta

Qual é a sua língua materna? *

Texto de resposta curta

Quais são as línguas que você fala além da sua língua materna? *

Texto de resposta curta

Em qual das línguas adicionais você tem maior fluência? *

Texto de resposta curta

Com que idade você começou a aprender inglês? *

Texto de resposta curta

Em que contexto você aprendeu inglês? Marque quantas forem adequadas a sua realidade. *

- [ ] Em escolas de idiomas
- [ ] Na escola
- [ ] Em casa
- [ ] No país em que a língua é falada como língua nativa
- [ ] Outros...

Caso você tenha estudado inglês em escola de idiomas, indique por quanto tempo.

- ○ até 6 meses
- ○ até 1 ano
- ○ até 2 anos
- ○ Mais de 2 anos

Atualmente você estuda inglês em escola de idiomas? *

- ○ Sim
- ○ Não

Com que frequência você usa o inglês? *

- ◯ O tempo todo
- ◯ Quase o tempo todo
- ◯ Em certas ocasiões
- ◯ Raramente
- ◯ Nunca

Quais são as atividades em inglês mais frequentes no seu dia a dia? Marque quantas forem adequadas a sua realidade. *

- ☐ Leituras no trabalho
- ☐ Pesquisas
- ☐ Assistir filmes, ouvir músicas, jogar video game
- ☐ Leituras de lazer
- ☐ Conversar com amigos e família
- ☐ Outros...

Você possui/ possuiu contato com falantes nativos de inglês? *

Texto de resposta curta

Você já esteve em algum país de língua inglesa? *

- ◯ Sim
- ◯ Não

Se sim, por quanto tempo?

- ◯ Menos de 2 meses
- ◯ Entre 2 meses a 6 meses
- ◯ De 7 meses a 2 anos
- ◯ Mais de 2 anos

Como você avalia o seu conhecimento da língua inglesa? *

- ◯ Básico
- ◯ Intermediário
- ◯ Avançado

APPENDIX P

Biographical Questionnaire (English Version) – Lexical Decision Task

Biographical Questionnaire

Before taking part of the study, please fill out the questionnaire with your personal and L2 learning information:

Your age *

Texto de resposta curta

Your sex *

- ◯ Female
- ◯ Male

Where are you from? (country/city) *

Texto de resposta curta

What is the highest degree you obtained or you are currently working towards? *

- ◯ PhD
- ◯ Master
- ◯ Bachelor
- ◯ High School
- ◯ Primary School

Do you have a degree in Linguistics or related areas? *

- ◯ Yes, I do.
- ◯ No, I don't.

Current occupation *

Texto de resposta curta

What is your mother tongue? *

Texto de resposta curta

How many more languages do you speak besides your mother tongue? *

Texto de resposta curta

Which of the additional languages do you speak best? *

Texto de resposta curta

Have you ever been to Brazil? *

Texto de resposta curta

If yes, how good is your knowledge of Portuguese? (Brazilian Portuguese)

- ○ I know a few words.
- ○ I can have a simple conversation.
- ○ I can read a simple book.
- ○ I can read and speak the language fluently.

APPENDIX Q

An overview of the frequency of figurative phrasal verbs and their matching lexical verbs

Phrasal Verbs	Frequency FPV	Lexical verbs	Frequency LV
Carry out	16637	achieve	2437
Hold up	17010	delay	1369
Bring up	15286	raise	9878
Check out	15579	search	2565
Put out	14036	spread	8377
Catch up	13103	require	17262
Go off	15450	sound	5385
Set out	11127	start	39698
Go over	11914	study	4447
Go through	9907	struggle	3186
Break up	9912	end	27701
Hang on	8533	wait	32907
Throw out	7925	deny	2888
Carry on	5514	pursue	1998
Set off	7333	travel	8995
Shut up	6829	stop	24246
Stand out	8421	highlight	2171
Sort out	5492	fix	2668

APPENDIX R

Meanings of Figurative Phrasal Verbs

FIGURATIVE PHRASAL VERBS[36]			
Phrasal Verb	**Meaning**	**Sentence - Familiarity Posttest**	**One-word Verb**
Break up	End or cause to end or fail.	Their marriage broke up in 2007.	End
Bring up	Raise for discussion or consideration.	I think he would bring up the subject.	Raise
Carry on	Continue to do or be involved with something or make something continue (especially despite difficult).	I would like to carry on working after I retire.	Pursue
Carry out	Put into execution; implement.	Economic reform will soon be carried out.	Achieve
Catch up	Become involved in something which prevents somebody from making progress or moving forward.	He is very busy and always caught up in his work.	Require
Check out	Have a look at; examine something/somebody (to get more information or to make a judgment).	Check out our website for more information.	Search
Go off	Emit a loud noise or sudden light as a signal or warning.	Let's hope the alarm doesn't go off.	Sound
Go over	Examine or discuss each part of something in detail in order to understand or remember it better, or make sure it is correct.	We need to go over the list once again.	Study
Go through	Experience something difficult or unpleasant.	You have to understand the tough situation she went through before judging her.	Struggle
Hang on	Wait for a short time.	Please hang on for a minute, I'll be quick.	Wait
Hold up	Delay or prevent the progression of something/somebody.	We were held up. By heavy traffic.	Delay
Put out	Make something known or accessible to the public (information, products).	Police have put out a warning about thieves in the area.	Spread
Set off	Start on a trip or journey.	We will finish packing and set off in the morning.	Travel
Set out	Start doing or working on something, with a particular goal in mind.	I set out to discover the truth behind the story.	Start

[36] Garnier & Schmitt (2015)

Shut up	Stop (or make somebody/something stop) talking or making a noise.	Just sit down and shut up!	Stop
Sort out	Do what is needed to solve a problem, conflict or difficult situation.	A few ideas were raised to sort out the company's financial issues.	Fix
Stand out	Distinguish oneself/itself by being better, more significant or more impressive than other people/things.	Excellent product quality is what made the brand stand out from its competitors.	Highlight
Throw out	Refuse to accept or consider (by people of authority).	The president attempted to have the death penalty thrown out.	Deny

APPENDIX S

An overview of the pseudo verbs and their length

Pseudo verbs	Length	Pseudo Phrasal verbs	Length
Formand	7	forma down	9
Covact	6	cova forward	11
Rendict	7	rend around	10
Hislect	7	hisle about	10
Merselt	7	mer down	7
Pernord	7	per forward	10
Bonfint	7	bon around	9
Felsild	7	fel about	8
Torfost	7	tor down	7
Vintord	7	vint forward	11
Beldofit	8	beldo around	11
Tilpord	7	tilpo about	10
Blotest	7	blo down	7
Cortand	7	cor forward	10
Binjold	7	binj around	10
Delvort	7	delvo about	10
Pelgord	7	pel down	7
Pernolt	7	perno forward	12
Colzent	7	col around	9
Fonlact	7	fon about	8
Garwort	7	gar down	7
Ponvand	7	ponva forward	12
Torvoct	7	tor around	9
minbost	7	minb about	9
Solract	7	solra down	9
Delsord	7	dels forward	11
Rigseft	7	rigse around	11
Dernoft	7	dern about	9
Sornold	7	sor down	7
Relbect	7	rel forward	10
Dartelt	7	darte around	11
Vonlort	7	von about	8
Bormact	7	borma down	9
Farvind	7	farvi forward	12
Pamdest	7	pamd around	10
Poltact	7	polta about	10

APPENDIX T

An overview of nonwords and words, and their length

Nonwords	Length	Words	Length
breem	5	tour	4
nent	4	mail	4
blyner	6	grass	5
beasal	6	blind	5
perd	4	soil	4
blait	5	iron	4
serm	4	artist	6
casoil	6	flight	6
deece	5	award	5
burse	5	shift	5
demmit	6	lake	4
emazen	6	bond	4
feap	4	poem	4
bruve	5	sale	4
croop	5	hole	4
berge	5	ring	4
jaul	4	pilot	5
awel	4	crowd	5
dight	5	pair	4
wote	4	soul	4
branel	6	milk	4
yait	4	suit	4
averme	6	weapon	6
bogget	6	artery	6
jasant	6	snow	4
karfal	6	wave	4
harbed	6	bear	4

APPENDIX U

Familiarity Posttest – Lexical Decision Task

Familiarity Posttest

Please choose the best verb to represent the same meaning of the **PHRASAL VERB**. There are 18 sentences.

1. Economic reform will soon be **CARRIED OUT**. *

- ○ fixed
- ○ achieved
- ○ highlighted
- ○ stopped
- ○ ended

2. We were **HELD UP** by heavy traffic. *

- ○ delayed
- ○ traveled
- ○ pursued
- ○ denied
- ○ waited

3. I didn't think he would **BRING UP** the subject. *

- ○ struggle
- ○ study
- ○ start
- ○ raise
- ○ stop

4. **CHECK OUT** our website for more information. *

- ○ require
- ○ sound
- ○ search
- ○ fix
- ○ spread

5. Police have **PUT OUT** a warning about thieves in the area. *

- achieved
- delayed
- struggled
- denied
- spread

6. He is very busy and always **CAUGHT UP** in his work. *

- fixed
- highlighted
- stopped
- pursued
- required

7. Let's hope the alarm doesn't **GO OFF**. *

- sound
- wait
- achieve
- delay
- struggle

8. I **SET OUT** to discover the truth behind the story. *

- search
- spread
- start
- study
- end

9. We need to **GO OVER** the list once again. *

- require
- achieve
- delay
- study
- search

10. You have to understand the tough situation she **WENT THROUGH** before judging her. *

- ended
- struggled
- waited
- denied
- sound

11. Their marriage **BROKE UP** in 2007. *

- ended
- raised
- searched
- spread
- studied

12. Please **HANG ON** for a minute, I'll be quick. *

- delay
- achieve
- pursue
- travel
- wait

13. The president attempted to have the death penalty **THROWN OUT**. *

- studied
- highlighted
- denied
- fixed
- sounded

14. I would like to **CARRY ON** working after I retire. *

- require
- search
- achieve
- pursue
- raise

15. We will finish packing and **SET OFF** in the morning. *

- achieve
- travel
- start
- struggle
- end

16. Just sit down and **SHUT UP**! *

- spread
- wait
- deny
- require
- stop

17. Excellent product quality is what made the brand **STAND OUT** from its competitors. *

- achieve
- study
- start
- delay
- highlight

18. A few ideas were raised to **SORT OUT** the company's financial issues. *

- fix
- travel
- sound
- end
- pursue

APPENDIX V

Free and Informed Consent Form (Portuguese Version) – Lexical Decision Task

Termo de Consentimento Livre e Esclarecido

Projeto de Pesquisa: uma investigação psicolinguística sobre o processamento de construções fraseológicas em inglês como L2

Caro (a) Participante,
Eu, Danielle dos Santos Wisintainer, aluna de doutorado do Programa de Pós-Graduação em Inglês: Estudos Linguísticos e Literários da Universidade Federal de Santa Catarina, orientada pela Professora Dra. Mailce Borges Mota, tenho como objetivo desenvolver um estudo sobre o processamento de frases em língua inglesa.

Gostaria de convidá-lo(a) a participar desta pesquisa, que busca investigar como processamos construções fraseológicas em inglês. Os estudos nessa área visam não só compreender o processamento de uma língua estrangeira (LE), mas também desenvolver meios de aperfeiçoar o ensino e aprendizagem da LE.

Se você concordar em participar deste estudo, você será solicitado(a) a preencher um questionário; a fazer um teste de proficiência em inglês; a realizar uma tarefa de priming semântico; e por último, a fazer um pós-teste de familiaridade de sentenças em inglês, todos online. São tarefas de natureza exclusivamente científica e sua identidade será totalmente preservada. Você preencherá o questionário com alguns dados pessoais (por exemplo, idade, sexo, etc.) e fornecerá informações sobre o seu aprendizado de inglês como L2. Não será necessário informar seu nome ou qualquer outro dado que possa levar a sua identificação. Você realizará um teste de proficiência para identificar o seu nível de conhecimento de gramática e vocabulário da língua inglesa. A tarefa de priming semântico é uma tarefa de leitura, a qual você terá que decidir se são palavras ou não-palavras em inglês. Seu tempo de resposta será gravado automaticamente. Esta tarefa terá duração de 15 minutos. Por fim, você realizará um pós-teste de familiaridade que consiste em avaliar se as sentenças em inglês são familiares ou não para você. Essa tarefa terá duração de 10 minutos. A sua participação neste estudo contribuirá para a pesquisa sobre a aquisição/ensino de línguas estrangeiras.
Em decorrência da participação nesta pesquisa, você pode estar exposto(a) a eventuais riscos, mesmo que baixos, tais como nervosismo, constrangimento, cansaço ou aborrecimento inerentes a qualquer situação de avaliação. Para minimizar a possibilidade destes sentimentos expostos acima e atenuar possível desgaste físico e/ou psicológico, o experimento será dividido em blocos curtos. Recomendamos que você realize o experimento em um lugar que ofereça condições confortáveis, referentes à iluminação, temperatura e ao posicionamento adequado do monitor do computador de acordo com a sua altura.
De acordo com a legislação brasileira, sua participação é absolutamente voluntária e não remunerada. Os pesquisadores estarão à disposição para esclarecimentos, antes, durante e depois da pesquisa. Você tem assegurada a liberdade de desistir de participar a qualquer momento do estudo, sem nenhuma penalização. Você poderá ter acesso ao registro de consentimento sempre que solicitado. Caso a sua participação nessa pesquisa lhe traga alguma despesa, você tem direito a ressarcimento. Caso venha sofrer qualquer prejuízo, material ou imaterial, comprovadamente decorrente de sua participação nesta pesquisa, você será indenizado de acordo com a legislação vigente.

Os dados obtidos neste estudo serão mantidos em sigilo e serão armazenados no LabLing por 5 anos, quando então serão descartados. Os dados serão acessados apenas pelas pesquisadoras responsáveis através de senha pessoal. Os resultados desta pesquisa serão divulgados em eventos ou publicações científicas sem qualquer identificação dos participantes. Você pode ter acesso aos resultados da pesquisa a qualquer momento entrando em contato com os pesquisadores.

Os procedimentos metodológicos adotados obedecem aos preceitos éticos implicados em pesquisas envolvendo seres humanos, conforme normatizado pela Resolução do Conselho Nacional de Saúde nº 510 de 07 de abril de 2016, que dispõe sobre as normas aplicáveis a pesquisas em Ciências Humanas e Sociais. As pesquisadoras também aderem a esse documento e comprometem-se a conduzir a pesquisa de acordo com o que preconiza a referida Resolução.

Contatos. Tendo qualquer dúvida sobre a pesquisa, você pode entrar em contato com Danielle dos Santos Wisintainer, pelo e-mail wisintainer.ds@gmail.com ou pelo telefone (48) 99998-0156, ou com a Professora Dra. Mailce Borges Mota através do e-mail mailce.mota@ufsc.br.

Comitê de Ética em Pesquisa (CEP). A pesquisa, da qual faz parte esse questionário, foi avaliada e aprovada pelo Comitê de Ética em Pesquisa com Seres Humanos (CEPSH) da UFSC. O CEPSH é um órgão colegiado interdisciplinar, deliberativo, consultivo e educativo, vinculado à Universidade Federal de Santa Catarina, mas independente na tomada de decisões, criado para defender os interesses dos participantes da pesquisa em sua integridade e dignidade e para contribuir no desenvolvimento da pesquisa dentro de padrões éticos. Caso você tenha alguma dúvida ou reclamação quanto à condução ética dessa pesquisa, você pode entrar em contato com o CEPSH – UFSC. Endereço: Prédio da Reitoria II, 4º andar, sala 401, Rua Desembargador Vitor Lima, nº222, Trindade, CEP 88040-400, Florianópolis-SC. Telefone: (48) 3721-6094. E-mail: cep.propesq@contato.ufsc.br.

Por favor escolha uma das opções *

- ◯ **Declaro que sou maior de 18 anos e que li e compreendi as informações do Termo de Consentiment …**
- ◯ **Não aceito participar da pesquisa.**

APPENDIX W

Free and Informed Consent Form (English Version) – Lexical Decision Task

Free and Informed Consent Form

Research project: a psycholinguistic investigation on formulaic language processing in L2 English

Dear participant,
I am Danielle dos Santos Wisintainer, a PhD candidate at the Graduate Program in English supervised by Professor Dr. Mailce Borges Mota at the Federal University of Santa Catarina. My objective is to develop a study on the processing of sentences in English.

I would like to invite you to participate in my study. The study investigates the processing of formulaic language in English. Studies in this area are intended not only to understand the processing of a foreign language (FL), but also to develop ways to improve the teaching and learning of an FL.

If you agree to participate in this study, you will be asked to fill out a questionnaire; to perform a semantic priming task; and finally, to perform a familiarity posttest of English sentences. All tasks are online. They are scientific experiments and your identity will be totally preserved. You will fill out the questionnaire with personal data (for example, age, sex, etc.) and provide information about your L2 learning. It will not be necessary to provide your name or any other information that may lead to your identification. The semantic priming task is a reading task. You will read strings of letters and have to decide whether they are words or nonwords in English. Your response time will be recorded automatically. This task will last 15 minutes. Finally, you will perform a familiarity posttest that consists of evaluating whether English sentences are familiar or not for you. This task will last 10 minutes. Your participation in this study will contribute to research on the acquisition/teaching of foreign languages.
Your participation in the present research may expose you to low risks, such as, nervousness, embarrassment, tiredness and boredom, feelings that are inherent to any testing situation. In order to minimize these feelings that the experiments may cause, the experiments will be divided into short blocks. We recommend that you perform the experiment in a place that offers comfortable conditions regarding lighting, temperature, and proper positioning of the computer monitor according to your height.

Your participation is voluntary and unpaid, as required by the Brazilian law. My supervisor and I will remain at your disposal for any further clarifications, before, during and after the research. You can give up participating in the study at any time, with no penalty. You may have access to the consent form whenever you request it. If you have any financial costs regarding your participation in this research, you are entitled to financial compensation. If you suffer any loss or injury, material or immaterial, regarding your participation in this study, you may request indemnity, according to current legislation.

The data obtained in this study will be kept confidential and will be stored in the LabLing for 5 years, when they will be discarded. The data will be accessed only by the researchers in charge of the study, through a personal password. The results of this research will be presented in conferences or published as scientific papers without any identification of the participants. You can access the research results at any time by contacting the researchers.

The methodological procedures adopted obey the ethical precepts related to research involving human beings, as determined by Resolution no. 510 of April 7, 2016 released by the National Council of Health. The Resolution provides the norms applicable to research in Humanities and Social Sciences.

Contacts. If you have any questions about the research, you may contact Danielle dos Santos Wisintainer at wisintainer.ds@gmail.com or (48) 99998-0156, or Professor Mailce Borges Mota at mailce.mota@ufsc.br.

Committee for Ethics in Research with Human Beings (CEPSH). The present study was assessed and approved by the CEPSH at UFSC. CEPSH is an interdisciplinary, deliberating, consultative and educational collegiate body, connected to the UFSC, but independent in decision making, created to defend the interests of research participants in their integrity and dignity and to contribute to the development of research within ethical standards. If you have any questions or concerns regarding the ethical aspects of this research, you may contact CEPSH - UFSC. Address: Prédio da Reitoria II, 4th floor, room 401, Desembargador Vitor Lima Street, n.222, Trindade, CEP 88040-400, Florianópolis-SC. Phone: (48) 3721-6094. E-mail: cep.propesq@contato.ufsc.br.

Please, choose from one of the options below: *

- ○ **I declare that I am over 18 years old and that I read the information this Free and Informed Consen ...**
- ○ **I don't agree to participate in this study.**