Justin Neal Buley

Processing of Tense-Aspect in Present Perfect Sentences by L1 Brazilian Portuguese (BP) learners of English

Dissertação de Mestrado

Dissertation presented to the Programa de Pós-graduação em Estudos da Linguagem of PUC-Rio in partial fulfillment of the requirements for the degree in of Mestre em Estudo da Linguagem

Advisor: Profa. Dr.a. Erica dos Santos Rodrigues

Rio de Janeiro,
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Abstract

Buley, Justin Neal; Rodrigues, Erica dos Santos. **Processing of Tense-Aspect in Present Perfect Sentences by L1 Brazilian Portuguese (BP) learners of English.** Rio de Janeiro, 2023, p. 229. Dissertação de Mestrado - Departamento de Letras, Pontifícia Universidade Católica do Rio de Janeiro.

This study investigates the processing behaviors of a group of Brazilian bilingual students, instructed, advanced English students (n=21), and an English monolingual control group (n= 11) during their comprehension of Present Perfect and Simple Past sentences in an on-line, self-paced reading (SPR) task. An off-line Acceptability Judgment Task (AJT) provides a baseline measure of explicit knowledge in order to validate the on-line results. The results are compared, qualitatively, between the bilingual and monolingual groups in order to investigate their sensitivity to experimental manipulations in Tense/Aspect, adverbial (Mis)match, and Telicity. The Present Perfect was used for the stimuli as it is a late-acquired feature of English which allows for the study of processing strategy of advanced level students. While both groups were able to recognize Mismatches off-line, monolinguals were not sensitive to the Mismatch condition in the on-line experiment. Surprisingly, the bilingual group showed more sensitivity to the adverbial Match variable, showing a processing facilitation in the Match condition as well as some mismatch sensitivity as well. The monolingual group showed significant effects for Telicity at multiple sentence regions. Some qualitative differences were seen between the two groups in their reading-time contours across the verb phrase. The monolinguals show within-group consistency across multiple conditions and signs of integrative processing (wrap-up) effects in their processing patterns which are not seen among the bilingual group. There are currently no studies with similar experimental conditions which investigate the on-line comprehension of the English Present Perfect with Brazilian Portuguese-English bilinguals in comparison to American English monolinguals.

Keywords

L2 sentence processing; Present perfect; Telicity; Cross-linguistic influence

Resumo

Buley, Justin Neal; Rodrigues, Erica dos Santos. **Processamento de tempo-aspecto em sentenças no Present Perfect por aprendizes brasileiros de Inglês como segunda língua (ESL).** Rio de Janeiro, 2023, p.229. Dissertação de Mestrado - Departamento de Letras, Pontifícia Universidade Católica do Rio de Janeiro.

Este estudo investiga os comportamentos de processamento de um grupo de Brasileiros bilíngues instrucionados de português L1 e inglês L2, (n=21), e um grupo de monolíngues de inglês norte-americano (n=11) durante a sua compreensão de sentenças no present perfect (vs. simple past) em uma tarefa on-line de leitura auto-monitorada (*Self-Paced Reading* - SPR). Uma medida off-line, Tarefa de Julgamento de Aceitabilidade (*Acceptability Judgment Task* - AJT) foi utilizado como uma linha de base de conhcimento explícito da estrutura. Os resultados são comparados, qualitativamente, entre o grupo do monolíngue e bilíngue para investigar a sensibilidade, de cada grupo, às manipulações experimentais em tempo/aspecto, correspondência adverbial, e telicidade. O present perfect foi usado para os estímulos, pois é um tempo verbal do inglês adquirido mais tardiamente o que permite estudar as estratégias de processamento de bilíngues de nível mais avançado. Ambos os grupos foram capazes de reconhecer incongruências na atividade off-line. No entanto, o grupo monolíngue não foi sensível à condição de incongruência adverbial em tempo real, na atividade SPR. Por outro lado, o grupo bilíngue mostrou-se mais sensível a variável da incongruência adverbial, apresentando um comportamento que indica uma facilitação (automatização) de processamento da condição. O grupo monolíngue mostrou sensibilidade significativo às manipulações de telicidade em várias regiões do sintagma verbal. Diferenças entre os dois grupos foram observadas nas suas distribuições de tempos de leitura entre as condições em várias regiões da frase e elas são discutidas em termos de estratégias de processamento. Os monolíngues apresentaram efeitos de processamento integrativo no final da frase, os quais não são observados no grupo bilíngue. Atualmente, não há estudos com condições experimentais semelhantes que investiguem como os brasileiros bilíngues, avançados em inglês comportam na compreensão on-line de sentenças em inglês no present perfect.

Palavras-chave

Processamento de L2; Present Perfect; Telicidade; Influência interlinguística

Table of Contents

List of figures

1
Introduction

This investigation sought to characterize the proficiency of advanced English as a Second Language (ESL) university students from Brazil, Portuguese L1, by measuring their on-line reading times in reaction to tense/aspect manipulations in English sentences and then comparing these reading time patterns to monolingual English speakers. This was done, primarily, to contribute a much needed empirical description of English L2 tense/aspect processing patterns of Portuguese-English bilinguals upon which future sentence processing and bilingualism studies can build. Overall, Brazilian Portuguese-English bilinguals are not adequately represented in bilingual sentence processing literature.

This study is also translational in nature and the results will provide insight into educational contexts, especially ESL given that the target structure is one of the most widely-recognized English structures: the Present Perfect. This structure not only presents a challenge to learners of all proficiency levels in terms of learning/acquisition but it has been studied across various language pairs (i.e. Russian, French, German), allowing for greater ease of comparison across of the Portuguese L1 experimental group across existing literature.

The Present Perfect is a persistent focus of teachers due to its difficulty at all proficiency levels and thus is a critical object of study for translational researchers. Vanpatten (2020), among other scholars, has observed that most empirical data available on L2 grammatical knowledge, including the present perfect, is based on learner production and off-line error analysis. Psycholinguistic experiments help to complement these data by providing a more complete picture of the underlying

representations and processes which support the processing and acquisition of tense/aspect in general and of the present perfect in particular.

On-line experiments, such as the self-paced reading (SPR) used in this study, measure a participant's real-time responses to experimental manipulations during task completion, allowing for analysis of their automatic reactions to the stimuli which provide a more accurate reflection of the state of their interlanguage - their *implicit* knowledge of the language and its grammar (ELLIS, 2008).

Implicit knowledge refers to the type of knowledge which is automatic and inaccessible to conscious reflection, and, as Ellis (2008) notes, most scholars agree that this type of knowledge is derived from experience, not from explicit instruction or algorithmic thinking. As alluded to previously, a participant's implicit knowledge of a given grammatical structure can be deduced by timing their reactions to the experimental conditions, on the order of milliseconds, in order to measure their sensitivity to these manipulations. These varying levels of sensitivity can be compared within and between groups in order to characterize how the L1 of the experimental group may be influencing their implicit knowledge of tense/aspect, especially when compared to the native-speaker group which provides a baseline for comparison.

It's important to note that experiments which do not collect these time-measurements (off-line tasks) cannot reliably discern the type of knowledge/processing being used at any given point during the completion of a given experimental task. Thus, these off-line task results cannot be used to decisively make inferences about the type of knowledge being utilized by a participant. Understanding the type of knowledge (implicit / explicit) that is recruited on a given task is critical given that a more explicit processing may be drawing more non-linguistic types of cognitive processes and thus provide a less precise measure of a participant's interlanguage.

While there is substantial literature on off-line bilingual production of tense/aspect and morphology, little research has been done on how these structures are processed and how well bilinguals can apply their L2 knowledge automatically during on-line comprehension (ROBERTS & LISZKA, 2013; ERIKSSON, 2016; FARINA, 2017).

In order to address this lack of research, a study was conducted by Roberts & Liszka (2013) which investigated L1 cross-linguistic influence during processing of English L2 tense-aspect by comparing two "learner" groups (French L1 and German L1) during their comprehension of present perfect and simple past sentences. They first collected (off-line) acceptability judgments to establish each group's level of explicit knowledge of these tense/aspect distinctions. Then, they used self-paced reading (SPR) to measure the reading-time patterns at various regions in the sentence and compared these processing patterns to those of a baseline group of British English monolinguals. More details on this experiment can be found in the literature review (chapter 2).

The authors found a strong, native-like sensitivity to tense/aspect manipulations in the French L1 group but not among the German L1 group. The authors argued that cross-linguistic influence was likely the factor which caused this sensitivity seen in the French L1 group. Thus, it was hypothesized that French L1 learners likely have a more robust implicit representation of these tense/aspect distinctions as a result of their experience using their L1 which may have conditioned their attention to tense/aspect cues in a way that ultimately facilitates ("transfers") to their processing of tense/aspect in their L2, English.

The authors argued that this more generalized notion of cross-linguistic influence, or transfer, was more likely given that the tense/aspect system of German and French both contain a compound past-time structure which is superficially similar to the English present perfect. However, only French actually encodes its aspectual distinctions grammatically whereas German does not. Thus, the authors hypothesized that bilinguals with an L1 which distinguishes aspectual differences grammatically likely experience a cross-linguistic benefit, caused in part by their attention management, during processing of grammatical aspect in English L2. In other words, depending on the L1, bilinguals can be conditioned, through "copious and constant use" of their L1, to pay more attention to grammar/morphology for aspectual cues with less dependence on *lexical* items for these same cues. In this way, a bilingual's L2 processing strategy is influenced by their L1 experience and, depending on the attention management used in the L1 processing, they can more readily process morphological forms in the L2 (ROBERTS & LISZKA, 2013).

This hypothesis was tested by Eriksson (2016), using a partial-replica of the experiment above, utilizing a single Russian L1 bilingual group whose L1 grammatically encodes temporal/aspectual semantics. If, indeed, the parameter of +grammatical tense/aspect in the bilingual's L1 does provide a facilitative effect during their processing of grammatical tense/aspect in the L2, then the Russian L1 learners should demonstrate a native-like sensitivity to violations of Present Perfect sentences.

However, contrary to this broad notion of L1 transfer, hypothesized by Roberts & Liska (2013), the bilingual group in the Eriksson (2016) study showed no sensitivity to Present Perfect violations during the on-line task. The monolingual group (British English) showed increased processing costs on mismatched verbs in Present Perfect sentences, especially on atelic verbs while the Russian-English bilinguals did not show any significant sensitivity. Curiously, however, the bilingual group did show some differentiated processing effects for verb telicity, especially in the final regions of the sentence, indicating that telic verbs may have integrative processing costs for bilinguals, perhaps indicating that this is a more salient feature in L2 sentence processing.

In summary, based on these findings, the author argued that the mere existence of grammatical tense/aspect in the L1 is not sufficient to facilitate the processing of tense/aspect in the L2, contrary to predictions made by Roberts & Liszka (2013). Instead, it was proposed that cross-linguistic facilitation likely depends not only on the morphological encoding of tense/aspect in both the L1 and L2 but to also have a formally and functionally correlated target structure. In other words, bilinguals are primed to look for grammatical tense/aspect cues in a more context-specific manner in which the L1 and L2 both have not only parametric [+/- grammatically encoded aspect] but also formal and functional similarity of the grammatical structure in question (ERIKSSON, 2016).

Another important question which is addressed in this study is to verify the effects of verb telicity in L2 sentence processing. As mentioned above, verb telicity seemed to have a significant effect on tense/aspect processing. Namely, the monolinguals showed more sensitivity to present perfect violations when verbs were atelic and the bilinguals showed slightly different patterns between telic and atelic

conditions, showing processing costs (slow-downs) in the sentence final region of sentences with telic verbs.

1.1 Motivations

1. Description of Brazilian ESL student's L2 processing behaviors: The primary motivation of this dissertation is to characterize the on-line processing behaviors of Brazilian ESL students: sequential bilinguals[1] (adult acquisition) of advanced proficiency level. No research has been found which investigates the processing behaviors of adult sequential bilinguals of Brazilian Portuguese L1 during their on-line comprehension of sentences in their L2 (English) using the current experimental design: Present Perfect structure in a self-paced reading (SPR) task alongside an off-line acceptability judgment (AJT) task. These data can serve to orient future research related to multiple fields from bilingual sentence processing to language pedagogy and perhaps even to larger topics such as linguistic typology and description. Above all, the data provide more representation of Brazilian bilinguals in the sentence processing literature.

2. Investigate the effects of lexical aspect during on-line sentence processing: Andersen (1995), based on learner production and error analysis, postulated the Aspect Hypothesis which predicts that there is a strong interaction of aspect at the lexical-morphological interface during multiple stages of L2 acquisition. More specifically, this is a widely observed tendency for L2 learners to prioritize lexical aspect initially and acquire atelic verbs (states and activities) before telic verbs (accomplishments and achievements). Because of this, the acquisition of grammatical structures (morphology) which are canonically telic or atelic are acquired in stages, following this tendency. The Present Perfect, according to the Aspect Hypothesis, is canonically atelic/imperfective for monolinguals but learners in tend to associate all past-time

[1] *Sequential* bilingualism, in contrast to *simultaneous* bilingualism, classifies a situation in which an individual's second language is acquired later in life after the first language has already been established and thus the L2 is learned with greater cognitive and linguistic maturity (PARADIS, 2023).

morphology with a canonical telic/perfective meaning which is argued to cause the difficulty in its acquisition. These claims of the Aspect Hypothesis imply that there is a strong interface between lexical aspect and grammatical aspect but how this interface actually affects tense/aspect processing in real-time during on-line comprehension is not well studied and would benefit from more empirical support (i.e. UNO, 2014; FARINA, 2017).

3. Verifying potential factors related to cross-linguistic L1 influence:

Given that,

a) it has been hypothesized that L2 learners whose L1 and L2 both encode aspectual distinctions grammatically may experience facilitative cross-linguistic influence during on-line processing of tense/aspect in the L2 (ROBERTS & LISZKA, 2013); and

b) it has been observed that cross-linguistic facilitation of tense/aspect processing is likely constrained to specific contexts in which a bilingual's L1 and L2 have overlap of formal and functional structures to encode a given tense/aspect combination (ERIKSSON, 2016);

The current study, having access to an advanced-level group of sequential bilinguals of Portuguese L1/English L2, seeks to verify these observations as its secondary objective. This language pair is ideal given that both languages have similar ways of encoding the tense/aspect utilized in this study on the English Present Perfect. In particular, this structure expresses a *retrospective viewpoint aspect* which is encoded, in both languages, via a combination of temporal adverbials and morphological inflections to express that a past situation has relevance to the current situation at the time of speech, also known as *current relevance*. While Portuguese tends to be more flexible than English with its adverbial collocation, there are some contexts in which both languages have substantial form/function correlation, including the use of an auxiliary verb to mark this aspectual distinction.

The motivations listed herein are formalized into research questions and hypotheses in Chapter 3.

1.2
Research Objectives

1.2.1
General Objective

To describe how Brazilian Portuguese-English bilinguals process tense/aspect anomalies in their L2 (English) and characterize how this processing may be impacted by verb telicity in hopes of contributing to the literature on bilingual sentence processing and to provide empirical support for future studies on cross-linguistic influence and second language acquisition.

1.2.2
Specific Objectives

1. Characterize the bilingual participants' explicit and implicit knowledge of the target structures (present perfect and simple past) in comparison to English monolinguals;

2. Examine how manipulations to these tense/aspect distinctions affect bilingual and monolingual sentence comprehension, both off-line and on-line;

3. Verify if manipulations to the telicity of the verb impact tense/aspect processing;

4. Determine whether bilinguals and monolinguals demonstrate fundamentally similar/different processing patterns of telicity and tense/aspect during on-line and off-line comprehension;

5. Determine to what degree, and in which conditions, the bilingual group demonstrates a processing performance that approximates that of the monolingual group in order to provide a basis for future studies investigating cross-linguistic influence of Portuguese L1 / English L2.

1.3
Dissertation Overview

In the following chapters, the study of the questions raised here in the introduction are addressed through a literature review which presents relevant theoretical background on the experimental variables and conditions followed by a presentation of the experimental methodology and variables and, finally, the results and the discussion of the results are presented. Full inferential analyses are in the appendix.

In the literature review (chapter 2), the concepts of implicit and explicit knowledge are defined and discussed in the context of Second Language Acquisition (SLA) where the distinction between learned and acquired knowledge is of critical importance. Then, the target structure, the present perfect, is presented in section 2.2. This structure has various overlaps in form and function with the simple past tense/aspect and it is a universally late-acquired structure which presents a challenge to most sequential bilinguals of English, regardless of their L1, especially to those learning English in a formal, instructional context. In section 2.3, a theoretical framework of sentence processing is presented - Vanpatten's (2015) Input Processing Theory of SLA – which argues that monolingual and bilingual processing both utilize the same underlying L1 parsing mechanisms but each employ distinctive *processing strategies*. In section 2.4, Andersen's (1995) Aspect Hypothesis is presented which predicts that lexical aspect, specifically the telicity, plays a fundamental role in the order of acquisition of L2 morphology and thus it is assumed to also affect the on-line processing of grammatical tense/aspect. Finally, given that this research seeks to lay an empirical foundation for future studies on cross-linguistic influence, this phenomenon is discussed in section 2.5, followed by an in-depth presentation of the tense/aspect system in Portuguese in section 2.6.

The methodology section, chapter 3, provides information on the groups (bilingual and monolingual) and the experimental design and variables: 2x2x2 (Telicity of the verb - telic vs. atelic.; Verb tense: present perfect vs. simple past; Verb-adverb tense/aspect congruency - match vs mismatch) as well as the design and function of the instruments: off-line acceptability judgment task (AJT), on-line self-paced reading (SPR).

Given there are two experiments, the results are presented in separate chapters: the Off-line (AJT) results are presented in chapter 4, and the On-line (SPR) results are presented in chapter 5.

Finally, the findings to the research questions and hypotheses are presented, in chapter 6, and are discussed in relation to bilingual sentence processing of tense/aspect and telicity, followed by final considerations.

2
Literature Review

Chapter Overview

This chapter presents theoretical underpinnings of the current dissertation:

1. Implicit v. Explicit knowledge: their roles in cognitive processes and their implications for learning;

2. The target structure, Present Perfect: descriptions of its tense/aspect with comparison to its functional competitor, the simple past;

3. Monolingual / Bilingual sentence processing: monolingual and bilingual processing strategies are presented with considerations of implicit knowledge and the target structure;

4. Lexical aspect & telicity: relevant concepts related to telicity which is one of the experimental conditions;

5. Cross-Linguistic Influence from Portuguese L1: considerations of present perfect correlates and insights on cross-linguistic influence are presented.

2.1
Implicit & Explicit Knowledge

The challenges that older individuals and adults typically face when learning a new language contrast markedly with the apparent ease with which children often demonstrate using even highly complex structures in their native language. Most adults rarely reach a high level of automation *and* precision in their L2 but some do excel and it raises the question about the role of "transferring" knowledge from the first language, cross-linguistic influence. It's important to distinguish here that not all knowledge is considered equal. In this sense, Krashen (1981) distinguishes between "acquisition" and "learning," where the former idea is more or less akin to what other researchers refer to as "implicit" or "procedural" knowledge, while the latter idea resembles "explicit" or "declarative" knowledge.

Implicit knowledge, as defined by Ellis (2008), is the knowledge of a language and its grammar which is extracted from *experience* of usage rather than from explicit learning and rules. According to Ellis, implicit knowledge has many unique characteristics that differentiate it from explicit knowledge – namely that it is intuitive and procedural; it is variable yet systematic; and it is only accessible by means of automatic processing (ELLIS, 2008). The table below contrasts these features of implicit and explicit knowledge in regard to these characteristics.

Characteristics	Implicit knowledge	Explicit knowledge
Awareness	Learner is intuitively aware of linguistic norms	Learner is consciously aware of linguistic norms
Type of knowledge	Learner has procedural knowledge of rules and fragments	Learner has declarative knowledge of grammatical rules and fragments
Systematicity	Knowledge is variable but systematic	Knowledge is often anomalous and inconsistent.
Accessibility	Knowledge is accessible by means of automatic processing	Knowledge is accessible only through controlled processing
Use of L2 knowledge	Knowledge is typically accessed when learner is performing fluently	Knowledge is typically accessed when learner experiences a planning difficulty
Self-report	Non-verbalizable	Verbalizable
Learnability	Potentially only learnable within the 'critical period'	Learnable at any age

Figure 1: Key Characteristics of Implicit and Explicit Knowledge (ELLIS, 2008, p. 6)

It is this implicit knowledge (coming from experience of use) which is of interest in the present study. For this reason, a very specific type of test must be designed: an

on-line task which records the completion of the activity over time so that the time spent on each step of the activity (i.e. each word being read) is carefully controlled. This allows for deduction, on the part of the researcher, about the type of knowledge / processing that is being employed by the participants at any given time.

Studies in the field of neurolinguistics confirm that there is a clear distinction between implicit and explicit knowledge (PARADIS, 2004; ULLMAN 2004). According to the definition proposed by Han & Ellis (1998), the two types of knowledge can be discerned, in light of the various attributes discussed above, based on two main criteria - *accessibility and awareness*. Implicit knowledge is easily accessed in activities that require fluent linguistic performance. On the other hand, explicit knowledge can only be accessed through controlled effort, and it is more commonly used in tasks that demand planning and monitoring.

Krashen (1981), one of the pioneers in describing the two learning processes, stated that in oral production and comprehension, second language learners rely on implicit knowledge, whereas explicit knowledge is used to monitor errors in speakers' sentences and is not available spontaneously and automatically.

A substantial amount of research has confirmed the notion that a large part of implicit knowledge acquisition can take place with little to no awareness even in adults, confirmed via timed Grammaticality Judgment Tests (GJTs) which allow for measurement of comprehension automaticity in adults without formal instruction (WILLIAMS, 2005; REBUSCHAT et al. 2015; GODFROID, 2016).

Timed Grammaticality Judgment Tests have been used for decades such as Bialystok (1979) who conducted a GJT under two different conditions: a spontaneous condition (where judgments had to be made within three seconds) and a delayed condition (with judgments made 15 seconds after reading each sentence). She observed that participants achieved better results in correctly identifying grammatical sentences in the spontaneous condition, but had a higher accuracy in identifying non-grammatical sentences in the delayed condition. Bialystok suggests that her findings are consistent with a processing model whereby implicit knowledge is especially strong in sentence grammaticality recognition whereas anomalous sentences are precisely what causes us

to stop and recruit a more explicit type of analysis, requiring the retrieval of this more explicit linguistic knowledge.

GJT tasks can take on different formats (ELLIS, 1991), ranging from participants simply judging whether sentences are ungrammatical to identifying specifically the incorrect part in ungrammatical sentences or correcting errors in those sentences. However, the key question in this is aimed at the responses to grammatical and ungrammatical sentences and whether these are based on different sources of knowledge.

For instance, Ellis (2005) found that scores derived from ungrammatical sentences in untimed GJT tasks placed a much greater load on the explicit factor compared to scores from grammatical sentences. Gutiérrez (2013) also identified statistically significant differences in learners' responses to grammatical and ungrammatical sentences, both in timed and untimed tests in their study. They proposed that learners draw on implicit knowledge when judging grammatical sentences and explicit knowledge when judging ungrammatical sentences.

While the results concerning grammatical vs. ungrammatical sentences haven't been consistent across all studies (eg. KIM & NAM, 2017), most of the evidence supports Ellis' discovery (2005), namely, that ungrammatical sentences are more likely to elicit the use of explicit knowledge (GUTIÉRREZ, 2013; VAFFAE et al, 2017; ROD ELLIS, 2018).

In summary, GJTs have had a long history in psycholinguistic study and have been used for measurement of both explicit and adapted for measurement of implicit knowledge over the years with the addition of measures such as time controls, confidence ratings and retrospective reports from learners to establish more clearly whether their judgments were accompanied by conscious awareness. Arguably, GJTs can still be used as measures of implicit knowledge as long as these methods are incorporated to investigate the nature of the judgments made by the learners (ELLIS, 2018).

However, with advancements in technology, more accessible computer-based tasks have been developed to administer on-line psycholinguistic experiments such as eye-tracking, EEG, and self-paced reading, among others which do not depend on the

judgments of participants but capture reactions at a more subconscious level. These instruments are able to track the participant's automatic responses to experimental stimuli on the order of milliseconds and more reliably and directly deduce not only the type of processing involved but provide quantitative data to allow for analysis of processing cost associated with a particular structure of interest. This is typically done via manipulations that present a processing challenge (i.e. ambiguities, incongruencies). More information on these methodologies (on-line/off-line) measures is addressed in the methodology section (section 3).

A point of convergence in the literature surrounding implicit knowledge is that the acquisition of implicit language knowledge (i.e. of a given construction) comes through *practice/experience with the language* - exposure to exemplars of that construction with which are process by the learner's internal acquisition mechanisms which tally frequency statistics and ultimately form the basis of the implicit constructions that allow for automatic language comprehension and production (PARADIS, 2004).

However, if experience/practice is what develops implicit knowledge, is this knowledge from experience language specific or can it be "transferred" from the experience that a bilingual has in their first language? This is one of the questions taken up in the current study: to understand to what extent the implicit knowledge, perhaps of language in general, initially acquired in the learner's L1, could be available to them during processing of their L2?

While it's clear that new vocabulary must be learned, is it possible that there are certain structures or systems of temporal expression which may facilitate L2 processing? What are the conditions necessary for this: is this transfer of implicit knowledge a more general phenomenon or more structure-specific?

2.2
The structure: Present perfect

The present perfect is a tense/aspect combination (*present tense + perfect aspect*) which is commonly investigated in English language proficiency studies given that it is a late-acquired feature which challenges even advanced-level learners. It is marked by a particle, also known as the *auxiliary verb*, which takes the present form of the verb *HAVE* while the main verb is inflected in its *past participle* form, as in the sentence "*I have fallen in love*." It is a retrospective aspect which can be subtle and views states or events as occurring in a time-frame leading up to speech time, according to Downing & Locke (2006). Additionally, the event is psychologically connected or *relevant* to the present. This can be seen in the example below where this relevance feature/meaning is shown as leading from the past *Event Time* up to the time of speech (DOWNING & LOCKE, 2006, p. 385).

Example: "His marriage has ended and he has gone to live in another city."

Event Time Speech Time

|----------[Relevance] ---------->

In this way, the present perfect expresses both tense and aspectual information and distinguishing between these two is crucial. While tense and aspect both pertain to time, they are oriented from different perspectives. Tense, as pointed out by Schmitt (2001), deals with the relationship between the moment an event occurs and the moment of speech (temporal properties). On the other hand, aspect focuses on the temporal characteristics of an event or situation and how these characteristics relate to a reference time. While tense primarily situates an event or state in the present or past, aspect is more concerned with features such as duration or completeness of the process/situation being expressed by the verb (DOWNING & LOCKE, 2006).

As alluded to previously, the distinction between aspect and tense arises from the different perspectives from which the event is considered, rather than *when* the event took place. Comrie (1976) explains that aspect does not involve the relationship of the situation's time to another specific moment but rather focuses on the *internal temporal structure* of the situation itself, giving rise to terminology such as situational-internal time (aspect) versus situational-external time (tense).

While the perfect is often referred to as an aspect and sometimes as a tense, Comrie (1976) argues that this structure doesn't seem to fit neatly into the definition of aspect as it's not exclusively concerned with the internal temporal situation of an event but also with situating a situation in time. Biber et al (1999) classify it as an aspect as it designates events or states that occur during a period leading up to a specified time. Like Biber et al, Collins and Hollo (2000) also consider the perfect as an aspect and state that tense is concerned with locating events and situations at specific points along a "timeline," while aspect focuses on other temporal aspects of an event or situation, such as whether it is "in progress" or has been completed, also referred to as *perfectivity*. It is critical to understand that this *perfective* aspect overlaps with, but is distinct from, the *perfect* aspect.

To clarify, the *perfective* aspect views a situation as *complete,* visualizing it from an *external* perspective which encompasses the entire event, including its points of beginning and end, such as in the sentence, "John saw the bear." Conversely, the *imperfective* aspect views an event as *incomplete,* focusing on the *internal* aspects and ongoing parts of the event, such as in the sentence, "John was looking at the bear."

On the other hand, somewhat counter-intuitively, the *perfect* does not make the same distinctions as the *perfective* aspect but instead expresses a completely different aspectual concept, called *relative tense,* which situates an event relative to another time through which the event is viewed. More specifically, it locates the event in time, the *Event Time (ET*), as being anterior to, or leading up to, a *Reference Time (RT)* through which the comprehender can evaluate that event in the context of that *Reference Time* (PANCHEVA, 2003).

Notice this dynamic notated in the examples below of the *perfect* in its present and perfect tense. Notice that, in present tense, the *Speech Time (ST)* coincides with the *Reference Time (RT).*

Example #1) Present Perfect:

Our company has changed so much since 2005.

(ET < RT,ST)

Example #2) Past Perfect:

Our company had changed so much until 2005.

(ET < RT < ST)

As can be seen in the example, the *perfect* situates the *Event Time (ET)* anterior to the *Reference Time (RT)* and this *Reference Time* is marked by the tense of the auxiliary verb. Through this mechanism, the anterior event is perceived through the lens of the *Reference Time* allowing for psychological connections (relevance) to be established between the two situations. In the case of the present perfect, then, as mentioned previously, this relevance is to the current moment, and is marked as a semantic feature *[+/- current relevance]*.

In other words, the *present perfect* is used not simply to locate events relative to one another in time but, more importantly, to express the speaker's view that a prior action or state has relevance to the current situation in the present moment, hence the term *current relevance*.

There are three main aspectual meanings (also called semantic functions) of the present perfect which were originally proposed by Comrie (1985) and consolidated by Deshors (2020):

a) Resultative perfect: the current result of a past event. For example, "Jane has had a bath," implies that Jane is now clean. In this case, the focus is not on the action but on the *current result* of the past action, at the moment of speech.

b) Continuative (persistent situation) perfect: a state or event that began in the past and continues to the moment of speech. For example, "Jane has lived here for ten years," implies that Jane's living started in the past and continues in the present. The current relevance lies in the fact that the past situation remains true at the moment of speaking.

c) Experiential / existential perfect: the reference time does not correspond with the moment of speech. For example, "Jane has been to France," implies that she has experience or knowledge related to living there. The focus here is not on the voyage to France or when it happened. The focus is on the lived experience and that this experience is somehow relevant in the current context.

To further contextualize this discussion on the *present perfect*, it helps to contrast this structure with its functional competitor, the *simple past*. In some cases, the two are

so similar that speakers can freely choose between them without much consequence. However, in other contexts, the choice becomes more restricted where one form becomes more appropriate than the other. There is, in the case of the simple past, according to Taylor (1989, a "terminative nature" which makes the simple past canonical / prototypical in describing singular, deictic past actions that have no implication of a persistent result into the present moment.

So, the distinction between the two tenses is rooted not just in their different compositions but in the temporal focus they place on events. The simple past is deictic, locating a completed, perfective event squarely in the past and thus all temporal adjuncts must align with this past time reference. The *present perfect,* in contrast, makes reference to both the past and the present and thus allows for temporal adjuncts that pertain to the present, whereas the simple past does not (Huddleston and Pullum, 2002).

It is precisely this point which allows for the *simple past* and *present perfect* to be alternated in an experimental design, such as the current study, which creates a mismatch between a temporal adverbial and the tense/aspect of the verb phrase. Below are some examples of match/mismatch pairs that show how the semantic features, namely the [+/- current relevance] feature, must be consistent between verb-phrases and their temporal adjuncts. Utilizing the *relative tense* markers introduced earlier, the examples show how the [+/- current relevance] feature is formed by a coincidence between *Reference Time (RT)* and *Speech Time (ST),* indicating that the past event, marked "*Event Time (ET),*" is being evaluated through the lens/context of the present, current situation. In these terms, [+current relevance] can be notated as ET < RT, ST and [-current relevance] can be notated as ET, RT < ST.

Example #3) Present perfect match:

Our company <u>has changed</u> so much <u>since 2005</u>.

(ET < RT, ST) (ET < RT,ST**)**

Example #4) Simple past mismatch:

Our company changed so much ***since** 2005.

(ET, **RT < ST**) (ET < **RT,ST**)

*point of grammatical violation

The examples above illustrate the (in)congruency in the semantics between the verb phrase and temporal adverbials. Notice that the *since-adverbial* collocates with the present perfect because its temporal semantics are in alignment because they both have a current relevance meaning: they both place the *Event Time* anterior to the *Reference Time* / *Speech Time*. Whereas, in Example #4, the *Event Time* and *Reference Time* both coincide in the past [-current relevance] which is not compatible with the [+current relevance] adverbial..

These underpinnings of current relevance are important to understand because, the comprehended, upon hearing the mismatched [+/- current relevance] adverbial verb phrases must resolve the ambiguity which involves, on a deeper level, deciding whether the reference time in question should be in the past, coinciding with event time, or in the present, coinciding with speech time. In Example #4, for instance, upon reading the phrase, *"The company changed so much,"* the reader interprets the change as a completed, perfective and punctual meaning, situated firmly in the past [-current relevance]. However, this conflicts with the temporal semantics of the current relevance adverbial, *"since 2005"* which indicates that there is some condition or relevance that persists into the present moment. Until the intended reference time is sorted out, the reader is caught in ambiguity, and will need to decide whether to integrate the perfective reading indicated by the simple past verb inflection or to integrate the present-tense reference time indicated by the adverbial which may indicate that the "change" in question is not necessarily finished, rendering an imperfective reading. So, despite the nuance being subtle, it still generates some ambiguity, especially when there are mismatches in perfectivity.

It's worth emphasizing again, that although the terms "perfective" and "perfect" may seem similar, the *present perfect* tense/aspect does not correspond to the perfective aspect - the *perfective* is an aspect that expresses the idea of an action observed in its

entirety, whereas the *present perfect* is a verb tense that connects two situations on a timeline. These two terms are not interchangeable (COMRIE, 1976).

Notice in the following examples, how the reading of the verb, *has changed*, indicates a fully completed (perfective) event yet at the same time indicates that there is some current relevance of this change which persists into the present moment, perhaps that change is still in progress (imperfective). The main point to focus on here is that the simple past has a perfective meaning whereas the present perfect can be both perfective and imperfective and it is precisely in the opening and closing of this possibility that the ungrammaticality occurs. Consider the examples below:

Example #5) Present perfect match:

Our company has changed in so many ways **since** 2005.

(ET < **RT, ST**) (ET < **RT,ST)**

Example #6) Present perfect mismatch:

Our company has changed in so many ways ***after** 2005.

(ET < RT, ST) (ET, RT < ST)

Notice in the examples above that the present perfect *"has changed"* can be interpreted in two ways: perfective (i.e. the change happened) or as imperfective (i.e. the change is not over) but in both cases, there is a present-tense current relevance - there's something about the change that is important now. In other words, the reference time is in the present. However, the adverbial *"after 2005,"* despite providing almost identical semantics, makes the sentence ungrammatical precisely because the *after-adverbial* is a non-current relevance adverbial which places the Reference Time in the past. In this case, we get a contrast from imperfective to perfective and current reference time to past reference time. Despite the pragmatics of the sentence being clear, native speakers will have some reaction to the mismatch, demonstrating how this marking of relative tense, despite being a subtle and perhaps formal distinction, can still create a reaction.

Having this level of sensitivity, similar to a native-speaker who intuitively reacts to the sentence above without having to analyze it, is an example of the native speaker's

implicit knowledge at work. In fact, many native speakers would not be able to tell you why the examples above are not right. On the other hand, while most advanced learners may be able to analyze these sentences, and even explain why they're wrong, they will often experience difficulty doing so in real-time, spontaneous processing. In other words, English L2 learners may have the explicit knowledge of the present perfect structure but cannot put that knowledge to use in real-time, reflecting a lack of implicit knowledge of the structure.

In summary, the present perfect has been compared to the simple past - the two structures have some overlapping functions and are often confused for one another, especially by learners. The present perfect and simple past both have an anterior time-reference and they have very similar formal characteristics, in some cases the two are superficially identical other than the presence or absence of the auxiliary verb *"have/has"* as the only distinguishing surface feature.

For this reason, as mentioned earlier, the two structures provide a great opportunity to create grammatical / ungrammatical experimental pairs to investigate the processing cost for one or the other. While a native-speaker is likely to show little difference between the two structures, intermediate or even advanced learners are likely to show some discrepancy in their processing patterns between the two given that, in theory, they have more experience with the early-acquired structures (simple past) compared to late-acquired structures (present perfect).

Upon testing the highly-advanced learners in this study, it's possible that there will be very little difference compared to native speakers; however, a difference is almost certainly expected. What's interesting to consider, however is to what extent there could be variation in these differences. For example, do learners show a more native-like sensitivity to simple past structures versus present perfect structures? Do they show a more native-like sensitivity in particular contexts (i.e. perfective/imperfective)? Secondarily, if they show variation in processing ability, how much of this variation in implicit knowledge are universal tendencies of L2 learners, how much is likely from their experience and how much, if any, is from a potential influence of their first language?

This distinction of order of acquisition can go even further as there is evidence that suggests that not only are some structures acquired earlier than others in a learner's acquisition experience but that this rate of acquisition may actually be moderated by the type of verb that is being used in the sentence, in particular, the semantics inherent in that verb may lend themselves particularly well to that structure and to that particularly type of temporal expression (i.e. activity, state, etc.). These inherent semantics of a verb are known as *lexical aspect* which will be discussed in the next section.

2.3
Monolingual / Bilingual Sentence Processing

For proficient language users, language processing (comprehension) is fundamentally driven through the mapping of words and phrases into their hierarchal syntactic relations (parsing). This is widely recognized to be an implicit type of process that is done automatically through a type of language-specific mental architecture, called the *parser*, which is a language mechanism in the mind that is optimized to conduct all the computational processes involved in assigning incoming words into their proper phrase structure. The representation generated by the parser allows for the construction of a propositional representation of the sentence which is integrated with the listener's world knowledge and inferencing ability, providing a complete and coherent mental representation of the intended message (FRAZIER AND FODOR, 1978).

Language processing has been through the design of instruments and stimuli that purposely cause parsing failures such as the famous garden path sentences which manipulate features like prosody and punctuation to mis-place a syntactic relation of a sentence element, rendering almost non-sensical interpretations (e.g. "The dog walked around the block is happy.") These breakdowns, such as the premature mis-assignment

of the verb “walked” in the example above, demonstrate that parsing happens incrementally where words are chunked into clause/phrases in real-time. (Idem)

Frazier and Fodor (1978) were some of the first to formalize these observations about the parser. Namely, that parsing is incremental and builds a syntactic tree by fitting one word at a time to its appropriate branch. Importantly, the parser is not a parallel processor that can build two different interpretations simultaneously which eventually forces what may be a pre-mature interpretation. Finally, its default mode is to build representations as efficiently as possible which means minimizing the number of attachments (Minimal Attachment) closing off phrases-in-progress as early as possible (Late Closure).

On-line methods, such as eye-tracking and self-paced reading are precisely what allow researchers to find, in real time, at which point the reader’s parser is failing and thus they can attempt to deduce the process by which the reader attempts to repair the meaning/disambiguate the sentence. Each language seems to prompt slightly different preferences for how sentences are parsed (i.e. the recency principle or the predicate proximity principle). Technicalities aside, the key point here is that there is always a positive relationship between processing cost and distance from antecedents. These two costs are balanced by the parser to make the most efficient connections based on recency and simplicity and this all happens incrementally in real-time (Idem).

As the new information is processed, connections are not just being made between pieces of the new stated information but also a series of inferences between this information and general (world) information are constantly being made to create a coherent mental model which can then interact with the parser which is trying to close the phrase as soon as possible and its these inferences that often cause the garden path sentences – the plausibility of an interpretation. (Idem).

These pragmatic inferences are critical given that sentence comprehension often depends on making proper inferences about the intended message. Consider how the sentences below (#2 and #4) require a type of bridging inference in order to understand the temporal boundaries:

1) Since moving, Jane Smith has liked her new town.

*2) After moving, Jane Smith has liked her new town.

3) After moving, Jane Smith liked her new town.

*4) Since moving, Jane Smith liked her new town.

Examples #2 and #4 show instances of minor ambiguities that contain aspectual ambiguity due to the mismatch between temporal adverbial and verb inflection. In this case, the only inference we have (without context) is to guess the intended meaning of the writer.

In example #2, the initial adverbial expresses a past-time temporal boundary (deictic past) and aspectual information (perfective) which immediately narrow the possible types of syntactic combinations that could appear at the verb, namely we expect to see a deictic-past, perfective event. However, upon arriving at the verb, the parser gets a present-tense inflection and the parser either keeps the initial representation that it started or the reader must either re-analyze the sentence or make inferences about the intended meaning which in this case is that the verb has an imperfective and present-time relevance. This is also seen in example #4 where the adverbial expresses a duration using present-time frame with a retrospective viewpoint into a past reference time. Upon arriving at the verb, however, we have a deictic past tense verb. This example is somewhat easier to disambiguate because the *since-adverbial* has past-time semantics and it can be easily inferred that the liking started in the past and has not stopped.

It's worth noting that while the example above is easy to analyze and disambiguate in an explicit manner, how these particular present perfect / simple past alternation examples will be dealt with during spontaneous reading in the self-paced reading (SPR) task has not been widely studied and thus far, it appears that bilinguals are not particularly sensitive to these subtle syntactic/aspectual ambiguities (i.e. ROBERTS & LISZKA, 2013; ERIKSSON, 2016). Nevertheless, the extent to which a native-like sensitivity to these manipulations (or lack thereof) is to be considered either desirable or problematic is a question for future debate, pending more on-line experimentation. For example, as Jegerski (2014) argues that conclusions based on data from on-line experiments which provoke a processing problem should be made carefully: just because a bilingual has learned to have the same processing problem as

a monolingual may not necessarily reflect an objectively superior processing ability or a higher level of proficiency.

One reason why the sentences above likely don't cause a complete parsing breakdown is that adverbials tend play a higher-level role (i.e. discourse-level) than the grammar within a sentence. Literature reviews of psycholinguistic studies on tense/aspect processing (i.e BESTGEN; VONK, 2000; DICKEY, 2001) in monolingual contexts report on the differential role of verb and adverbial semantics on sentence comprehension and confirmed that fronted temporal adverbials set a "reference time" for understanding any tensed clauses that follow it. These studies supported previous assumptions (based on off-line studies) that temporal adverbials serve a strong discourse function as topic-markers which introduce a new discourse segment (i.e. VIRTANEN, 1992) and are central in facilitating the management of attention and memory during comprehension.

One particular study with experimental manipulations similar to the current study was Steinhauer and Ullman (2002) whose investigation on how mismatches between the verb tense and fronted temporal adverbials affected on-line processing by use of event-related potentials (ERPs) during sentence comprehension. When native English speakers encountered sentences with tense mismatches, there were immediate effects after the verb onset (400ms) namely the -P600 which is a clear sign of semantic anomaly detection, suggesting that native speakers are indeed sensitive to mismatches on-line but there is still question as to how consistently they actually demonstrate a detectable reaction when measuring at the interfaces (i.e. eye-tracking/self-paced reading). For this reason, among others, the current study seeks to contribute to this question which is how noticeable are monolingual reactions to these present perfect mismatches in on-line experiments that capture performance during reading comprehension?

2.2.1
Bilingual (L2) sentence processing

Bilinguals, especially adult sequential bilinguals, have a particularly interesting role in this experiment in light of the subtlety and complexity of disambiguating the syntactic/aspectual distinctions involved in processing the present perfect mismatch. The question is: how common is it for a bilingual to use an equally deep parsing strategy when comprehending their L2 which is similar to that of a monolingual? And perhaps an even better question is: would it even be an overall beneficial (cost effective) adaptation to make?

Acquisition is a long and gradual journey, typically taking years for adult bilinguals to show native-like automaticity and precision. Initially, sequential bilinguals resort to comprehension strategies that are more non-syntactic in nature and rely heavily on inferential types of processing, working more at the pragmatic and lexical level to obtain temporal semantic cues. This changes over time as their processing ability develops and they begin to free up their attention resources to process more morpho-syntactic elements (BARDOVI-HARLIG, 2002).

According to Vanpatten's (2015) Input Processing Theory of SLA, learners have developing L2 processing mechanisms which are adapted from their L1 parser and may not fully parse certain grammatical structures if these structures are not critical to the meaning of the sentence. In this way, sequential bilinguals tend to give primacy to lexical items and may not fully process items which are redundant or less meaningful in terms of their contribution to sentential meaning (VANPATTEN, 2015).

When considering these principles in relation to the examples shown earlier of the present perfect/simple past alternations, it provides insight into why this particular structure is resistant to acquisition given that, in addition to being non-lexical, it also exhibits substantial variability in its importance to full sentence comprehension. For example, the inclusion of the auxiliary in, "I (have) watched that movie," provides negligible difference in the propositional content and only carries a subtle aspectual distinction of [+current relevance] which is likely only a pragmatic implication in this context. This contrasts greatly with the dramatic semantic implications seen between the sentence, "I was with you for five years," and "I have been with you for five years." In the first, the action is seen to be finished in the past whereas the second example shows an imperfective, persistent situation. The propositions in this case are actually

polar opposites. In summary, this tendency for the present perfect to vary in relation to its degree of redundancy and significance in terms of constructing sentential meaning helps to explain why this particular tense/aspect continues to be under-processed (or skipped) not only in the early stages of acquisition where attentional resources are often strained but even in the late-stages as well (VANPATTEN, 2004).

As has been established, bilinguals tend to prioritize pragmatics before meaning and form (i.e. BARDOVI-HARLIG, 2002; VANPATTEN, 2014) and while they gradually stop relying so much on making inferences about semantic and syntactic relations as they advance in proficiency, they can still default to this processing strategy based on lexical primacy.

What's fascinating is that in the behaviorist-dominated 1950s, this would have been problematized but nowadays, studies reveal that bilinguals may actually benefit from not being pulled into the same vices as native speakers (i.e. JEGERSKI, 2014). While their default lexical-primacy strategy may not provide the same depth of syntactic parsing as that of a monolingual, this doesn't necessarily mean that it is an inferior strategy: as long as their comprehension is sufficient, it could arguably constitute an overall more efficient strategy.

However, the risk-reward must be considered given that, in some situations, if a reader does not properly parse the auxiliary of the present perfect for its temporal and aspectual meaning, their comprehension of the sentence can suffer greatly in some cases. Notice, in the illicit (*) examples below, namely sentence (b), that the mismatch in temporal/aspectual cues between the verb phrase and adverbial greatly impacts the sentence meaning:

a) John has lived in Rio since 2015. (present perfect/match)
b) John has lived in Rio *in 2015. (present perfect/mismatch)
c) John lived in Rio in 2015. (simple past/match)
d) John lived in Rio *since 2015. (simple past/mismatch)

In the illicit sentences, the reader must infer what the most likely intended meaning is, forcing a preference of either the verb or the adverbial. In these cases, if bilinguals default to a lexical primacy strategy, they would process the adverbial for

temporal cues and assume that the event is bounded in the past and the present-tense, persistent situation meaning is lost.

A study done by Roberts & Liszka (2013) used these same experimental conditions, using fronted temporal adverbials in order to study the difference between explicit and implicit knowledge of English tense/aspect in bilinguals from German and French L1. The authors used off-line acceptability judgment tasks and on-line self-paced reading tests. Their results show that all L1 groups – English L1 (native speakers), French L1, and German L1 all judged the mismatch conditions in tense and aspect to be less acceptable off-line, a reflection of working knowledge, an *explicit* knowledge, of English tense/aspect. However, the on-line processing patterns between groups differed significantly.

The monolinguals rated the tense/aspect mismatches as unacceptable but only showed a struggle with *present perfect* mismatches, not the simple past. As for the bilinguals, the French L1 bilinguals showed a similar alignment between their off-line and on-line performance in which they were sensitive to mismatch conditions in the present perfect but the German L1 group did not display the same sensitivity. The authors argued that the L1 background was likely the most significant factor which could have affected the French group's processing, indicating that certain attributes of the L1 may exert a significant influence on real-time language processing. The authors hypothesized that this may be due to the grammatical encoding of aspect in French, a feature absent in German. In other words, this raised questions about the potential cross-linguistic influence of the L1 on L2 processing, suggesting that an understanding of temporal relations, despite being obtained through use of the L1, could facilitate L2 processing but more on-line studies of L2 tense-aspect processing would be needed given that there were no similar studies available for direct comparison.

Another study which reflects sensitivity in bilingual processing of present perfect and simple past sentences was seen by Farina (2017) who measured differential reactions between intermediate and advanced-level English learners based on the boundedness of the verb phrase. The author examined if the boundedness of the predicate [+/- grammatically bounded] had any significant differences on reading times between groups. They found that advanced learners (but not intermediate learners) had

longer reading times on present perfect sentences, particularly in the nonbounded contexts. Conversely, the simple past was processed more quickly in these same contexts, likely a reflection of the simple past tense being learned earlier and used more frequently.

While the author saw little to no effect of typological frequency, there was a profound effect of telicity in the reading times, especially in the present perfect tense. This was argued to be a result of the shared semantics between telic predicates and the present perfect tense which together facilitate quicker processing, according to Anderson's (1995) Aspect Hypothesis (FARINA, 2016).

Farina's (2016) research on present perfect versus simple past sentence processing compared French-English bilinguals and English monolinguals in their processing of sentences contained manipulations to telicity. The author identified qualitative differences in tense-aspect processing between monolinguals and bilinguals. Unlike monolinguals, who were sensitive to the canonical perfective + past-tense combination, indicated by their slower atelic VP reading times, the bilinguals speakers showed no such processing cost. The author suggests this is likely a reflection of a type of prediction process that monolinguals exercise during parsing which was especially taxed in the atelic condition. This suggests that there are indeed fundamentally different cognitive mechanisms (or at least strategies) being used between the two groups, with the bilinguals adopting a more inferential type of strategy.

In summary, there are a variety of studies which support the notion that the temporal boundaries marked by lexical elements seem to have a particularly strong effect on both monolingual and bilingual processing.

Specifically, interactions with the inherent lexical aspect of the verb as well as the adverbial seem to show consistent effects on bilinguals in relation to their processing of tense/aspect morphology, supporting the notion that bilinguals tend to default, even at higher levels, to lexical-aspectual processing strategy but it is not entirely clear whether this adaptation is ultimately beneficial. Ideally, the current study will shed more light on this issue, illuminating how lexical aspect (namely telicity) articulates with on-line tense/aspect processing.

2.4
Lexical Aspect & Telicity

Comrie (1976) defines aspect as a linguistic category that is *non-deictic* - it does not link events to a reference point, but rather expresses the internal temporal structure of an event. The expression of aspect is often associated with grammar, (i.e. grammatical aspect) but aspectual meanings/attributes can also be expressed through the lexical items of a sentence, whose intrinsic semantics can work together, or interact, to create a compositional aspect for a given sentence (LOURENÇONI & MARTINS, 2016).

Regarding semantic aspect, Comrie (1976) established three pairs of semantic features that have distinct aspectual implications:

i. punctuality versus durativity,

ii. stativity versus dynamicity,

iii. telicity versus atelicity.

The first two pairs are relatively straightforward: i) does the situation in question have a duration or is it punctual (i.e. fight v. defeat); and ii) does the situation involve a change in state or does it remain static (i.e. have v. search). The third characteristic is of particular importance to the current study as it has shown to interact with rate of acquisition. The third semantic feature [+/- telicity] refers to a situation that includes an inherent and clearly defined endpoint, preventing the situation from continuing beyond that point, since upon reaching it, it would be in some way complete/finalized. (COMRIE, 1976; SLABAKOVA, 2000; MACDONALD, 2008).

The feature of telicity can be expressed in various ways across languages. It can be indicated, through the presence of a prepositional adverbial adjunct. An example of this can be seen in the atelic sentence *"Luis worked"* which becomes telic merely by placing a temporal adjunct after the verb,*"Luis worked until six,"* specifying an endpoint to the action (DE MIGUEL, 1999).

There are also direct complements to the verb which Lourençoni & Martins (2016) refers to as having a *"(non)delimited character* " in which *delimited* complements such as, "*eat an apple, bake the cake, pick ten apples,"* result in a clear

end-point and thus a telic interpretation whereas non-delimited complements, such as *"eat apples, bake cakes, pick apples,"* result in an atelic interpretation. However, this delimitation character can have degrees of intensity. For example, the phrase *"bake some cakes,"* is delimited to a degree and thus could result in a telic or atelic interpretation, based on the context. (LOURENÇONI & MARTINS, 2016).

These are examples of how the telicity of the sentence is determined by how the complement and temporal adjuncts (and other elements) ultimately interact with the verb which is the first cue about what type of grammatically-encoded temporal morphology the sentence will have. The inherent semantics of the verb (i.e. its telicity) in respects to their temporal/aspectual relations are referred to as *inherent lexical aspect.*

A verb's inherent lexical aspect can be considered as a composition/configuration of three parametric pairs of semantic aspectual features, mentioned previously. Vendler (1967) proposed a four-category classification for verb types (of their inherent aspect) using these elemental aspectual features (punctual / telic / dynamic):

	STATE	ACTIVITY	ACCOMPLISHMENT	ACHIEVEMENT
PUNCTUAL	−	−	−	+
TELIC	−	−	+	+
DYNAMIC	−	+	+	+

Figure 2: Feature analysis of the four verb classes (TERAN, 2014, p. 18)

As can be deduced from the table above, the four verb classes based on their semantic sub-features are the following: i) states - static conditions requiring no added effort (e.g., love, see), ii) activities - continuous actions with an undefined endpoint, uniform throughout (e.g., run, dance), iii) accomplishments - events with a duration and a clear endpoint (e.g., run a mile, build a house), and iv) achievements - instantaneous events reducible to a single time point (e.g., recognize, die).

Keep in mind that these verb classifications are called *inherent aspect* because they consider the temporal semantics of a verb that is unmarked, in isolation. The aspectual contour can change based on other elements in the sentence. For example, *"I have a piece of cake,"* is a state, but the moment I use the sense of *have as in 'eat',* "I am having cake," it is now an activity. Going one step further, by simply creating an

end-point with a complement, “I am eating a piece of cake,” we now see that this is an accomplishment as there is a clear endpoint where the activity is finished.

The point of this example above is to illustrate how the inherent aspect of a verb is just a starting point and its aspectual meaning will change depending on other sentence elements. It's important to note that lexical aspect differs from grammatical aspect, which marks a temporal reference through tense-aspect forms like the progressive marker (e.g. "I am playing the piano"). As an example, consider the two sentences "She is running in the park" and "She is running a mile in the park." Although they have the same grammatical aspect (progressive), they differ in lexical aspect - the first sentence describes an action continuing with an arbitrary endpoint, while the second expresses a durative situation with a final endpoint.

There is evidence which suggests that acquisition of L2 tense-aspect morphology (i.e. grammar) is heavily influenced by the inherent aspectual property of verbs. This has been observed in numerous studies, including the seminal work by Andersen and Shirai in 1994 and 1996, as well as Shirai's later works in 2004 and 2009.

Andersen (2002), in his work on the *Aspect Hypothesis*, argues that learners have “a cognitive predisposition to find real realized unitary bounded events encoded in the language and thus recognize that meaning of past perfective form and not the broader range of meanings the form has in adult native speaker use.” According to Anderson’s Aspect Hypothesis, learners tend to associate perfective tense-aspect markers with the meaning of a past event with a clear endpoint or result and thus the present perfect becomes canonical with these situations, even in late acquisition stages of acquisition. Thus, it’s common to see an interaction between telicity and L2 sentence processing.

Ayoun-Salaberry (2014) investigated this with French learners and found that lexical aspect has a significant effect in French learner’s proper use of English L2 simple past morphology. This was seen in the learner’s tendency to deviate from the predicted developmental path of past tense marking. According to Anderson’s (1995), Aspect Hypothesis (AH), learners tend to acquire morphology most closely associated with perfective and telic predicates before those with imperfective and atelic predicates. However, when French learners marked atelic states more consistently than telic predicates, this was a sign that perhaps a French L1 background provided learners

with a more robust implicit knowledge of tense-aspect morphology which was being applied to the L2 and over-rode this natural tendency (AYOUN-SALABERRY, 2014).

Some studies have found that the influence of the L1 may actually be most salient in its interaction with lexical aspect, especially with regards to telicity. These influences are often observed in telic/atelic distinctions precisely because they go against the clear, and otherwise stable, predictions made in the Aspect Hypothesis (ANDERSON, 1995) which observes a universal tendency for learners to first acquire telic and then atelic verbs, from accomplishment to achievement and then from activities to states. Gradually, all of these verb classes equalize in late-stages of acquisition. However, learners of certain L1 backgrounds seem to consistently override this predicted order of acquisition. Teran (2014) found that English L2 learners of Spanish L1 first acquired, and more easily processed, the unbounded Persistent Situation function of the present perfect which, once again, goes against the predictions of the Aspect Hypothesis and, the authors considered that L1 influence was the only likely explanation.

Teran (2014) echoed the need to control for lexical aspect and verb prototypicality in sentence processing studies but also considered that there may be several other factors moderating the development of present perfect in second language acquisition such as the effects of sentence-type, input exposure, L1 transfer and rote-learned forms. Sugaya and Shirai (2007) also notes that a variety of factors likely work together simultaneously and in a complementary fashion in the acquisition of tense and aspect.

Turning to the current study, which follows a line of research into the bilingual processing of the English present perfect, one particular study, Eriksson (2016), addressed this need to test for the effects of telicity in tense/aspect processing of the present perfect, given this well-established link between telicity and morphological processing. As mentioned in earlier chapters, the Eriksson (2016) study, *Processing of tense and aspect manipulations on-line in the first and second language: a self-paced reading study with Russian advanced learners of English,* tested for the effects of verb telicity on the processing of English L2 sentences in the present perfect and simple past through on-line SPR and off-line AJT tasks with verb telicity as an independent

variable, primarily seeking to test for its interaction effects between monolingual and bilingual participants.

The author found that Russian-English sequential bilinguals did not show any sensitivity to mismatch conditions but did see a consistent difference in their processing of telic and atelic sentences overall (a main effect). This distinction is crucial as it indicates that while the learners processed grammatical structures similarly, the semantic content of the verb had a strong influence on their processing. In particular, atelic verbs incurred a prolonged higher processing cost for the bilingual group across all match/mismatch conditions and tense/aspect conditions, suggesting that these learners might have, similar to the native-speaker group from the Roberts & Liszka (2013), a type of predictive anticipation while incrementally processing sentences with atelic verbs which are non-prototypical in past-tense structures.

This pattern aligns with the Aspect Hypothesis: all L2 learners tend to attribute a perfective value to the present perfect tense in English. The only effect for the monolingual speakers was in the interaction between the present perfect mismatch and atelic verbs, suggesting that monolinguals are more sensitive to the imperfective, "extended-now" interpretation and the atelic verbs likely make this type of more salient whereas bilinguals (i.e. the Russian learners in this case) more often interpret it in a resultative perfective sense. However, the author emphasized the need for more research to test if this main effect of telicity is actually a universal phenomenon or perhaps unique to Russian-English bilinguals, given that Russian is also a highly-inflected language.

In summary, the Aspect Hypothesis posits that L2 learners initially use tense-aspect forms based on their inherent lexical aspect before fully acquiring the target language's tense-aspect system. This hypothesis has been supported by various studies in L2 acquisition, indicating that learners' background and grammatical structure of their L1 significantly influence their L2 processing and acquisition but that telicity may be a feature that is universally active across L1 groups.

Additionally, the current study has the secondary objective to explore the possibility that Portuguese-English bilinguals may experience some cross-linguistic influence from their L1. Testing for the effects provides another layer upon which to assess whether bilinguals of Portuguese L1 conform to this general norm or whether they show a different reaction. Additionally, (as will be covered in later chapters) the bilingual group has an L1 (Portuguese) with relatively more flexibility in the collocation of present time adverbials (since, already, etc.) with both present and past tense/aspect inflections on the verb. If the bilinguals' attention is conditioned to their L1, they may tend to pay more attention to the adverbial for these cues and utilize more inferencing, making them less sensitive to mismatches in the tense/aspect.

2.5
Cross-Linguistic Influence

According to Krashen (1983), cross-linguistic influence does not likely play a significant role in "acquisition," which, according to him, happens through a fundamentally similar process as that seen in monolingual children (via exposure to natural input). While the author acknowledges that the L1 can have a role in language use, its function is more of the explicit type. However, Möhle & Raupach (1989) took the opposite perspective, arguing that very little transfer involves declarative knowledge (i.e., "learning"), at least in cases of *instructed second language acquisition*. They state that since procedural knowledge develops gradually, the classroom environment can promote declarative knowledge that eventually transforms into procedural knowledge, which follows more of a *skill-based theory of acquisition* (i.e. DEKEYSER, 2005). The current study does not necessarily take a position on this issue of the interface between implicit and explicit knowledge, but it does assume that cross-linguistic influence can, at the very least, *facilitate* the use and/or acquisition of implicit linguistic knowledge which can at the very least be applied to the use of the L2, especially when there are similarities or correspondences between certain features of the L1 and L2 (i.e. MÖHLE & RAUPACH, 2000).

However, it must be addressed: when we talk about “transfer” what is it that is actually being transferred? The discussion around this has typically converged on the concept of constraints. Schachter (1993), explains that the broad view of transfer can be thought of in terms of restrictions on the overall assumptions that bilinguals will formulate about their second language (ODLIN, 2023).

Some researchers argue that some structural features have shown obvious resistance to transfer, most notably the constraints on basic word order (RUTHEFORD, 1983; ZOBL, 1986), "functional projections" as described in Universal Grammar paradigm (VAINIKKA & YOUNG-SCHOLTEN, 1998) and, as is in the current study: bound morphology (EUBANK, 1993; KRASHEN, 1983). Nevertheless, there is substantial variation across acquisition contexts when it comes to acquisition of bound morphology and thus no definitive conclusions have yet been drawn (ODLIN, 1990, JARVIS & ODLIN, 2000).

In the spirit of maintaining the discussion, if there are indeed some constraints on the assumptions that a given learner can make about their L2, it would ultimately depend on the learner making some type of cross-linguistic identification of similar features between the languages, whether it be conscious or not. Thus, a constraint could be considered, in this context, as any element that inhibits a learner from perceiving the similarity between language features from the very outset or at least they are prevented from determining that such likeness is real and advantageous and then be able to put this knowledge to use in an automatic way. But the problem here is that we cannot assume that the knowledge available for conscious reflection is at all related to or compatible with the implicit knowledge necessary for an automatic and precise use of the language (ODLIN, 1990, JARVIS & ODLIN, 2000).

Constraints can also be thought to encompass more general cognitive abilities, including perception and memory, or they may involve linguistic principles that are wholly or partially independent from other human skills. Despite the likelihood of certain types of constraints existing, there still remains considerable uncertainty about the quantity of existing constraint types or the precise nature of each one of them.

Some argue that the concept of linguistic universals imposes constraints in both first language (L1) and second language (L2) acquisition (Hawkins, 2004), and that, in both cases, the learning processes of theoretical interest take place at the implicit level.

Even individuals who question the nature of these linguistic universals tend to agree that L2 acquisition is strongly influenced by prior knowledge of L1 or L1-based processing strategies (ELLIS & SAGARRA, 2011). Those in the process of learning a second language arguable approach L2 acquisition by bringing along some pre-existing linguistic knowledge and habits acquired from the L1 acquisition experience.

In the early literature on Second Language Acquisition (SLA), cross-linguistic influences were typically couched within theories related to "hypothesis testing" and learner strategies (CORDER, 1981; TOMASELLO & HERRON, 1989) suggesting a degree of intentionality and awareness in the process. While few scholars support the notion that L1-L2 influences are actually rooted in explicit processes there is still equally little empirical support to prove on the contrary that they arise at an implicit level. Instead, most scholars take the position that cross-linguistic influence is impacted by a variety of over-arching constraints such as individual proficiency, sociolinguistic factors, markedness, prototypicality, among others and it is precisely through the culmination of many interacting general constraints which is thought to be the critical factor in cross-linguistic influence with no single factor likely to be a significant determiner (ELLIS, 1994; 2001).

In fact, Werner et. al (2021) conducted a multifactorial corpus study which investigated bilingual production data of the present perfect and simple past and argued that a learner's native linguistic background (in itself) does not significantly influence their use of these structures. They argue that "linguistic influence emerges in the larger picture (i.e. error rates) rather than in the details (i.e. linguistic conditioning of the errors)" and that universal principles and surrounding linguistic factors are more crucial in the acquisition of the present perfect based on their observation on the alternation of present perfect and simple past errors and their co-occurring contexts. (WERNER et al, 2021)

A similar result was found by Deshor (2020): the alternation between simple past and present perfect is most significantly influenced not by L1 influence or lexical

aspect (as argued herein) but by a *combination* of effects, namely those in co-textual linguistic environment, with some proving stronger than others. The authors evaluated interactions such as verb semantics and verb type as being factors that moderate the correct use of the present perfect and simple past. They argue that the interaction between tense and the verb semantics is so strong that the effects of the L1 are comparatively insignificant. For example, it was found that verbs denoting an abstract process distinguish themselves from other verbs as they were more likely to trigger a simple past structure no matter what the L1 background was. This was also seen in the tendency for native speakers to prefer present perfect with action verbs compared to non-native speakers which universally preferred simple past in similar contexts (DESHOR, 2020).

In other words, results from these large-scale, corpus-based analyses of learner errors seem to suggest that the interaction of L1 may be relatively insignificant and that the over and under generalizations seen in learners are motivated by a combination of co-occurring linguistic factors.

However, as mentioned previously, studies of production are ultimately based on the externalized product of learners' linguistic competence which involves so many other complex, non-linguistic cognitive activities, that it's hard to determine what mind-internal factors are actually at play and therefore, it's beneficial, and perhaps necessary, to also study on-line comprehension to this end (VANPATTEN & JEGERSKI, 2010).

It is in the spirit of answering this call that the current study seeks to take psycholinguistic data from the main experiment into this discussion about the significance of L1 influence in L2 acquisition and what exactly is being "transferred" between the L1 and the L2: whether it's a type of generalized knowledge based on shared parametric categories or perhaps is limited to instances of close correlation between the L1 and L2?

One of the main studies in this line of research on L2 English present perfect tense/aspect processing, Roberts & Liszka (2013), *Processing tense/aspect agreement violations online in the second language: A self-paced reading study with French and German L2 learners of English*, sought to answer this question through

psycholinguistic experimentation. As mentioned earlier, the authors tested advanced English students from French and German L1, and found that French learners showed a more native-like processing of the present perfect, evidenced by similar slow-down reactions at the same region of the verb phrase.

They conducted a self-paced reading experiment, similar to the current study, with the aim of investigating whether proficient students of French and German, who are studying English as a second language (L2), possess the ability to perceive time/aspect mismatches between a temporal adverbial placed at the beginning and the inflected verb that follows it *(ex: "Last week, James has gone swimming every day,")* during on-line comprehension. Their hypothesis was that if the learners have fully acquired the underlying meaning of morphological marking for time and aspect, they should be capable of detecting the mismatch between an initially placed temporal adverb and the ensuing tensed clause, both in on-line and offline comprehension. Twenty German participants (average age of 23.5 years), twenty French participants (average age of 39.4 years), and a control group consisting of twenty English participants (average age of 35 years) were tested.

In the main experiment, two activities were conducted: an offline acceptability evaluation to assess explicit knowledge, and a self-paced reading experiment to explore implicit knowledge. The same materials, including items with time/aspect violations, were utilized in both activities. Twenty-four experimental items were arranged in a pseudo-random order and interspersed among an additional 60 distractor items. In the acceptability judgment task (AJT), participants were instructed to read each sentence and then rate its acceptability on a scale ranging from 1 (less acceptable) to 6 (more acceptable). Each of the experimental items and half of the filler items were followed by a yes/no comprehension question to ensure, as much as possible, that participants were paying attention.

The findings corroborate the hypothesized assumption as the AJT results showed that all groups regarded match conditions as more acceptable than mismatch conditions, both for simple past and present perfect sentences. However, only the French participants exhibited sensitivity during on-line processing, incurring higher

processing costs for the mismatch condition in their on-line reading times, specifically in the spillover region of the verb.

In other words, the *on-line* processing of French learners more accurately reflected their *off-line* metalinguistic assessments in both simple past and present perfect whereas the German L2 learners did not. Curiously, the native speakers showed sensitivity only to the mismatches in present perfect and not in the simple past.

What is curious about this study is that German and French languages actually have much in common: they both have compounded past tense forms which are superficially similar to the English present perfect and they both have some functional similarity in that they both utilize a simple present tense form as the correlate structure to express the unbounded *persistent situation* function of the present perfect (i.e. "I live* here since May.") Additionally, the two languages utilize temporal adverbials or pragmatics to disambiguate the preterit from the perfect. Despite these similarities, the two groups performed quite differently in the on-line test.

Based on these results, the researchers concluded that the performance difference between the French and German groups is most likely attributable to the L1 which facilitates the acquisition of certain morphology, perhaps by facilitating the automatization of processing of these structures, more quickly building an implicit type of knowledge, or perhaps is a general learned-attention brought on by frequent and copious contact with tense/aspect in the L1 (ROBERTS & LISZKA, 2013, p.427).

The authors brought special attention to the fact that French grammatically encodes the *perfect aspect*, but there is no 1-to-1 correlation between the present perfect equivalent structures. Despite this, French L1 bilinguals still showed a strong, native-like processing of English L2 sentences which suggests that, instead of a 1-to-1 structural mapping, the cross-linguistic influence is actually more generalized, perhaps due to the presence of grammaticized aspect in the L1 which may sensitize learners to the salience of aspect in their L2 (ROBERTS & LISZKA, 2013).

However, these results were challenged by Eriksson (2016), who problematized the imbalance of telicity in the stimuli as this could have skewed the results. Thus, the author conducted a partial replica of the Roberts & Liszka (2013) study, using the same paradigm of SPR and off-line AJT tasks.

As mentioned earlier, the Eriksson (2016) study examined the non-native tense/aspect processing of simple past and present perfect sentences while also balancing the stimuli for telicity. The author argued that, if the grammaticizing of tense/aspect in the L1 were exerting an effect, some sensitivity would be seen in the non-native group whose L1 (Russian) grammaticizes aspect.

Unlike the monolinguals, the bilinguals (Russian L1) did not show sensitivity to the mismatches during on-line processing which supports the notion that cross-linguistic influence is likely more context and correlate specific. Additionally, there could be effects found in the processing of telic and atelic conditions as the Russian-English bilinguals had consistently slower reading times on all atelic sentences. The author hypothesized that this could be caused by attempts to find a perfective/imperfective counterpart in English based on their understanding of aspect in Russian which is heavily inflected for the perfective/imperfective distinction. However, this tendency to have a facilitation with telic predicates is seen universally across L2 leaners and further research would be needed to clarify to what extent telicity might also be a feature that experiences cross-linguistic influence.

2.6
Portuguese Tense/Aspect Correlates to the Present Perfect

It has been hypothesized (i.e. ROBERTS & LISZKA, 2013) that non-native speaker groups whose L1 encodes aspectual distinctions grammatically may experience a generalized cross-linguistic facilitation during processing of tense/aspect in the L2. However, this generalized facilitation effect has been questioned (ie. ERIKSSON, 2016) and instead it is more likely that there is a more direct form/function correlation between tense/aspect structures necessary for there to be a significant cross-linguistic influence from the L1 to the L2.

In addressing this question, Portuguese-English bilinguals provide a great sample group as their language pair share important the characteristics mentioned above. Brazilian Portuguese, according to Finger (2008), utilizes three different grammatical structures to fully articulate the semantic range of the English Present Perfect.

However, one of which has a very strong similarity in both form and function (Pretérito Simples Composto) and her work with Brazilian Portuguese L1 students of English as an L2, observed that students, during Portuguese to English translation tasks, were very aware of this correspondence, evidenced by their consistency and precision with this correlate. Thus, there is an established sensitivity in this particular bilingual group to the presence/absence of a compound tense correlate, albeit perhaps on a more conscious level, which has a 1-to-1 correlation between the two languages to in its form and its function in expressing a present-tense retrospective viewpoint of past-time events.

Additionally, Finger (2008) found that there was a strong effect of telicity in predicting production accuracy. There seemed to be a facilitative effective of telic verbs, especially in the semantic function of the *Perfect Existencial* which expresses *perfective* events which are often *iterative* from the past and have a current relevance that persists into the moment of speech ("Ele tem me ajudado muito" / "He has helped me a lot."). Thus, in *perfective* contexts with *telic* verbs, Brazilians are accustomed to using a structure that is almost identical to the English present perfect.

Similar to the French L1 group in the Roberts & Liszka (2013) study which showed a native-like processing of present perfect mismatches in the atelic condition, Brazilian Portuguese has a similar profile: it grammatically encodes viewpoint aspect and contains a variety of English present perfect equivalent structures with varying degrees of form/function correlation that, hypothetically, may condition learners to manage their attention to grammatical cues in fundamentally similar ways across both languages. Brazilian Portuguese does not have a single structure that can fully capture the semantic range of the English Present Perfect and, to approximate the meanings expressed, Portuguese speakers use three different tenses:

1) Presente Simples (Simple Present),

Used to describe events happening at the moment of speaking as well as permanent states and habits.

"Carlos é medico há mais de 10 anos."

[Carlos is doctor has more of 10 years]

(Carlos has been a doctor for over 10 years)

2) Pretérito Perfeito Simples (Simple Past),

This tense describes events located at a specific past time and viewed from the perspective of the present. It indicates that the action is both past and complete. It also points to the event as past when it comes to the current moment of speaking.

"Maria já foi em Paris."

[Maria already went in Paris]

(Maria has been to Paris)

3) Pretérito Perfeito Composto (Present Perfect).

Used to indicate repeated or continuous event up to the moment of speaking.

"Gabriel tem escrito poemas de amor recentemente"

[Gabriel has written poems of love recently]

(Gabriel has been writing love poems recently)

(FINGER, 2008)

Finger's (2008) aspectual analysis on the acquisition of Present Perfect in Brazilian L1 learners of English as an L2, provided a translation task to 71 learners of three proficiency levels to test their accuracy in translating these correlates of the present perfect from Portuguese into English. The list of sentences covered all three semantic correlations with verbs across all 4 lexical aspect classes (states, activities, achievements, accomplishments) and a variety of collocating adverbials adjuncts.

The results revealed that the type of verb used in a sentence significantly affects the accuracy rates among learners in their translations. Specifically, "accomplishment" verbs were more readily associated with the English Present Perfect tense when collocated with *for- and since-adverbials.* This is presumed to be due to the intrinsic telic value which combines with the Present Perfect tense and implies that the described event is complete or has ended but the relevance or interactivity persists into the moment of speech.

At the intermediate and advanced level, difficulty was most seen for the Pretérito Perfeito Simples ("Simple Past") correlate when there were no accompanying

adverbials. However, learners still showed slightly more ease in constructing sentences with telic verbs which seemed to interact with the inherent notion of action completeness in this particular usage of the Present Perfect tense in English.

Work as early as Gohn (1981) and more recently, Sousa (2011) have studied the types of ungrammatical sentences in the *present perfect* produced by Brazilian students of English as L2 and notice, in the production, the influence of their native language, Brazilian Portuguese (BP) seems to strongly influence factor the types of errors committed as learners tend to select superficially similar BP correlates in place of the present perfect, namely the *simple present* and *simple past* tenses, mentioned above. It is precisely this flexibility of tense collocation that makes BP an interesting choice as is not entirely clear whether or not Portuguese-English bilinguals, during on-line comprehension will experience facilitation or interference given that, from an attentional point-of-view, there is a strongly related correlate in the imperfective function but given that this is one of three options, this overall 3-to-1 correlation of English present perfect structure correlates could cause less sensitivity to tense violations on the verb.

In attempts to investigate the unique grammar of Portuguese-English bilinguals, Cordeiro (2023) conducted an investigation that focused on two main objectives: i) identifying the types of errors in the present perfect made by Brazilian students throughout their learning journey, and ii) understanding what these errors reveal about the internal grammatical structure of these students. The authors, through error analysis, concluded that the complicating factor, in regards to learner errors, lies in the dependence (or lack thereof) on the use of verbal morphology to create the desired temporal (aspectual) references, a factor that, as mentioned above, is not so fixed in Portuguese which expresses temporal/aspectual relations with strong use of lexical tense/aspect markers.

There are four main aspectual distinctions made in Brazilian Portuguese, - imperfective, perfective, iterative, and indeterminate, originally proposed by Castilho (1968). These aspectual attributes combine in ways that functionally *approximate* the various uses of the *present perfect* in English and thus the expression of the "*perfect*

aspect" in Portuguese is not strictly-speaking, a grammatically-encoded aspect with its own complementary distribution as is the case in English.

Interestingly, over time, English has maintained the *perfect aspect* as a morphologically-encoded carrier of temporal/aspectual information while Portuguese seems to have lost this characteristic, rendering the expression of the "*the perfect aspect"* less grammatically salient/dependent as it is not obligatory encoded in the morphology of Portuguese sentences. Instead, Portuguese morphology tends to carry the *perfective/imperfective* aspectual distinction. This difference might explain why Brazilian English learners tend to associate the *present perfect* with *perfectivity,* and thus encounter difficulties in acquiring the structure. However, this is an area of study that still lacks empirical research (TRAVAGLIA, 2014).

Two studies (COSTA, 1997; SCHMITT, 2001) can shed light on the distinction between Brazilian Portuguese and English concerning the encoding of the *perfect aspect*. Costa (1997) identifies two aspects, mentioned earlier, that describe the composition of *the perfect* in Portuguese: *iteration* and *duration*. Iteration refers to multiple events that repeat one after the other *(i.e. "Many foreigners have come here.")* while duration refers to a single event that continues/persists into the present *(i.e. "I have lived in Rio since 2005")* and these two features (+iterative, +durative) can also interact in the same sentence *(i.e. "In the last few years, I have had a lot of success.")*. (COSTA, 1997).

Taking this into a more comparative context, Schmitt (2001) conducted an interlinguistic analysis of the *perfect tense/aspect*, comparing speech of native-speakers between the two languages. Schmitt observes that while both Portuguese and English utilize the simple-present tense to indicate a current state *(i.e. "Pedro sings.")* Portuguese can stretch this current state into a durative reading that starts from the past and continues to the time of speech. This is possible because the simple present tense in Portuguese has the flexibility to collocate with past-time adverbials to express this continuative function without any additional morphological inflection, notice the following example, with the gloss and translation provided in English.

Example # 8) Perfect Correlate in Portuguese: Presente do indicativo

BP: Pedro canta há muitos anos.

Gloss: Peter sings for[-PST] many years.

AmE:‘Peter [has sung/has been singing] for many years.’

Notice, in the Portuguese equivalent of the continuous/persistent present perfect (Example #8) we see the [+durative] meaning expressed exclusively via adverbial support in collocation with a simple present tense verb inflection. This creates the current relevance meaning, as is done in English, where the action/situation, the “singing” started in the past but persists into the present moment, and this “singing” is considered to be part of the ongoing situation at the time of speech, rendering an *imperfective* reading. This example shows an instance where Portuguese-English bilinguals may show some relatively higher levels of sensitivity if their frequency of use with duration adverbials collocated with a present-tense verb form does indeed prime their attention management across both languages L1 and L2.

In the example below (Example #9), we can see that, in BP, when *perfect* morphology is added to the verb it actually forces an *iterative* reading which would be in line with the experiential/existential function of the present perfect (the *perfective* function)

Example # 9) Perfect Correlate in Portuguese: Pretérito perfeito composto

BP: Pedro tem cantado muito desde 2010.

Gloss: Peter has sung much since 2010.

AmE: *‘Peter has sung a lot since 2010.’*

The example above (Example #9) demonstrates how the *perfect* morphology in Portuguese, marked by the *auxiliary + past participle* similarly to the English present perfect, renders an iterative reading in Portuguese. This function correlates with the experiential/existential function of the present perfect whereby (a repetition of) an action which occurred previous to the time of speech results in some type of current experience or existential relevance at the time of speech, (i.e. Pedro is a practicing singer with experience) which results in a *perfective* interpretation of the action.

However, there is also a "*stretched reading*" interpretation in which a repetition of actions/events "the singing" can be interpreted, by the comprehender, to be part of an ongoing state of affairs which started in the past and continues/persists into the present moment and counter-intuitively creates a *durative* and *imperfective* state in which an iterative and perfective action is and continues to be open to repetition, ambiguously occupying a middle-ground between a perfective event that iterates imperfectively into the future. So, at the phrase level the action is bounded and perfective but at the sentential level, the persistence of this state of affairs is imperfective. Admittedly, this aspect is nuanced and involves assumptions based on the most likely interpretation which is also part of what causes the difficulty for Brazilian learners of English with Portuguese as an L1 (FARINA, 2016; SCHMITT, 2001).

Linking back to the previous discussion on the influence of lexical aspect, these distinctions [+/-durativity/iterativity] expressed by the Portuguese *perfect tense* create variation that does not overlap neatly with the functions of the present perfect in English. A notable example, brought by Schmitt (2001) is in relation to the possibility for the *Portuguese perfect* to force an iterative reading of stative verbs, something which is not acceptable in standard English. For example, the Portuguese sentence, *"A Claudia tem sabido Francês,"* directly translates into English as, "*Claudia has known* French,"* which is non-standard because the state verb *know* in English does not have the parameter [+/-iterative] and thus as more accurate translation, depending on the context, would likely be, *"Claudia has demonstrated knowledge in French,"* which captures the iterative feature through the indication of a series of events, an iteration, in which knowledge is being instantiated or applied. (SCHMITT, 2001).

As mentioned earlier, the boundedness of the sentence can determine the way these boundedness conditions are established. Most often they are created through a temporal adverbial (i.e. *last year, since winter*). However, as Depraetere (1995) notes, the semantics of a verb or verb phrase may contain an inherent endpoint (+telic) and if this endpoint is reached, then a temporal boundary is created by virtue of the telicity of the verb (phrase). In this way, telicity has a critical interaction with the interpretation of the time boundaries of the sentence and thus directly influences which semantic

function of the perfect is instantiated and could provoke a type of on-line disambiguation process that would cause an immediate processing cost on and after the verb.

The bounded function of the present perfect (the resultative) is canonical with telic/perfective predicates and this is often considered the most prototypical of function of the present perfect among monolinguals. It also has the strongest formal/functional correlation to the Portuguese present perfect (*pretérito perfeito composto).* Thus, if learners were to show a disproportionate sensitivity to this one condition, this could be an indicator that of a L1 influence which is amplified by a very specific linguistic context which elicits this specific semantic function of the structure. On the other, if the learners show sensitivity to all conditions, then this would suggest that the influence is more generalized and not so much a structure or context specific phenomenon.

Due to the fact that the *perfect tense* in English does not correspond to its equivalent in Brazilian Portuguese (BP) in most cases, BP speakers must resort to various alternate structures to translate this form into Portuguese. This is most often done, according to Shutz (2004), “through a combination of specific adverbs, prepositions, adverbial clauses with verbs, or verbal phrases in which the main verb is in the Present, Past, Gerund, or Infinitive" (SCHUTZ, 2004, p. 12).

In other words, the correlates of the present perfect are not strictly limited to three neat verb inflections given that, colloquially, in Brazilian Portuguese, there are additional devices available. The system of tenses is divided into the present, preterite (or past), and future and are further subdivided into the indicative and subjunctive moods, illustrated in the diagram below (CUNHA & CUNHA, 2001):

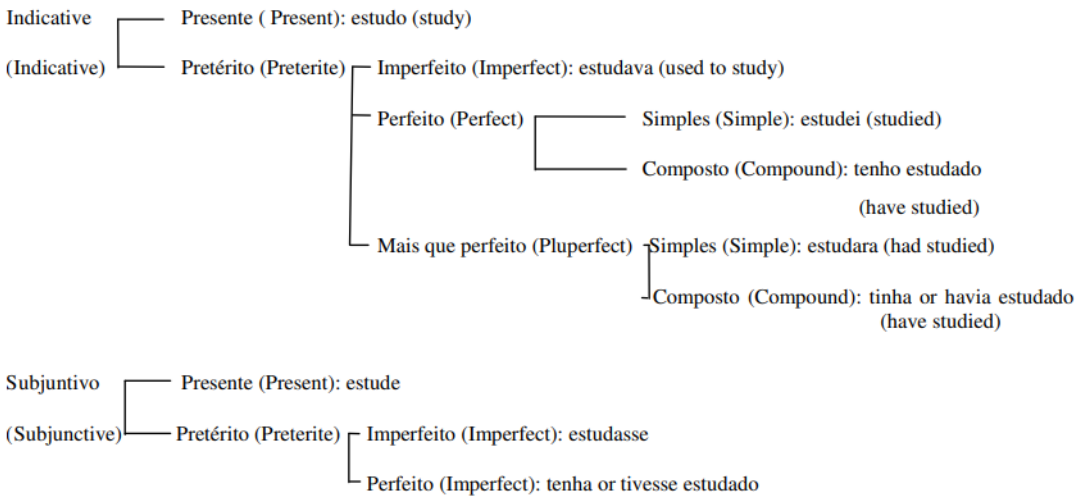


Figure 3: Subdivisions of tenses in Portugueses (CUNHA & CUNHA, 2001)

The simple past tense *(pretérito perfeito simples)* in Brazilian Portuguese indicates that an action occurred at a specific moment in the past. However, unlike in English, the past situation/event is perceived by the observer from the viewpoint of the present context - a *retrospective viewpoint* – which immediately creates this link of current relevance which is only available in English via the present perfect. In BP this current relevance is not encoded grammatically but through lexical and pragmatic means. Consider the dialogue below to clarify:

Example #11) Dialogue illustrating flexibility in BP viewpoint aspect:

- Porque ele é tão forte? (Why is he so strong?)
- Porque ele malhou muito. (He worked out a lot.)

(CUNHA & CUNHA, 2001)

This dialogue sounds strange in English because the proposition of the initial question is related to the current situation and the answer, given with a *simple past verbal inflection* does not align with this pragmatically. English speakers do not automatically assume a retrospective viewpoint. In other words, the perceived (retrospective) connection between the past and the current situation which is implicit in Portuguese must be made explicit in English otherwise it is typically assumed to not exist, (i.e. there is no expression/comprehension of current relevance). Despite the context/semantics being quite obvious, likely only resulting in a minor reaction

(perhaps unconsciously) from a monolingual, the discourse pragmatics are clearly misaligned due to [-current relevance] feature of the simple past verb semantics. Following the principle of selecting the most specific feature to express a given temporal relationship, standard American English speakers would opt for (and judge) the *present perfect tense* to be more adequate in this situation as it makes this retrospective connection, the current relevance, more explicit.

The third structure of interest, the compound form, known as the *pretérito perfeito composto* in Brazilian Portuguese, expresses a repetitive or continuous action that has relevance to the present. For example, "Tenho escrito muitos poemas /I have written many poems," mentions a past action but places the focus on the current state of affairs which, in this case, is related to the subject being active and productive in their poem writing. Furthermore, it is understood that this state of affairs is likely to continue into the future (it's in progress / imperfective). In fact, Costa (2002) argues that the "pretérito perfeito composto" is the only compound tense in Portuguese that can accommodate imperfective characteristics, as it refers to iterative or habitual activities that extend up to the present moment. While iterativity is a specific phenomenon of the "pretérito perfeito composto" in Brazilian Portuguese, it can also express unique and durative situations (TRAVAGLIA, 1981; MOLSING, 2006).

Ilari (2001) argues that both theories are problematic because, although the present perfect is characteristically iterative, it also expresses unique and durative situations. For instance, "A Maria tem estado doente" (Maria has been sick). This further underscores the complexities in interpreting the perfect tenses in both languages.

As mentioned earlier, the telicity of the verb interacts with other elements of the sentence, namely its complements, to create time boundaries which influence the overall temporal/aspectual contour of the sentence. According to Moure (1991), the distinction between a telic sentence and an atelic sentence is established based on the degree of precision offered by the determiner to the verb's object. If the complement lacks explicit determination, such as an unspecified quantity, as in the sentence, *"Mark ran,"* the lack of clarity in its delimitation will result in an atelic-oriented interpretation

whereas a more intensely determined complement, such as *"Mark ran a marathon,"* results in a telic interpretation. In Brazilian Portuguese (BP) and English, there is no verbal morpheme that signals the limitation of an event, which needs to be expressed through other elements in the sentence structure, such as a specific type of complement, a prepositional adverbial adjunct, or optional delimiting particles. (MOURE, 1991)

In conclusion, the acquisition of tense/aspect in English poses a challenge for speakers of Brazilian Portuguese (BP) given the dramatic difference in flexibility between the two languages in expressing the [+current relevance / +anaphoric anterior time] feature that is so characteristic of the English present perfect. While English demands very specific and rigid form/function requirements: compounded auxiliary verb with a morphologically inflected participle which, by itself expresses a complex *relative tense* relationship which sets two temporal points in relation to one another and can express both perfective and imperfective meanings.

Brazilian Portuguese, on the other hand, has such a wide range of paraphrastic options to create a similar meaning. Just for the sake of elucidation, consider how many ways a single *present perfect* sentence can be rephrased and keep in mind that this list is not exhaustive:

English: "Since last year, John has worked out a lot."

Portuguese:

a) "Desde o ano passado, John tem malhado muito."
b) "Desde o ano passado, John malha muito."
c) "Desde o ano passado, John malhou muito."
d) "Desde o ano passado, John anda malhando muito."

It is with this last example that we appreciate the incredible creativity and flexibility of expression available to Portuguese-English bilinguals. Now, the question is whether this wide range of options facilitates or impedes their on-line processing of the English present perfect.

3
Methodology

3.1
Research Questions & Hypotheses

3.1.1
Research Questions

Primary Questions:

1. Using an on-line Self-Paced Reading (SPR) task and an off-line Acceptability Judgment Task (AJT), do sequential bilinguals of Portuguese L1/English L2 demonstrate sensitivity to tense/aspect mismatches between verb inflections and temporal adverbials during their off-line and on-line comprehension of English sentences in the present perfect and simple past?
2. Does the inherent telicity of the verb (telic/atelic) affect the on-line and off-line comprehension of tense/aspect in bilingual sentence processing?

Secondary Question:

1. Upon secondary analysis of the bilingual and monolingual participants' sensitivities to tense/aspect violations across all tense/aspect, match/mismatch, and telicity conditions, are there any conditions (or combinations thereof) in which the Portuguese-English bilinguals exhibit facilitation and/or processing patterns that are qualitatively similar to those of English?

3.1.2

Objectives

Primary Objectives:

1. Describe the processing behaviors of Brazilian adult bilinguals (Portuguese L1/English L2), in contrast to monolinguals (English L1), during their comprehension of English tense/aspect manipulations (simple past v. present perfect) in both licit and illicit adverbial match conditions (match/mismatch) through the application of two experiments: a) an on-line experiment (SPR) to provide data on incremental sentence processing costs in terms of reading times (milliseconds) at each word in the critical region and b) an off-line experiment (AJT) to validate the participants' knowledge of the structure (acceptability ratings 1-6) and to further contextualize the data from the on-line experiment.
2. Determine whether Brazilian adult bilinguals (Portuguese-English), in contrast to monolinguals, show a sensitivity to manipulations to verb telicity (main effects) during their on-line and off-line comprehension of English tense/aspect and determine to what extent this sensitivity affects their processing of tense/aspect violations (interaction effects).

Secondary Objective:

1. Determine, based on the experimental results (off-line judgments, reading times, and reading time contours) to what extent the bilingual and monolingual participants show qualitatively similar sensitivities to tense/aspect manipulations and determine whether the bilingual participants exhibit any particular processing facilitations or costs which might be attributable to cross-linguistic influence from their L1 (Portuguese).

3.1.3

Hypotheses

Primary Hypotheses:

1. Based on results of previous L2 sentence-processing studies which measure on-line comprehension of present perfect tense/aspect violations with an SPR task (ROBERTS & LISZKA, 2013; ERIKSSON, 2016), it has been hypothesized

that bilinguals with an L1 that a) *grammatically encodes* temporal/aspectual distinctions and b) contains a *shared formal/functional correlate* of the present perfect tense/aspect are likely to experience facilitative effects during their on-line comprehension of this tense/aspect due to attentional conditioning from their L1. Therefore, it is hypothesized, based on the studies cited above, that Brazilian adult bilinguals (Portuguese L1/English L2), due to the presence of these two attributes in their L1, will be sensitive on-line to mismatches between the present perfect tense/aspect and collocating temporal adverbials, which will be indicated by a significant increase in the reading times on and around the verb region, reflecting a higher processing cost. Additionally, sensitivity to violations in the present perfect are expected to be more pronounced than violations in the simple past tense/aspect, in line with the studies cited above, likely due to the temporal semantics of the simple past being more deictic and perfective in nature, thus provoking less ambiguity about the sentential aspect. Finally, it is expected that bilinguals, due to their instructed acquisition background, will have robust metalinguistic knowledge which will result in a relatively strong, consolidated within-group performance on the off-line task as compared to the on-line task.

2. Bilinguals (compared to monolinguals) will show relatively higher sensitivity to manipulations in verb telicity given that a) based on the results from Eriksson (2016) which found that bilinguals of Russian L1/English L2 tended to have overall slower reading times on and after telic verbs as compared to monolinguals who showed no differential sensitivity to verb telicity and b) adult second language acquisition tends to occur in stages moderated by *lexical aspect* and associated canonical morphology whereby, as described by Andersen's (1995) Aspect Hypothesis[2], L2 learners initially tend to prioritize the processing of lexical items for temporal/aspectual cues and thus pay more attention to the *lexical aspect* of the verb, resulting in a skew to initially acquire

[2] The main claim of the Aspect Hypothesis is that L2 learners initially use tense-aspect forms based on their inherent lexical aspect before fully acquiring the target language's tense-aspect system.

atelic verbs and their canonically *imperfective* morphology, followed gradually by *telic* verbs and their canonically *perfective* morphology; and c) the present perfect tends to be associated with telic verbs and a perfective value which may make mismatches more salient in *atelic-imperfective* contexts. Therefore, it is expected that the Brazilian adult bilinguals (Portuguese-English), in contrast to monolinguals, will show differential sensitivities to manipulations to verb telicity (main effects) during their on-line and off-line comprehension of English tense/aspect and this sensitivity will likely make certain tense/aspect violations more salient for bilinguals, namely the present perfect in the atelic condition.

Secondary Hypothesis:

1. Upon secondary analysis, correlations between bilingual and monolingual off-line judgments, reading times, and reading time contours will allow for verification of three areas of interest in terms of processing cost/facilitation which might attributable to cross-linguistic influence of Portuguese L1. These two areas are based on observations by Finger et al. (2008) who analyzed Portuguese > English student translation accuracy across various conditions in the present perfect and simple past. The students demonstrated a tendency to easily conceptualize the English present perfect in its *perfective* function in situations that corresponded to the Portuguese Pretérito Perfeito Simples, which is superficially similar to the English *simple past* and, according to the author, student translation accuracy was highest when collocated with telic verbs (accomplishments and achievements); and b) in terms of processing costs for Portuguese L1 English students, the learners faced difficulty when required to distinguish between contexts where the use of the present perfect contrasts with the simple past where the semantic implications of the present perfect go beyond the mere transmission of a completed idea or action (*imperfective*). Therefore, it is expected that the bilingual group will experience facilitation with telic/perfective predicates and higher processing costs for atelic/imperfective predicates.

3.2
Variables & Grouping

Groups:

A) (Sequential) Bilingual Group: Portuguese L1 / English L2

B) **Monolingual Group:** North-American English L1 – Control group
Note: The effects and interactions of the variables listed below are analyzed separately for each group and then discussed in the Discussion section.

Independent Variables

1. Telicity of verb: atelic / telic;
2. Tense/Aspect: present perfect / simple past;
3. Tense/Aspect (TA) Match: match / mismatch (between adverbial and verb).

Dependent Variables:

1. Off-line Likert acceptability judgment rating (1-6): Measure of participant's baseline, explicit knowledge of the target structures: present perfect / simple past.

2. On-line self-paced reading times (milliseconds): Measure of participant's sensitivity to tense/aspect violations in the critical and spillover regions of the sentence (word positions #5-8), an indicator of processing cost during on-line comprehension correlated to the participant's (implicit) knowledge.

Overview of Variables/Conditions (2x2x2)

	Present Perfect (n=16)		Simple Past (n=16)	
Verb Telicity	Match (baseline)	Mismatch	Match (baseline)	Mismatch
Telic	Since the party… I have learned…	After the party… I have learned…	After the party… I learned…	Since the party… I learned…
Atelic	Since the party… I have studied…	After the party… I have studied…	After the party… I studied…	Since the party… I studied…

The above combinations of variables result in a total of 32 experimental sentences in 4 trials x 8 conditions, pseudo-randomized with 32 filler sentences.

3.4
Participants

Portuguese-English Bilingual Group: This study utilizes a sample of 21 Brazilian sequential bilinguals of Portuguese L1 / English L2, adult age-of-acquisition, advanced-level students of English as a Foreign Language (EFL), between 20 and 50 years of age (mean = 24), 16 of which are post-graduate students of Portuguese & English Letters degree, currently enrolled in 5th-semester English literature courses. The other 5 participants are recent graduates of a similar profile. They are all Brazilian nationals, with Portuguese as their exclusive native language.

In regards to English educational background, the grand majority of participants (84% on average) report having at least two years of English language instruction at every level of their education from elementary through university. None of them have engaged in study abroad programs recently and a small number (19%) have had one study abroad experience in the non-recent past ranging between 1 to 3 months duration (chart below).

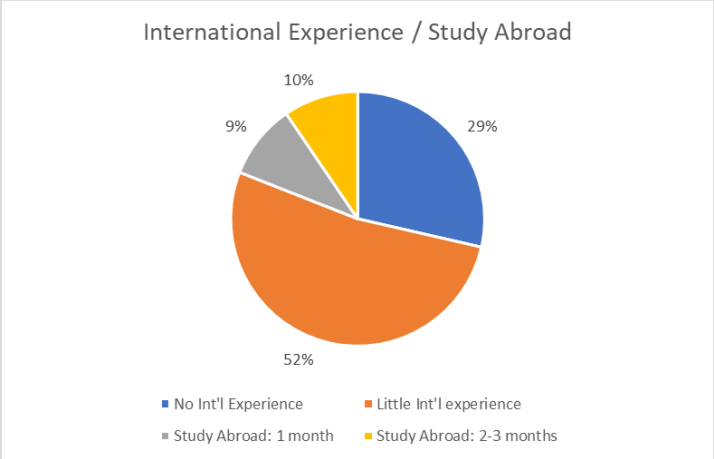


Figure 5: Graph of bilingual group's international experience

In regards to recent English language contact (during the last semester), roughly a third of participants report having had weekly or daily contact with native English speakers (33%) and/or English speaking colleagues (38%), the rest of the participants report little or no recent extracurricular contact with English speakers, at most a couple times per year. However, the great majority of participants (95%) report watching videos and listening to music in English on a daily or weekly basis. In regards to

reading, on average, 35% of participants report daily or weekly reading in English such as news, books, and magazines.

Participants' advanced level status was confirmed via their score on the Updated Vocabulary Levels Test (UVLT) which estimates their vocabulary range which can be correlated to various levels of the Common European Framework Reference (CEFR). The minimum for participation in the experiment was to reach advanced level (C1, (advanced or C2, very advanced). The minimum (C1 level) corresponds to mastery of at least the most frequent 3,750 words which all participants demonstrated by achieving 87% or higher on the word recognition task in a representative sample taken from the 4,000 word-frequency level. More information can be found in the section on the UVLT. The majority of participants (n=15) correlate to the very advanced C2-level and the rest (n=6) at the advanced, C1-level. Given the objective of the UVLT test is to serve as a triage and confirmation of an already presumed advanced status, the participants' vocabulary scores / CEFR levels did not undergo statistical analysis nor were they utilized in the analysis of the experiment.

Monolingual Group: The English monolingual group (n=11) is used to provide baseline measurements with which to contrast and contextualize the bilingual group's sentence processing patterns. This group is composed of a convenience sample of North-American-English speaking post-collegiate professionals, between 34 and 44 years of age (avg = 38, SD = 3.2). Given that all participants in this group have a college degree, over half (54%) having obtained higher post-graduate degrees, lack of reading comprehension or fluency should not be a confounding factor.

A slight majority of participants (7/11) report some bilingual contact and report some past experience with studying/living abroad in the country where their L2 is spoken. However, only three participants (3) reported having an advanced L2 proficiency.

Spanish is the main L2 (6/7) of the bilingual participants. Of these seven bilingual participants, two report having 2 years of experience living/studying abroad while the other 5 had shorter experiences of less than 1 year (n=2) and less than 6 months (n=2). The remaining four (4) participants are monolingual, two of which report having some minor familiarity with the Spanish language.

Upon acceptance, similar to the bilingual group, the monolingual participants were grouped into the same four Latin-square groups and treated with the same experimental conditions.

3.5 Instruments

3.5.1 Updated Vocabulary Levels Test (UVLT)

The Vocabulary Levels Test is a test originally developed by Nation (1990) in order to provide a measure of vocabulary size. There are five levels, each with a sample of words taken from a particular frequency range in the Brown Corpus, the first level corresponding to the 2,000 most frequent words and the fifth level going up to the 10,000 most frequent words. Test-takers must match a word with its definition and should be able to identify 12 of 18 words presented at each level. A test-taker's vocabulary size can be estimated and the corresponding CEFR level can be assumed. (SOUZA & SILVA-SOARES, 2015, P. 193).

An enhanced version with its first validation study was presented by Schmitt, Schmitt, and Clapham in 2001. This VLT version uses a matching format to test 150 words across four frequency levels (2000, 3000, 5000, 10,000) and an academic vocabulary level, and was a widely used vocabulary estimation tool for over a decade. More recently, however, the Updated Vocabulary Levels Test (Webb, et al., 2017) was adapted from the original and increased the number of items at each level from 18 to 30, with a minimum score of 26/30 on a given level which has demonstrated to a more statistically valid result.

Webb and Sasao's (2017) UVLT was designed to address their concern with the lack of 1000 and 4000 word-frequency level coverage led to the introduction. The UVLT, using a matching format like the VLT, is built on Nation's 2017 BNC/COCA word list, with 15 nouns, 9 adjectives, and 6 verbs tested at each level. The UVLT omits the 10,000 frequency and academic levels, replacing them with the 1000 and 4000

word-frequency levels, reflecting a shift toward higher-frequency words (STOECKEL et al., 2021).

In this way, the UVLT provides a formalized and standardized measure of language competence for participants without the need for a prolonged and complex grammatical test which could discourage participation. The correspondence between the standard CEFR proficiency levels and a participant's vocabulary size, as indicated by Souza & Soares (2020), can be seen below.

CERF Level	Vocabulary Descriptors	Vocabulary Size XLex (5000 max)
C2	Broad lexical repertoire including idiomatic expressions and colloquialisms.	4,500 – 5,000
C1	Little obvious searching for expressions. Good command of idiomatic expressions and colloquialisms.	3,750 – 4,500
B2	Vocabulary for matters connected to his or her field and most general topics.	3,250 – 3,750
B1	Sufficient vocabulary to express him/herself with some circumlocutions.	2,500 – 3,250
A2	Sufficient vocabulary to conduct routine, everyday transactions involving familiar situations.	1,500 – 2,500
A1	Basic vocabulary repertoire of isolated words and phrases related to particular concrete situations.	< 1,500

Figure 5: Vocabulary range criteria from Concil of Europe (SOARES & SILVA, 2020, p. 193)

The question of how accurately vocabulary level (as measured by the VLT) corresponds to proficiency was explored by Souza & Silva-Soares (2015) by replicating previous research which investigated the correlation between vocabulary size and overall proficiency. They compared VLT scores to other measures of proficiency, specifically the Oxford Placement Test and grammaticality judgment tasks, with a group of 30 adult, advanced-level, bilingual speakers of English/Portuguese (SOUZA & SILVA-SOARES, 2015, P. 194).

They found a moderate and significant correlation between the scores on the VLT and those on the OPT across all vocabulary ranges. This was also confirmed on the grammaticality judgment tasks where learners who scored a low-proficiency on the VLT failed to access grammatical knowledge under time restrictions. Souza & Silva-Soares (2015) concluded, in line with previous studies (LAUFER & NATION, 2001; SEGALOWITZ & HULSTIJN, 2005), that larger L2 vocabulary sizes indicate higher fluency in access to both lexical and grammatical representations. Laufer and Aviad-

Levitzky (2017) study on vocabulary size score, derived from vocabulary levels tests, also successfully matched learners to their reading level with 91% accuracy.

Most recently, the UVLT score was validated in a study with 234 participants using an IELTS reading score for comparison. (HUNG TAN HA, 2022), where authors found that as long as consistent cut-off scoring is used, there is a linear relationship between vocabulary knowledge and reading level.

While a more specific vocabulary size calculation could be done from the UVLT results, the current study applies a simple cut-off / threshold method (as described in HUNG TAN HA, 2022) given that this test serves as a triage in order to guarantee that participants are advanced learners, (C level of the CERF framework) which corresponds to a vocabulary size of +3,760 words, as noted by Soares & Silva (2020), which would be the case of a learner who scores the 27/30 threshold on the UVLT for that vocabulary range.

It's worth highlighting here that the learner's exact UVLT score is not used in the experimental analyses but this wide-band vocabulary measurement adequately ensures that participants meet a formalized criteria as an advanced-level ESL learner and that they are able to deal with the complexity of the experimental tasks.

The test utilized in this study was taken from Webb (2017).

3.5.2
The Language Contact Profile (LCP)

The Language Contact Profile is a questionnaire used to assess second language contact for students in various types of study programs. It was initially developed by Selliger in 1977 and has been refined over the decades by various scholars until the 1995 version by Barbara Freed at Carnegie Mellon University. This version is now a standard in L2 education studies (i.e. DEWEY, 2002 and KOHRO, 2001).

Each item in the questionnaire provides critical background information on the participant so that their prior experience can be considered in order to ensure that groups are relatively homogenous in their composition and any outlying individual differences can be considered. Part 1 elicits background information and past

experiences with the second language (English) while part 2 elicits information related to the frequency of ongoing/recent contact with the language. (FREED, 2004, p. 1)

The LCP was chosen for the current study not just due to its simple and accessible implementation but its popularity among prominent SLA scholars. While it may be modified to fit the peculiarities of a given study, the current study does not require any significant modifications from the original.

In the current study, participants that indicated proficiency in a third language or more than 6 months of study-abroad/exchange immersion experience were excluded. The LCP can be found in the Appendix, Section 6.2.

3.5.3
Off-line Acceptability Judgment Task (AJT)

When testing on-line comprehension, it's important to have a complementary off-line measure to ensure that participants do, in fact, have working knowledge of the structure in question. The off-line task measures the participant's explicit knowledge of the target structures (present perfect/simple past) by asking them to evaluate sentences on a Likert scale of *acceptability*.

Different from a "*grammaticality*" rating , *acceptability* ratings reflect an individual's perception of the stimulus without emphasis on any formal, prescriptive rules. As Oliveira et al, (2013), points out, acceptability judgment data reflect participants' *reactions* to specific structures not just on the basis of grammaticality but also in terms of processing cost, meaning, context, among other factors, which together provide an assessment of the individual's *personal* grammar, not necessarily their knowledge of formal, *prescriptive* grammar (OLIVEIRA et al, 2013).

Additionally, following the orientations of Oliveira et al. (2013), the participant instruction page clarified the concept of *acceptability* judgments and gave participants some practice examples to familiarize themselves with the task before judging the experimental stimuli (OLIVEIRA et al, 2013).

The figure below shows the presentation of the stimuli where with the sentence followed by the Likert rating scale from 1 (least acceptable) to 6 (most acceptable) with

any point lying representing a more neutral rating, indicating that the participant has some question about the sentence's acceptability.

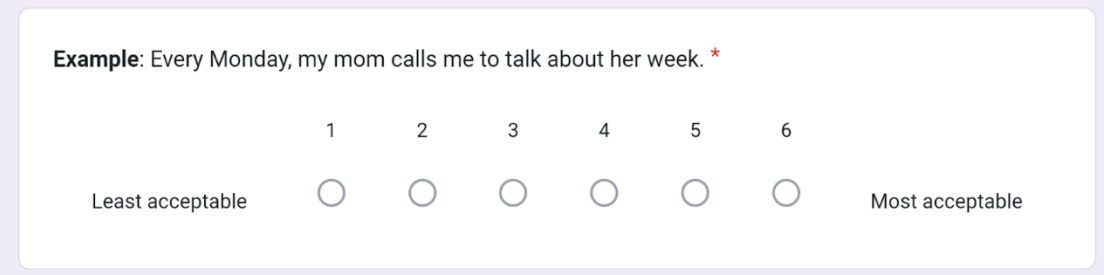


Figure 6: Example of Acceptability Judgment Task Item

The stimuli are made up of sentences containing the tense/aspect manipulations (simple past/present perfect) in the four experimental conditions: match, mismatch, telic, and atelic. These experimental items are interleaved (pseudo-randomized) with 32 filler items and distributed among four presentation lists to be used in latin-square groups so that no participant sees the same item in the same condition more than once.

Additionally, the location of the adverbial could affect comprehension which is something that could be investigated in post-hoc analyses. Depending on these secondary analyses, this alternation in position could potentially lead to some interesting exploration/discussion about the relative effects of adverbials and adverbial placement on the processing of tense/aspect, adding more context to the on-line data from the self-paced reading task.

Sentence	Acceptability					
	<Unacceptable					Acceptable>
Since winter, Joe has achieved good grades in school. He is a top student now.	1	2	3	4	5	6
Last summer, Beth has planted some new flowers. Her garden looks great.	1	2	3	4	5	6

Sarah wrote four romance novels last Christmas. She is a productive author.	1	2	3	4	5	6
Alex lost his phone many times since last year. He always forgets it at parties.	1	2	3	4	5	6

Given that this experiment is a partial-replica of Roberts & Liszka (2013) and Eriksson (2016), it uses the same verbs in the stimuli which were adapted by Eriksson (2016) which rebalances the position of adverbials. Given that the off-line task doesn't require the fronted-adverbial, half of the items had their temporal adverbials moved to the sentence-final position to more accurately replicate the variety found in naturally occurring language.

However, the stimuli used in Eriksson (2016) had some irregularities/imbalances in the secondary characteristics of the items which could potentially impact the results: 1) instances of multiple morphological cues in the same item; 2) inconsistent compositional / sentential telicity; 3) variation in adverbial position and type.

1. **Remove instances of multiple morphological cues:** some stimuli contained sentences with two tensed verbs in the same sentence (i.e. item #5 and 24), providing multiple morphological cues for mismatch detection. This could be problematic given that this experiment is focused on the interaction between lexical and morphological aspectual cues and in other parts of the experiment these two factors are in balance. An example of this can be seen in item #5, "Since she first saw him, Mary has thought Jack was very attractive." While this is an acceptable sentence, the most questionable feature which causes a reaction would be the correspondence between the main verb in the *present perfect* and its complement verb phrase in the *simple past*. In this case, a participant's focus is on the correspondence of elements *within the verb phrase* instead of the correspondence between *the verb phrase* and *adverbials*.

Therefore, tensed verbs were replaced, in these situations with modal verbs "could be" which is more semantically flexible in its time expression and thus does not present a semantic anomaly which, in this case, could impact the average scoring of what would otherwise be acceptable sentences.

2. **Standardize compositional / sentential telicity:** some stimuli had inconsistent telicity as compared to the SPR. In the SPR test, the telicity of the sentence was matched with the inherent telicity of the verb. This is an important part of the design of the stimuli because the goal of the study is precisely to measure the impact of telicity, starting with inherent aspect of the verb and thus it's important to avoid creating mismatches between the inherent lexical aspect of the verb and the compositional aspect of the sentence. The sentence in item 7, for example, *"We have walked <u>to school</u> every day for the last three months,"* adds a destination to the verb which creates a telic composition *("walk to school")* in a condition that is supposed to be atelic and imperfective. While the unbounded adverbial, "*for the last three months*" creates a *stretched reading* whereby it is understood that a telic situation can be repeated over an unbounded period of time however, this seems to not be in the spirit of the original experiment objective which seeks to standardize telicity in the predicates and avoid any conflicting internal factors in the compositional aspect of the sentence. Notice that the updated version, *"We have walked every day for the last three months,"* ensures that the inherent lexical aspect of the verb (atelic) is preserved by avoiding a complement that creates an end-point. This was maintained in all stimuli whereby inherently atelic verbs are matched with atelic-imperfective predicates and, conversely, inherently telic verbs have telic-perfective predicates.

3. **Consolidate variation in adverbial position and type:** there was no consistent distribution of adverb type among the pre and post position of the sentences in the AJT stimuli. For example, the original stimuli concentrated recent-past adverbials in the post-position and the adverbial frame "*last+time/event"* was overwhelmingly used in fronted position. While the semantic nuances of the adverbial are not an experimental condition they could

still present unwanted variation if they are not balanced in the stimuli. Therefore, the variation of adverb frames was reduced so that the same adverb could be used in both positions at least once. One particularly interesting adverb which was removed was *"recently"* which is a curious example as it can acceptably collocate with both simple past and present perfect sentences, invoking a unique function of the present perfect called the "recent-past" where the aspectual meaning [+/- current relevance] seems to be specified on a more pragmatic level, unique to the comprehender's viewpoint. In other words, creating clear and consistent mismatches between this adverbial and a simple-past verb phrase may not be plausible in the current experimental design.

In summary, by reducing the number of embedded verb phrases, ensuring consistent telicity markers throughout the predicate, and reducing the variety of adverbial frames in order to better balance the positions and types of adverbs, a more equal distribution of all secondary stimuli characteristics was achieved and thus should reduce the risk of potential confounding factors and/or "statistical noise" caused by their variability.

The results from the AJT are analyzed for within-group effects in both native and non-native groups and are also used as a baseline upon which to evaluate the online self-paced reading data. One discussion on the analysis and evaluation of AJT results is the validity of applying traditional mean and standard deviation calculations to a type of data that is ordinal and hierarchical. Therefore, it's ideal to opt for percentages, medians and modes to describe the results (OLIVEIRA el al, 2013).

3.5.4
On-line Self-Paced Reading Test

In sentence processing research, it is necessary to have instruments which capture the real-time processing behaviors of participants during sentence comprehension, known as *on-line* measures. While there are numerous on-line protocols available with varying degrees of granularity and flexibility (i.e. eye-tracking, keylogging, and ERP), self-paced reading (SPR) was chosen for the current study as it can be deployed

remotely for participants to complete at their convenience and it does not require any specialized equipment which could limit participation or interfere with task completion. In brief, SPR utilizes a computer display and a button (typically the spacebar) which allows a participant to reveal and read a sentence, one word at a time, allowing for the measurement of word-by-word reading times and thus providing insight into how their processing of sentences is impacted by their unconscious reactions to experimental manipulations.

There is a single display window in the middle of the screen with underscores marking where each word in the sentence will appear, allowing participants to have a peripheral view of the length of the sentence and upcoming words which allows for a more natural reading experience. The current study employs the non-cumulative self-paced reading protocol where participants cannot re-read previous words once the next word is revealed. This is done by simultaneously removing the previous word and revealing the subsequent word with each press of the spacebar. The figure below demonstrates how the sentence display changes each time the participant presses the button.

Spacebar press #	Screenshot of Sentence Display after pressing spacebar
0	_ _
1	Since _
2	_ _ _ _ last _
3	_ _ _ _ week. _
4	_ _ _ _ _ _ I _
5	_ _ _ _ _ _ _ _ have _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
6	_ _ _ _ _ _ _ _ _ _ had _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
7	_ _ _ _ _ _ _ _ _ _ _ _ lots _ _ _ _ _ _ _ _ _ _ _ _ _
8	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ of _ _ _ _ _ _ _ _ _ _

9	problems
10	with
11	my
12	car.

Figure 5: Screenshots from PC-IBEX platform's self-paced reading demo. Taken from https://farm.pcibex.net/experiments/xcpUhQ/edit on July 26, 2022.

These tests are delivered online via PC-Ibex which is an asynchronous, web-based, psycholinguistic test delivery platform. After the experimental and distractor stimuli are uploaded to the platform, the participant can access the task via URL link by any internet browser. When the participant accesses the link, they are prompted to provide their identification after which they begin the experiment. Each sentence is followed by a post-item distractor activity – in this case a comprehension question – which ensures that the participant is attending to the activity and understanding the sentence. Experimental and distractor sentences are pseudo-randomized so that experimental sentences never appear consecutively. After finishing the reading of all sentences and comprehension questions, the participant's information and their performance data are accessed by the researcher through the back-end of the platform for download and analysis.

Roberts (2019) reports that SPR has been used as an instrument for studying L2 grammatical knowledge for several decades, as early as Selinker (1972), whereby researchers have utilized learners' reactions / sensitivity to grammatical violations to assess the state of their interlanguage (ROBERTS, 2009).

As learners become more advanced, their reactions to experimental manipulations in the L2 become more native-like, allowing researchers to assess a non-native speaker's current level of implicit L2 processing ability / knowledge in comparison to a native-speaker. Importantly, because there is a time control, the potential interference of the learner's explicit L2 knowledge during task completion is controlled for and minimized (DRACOS, 2012).

In other words, unlike traditional tests, which do not track how an activity is completed over time (off-line), these millisecond-level time measurements can

determine, to an extent, if the processing/ knowledge utilized during the various moments in the processing of anomalous sentences is of an explicit or implicit type (KEATING & JEGERSKY, 2014).

3.5.4.1
Materials for Self-Paced Reading (SPR)

This section outlines the design of the SPR materials in its (three) main components: a) experimental stimuli, b) distractor stimuli, c) post-stimulus distractor task.

a) Experimental Stimuli:

The stimuli in this study were adapted from Eriksson (2016) who adapted the stimuli originally used in Roberts & Liszka (2013) but modified the structure of sentences to balance telicity and measure its effects.

Overall, there were 32 experimental items in four versions (conditions) resulting in 128 sentences and 40 filler sentences. Each item had a critical sentence followed by a wrap-up sentence.

The experimental items included a temporal adverbial (prepositional phrase or temporal adverb) to provide a time reference that would either match the verb's aspect or not, thus creating the match/mismatch condition in both the simple past and present perfect verb forms. For example, *"Last spring, Bert has planted many different flowers,*" is a present-perfect-mismatch condition.

As mentioned, the original stimuli used in Roberts and Liszka (2013) contained a majority of their sentences as atelic (79%), creating an imbalance. The telic VPs included both achievement verbs (e.g., crash, win) and accomplishment verbs (e.g., plant, write) and atelic VPs had state verbs (e.g., like, love) and activity verbs (e.g., play, study). The original stimuli used 13 states, 5 activities, 2 accomplishments, and 4 achievements. Some verbs were repeated across items.

Eriksson (2016) reworked the items to balance for telicity, creating 16 perfective sentences with telic predicates (10 achievement verbs and 6 accomplishment verbs) and 16 imperfective sentences with atelic predicates (12 state verbs and 4 activity verbs), utilizing telicity determination developed by Shirai and Andersen (1995).

In order to create a partial-replica of the Eriksson (2016) study, the current study adapted the stimuli from Eriksson (2016), taking special care to not change the verb selection or temporal relations of the stimuli, thus all grammatical forms and syntax of each sentence was maintained with minor changes to the semantic content.

However, there were five important changes made to the stimuli of Eriksson (2016) that were considered to be critical in order to standardize the stimuli including: 1) standardizing adverbial complexity; 2) standardizing length of pre-critical region; 3) standardizing the critical & spillover regions; 4) redesigning post-stimulus distractor items; 5) standardizing subject/verb agreement inflection. Below is a description of each of the modifications in more detail.

1. Standardize adverbials: The original stimuli had substantial variation in the adverbials in relation to length, diversity and complexity. Additionally, the alternation between them in the various experimental conditions was random.

First, there was a wide variety of adverbial frames which were not systematically developed and distributed among the stimuli. While it is important to have a variety of adverbial types, it is difficult to confirm what impact certain adverbials may have on the interpretation of sentences due to this variability in composition and distribution. For 32 experimental stimuli, the author used 23 different adverbial frames which can be divided into 6 basic categories: a) deictic past, punctual: in/on/at + time reference; b) deictic past, relative: ago + duration / last + time-reference; d) deictic past, clause: when / after + verb phrase; e) anterior-anaphoric, duration: for + duration / since + time reference; f) anterior-anaphoric, clause: since + verb phrase.

The frequency of adverbials denoting an absolute time reference (i.e. “Since 2005”) and relative time-references (i.e. “Since the election”) were not equally distributed and were also interchanged inconsistently between simple past and present perfect sentences. For example, one of the sentence pairs (#3) from Eriksson (2016) contained a present-perfect match sentence: “Since last Christmas, Jane has written three children's books,” and its corresponding simple past mismatch condition “Last year, Jane has written three children's books.” In this case, one has an adverbial making reference to an event “last Christmas” its time reference while the other is a specific time period “last year.”

While it is not the objective to compare these experimental pairs directly, it raises questions as to what confounding effects these random alternations could potentially bring and thus limits the ability to conduct post-hoc analyses on the reading times between the *two types* of mismatch conditions, as it's possible that these semantic nuances ("last Christmas" versus "last year" could interact with other elements in the sentence, potentially causing variation in the participant's on-line comprehension.

More importantly, however, there was also substantial variation in the *complexity* of adverbial composition. Namely, some of the time-references in the stimuli contained complex DP/NPs, containing possessive pronouns without an anaphoric antecedent as in "Since her first class, she has improved her performance." Many adverbials used tensed verb phrases. These complex adverbials were not always alternated with more simple adverbials. One example, sentence thirteen (13), alternates between a long, tensed-VP adverbial and a simple time reference: "Since he quit his job, Jack has met many wonderful friends," versus the simple past condition, "Last summer, Jack met many wonderful friends."

Given that the complexity in composition is not an experimental condition, it's questionable to what extent having this variation could impact the results of the experiment given that these more complex combinations could interact with the predicates in unforeseen ways and possibly put more processing demand on the reader at the critical region. In the example above, we see that the reader must connect the subject NP back to its antecedent *"he / his,"* whereas this is not present in the simple past conditions.

In fairness, it is important to note that these examples were not directly compared in statistical analyses in the Eriksson (2016) study however it does bring into question the value of the discussion of these results which may have third-variable interacting in unforeseen ways. In this case, 14 of the 32 experimental sentence quartets contained a substantial variation in adverbial complexity, with longer and more complex adverbials being more often collocated with the present perfect. In other words, almost half the stimuli had relatively long and complex adverbials which raise the processing cost in the pre-critical region only in the present perfect condition and not in simple past condition. According to Jegerski, "any difficulties inherent in processing

precritical regions could cause unintended spillover effects in critical regions (Jegerski, 2015, p. 8)."

Given that spillover effects from the pre-critical region could have a significant effect on the processing of the critical region itself, all adverbial phrases in the current study were shortened to a maximum of three words and they were simplified so that they only provided a time reference, there are no complex DPs/PPs containing non-finite clauses, genitives or anaphoric pronouns which precede their antecedent, all of which, in general, create an unnecessary processing cost in the pre-critical region which is not relevant to the current objective.

The table below shows the resulting combinatorial construction of adverbials used in this study. All *present-perfect-match* adverbials use *since* + a time refence complement and the simple past match sentences use 3 different adverbial heads combined with these same PP time references. Note that time references are kept the same in all four conditions.

Fronted Adverbial Combination Scheme		
Match type	Adverb used +	PP Time reference complement
Present perfect match condition:	- SINCE	- Time period (i.e. "in March / winter") - Absolute time (i.e. "in 2005") - Relative time (i.e. "at the party")
Simple past match condition:	- LAST - AT / IN / ON - AFTER	

Condition	**Sentence**
1) Present perfect match	Since winter, Joe has achieved good grades in school.
2) Present perfect mismatch	Last winter, Joe has achieved good grades in school.*
3) Simple past match	Last winter, Joe achieved good grades in school.

4) Simple past mismatch	Since winter, Joe achieved good grades in school.*

Figure 8: Stimuli combination scheme for fronted adverbials

This more standardized and consistent alternation between experimental conditions, ensuring that the same time reference complements are used in all conditions (the only difference between adverb) is meant to reduce the chance for unintended factors such as salience or semantic correspondence that could be caused by the combinations between the telicity and aspect of the predicates with the unique semantics of various time reference complements.

Once again, it's worth noting that while the primary objective of this experiment is not to directly compare simple past and present perfect results in the statistical analysis, it is still worthwhile to standardize the stimuli as much as possible to maintain maximum exploratory value and provide solid foundation for discussion.

One last significant change made in order to reduce adverbial complexity and variation was to remove all instances of *for-adverbials* (n=4) from the stimuli. *For-adverbials* only collocate with atelic-imperfective predicates because their semantics are so distinct, especially when used in the variations necessary for this study *FOR + duration + NOW* alternated with an adverbial frame such as *duration + AGO* in the simple past condition. The *for-adverbial* in these cases provides overt cues on the telicity and perfectivity of the sentence, potentially creating a strong priming effect which would impact the participant's processing of sentence. For example, upon reading the fronted *for*-adverbial, *"For five years now,"* the participant will already have determined that they are going to see an atelic-imperfective predicate before arriving at the critical region. Consider additionally that, according to Vanpatten's lexical preference principle, learners tend to skip processing of morphological cues if they can extract the same information from lexical cues. In other words, if the aspectual content of the sentences is already specified in the adverbial than there is a risk that the learner may under-process (or even skip) the morphological cues in the verb phrase, especially in regards to function words such as the auxiliary contained in the present perfect (VANPATTEN, 2000).

Finally, it's worth noting that, having an extended spillover region three words span from the critical region (verb), incurs a higher risk of uncontrolled "third-variable" effects influencing the results. In other words, there are likely more factors which are not directly related to the experimental conditions which may affect the V+3 Region in unknown ways and thus the results and their significance should be carefully interpreted.

During stimuli design, the factor which was most carefully controlled in the spillover region (V+1, V+2, V+3) in the stimuli was the overall compositional telicity/perfectivity of the verb phrase and semantic plausibility. To this end, verb complements were chosen with careful consideration of their semantics in order to ensure that the compositional telicity of the phrase matched the inherent telicity of the verb. This was done in telic sentences through the use of delimiting quantifiers which establish clear end-points and, in the case of atelic sentences these delimiting quantifiers are absent and any collocations that suggest temporal endpoints were avoided.

The second priority was given to semantic plausibility. Overall, word selection was standardized to include only high frequency words of 2-syllable word length and plausible collocation. However, attempting to restrict word-class or morphological variations was not always viable without breaking the first two criteria. Therefore, there is a higher level of variation and higher potential for controllable factors (i.e. word length and word class) at later sentence regions.

In light of the risks mentioned above, the current study opts to maintain this large spillover region because it extends to the sentence final region which can provide insights into wrap-up effects where sentential-level processing can sometimes appear at the sentence final position.

In summary,

1. Only *since-adverbials* were used in the present perfect conditions as they lend themselves well to both telic and atelic conditions, helping to reduce the potential for the imbalance of adverbial type as a confounding factor between telic and atelic conditions. Despite causing a small reduction in stimuli variety (affecting 4/32 items), removing these *for-adverbials* seemed prudent as their rich specified aspectual

information and clashing semantics in mismatch conditions likely have a strong impact on sentence processing, aggravating further the potential for unintended variation between the telic and atelic conditions.

2. Standardize length of pre-critical region: As mentioned above, the original stimuli had substantial variability in the pre-critical region of the sentence in terms of the number of words and average word length. Therefore, the number of words in each pre-critical region was set at 4 words so that the critical region (the verb phrase) always started in the fifth position. For this reason, all adverbials were limited to 2-3 words and subject NPs limited to 1-2 words, accordingly.

3. Standardize critical & spill-over regions: in the critical region (the verb) and the spillover region (verb +1, verb +2, verb +3), the original stimuli had variability in overall length as well as individual word length, not just in character count but also in syllables, both of which could possibly impact reading times. For example, some sentences, such as #29, *"Sarah felt very unhappy at work,"* contains a critical region and spillover region that is a total of 5 words with a variety of word lengths in both syllable and character count.

While the original studies (ERIKSSON, 2016; ROBERTS & LISZKA, 2013) did control for this variation through statistical methods, namely through the use of residual reading times which controls for word length by presenting reading times in their deviance above or below the expected reading time for each word based on its character count. it was equally viable to make adjustments to the length of the critical region and the words inside it in order to minimize this variation and have more validity directly in the raw reading time measures. Thus, critical regions were set firmly at 4 words (removing instances of article + noun segments seen in the example above) and, when possible, all words in the critical regions were limited to 1 syllable with an average word-length of 5 characters. In rare cases, these constraints were not plausible given that word-choice confines sometimes necessitate 2-syllable words. This was the case particularly with state verbs and their combination with atelic-imperfective predicates which required the use of verb complements with a frequency adverb "every" and in some cases some gerunds such as in the sentence, *"John liked fishing every day."* While it's possible to create sentences while adhering to the strict 1-syllable length limit, they

would be overly contrived due to their lack of collocation strength, running a risk of them being considered semantically anomalous - a critical factor which interrupts a natural reading experience. This consideration was given priority as necessary on a few occasions.

4. Redesign post-stimulus distractor items: The post-stimulus distractor items not only keep the reader engaged in the reading process but also encourage and control for proper sentence comprehension. For this reason, a question was placed after every stimulus in order to ensure the participant is actually reading each word for meaning. During the analysis of the results, comprehension question accuracy can be utilized to clean the data by either removing outlier participants with low comprehension and/or by removing the experimental items which were not accurately comprehended.

The original stimuli contained yes/no comprehension questions but often contained morphology or past-time references similar to those found in the experimental stimuli. This was the case with seven (7/32) different post-item distractors in the Eriksson (2016) stimuli.

Some of these distractors not only shared morphological features with the experimental stimuli (especially simple-past tense) but also prompted participants to reflect overtly on the temporal semantics of the stimuli themselves, which could bring unwanted attention to the grammatically encoded tense/aspect manipulated in the stimuli. In other words, it's possible that this could not only create a priming effect but a task-learning effect**.** According to distractor design principles outlined by Keating & Jegerski (2015), post-stimulus distractor questions should not contain any of the linguistic variables manipulated in the experiment. This may include the repetition of, or bringing extra attention to the form or semantics.

So, the current study avoided the use of simple past and present perfect morphology in these post-item comprehension checks and ensured that propositional content contained in these distractor items make any reference to, or indirectly prompt readers to reflect on the temporal relations or past-time semantics of the stimuli.

Furthermore, a very critical issue with the Eriksson (2016) study was that the comprehension questions were not actually utilized to filter the results because they were determined to be too challenging and thus would have results in trimming too

much data. In order to avoid this, the difficulty of the items was reduced, limiting the scope of questions to reflect very simple and superficial comprehension such as the number or quality of adjectives and nouns. Greater simplicity was also introduced by changing the format to TRUE or FALSE, further avoiding the grammatical complexity inherent in a question. For example, in the item, "Since January, Amy Martin has bought four new bikes," the comprehension check was merely to confirm "Amy has multiple bikes (T/F)." While this may seem to be elementary and perhaps not as stimulating, the goal is not to challenge the participant as much as to ensure that they are actually engaged in reading.

5. Standardize subject/verb agreement: In terms of the subject-verb agreement in English, a singular, third-person subject necessitates the use of a unique corresponding verb, namely the 3rd person-singular *"has"* auxiliary, in contrast to *"have"* found in all other inflections. The original list contained a few outlier sentences (i.e. item #16) that alternated to this other form. Given that the implications of alternating plural and non-plural subjects could be of importance, as well as the variation introduced in the corresponding auxiliary, all the subjects were standardized to be in the third-person singular.

4

Results of Off-line Experiment: Acceptability Judgment Task (AJT)

4.1

Descriptive Results of AJT Task

Note: In the analysis and reporting of the results, the groups are labeled as Native-Speaker (NS) and Non-Native speaker (NNS).

Descriptive Statistics

		Valid	Mode[a]	Median	Minimum	Maximum
PP-M-A	NNS	84	6.000	5.000	1.000	6.000
PP-M-A	NS	44	6.000	5.000	2.000	6.000
PP-MM-A	NNS	84	1.000	3.000	1.000	6.000
PP-MM-A	NS	44	2.000	3.000	1.000	5.000
SP-M-A	NNS	84	6.000	6.000	1.000	6.000
SP-M-A	NS	44	6.000	5.000	3.000	6.000
SP-MM-A	NNS	84	6.000	4.000	1.000	6.000
SP-MM-A	NS	44	5.000	4.000	1.000	6.000
PP-M-T	NNS	84	6.000	5.500	1.000	6.000
PP-M-T	NS	44	6.000	5.000	1.000	6.000
PP-MM-T	NNS	84	6.000	4.500	1.000	6.000
PP-MM-T	NS	44	4.000	3.500	1.000	6.000
SP-M-T	NNS	84	6.000	6.000	1.000	6.000
SP-M-T	NS	44	6.000	6.000	1.000	6.000
SP-MM-T	NNS	84	4.000	4.000	1.000	6.000
SP-MM-T	NS	44	5.000	3.500	1.000	6.000

[a] More than one mode exists, only the first is reported

PP = Present Perfect, SP = Simple Past, M = Match, MM = Mismatch, T = Telic, A = Atelic

As can be seen, both native and non-native speakers show substantial variation in their minimum and maximum ratings, indicating that the acceptability ratings seem

to be quite subjective to individual differences in perception, knowledge, etc. The mode values indicate which single acceptability scale rating was the majority for a given condition. A high mode indicates a concentration of favorable ratings whereas a low mode indicates a concentration of unacceptable ratings. There seems to be substantial variation between the two groups (NS v. NNS) in the distribution of these modes, indicating they likely have different skews in their distributions.

What's particularly interesting is to note the incredible consistency with which the mode values of the Native Speaker (NS) group alternate between experimental conditions (mode values = 6,2,6,5,6,4,6,5), indicating that they were likely sensitive to the experimental manipulations. This is in sharp contrast to the Non-Native Speaker (NNS) group with consistently high mode ratings across almost all experimental conditions (6,1,6,6,6,6,6,4) which suggests that their ratings are likely not as affected by experimental conditions and are likely dispersed across the entire scale.

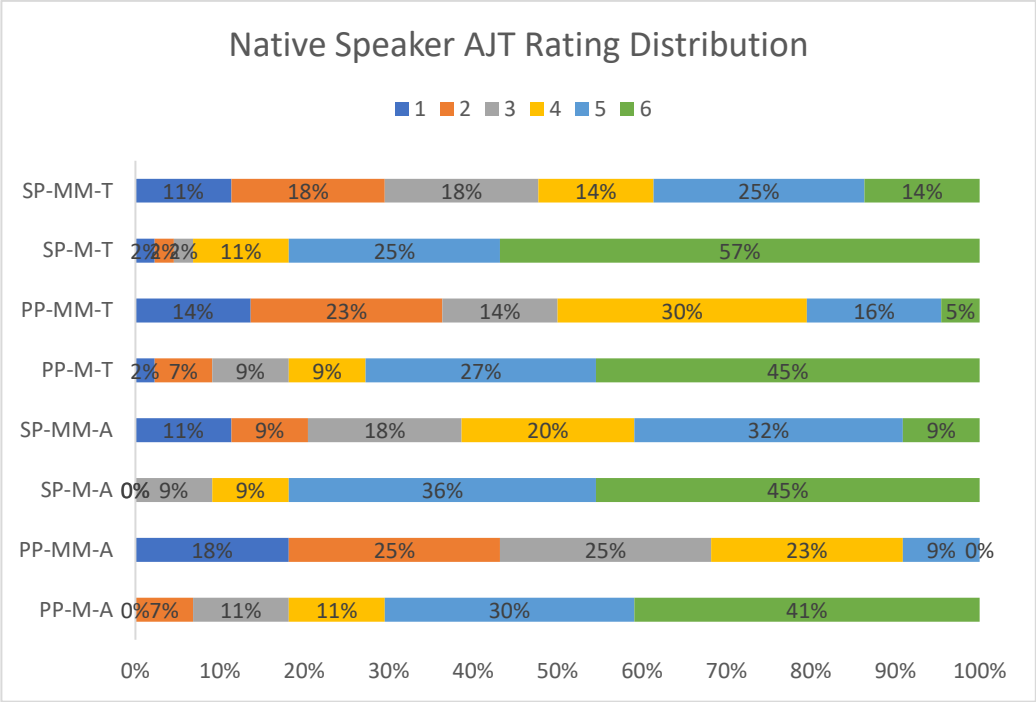
The problem with just looking at mode values is that it only tells part of the story – it doesn't tell you about the likely trends or distributions. This can be confirmed via the median value which gives an indication of how concentrated these ratings are on one particular end of the scale. As can be seen among the NS group scores, the two values (median and mode) are very close to each other, indicating a stronger concentration around the mode value which indicates more of a consistent consensus within that group. The NNS group on the other hand has substantial variability as they are almost perfectly aligned in some conditions which have an identical median and mode whereas they are quite dispersed in other conditions.

4.1.1
Visual Plot of AJT Ratings: Native Speaker (NS) Group

Analyzing the graphic distribution of the AJT data allows for quick visualization and overall impressions of the data which can bring more clarity and context when in later statistical analyses.

The graphs below show each group's Acceptability Judgment Task ratings, ranging from 1 (least acceptable) to 6 (most acceptable). The data is displayed in

horizontal stacked bar graphs, each bar representing a different experimental condition. Axis labels on the left indicate conditions: Simple Past (SP), Present Perfect (PP), Match (M), Mismatch (MM), Atelic (A), and Telic (T).



Note: 1 = least acceptable, 6 = most acceptable

Figure 9: Acceptability Judgment Ratings for Native Speakers

Simple Past / Telic: As seen below, in the first two bars, corresponding to the simple past/telic condition (mismatch v. match), the native speaker group showed substantial variability in reaction to the mismatch condition (SP-MM-T), given the clear and almost equal division between three groupings: negative, doubtful, and positive reactions, seen in the first bar graph. This is in sharp contrast to the baseline condition, simple past – match (SP-M-T), which has a clearly positive trend and an overwhelming majority of most acceptable ratings. This is a clear sign that the match condition is very clearly recognized while the mismatch condition is divisive and varies according to the individual.

Present-Perfect / Telic: In the present perfect/telic conditions, the native speakers also showed no strong trend in their reaction to mismatches (PP-MM-T) but

there does seem to be a moderately negative reaction given the relatively large concentration of least acceptable ratings (ratings 1-2). This is in sharp contrast to the baseline match condition (PP-M-T) which shows a clearly positive reaction with the grand majority (72%) in the most acceptable ratings (5-6). This indicates that native speakers clearly recognize the match condition and only moderately question the mismatch condition with a slight negative skew.

Simple Past / Atelic: In the atelic, simple past condition, native speakers perceive the mismatch condition (SP-MM-A) as questionable with a moderately acceptable skew. This is evidenced in the majority of ratings falling within the upper (acceptable) half of the scale (61%), however there is high variability among participants with a large number falling into the central, undecided, group (38%). This is in contrast to a clear and confident recognition of the baseline match condition (SP-M-A).

Present Perfect / Atelic: The present perfect atelic condition shows a more distinctively negative mismatch reaction among native speakers with the majority of ratings falling in the bottom half of the acceptability scale and a clear avoidance of the most acceptable ratings. This is in contrast to the strong positive reaction to the baseline match condition (PP-M-A) which saw a strong positive trend and overwhelming majority of positive ratings, indicating a strong and confident recognition.

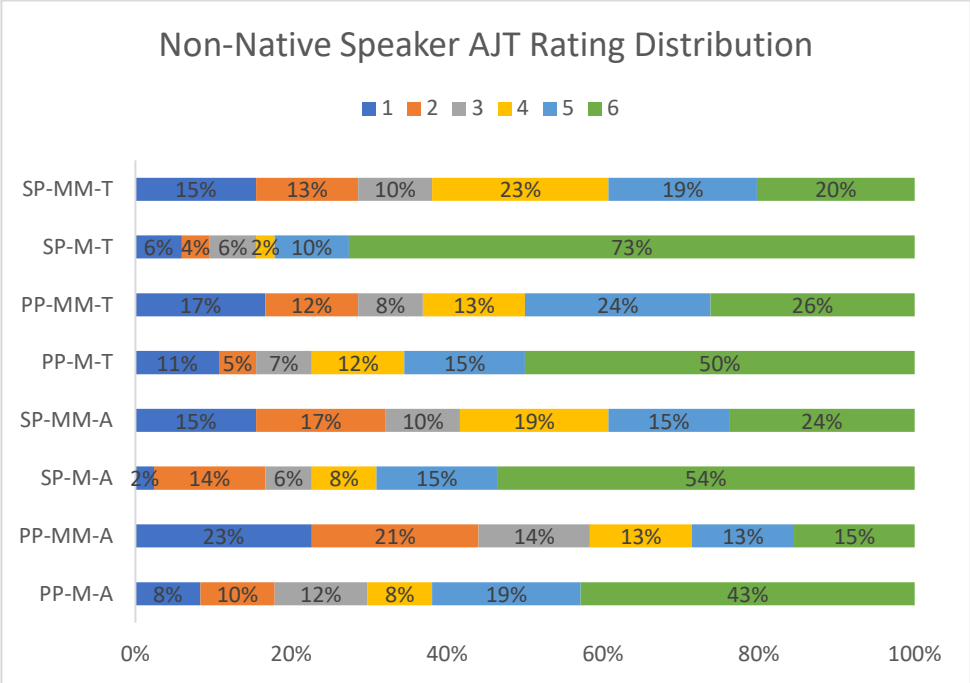
Native- Speaker Summary:

In summary, the native speakers confidently identify all the match conditions but have varying levels of sensitivity to mismatches. In particular, the present perfect mismatches were more distinctively recognized, with the atelic mismatch (PP-MM-A) showing a clearly negative bias. On the other hand, the simple past mismatch conditions are quite subjective. While there was a slight negative skew in the SP-atelic condition, the simple past telic mismatch was particularly divisive as it had no significant majority or trend.

Overall, native speakers clearly recognize matches but have nuance in how they react to mismatches depending on the tense/aspect and, to some extent, telicity may moderate this reaction.

4.1.2

Visual Plot of AJT Ratings: Non-Native Speaker Group (NNS)



Note: 1 = least acceptable, 6 = most acceptable

Figure 10: Acceptability Judgment Ratings for non-native speakers

Simple Past / Telic: As seen in the graph above, in the simple past/telic condition, non-native speakers showed no central tendency in their response to the mismatch sentences and, similar to native speakers, showed an almost equal grouping among the low, middle and higher ratings, suggesting a high level of subjectivity. This contrasts substantially to the baseline match condition (SP-M-T) which was overwhelmingly positive with 73% of participants giving a most-acceptable rating, showing that participants are particularly confident in recognizing grammatical simple past telic sentences.

Present-Perfect / Telic: Overall, in the present perfect / telic condition, non-native speakers actually rated the mismatch condition as being slightly acceptable with a significant number of participants who were still able to confidently recognize the mismatch. In contrast, the baseline match condition (PP-M-T) saw a stronger consensus with the grand majority give an acceptable rating while a few participants seemed to

have trouble recognizing the match condition, likely a reflection of individual differences in proficiency or performance during task completion.

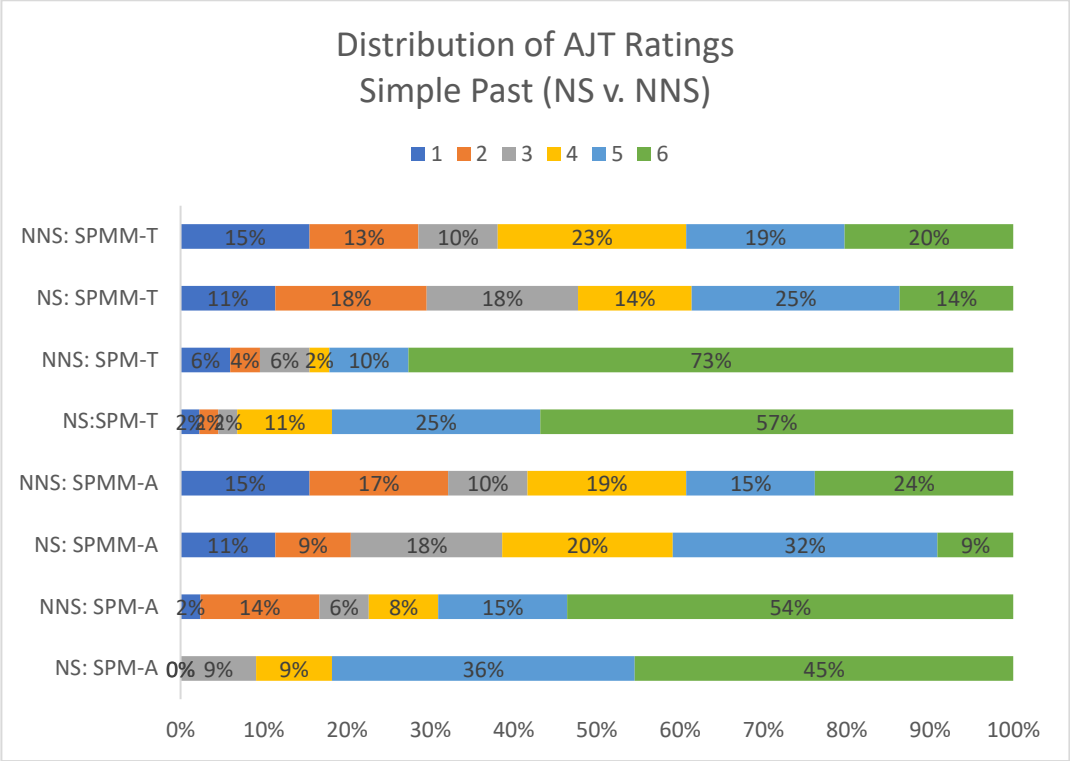
Simple Past / Atelic: The simple past atelic condition saw substantial dispersion of the ratings among all acceptability levels in the mismatch condition (PP-MM-A), indicating a clear level of confusion that's being generated but without any consistency or central tendency. Like before, this pattern contrasts greatly to its baseline match condition (PP-M-A) in which participants overwhelmingly rated the sentence as acceptable

Present Perfect / Atelic: Finally, the present perfect atelic condition saw an overall consistent reaction to the mismatch condition (PP-MM-A) with the majority of ratings in the unacceptable half of the scale and a handful of participants showing no sensitivity to the mismatch at all. With the match condition (PP-M-A) on the other hand, we see almost the reverse pattern where the majority found the sentence acceptable with a few participants showing some level of confusion, rating the match sentence to as unacceptable.

4.1.3
Visual Plot of AJT Ratings: Between NS and NNS Groups

Separate plots was generated for each tense/aspect condition in order to have a more readable graph. Each condition is placed adjacent to one another to allow for comparisons between groups of how each condition was judged.

Simple Past Acceptability Ratings (NS v. NNS)



Note: 1 = least acceptable, 6 = most acceptable

Figure 11: AJT ratings between groups for simple past

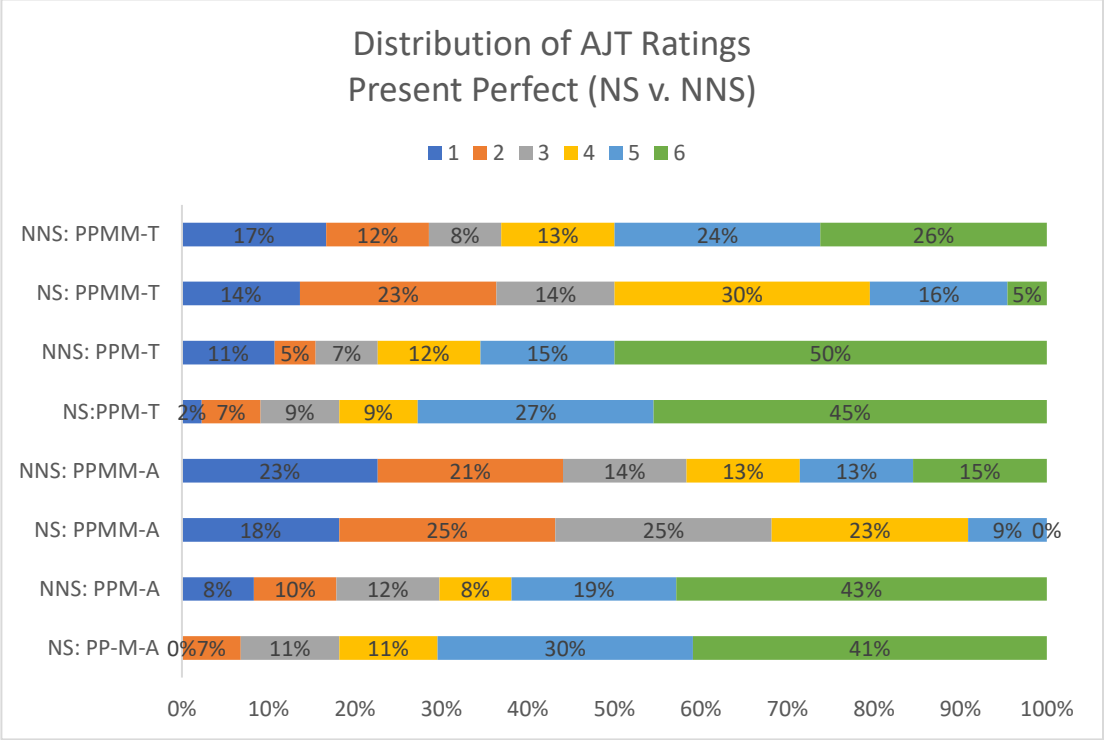
Comparisons of Simple Past Ratings:

Native and non-native speakers rate the simple past conditions similarly. There was a clear majority and strong trend of acceptable ratings from both native and non-native speakers both for telic and atelic conditions. Curiously, the non-native group actually rated these conditions more confidently than the native speakers did which may be a reflection of their instructed language acquisition background in which exposure to and attention to the more formalized aspects of language and explicit activities, such as the AJT, are quite common.

In the mismatch conditions, both the native speakers and non-native speakers showed substantial within-group variability in their ratings, especially in the telic condition where there was no clearly identifiable preference within either group. Instead, mismatches caused an almost equal division into three distinct groupings: left, right and center, indicating variation in both in the participant's perception of acceptability as well as the confidence of their ratings.

While this pattern was seen in both atelic and telic conditions, the telic condition was particularly divisive whereas the atelic condition seemed to be slightly more acceptable among both groups. This could indicate that telicity may moderate off-line sensitivity to mismatches, especially in the native speaker group which saw a greater difference, but this needs to be confirmed in statistical analysis.

Present Perfect



Note: 1 = least acceptable, 6 = most acceptable

Figure 12: AJT present perfect ratings between groups

An interesting observation seen in the present perfect condition is how similarly the native and non-native groups react to the match conditions but show significant nuance in their judgments of mismatches and this seems to change depending on the telicity of the sentence.

The first pairing, for example, the telic-mismatch condition, (PPMM-T) shows a large dispersion of ratings among all participants yet each group has a distinctive pattern. The non-native speaker group has a majority of upper-end ratings, indicating a slightly acceptable skew whereas the native speakers have a small majority in the lower ratings, indicating a slightly *unacceptable* skew. However, what's perhaps more

indicative is the difference in the confidence of ratings: the non-native group is more polarized – showing large concentrations on both ends of the scale whereas the native speakers are concentrated on the bottom two-thirds of the scale, with very few "*most acceptable*" ratings (ratings 5 and 6). Overall, the acceptability of the telic-mismatch condition seems to be somewhat subjective, especially among non-native speakers.

Overall, in the atelic mismatch condition, both the native and non-native groups gave a relatively consistent, *unacceptable* rating, especially in the non-native group. However, we see a clear difference, once again, in the confidence of the ratings which can be seen on the upper and lower ends of the rating scale. The native speakers had almost no ratings at the upper end of the scale whereas a significant portion of the non-native speakers (28%) rated the mismatch as most acceptable (rating 4 and 5).

In summary, we can see that the non-native group and the native group, despite having similar patterns in their reactions to mismatches have critical distinctions, namely in the variability and in the confidence of their ratings. However, both groups do seem to show an effect for telicity in their reactions to mismatches, namely in the atelic condition where the mismatch seems to be more salient for both groups.

4.2
Inferential Results of AJT Task

4.2.1
Between-Group Statistical Analysis (NS / NNS Groups)

Given that the AJT Likert-scale data is ordinal, a non-parametric test is utilized to test for variance and significance. For this, the Friedman test was utilized to test for significance of effects followed by a Conover's Post-Hoc Comparison to measure the significance level of each factor/interaction.

Friedman Test

Factor	Chi-Squared	df	p	Kendall's W
Experimental Conditions	207.779	7	< .001	0.232

Friedman test of all experimental conditions and groups

The experimental conditions showed that there are significant effects between the independent and dependent variables seen in the high Chi-Squared value and low p-value, suggesting that at least one of the experimental conditions impacts sentence acceptability in at least one of the groups which is sufficient evidence to reject the null hypothesis.

Additionally, The moderate Kendall's W size (0.232) effect indicates that there is moderate consistency in agreement among the rankings of the various conditions but which condition pairings are significant requires further analysis.

To this end, the Conover's Post-Hoc comparisons test was run on the data. This test goes through a combination of every possible experimental condition pairing. However, given that the current experimental design uses a 2x2x2 (Tense/Aspect, TA Match, Telicity) factorial design, it's important to only analyze the relevant pairings which are those that differ by only a single condition.

In other words, some condition pairings may show a significant result but are not compatible for comparison. For example, The Present Perfect / Match / Atelic vs. Present Perfect / Mismatch / Telic resulted in a highly significant result ($t = 4.855$, $p = <0.001$). While this may possibly reflect some legitimate interaction effect of telicity it's not a relevant comparison given that it confounds two factors: a match in the atelic condition cannot be directly compared to a mismatch in the telic condition.

For the sake of clarity, the entire results table is shown here with the relevant condition pairings highlighted for easy identification:

Conover's Post Hoc Comparisons - Experimental Conditions

		T-Stat	df	W_i	W_j	p	p_{bonf}	p_{holm}
Pres. Perf. / Match / Atelic	Pres. Perf. / Mismatch / Atelic	8.101	889	654.500	360.000	< .001	< .001	< .001
	Pres. Perf. / Match / Telic	0.770	889	654.500	682.500	0.441	1.000	1.000
	Pres. Perf. / Mismatch / Telic	4.855	889	654.500	478.000	< .001	< .001	< .001
	Simple Past / Match / Atelic	1.444	889	654.500	707.000	0.149	1.000	1.000
	Simple Past / Mismatch / Atelic	4.250	889	654.500	500.000	< .001	< .001	< .001
	Simple Past / Match / Telic	2.613	889	654.500	749.500	0.009	0.255	0.082
	Simple Past / Mismatch / Telic	4.896	889	654.500	476.500	< .001	< .001	< .001
Pres. Perf. / Mismatch / Atelic	Pres. Perf. / Match / Telic	8.871	889	360.000	682.500	< .001	< .001	< .001
	Pres. Perf. / Mismatch / Telic	3.246	889	360.000	478.000	0.001	0.034	0.013
	Simple Past / Match / Atelic	9.545	889	360.000	707.000	< .001	< .001	< .001
	Simple Past / Mismatch / Atelic	3.851	889	360.000	500.000	< .001	0.004	0.002
	Simple Past / Match / Telic	10.714	889	360.000	749.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	3.205	889	360.000	476.500	0.001	0.039	0.014
Pres. Perf. / Match / Telic	Pres. Perf. / Mismatch / Telic	5.625	889	682.500	478.000	< .001	< .001	< .001
	Simple Past / Match / Atelic	0.674	889	682.500	707.000	0.501	1.000	1.000
	Simple Past / Mismatch / Atelic	5.020	889	682.500	500.000	< .001	< .001	< .001
	Simple Past / Match / Telic	1.843	889	682.500	749.500	0.066	1.000	0.525
	Simple Past / Mismatch / Telic	5.666	889	682.500	476.500	< .001	< .001	< .001
Pres. Perf. / Mismatch / Telic	Simple Past / Match / Atelic	6.299	889	478.000	707.000	< .001	< .001	< .001
	Simple Past / Mismatch / Atelic	0.605	889	478.000	500.000	0.545	1.000	1.000
	Simple Past / Match / Telic	7.468	889	478.000	749.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	0.041	889	478.000	476.500	0.967	1.000	1.000
Simple Past / Match / Atelic	Simple Past / Mismatch / Atelic	5.694	889	707.000	500.000	< .001	< .001	< .001
	Simple Past / Match / Telic	1.169	889	707.000	749.500	0.243	1.000	1.000
	Simple Past / Mismatch / Telic	6.340	889	707.000	476.500	< .001	< .001	< .001
Simple Past / Mismatch / Atelic	Simple Past / Match / Telic	6.863	889	500.000	749.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	0.646	889	500.000	476.500	0.518	1.000	1.000
Simple Past / Match / Telic	Simple Past / Mismatch / Telic	7.509	889	749.500	476.500	< .001	< .001	< .001

Note. Grouped by subject.

Of the 12 relevant condition pairings, 6 had positive T-statistics and highly significant p-values which held up to multiple comparison corrections (Pbonf / Pholm), indicating a robust effect for these pairings:

1. Present Perfect / Match / Atelic vs. Present Perfect / Mismatch / Atelic:

TA Match strongly influenced the ratings of present perfect sentences with atelic verbs (t = 8.101, p = <0.001). This suggests that tense-aspect match is crucial in these contexts and that our participant group is sensitive to these conditions.

2. Present Perfect / Mismatch / Atelic vs. Present Perfect / Mismatch / Telic:

Telicity had significant effects on the ratings of mismatched present perfect sentences (t = 3.246, p = 0.001) but the size of this effect is not as robust across multiple comparison, given the higher p-value correction (pBonf = 0.034) however these results suggest that that telicity does significantly influences sensitivity to mismatches.

3. Present Perfect / Mismatch / Atelic vs. Simple Past / Mismatch / Atelic: Tense/Aspect had a highly significant effect on the ratings of mismatch / atelic sentences (t = 3.851, p = <0.001), suggesting that participants were particularly sensitive to mismatches in atelic conditions for both present perfect and simple past.

4. Present Perfect / Match / Telic vs. Present Perfect / Mismatch / Telic:

TA Match had a very significant effect on the acceptability ratings of present perfect / telic sentences (t = 5.625, p = <0.001), suggesting that participants are sensitive to this mismatches in the telic condition.

5. Simple Past / Match / Atelic vs. Simple Past / Mismatch / Atelic:

The effects of TA Match on the acceptability ratings of simple past / atelic sentences were very significant (t = 5.694, p =<0.001), suggesting that participants are sensitive to this condition.

6. Simple Past / Match / Telic vs. Simple Past / Mismatch / Telic:

The effects of TA Match are also highly significant in the simple past / telic condition (t = 7.509, p = <0.001) which suggests that, despite this conditions high variability in participant acceptability ratings, participants still show significant reactions.

4.2.2 Summary of Results

In summary, we can see that the TA Match (Match/Mismatch) condition is the most critical factor for sensitivity as it resulted in significant results in all its pairings across tense/aspect and verb telicity.

There are significant differences between atelic and telic conditions, particularly when there's a mismatch in tense/aspect. This can be seen in pairings number 2 and 3 above, suggesting that there could be an interaction effect between Telicity and TA Match.

Additionally, telicity may have some interaction effects with Tense/Aspect and TA Match given the considerable difference in effect sizes when comparing multiple Tense/aspect*TA Match conditions. This is especially apparent for the present perfect match/mismatch in which the difference in effect size was relatively large between the atelic condition (t = 8.101, p = <0.001) and the telic condition (t = 5.625, p = <0.001), suggesting that atelic verbs may make present perfect mismatches more salient.

The opposite pattern was seen in the Simple Past * TA Mismatch condition, where there was a slightly more significant effect for telic match/mismatch sentences

(t = 7.509, p = <0.001) as compared to the atelic match/mismatch sentences (t = 5.694, p =<0.001).

If these differences in interactions are significant, this would confirm the Aspect Hypothesis which argues that telic verbs are canonical in the simple past and to a lesser degree in the present perfect.

These initial off-line results will be discussed in detail in the discussion section as they seem to provide empirical support for theories the Aspect Hypothesis and Shallow Processing Hypothesis, especially when considering tense/aspect and telicity mismatches.

Secondly, in consideration of potential cross-linguistic insights: a deviation from these results in the on-line task could offer insights into how Portuguese L1 might affect the non-native participants' sensitivity to tense/aspect manipulations in English as an L2.

In the next section, we look deeper into each group to consider how these effects differ between the groups.

4.2.2
Inferential Analysis of AJT Results for Native-Speaker (NS) Group

Looking briefly at the minimum-maximum ranges of ratings (1-6) in the table below, we can see that the Native Speaker (NS) group has a surprisingly wide variety of ratings on every condition. In this way, even the licit Match sentences are sometimes rated unacceptable and conversely mismatch conditions were sometimes rated favorably. This suggest that there substantial variability individual's acceptability perceptions.

Descriptive Statistics

		Valid	Mode[a]	Median	Minimum	Maximum
PP-M-A	NS	44	6.000	5.000	2.000	6.000
PP-MM-A	NS	44	2.000	3.000	1.000	5.000
SP-M-A	NS	44	6.000	5.000	3.000	6.000
SP-MM-A	NS	44	5.000	4.000	1.000	6.000
PP-M-T	NS	44	6.000	5.000	1.000	6.000
PP-MM-T	NS	44	4.000	3.500	1.000	6.000
SP-M-T	NS	44	6.000	6.000	1.000	6.000
SP-MM-T	NS	44	5.000	3.500	1.000	6.000

[a] More than one mode exists, only the first is reported

These observations were tested via inferential statistical analysis. Report below:

Friedman Test

Factor	Chi-Squared	df	p	Kendall's W
Experimental Conditions	134.656	7	< .001	0.437

Friedman Test for Native Speaker AJT Data

For the native-speaker group's off-line data, the Friedman test showed a highly-significant result of the effects/interactions of experimental conditions, allowing for rejection of the null-hypothesis (chi-Squared = 134.656, p = <.001). The Kendall's W effect-size value (0.437) indicates that this group has a significant degree of concordance, indicating that there is a relatively consistent pattern in the ratings of native speakers to each of the experimental conditions.

Conover's Post Hoc Comparisons - Experimental Conditions

		T-Stat	df	W_i	W_j	p	p_{bonf}	p_{holm}
Pres. Perf. / Match / Atelic	Pres. Perf. / Mismatch / Atelic	7.142	301	247.500	92.500	< .001	< .001	< .001
	Pres. Perf. / Match / Telic	0.138	301	247.500	250.500	0.890	1.000	1.000
	Pres. Perf. / Mismatch / Telic	5.414	301	247.500	130.000	< .001	< .001	< .001
	Simple Past / Match / Atelic	0.875	301	247.500	266.500	0.382	1.000	1.000
	Simple Past / Mismatch / Atelic	3.386	301	247.500	174.000	< .001	0.022	0.010
	Simple Past / Match / Telic	0.576	301	247.500	260.000	0.565	1.000	1.000
	Simple Past / Mismatch / Telic	3.893	301	247.500	163.000	< .001	0.003	0.002
Pres. Perf. / Mismatch / Atelic	Pres. Perf. / Match / Telic	7.280	301	92.500	250.500	< .001	< .001	< .001
	Pres. Perf. / Mismatch / Telic	1.728	301	92.500	130.000	0.085	1.000	0.765
	Simple Past / Match / Atelic	8.017	301	92.500	266.500	< .001	< .001	< .001
	Simple Past / Mismatch / Atelic	3.755	301	92.500	174.000	< .001	0.006	0.003
	Simple Past / Match / Telic	7.717	301	92.500	260.000	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	3.248	301	92.500	163.000	0.001	0.036	0.014
Pres. Perf. / Match / Telic	Pres. Perf. / Mismatch / Telic	5.552	301	250.500	130.000	< .001	< .001	< .001
	Simple Past / Match / Atelic	0.737	301	250.500	266.500	0.462	1.000	1.000
	Simple Past / Mismatch / Atelic	3.525	301	250.500	174.000	< .001	0.014	0.006
	Simple Past / Match / Telic	0.438	301	250.500	260.000	0.662	1.000	1.000
	Simple Past / Mismatch / Telic	4.032	301	250.500	163.000	< .001	0.002	0.001
Pres. Perf. / Mismatch / Telic	Simple Past / Match / Atelic	6.289	301	130.000	266.500	< .001	< .001	< .001
	Simple Past / Mismatch / Atelic	2.027	301	130.000	174.000	0.044	1.000	0.435
	Simple Past / Match / Telic	5.990	301	130.000	260.000	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	1.520	301	130.000	163.000	0.129	1.000	1.000
Simple Past / Match / Atelic	Simple Past / Mismatch / Atelic	4.262	301	266.500	174.000	< .001	< .001	< .001
	Simple Past / Match / Telic	0.299	301	266.500	260.000	0.765	1.000	1.000
	Simple Past / Mismatch / Telic	4.769	301	266.500	163.000	< .001	< .001	< .001
Simple Past / Mismatch / Atelic	Simple Past / Match / Telic	3.962	301	174.000	260.000	< .001	0.003	0.001
	Simple Past / Mismatch / Telic	0.507	301	174.000	163.000	0.613	1.000	1.000
Simple Past / Match / Telic	Simple Past / Mismatch / Telic	4.469	301	260.000	163.000	< .001	< .001	< .001

Note. Grouped by subject.

Conover's Post-Hoc Comparisons for Native Speaker' AJT Ratings

Observations of Native-Speaker AJT Inferential Analysis:

1. Pres. Perf. / Match / Atelic vs. Pres. Perf. / Mismatch / Atelic:

The effects of TA Match in present perfect, atelic sentences were highly significant (t= 7.142, p = < .001), indicating that the NS group has strong reactions to match versus mismatch sentences in this condition.

2. Pres. Perf. / Mismatch / Atelic vs. Simple Past / Mismatch / Atelic:

There was a strong effect of Tense/Aspect in mismatched, atelic sentences (t = 3.755, p = 0.003) which suggests that the TA Match and Telicity may have some type of interaction with Tense/Aspect.

3. Pres. Perf. / Match / Telic vs. Pres. Perf. / Mismatch / Telic

A highly significant difference was found between the Match and Mismatch condition in present perfect, telic sentences, (t = 5.552, p = <.001) which suggests that native speakers are also sensitive to mismatches in the present perfect telic condition, although the lower t-value indicates that this may be to a lesser extent.

4. Simple Past / Match / Atelic vs. Simple Past / Mismatch / Atelic

A highly significant difference was found between the Match and Mismatch condition in simple past, atelic sentences, (t = 4.262, p = <.001) but with an effect that is lower than the present perfect conditions.

5. Simple Past / Match / Telic vs. Simple Past / Mismatch / Telic

A an almost identical significant difference was also found between the Match and Mismatch condition in simple past, telic sentences, (t = 4.469, p = <.001), showing substantial similarity between telic and atelic in the simple past.

4.2.3
Inferential Analysis of AJT Results for Non-Native-Speaker (NNS) Group

Descriptive Statistics for NNS Group

		Valid	Mode	Median	Minimum	Maximum
PP-M-A	NNS	84	6.000	5.000	1.000	6.000
PP-MM-A	NNS	84	1.000	3.000	1.000	6.000
SP-M-A	NNS	84	6.000	6.000	1.000	6.000
SP-MM-A	NNS	84	6.000	4.000	1.000	6.000
PP-M-T	NNS	84	6.000	5.500	1.000	6.000
PP-MM-T	NNS	84	6.000	4.500	1.000	6.000
SP-M-T	NNS	84	6.000	6.000	1.000	6.000
SP-MM-T	NNS	84	4.000	4.000	1.000	6.000

As seen earlier, we see a slightly less significant reaction to experimental conditions, seen in the consistently high mode ratings, indicating a level of confusion with several mismatch conditions (except for the present perfect mismatch – atelic). Within each condition, we see substantial variability in their ratings. In the match conditions, the NNS group is consistent and confident in their ratings as seen by the minor (or absent) difference between the median and mode. Overall, looking at the table, it's clear that the NNS group seems to be very accepting of most sentences except for the present perfect mismatch – atelic which they seemed to be quite decisive in their unacceptability ratings. To test these observations, inferential statistical tests are applied specifically to the NNS group to test for within-subjects effects. Results of statistical analysis are reported below.

Friedman Test

Factor	Chi-Squared	df	p	Kendall's W
Experimental Conditions	94.172	7	< .001	0.160

The Friedman test for the non-native-speaker group indicated a statistically significant difference (chi-squared value = 94.172, p = <.001) in the ratings across the eight different experimental conditions (2 Tense/Aspect x 2 TA Match x 2 Telicity). The Kendall W's effect size (0.16) suggests a relatively lower level of consistency among participants' ratings compared to the native-speaker group (Kendall W = 0.37).

Conover's Post Hoc Comparisons - Experimental Conditions

		T-Stat	df	W_i	W_j	p	p_{bonf}	p_{holm}
Pres. Perf. / Match / Atelic	Pres. Perf. / Mismatch / Atelic	4.766	581	407.000	267.500	< .001	< .001	< .001
	Pres. Perf. / Match / Telic	0.854	581	407.000	432.000	0.393	1.000	1.000
	Pres. Perf. / Mismatch / Telic	2.016	581	407.000	348.000	0.044	1.000	0.487
	Simple Past / Match / Atelic	1.145	581	407.000	440.500	0.253	1.000	1.000
	Simple Past / Mismatch / Atelic	2.767	581	407.000	326.000	0.006	0.163	0.076
	Simple Past / Match / Telic	2.819	581	407.000	489.500	0.005	0.140	0.070
	Simple Past / Mismatch / Telic	3.194	581	407.000	313.500	0.001	0.041	0.025
Pres. Perf. / Mismatch / Atelic	Pres. Perf. / Match / Telic	5.620	581	267.500	432.000	< .001	< .001	< .001
	Pres. Perf. / Mismatch / Telic	2.750	581	267.500	348.000	0.006	0.172	0.076
	Simple Past / Match / Atelic	5.911	581	267.500	440.500	< .001	< .001	< .001
	Simple Past / Mismatch / Atelic	1.999	581	267.500	326.000	0.046	1.000	0.487
	Simple Past / Match / Telic	7.585	581	267.500	489.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	1.572	581	267.500	313.500	0.117	1.000	0.816
Pres. Perf. / Match / Telic	Pres. Perf. / Mismatch / Telic	2.870	581	432.000	348.000	0.004	0.119	0.064
	Simple Past / Match / Atelic	0.290	581	432.000	440.500	0.772	1.000	1.000
	Simple Past / Mismatch / Atelic	3.622	581	432.000	326.000	< .001	0.009	0.006
	Simple Past / Match / Telic	1.965	581	432.000	489.500	0.050	1.000	0.487
	Simple Past / Mismatch / Telic	4.049	581	432.000	313.500	< .001	0.002	0.001
Pres. Perf. / Mismatch / Telic	Simple Past / Match / Atelic	3.160	581	348.000	440.500	0.002	0.046	0.027
	Simple Past / Mismatch / Atelic	0.752	581	348.000	326.000	0.453	1.000	1.000
	Simple Past / Match / Telic	4.834	581	348.000	489.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	1.179	581	348.000	313.500	0.239	1.000	1.000
Simple Past / Match / Atelic	Simple Past / Mismatch / Atelic	3.912	581	440.500	326.000	< .001	0.003	0.002
	Simple Past / Match / Telic	1.674	581	440.500	489.500	0.095	1.000	0.757
	Simple Past / Mismatch / Telic	4.339	581	440.500	313.500	< .001	< .001	< .001
Simple Past / Mismatch / Atelic	Simple Past / Match / Telic	5.586	581	326.000	489.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	0.427	581	326.000	313.500	0.669	1.000	1.000
Simple Past / Match / Telic	Simple Past / Mismatch / Telic	6.013	581	489.500	313.500	< .001	< .001	< .001

Note. Grouped by subject.

Conover's Post-Hoc comparisons for Non-Native Speaker AJT Ratings

Observations from the Non-Native Speaker AJT Analysis:

1. Pres. Perf. / Match / Atelic v. Pres. Perf. / Mismatch / Atelic:

A statistically significant difference was seen between Match and Mismatch in present perfect, atelic sentences (t=4.766, p=<0.001), indicating a strong non-native sensitivity to this condition.

2. Pres. Perf. / Mismatch / Atelic v. Pres. Perf. / Mismatch / Telic

A slight, although technically insignificant, effect was seen between telic and atelic conditions in ratings of present perfect, mismatch sentences (t=2.750, p = 0.006, pholm =0.076). Although the corrected p-value exceeds conventional levels of significance for multiple-comparison, this effect seems to be rather noteworthy at least in the context of the current study, as it is an effect that is seen at a significant level among native speakers, representing an interesting contrast with the non-native group for further discussion.

3. Pres. Perf. / Match / Telic v. Pres. Perf. / Mismatch / Telic

A marginal and non-significant difference was observed between the Match and Mismatch in the ratings of present perfect, telic sentences (t=2.870, pholm =0.064), indicating a tentative sensitivity to TA Match in the present perfect tense, but not nearly as pronounced in the telic condition.

4. Simple Past / Match / Atelic v. Simple Past / Mismatch / Atelic

An effect of TA Match was seen in ratings of simple past, atelic sentences (t=3.912, p = 0.001), which is to be expected in light of the clear positive reaction this group had to simple past matches which is evidently strong enough to compensate for the variability in reactions to the mismatch conditions.

6. Simple Past / Match / Telic v. Simple Past / Mismatch / Telic

An even stronger significance was seen for the TA Match condition in the ratings of simple past, telic sentences (t=6.013, p=<0.001) as compared to the atelic condition. This suggests that non-native speaker's acceptability rating (and thus their processing) of simple past sentences seems to vary more between atelic and telic conditions as compared to the native speaker group which saw no interaction between telicity and simple past.

5
Results of On-line Experiment: Self-Paced Reading (SPR)

5.1
SPR Data Trimming

Comprehension Cut-off

Some studies delete items whose corresponding post-item distractors (comprehension questions) were incorrectly answered. Conversely, it's also conventional, as long as the overall comprehension score is high, to keep the data as is.

The responses to the post-item comprehension questions were first analyzed by item in order to identify any outliers that presented unusual difficulty to multiple participants. This was done first with the native speakers to serve as a norming procedure so that individual differences in proficiency would not be a factor.

Overall, the consistency of the test was very high given that, of the 32 post-item comprehension questions, only one (sentence #28) was answered incorrectly by more than one participant in the native speaker group, which resulted in a relatively low mean group score for that item: 73% (3/11). Upon investigation, it was deemed that the issue with the question was not due to lack of participant comprehension but with the wording of the item which made the correct response ambiguous. Therefore, for this particular post-item question data was preserve. This affected 3 native speakers and 3 non-native speakers.

After removal of the outlier item, the native-speaker group (n=11) had individual scores between 91 to 100% on experimental items. The mean score for the native-speaker group was 96%, SD = 3.2%. The non-native group (n=21) had the same score range (91-100%) and an average score of 97%, SD = 2.6%.

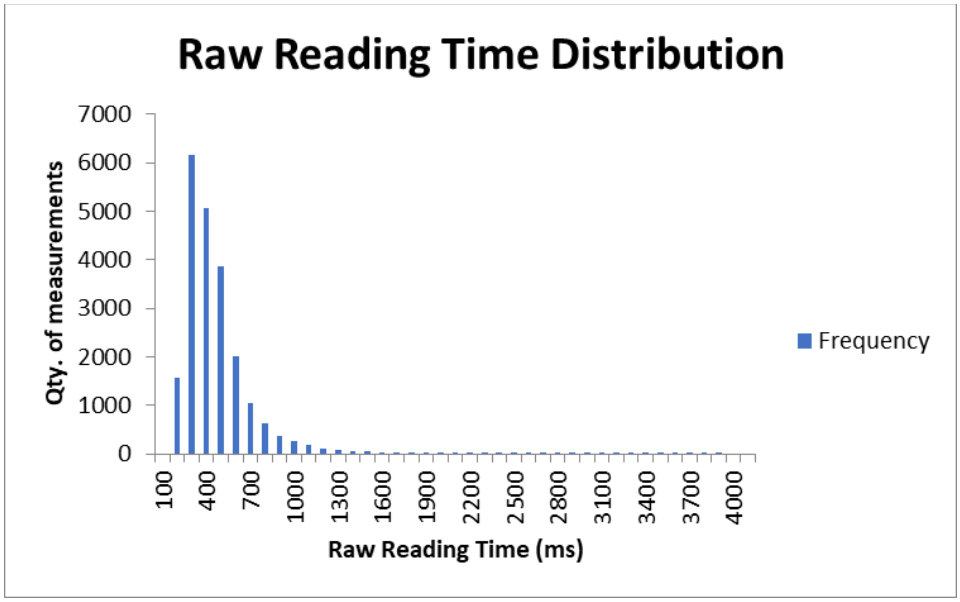
The high comprehension scores, well above the typical 87% cut-off, suggest that participants were motivated and consistently paying attention throughout the task and

thus were likely reading for comprehension. So, the items were maintained in the analysis.

Absolute Cut-Off

The raw reading times for both groups were trimmed based on both absolute and relative cut-off criteria. Absolute cut-offs are an efficient way to identify outliers in the data as a whole. An absolute lower-end cutoff of 100-200ms is conventional in self-paced reading seeing as less than 100 ms is considered an accidental button press and 200 ms is considered the minimum value that truly reflects an underlying processing of a word. However applying a 200ms cut-off limit would have disproportionately impacted several particularly fast-reading individuals (n=4). Thus, a more conservative 150ms lower-limit cut-off was applied. As is common in similar studies, instead of deleting the measurement from the analysis, it is substituted by the limited value of 150ms. This limit affected 9 measurements in experimental conditions.

For the upper-limit, studies on non-native sentence processing consider that the maximum reading times which could reasonably reflect a processing difficulty versus delays caused by external factors during task completion is an upper-limit of 4000ms for non-native speakers and 3000ms for native speakers. These cut-off values were applied as an absolute upper limit across all members of each group, limiting 12 values in the NS group, 4 of which were in experimental measurement regions and limiting 4 values in the NNS group, all of which were in experimental regions.



Cut-offs based on participant-based SD:

After the absolute-cutoff limits were applied, the remaining data could be trimmed by a cut-off value calculated by item SD or by participant SD or both. However, there seemed to be substantial variability in the reading speeds of each participant and thus an item-based outlier identification method risked disproportionately impacting slow-readers. It's worth noting that many participants reported that the SPR task was unfamiliar and difficult and this likely explains the observed variation as some participants evidently worked harder to ensure thorough comprehension during the task.

Participant-based outlier identification, according to Marsden (2017), typically uses a cut-off that is two (2) to three (3) times a participant's standard deviation above their individual mean reading time. Given the importance of data in the upper-limits which may be signals of sensitivity to the experimental manipulations, a more conservative, median value of 2.5 times the participant's standard deviation was utilized. Additionally, instead of deletion, the outlier was replaced with a more conservative value. In this case, the upper-limit value was found by substituting the outlier with the mean reading time of the same experimental group for that particular region and condition. This resulted in the correction of measurements in the experimental regions: 81 for the non-native group (12%) and 56 in the native-speaker group (15%).

5.2
Descriptive Results of SPR Task (Tables)

Below are the descriptive tables showing the raw reading times (post-trimming) for each region, comparing the mean reading times (RTs) between groups (NS v. NNS) at each region in the critical/spillover region of the sentence.

REGION 1: The Verb

		Valid	Mean	Std. Deviation	Minimum	Maximum
PP-M-A	Native Speaker	11	388.045	132.915	249.750	643.500
PP-M-A	Non-Native	21	417.119	195.068	204.250	872.250
PP-MM-A	Native Speaker	11	372.091	97.778	245.250	554.000
PP-MM-A	Non-Native	21	373.702	139.988	190.500	685.500
SP-M-A	Native Speaker	11	404.636	114.173	259.500	601.250
SP-M-A	Non-Native	21	410.726	140.029	246.000	789.750
SP-MM-A	Native Speaker	11	423.864	143.073	276.750	661.000
SP-MM-A	Non-Native	21	446.333	228.194	232.750	1204.750
PP-M-T	Native Speaker	11	404.955	145.598	223.000	738.000
PP-M-T	Non-Native	21	426.131	164.010	244.250	815.250
PP-MM-T	Native Speaker	11	448.341	160.895	315.500	795.750
PP-MM-T	Non-Native	21	434.976	169.919	198.250	830.750
SP-M-T	Native Speaker	11	437.227	150.588	226.250	670.750
SP-M-T	Non-Native	21	415.429	159.563	210.750	809.000
SP-MM-T	Native Speaker	11	427.818	146.380	272.000	720.250
SP-MM-T	Non-Native	21	425.964	161.484	220.250	860.500

Group Mean Reading Times at the Verb Region (NS v. NNS)

At the verb region, we can see that the group mean reading times (RTs) seem to be within a consistent range between conditions and between NS and NNS groups.

Across all conditions, the NNS group generally exhibited more variability in their reading times (RTs), as indicated by higher standard deviations compared to the NS group. The widest range of RTs for the NNS group is seen in the Simple Past/Mismatch/Atelic condition (SP-MM-A), (NNS range = 232.750-1204.750ms) hinting at potentially more significant individual differences in processing requirements in this condition.

The greatest difference in mean RTs was found in the Present Perfect/Match/Atelic (PP-M-A) condition where the NNS group had a higher mean reading time (417.119ms) compared to the NS group (388.045ms). No other present-perfect conditions seemed to show any significant differences between groups or comparable conditions.

In Simple Past sentences, we can see one potentially interesting difference in reading patterns between groups in the atelic condition. There's a noticeable difference between NS and NNS groups in their reactions to Match versus Mismatch in Simple Past, atelic sentences (SP-M-A and SP-MM-A). While the native-speakers actually sped up on the mismatch (M = 404.636ms v. MM = 423.864ms), the non-native speakers

slowed down slightly, (M = 410.726ms v. MM = 446.333) however, this may not be statistically significant, especially given the high variation in the NNS group.

Overall, at the critical region, (on the verb), there are no stark differences in mean RTs between groups but there are a few slight subtleties and fluxes of the within-group variations that suggest that the groups may be experiencing some effects of the experimental manipulations.

REGION 2: Verb + 1

		Valid	Mean	Std. Deviation	Minimum	Maximum
PP-M-A	Native Speaker	11	410.727	136.792	254.750	676.750
PP-M-A	Non-Native	21	376.964	132.923	193.750	705.750
PP-MM-A	Native Speaker	11	397.568	66.658	281.000	476.750
PP-MM-A	Non-Native	21	427.607	168.256	216.750	834.500
SP-M-A	Native Speaker	11	408.614	103.842	252.250	591.250
SP-M-A	Non-Native	21	397.500	153.942	220.000	694.000
SP-MM-A	Native Speaker	11	398.591	97.007	286.000	585.750
SP-MM-A	Non-Native	21	416.595	172.030	229.000	839.750
PP-M-T	Native Speaker	11	420.818	150.404	275.500	800.250
PP-M-T	Non-Native	21	391.393	144.442	218.750	752.000
PP-MM-T	Native Speaker	11	443.568	146.240	292.500	676.000
PP-MM-T	Non-Native	21	399.190	137.715	206.750	714.750
SP-M-T	Native Speaker	11	409.818	102.653	254.250	585.000
SP-M-T	Non-Native	21	397.845	144.959	213.000	860.750
SP-MM-T	Native Speaker	11	429.795	150.737	281.500	704.500
SP-MM-T	Non-Native	21	396.714	132.183	231.000	708.500

Group Mean Reading Times at the Verb+1 Region (NS v. NNS)

Across all conditions, the variability in reading times remains generally high within both groups, as seen by the wide range of minimum and maximum mean reading times (RTs), with slightly more variation being found in the NNS group, likely a reflection of individual differences in proficiency and processing speeds.

Counter to what would be expected, mean reading times (RTs) are fairly consistent between Match and Mismatch of tense/aspect for both the NS and NNS groups, suggesting that this factor alone may not be affecting the reading times at the Verb+1 region.

The only noteworthy data points which could represent potentially significant reactions to the mismatch conditions were in the present perfect. In the atelic sentences (PP-MM-A), the NNS group showed a slightly higher mean RT than the NS group (NNS = 427.607ms, NS = 397.568ms) but the high within-group variability likely

makes this difference insignificant. Also, in the telic mismatch sentences (PP-MM-T), we can also see a noticeably higher mean RT for the NS group (NS = 443.568ms, NNS = 399.190ms). So, it seems that native speakers could be showing some sensitivity to the mismatch in the present perfect but the extent to which telicity is involved in this interaction needs to be confirmed.

In summary, at the spillover (V+1) region, the reading times are generally quite similar for both NS and NNS groups across the various conditions: Tense/Aspect, TA Match, and Telicity. However it seems that there could be a few interactions between these variables that create a more significant impact on sentence processing but this needs to be verified in inferential analysis.

REGION 3: Verb + 2

		Valid	Mean	Std. Deviation	Minimum	Maximum
PP-M-A	Native Speaker	11	395.568	130.389	221.000	666.250
PP-M-A	Non-Native	21	387.321	155.361	212.750	852.500
PP-MM-A	Native Speaker	11	371.818	127.420	185.250	612.500
PP-MM-A	Non-Native	21	407.560	128.236	208.500	657.750
SP-M-A	Native Speaker	11	377.727	115.446	257.250	580.750
SP-M-A	Non-Native	21	386.655	133.511	222.250	661.500
SP-MM-A	Native Speaker	11	389.614	127.498	258.000	692.250
SP-MM-A	Non-Native	21	398.333	173.254	213.250	841.000
PP-M-T	Native Speaker	11	419.773	166.141	222.000	728.250
PP-M-T	Non-Native	21	398.179	161.371	212.500	791.500
PP-MM-T	Native Speaker	11	419.682	144.392	274.500	710.250
PP-MM-T	Non-Native	21	392.857	114.273	236.000	624.250
SP-M-T	Native Speaker	11	415.977	142.252	236.250	675.000
SP-M-T	Non-Native	21	404.845	157.661	222.250	861.250
SP-MM-T	Native Speaker	11	438.023	150.912	275.000	721.000
SP-MM-T	Non-Native	21	415.464	149.999	237.250	717.750

Group Mean Reading Times at the Verb+2 Region (NS v. NNS)

Reviewing the reading times at the Verb + 2 region, once again, we see that both groups have mean reading times (RTs) that don't drastically or consistently differ between Match and Mismatch conditions. The largest Mismatch difference between groups was seen in Present Perfect, atelic sentences (PP-MM-A) where non-native speakers had slightly higher mean RTs (NS = 371.818ms, NNS = 407.560ms) and the standard deviations of each group are fairly close, pointing to a similar distribution of responses within each group. The significance of this is further supported by comparing

the baseline (PP-M-A) Match condition (NS = 395.568, NNS = 387.321) which suggests that the non-native speakers experienced a slow-down (+20ms) whereas native speakers did not (-24ms) but the significance of this effect is questionable.

In regards to Tense/Aspect, both groups demonstrate comparable mean reading times (RTs) across the Present Perfect and Simple Past sentences. What's particularly interesting is how similar the Simple Past mean RTs are between groups which contrasts from the Present Perfect condition where there seems to be more variability.

Finally, it does not appear that telicity has an overall impact on the mean reading times in either group at this Verb+2 spillover region which is consistent with what was seen in the Verb and Verb + 1 regions. However, the interaction between Telicity and Tense/Aspect may be significant given that, similar to other regions, there are relatively marked differences between the two group's mean RTs, specifically in atelic-present perfect sentences (PP-MM-A: NS = 371.818, NNS = 407.560) as well as telic-simple past sentences (SP-MM-T: NS = 438.023ms, NNS = 415.464ms). Whether a pronounced effect for each group can be statistically confirmed, these two Telicity*Tense/Aspect combinations seem to cause higher levels of variability both between and within groups.

In summary, the reading times for the Verb + 2 region are fairly consistent across groups and conditions, suggesting that main effects of any given variable this late in the sentence are unlikely but there seems to be some nuances in the interactions.

REGION 3: Verb + 3

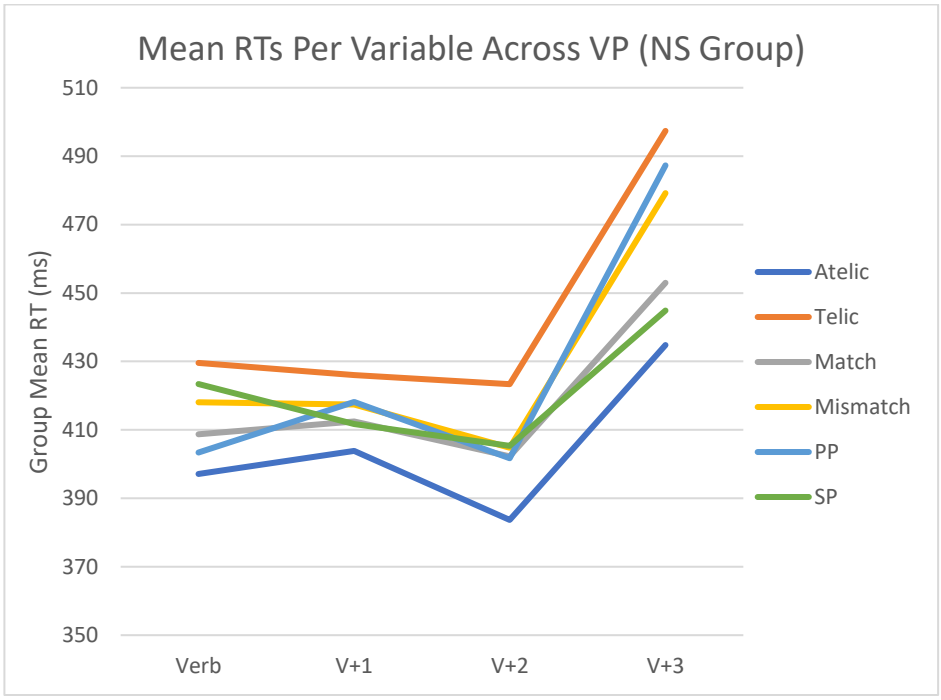
		Valid	Mean	Std. Deviation	Minimum	Maximum
PP-M-A	Native Speaker	11	389.659	143.086	257.250	765.500
PP-M-A	Non-Native	21	443.143	251.869	205.250	1377.750
PP-MM-A	Native Speaker	11	514.977	317.884	285.250	1204.750
PP-MM-A	Non-Native	21	406.845	158.352	209.750	727.750
SP-M-A	Native Speaker	11	390.773	105.611	277.500	586.500
SP-M-A	Non-Native	21	398.464	174.654	214.000	795.500
SP-MM-A	Native Speaker	11	443.773	168.594	272.250	726.750
SP-MM-A	Non-Native	21	478.857	285.017	233.250	1236.250
PP-M-T	Native Speaker	11	547.864	362.265	237.750	1414.000
PP-M-T	Non-Native	21	453.202	213.294	221.000	931.000
PP-MM-T	Native Speaker	11	496.727	230.068	300.000	1066.750
PP-MM-T	Non-Native	21	422.774	183.205	211.750	773.000
SP-M-T	Native Speaker	11	483.659	195.540	270.000	928.500
SP-M-T	Non-Native	21	412.071	200.817	208.000	926.250
SP-MM-T	Native Speaker	11	461.318	243.543	280.750	1102.500
SP-MM-T	Non-Native	21	404.167	154.254	224.500	694.000

Group Mean Reading Times at the Verb+3 Region (NS v. NNS)

Looking at the maximum values, we can see this region has extremely variation compared to previous regions, which makes sense given it is the sentence final position. The large variation between groups and conditions across Mean RTs, SD and overall range, suggest that this could be a particularly sensitive region in terms interaction effects.

5.3.1

Visual Plot: SPR Reading-Time Contour Per Variable/Level



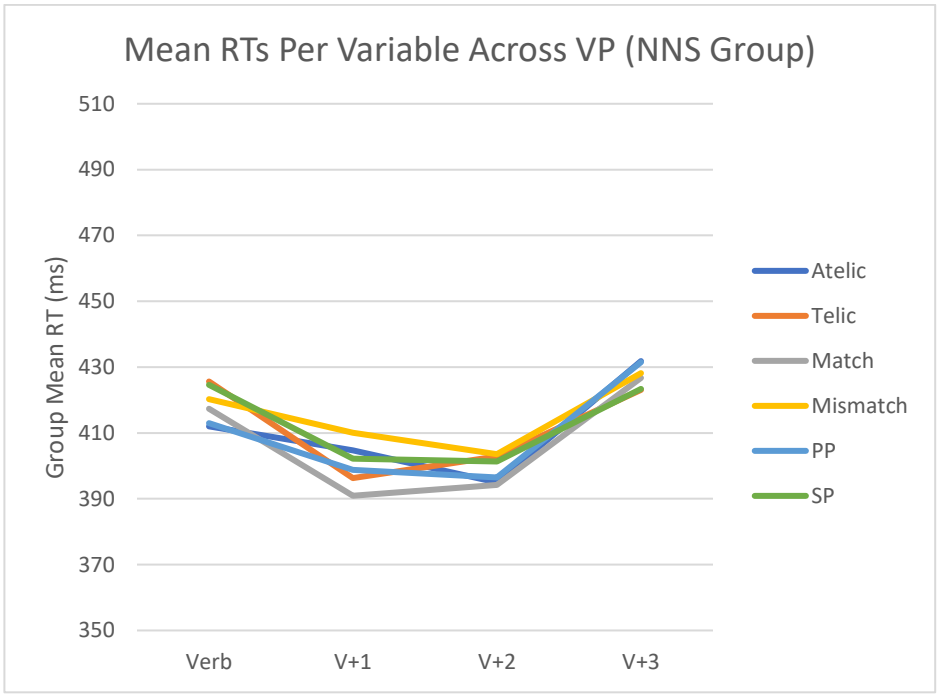


Figure 13: Graphs of mean reading times per variable level

In comparing native and non-native speakers in the distribution of reading times across all the variables/levels and across all measurement regions of the verb phrase, we can observe some distinct differences in the reading-time contours.

Firstly, we can see that both groups have a surprisingly consistent starting time on the verb and then follow distinctive reading-time contours up until the end of the verb phrase.

Native speakers seem to exhibit more sensitivity to the experimental conditions in general as evidenced by the larger spread of the envelope of their reading times across all conditions across the phrase. Conversely, the non-native speakers seem to show almost no differences between variables.

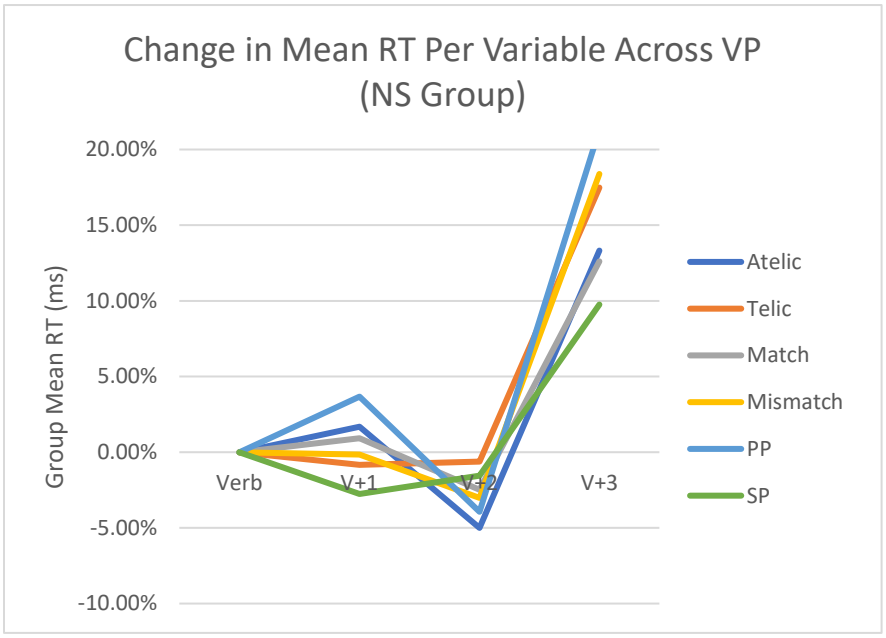
Telicity stands out as a defining feature among native speakers and seems to have a clear facilitation effect in the case of atelic verbs which were consistently registered at the minimum end of their reading time range while telic verbs, on the other hand, are consistently at the maximum end of the group's range. This trend suggests that telicity likely has strong main effects within the Native-Speaker group and its effects seem to be persistent across the entire verb phrase.

In native speakers, there is a pronounced sentence-final wrap-up effect, likely indicating deeper syntactic integration. In fact, within this wrap-up effect, we can observe what seems to be significant grouping between main effects with an especially close pairing of Present Perfect and Mismatch conditions grouped near the top with the Telic condition and also a tight pairing of Simple Past and Match conditions grouped at the bottom end with lower reading times. The clear grouping among variables and the extreme precision of Tense/Aspect and TA Match pairings (difference = <10 ms) suggest that this is a very critical sentence region for analysis of the Native Speaker group's processing.

In contrast, the NNS Group showed very little coherent patterning. There was a generalized acceleration in the middle regions of the VP indicating potential spillover effects from the verb. Their slightly elevated sentence-final reading times suggest a native-like wrap-up trend but it is not nearly as pronounced as the native-speaker group. Additionally, another critical difference is the consolidation of all the variables around

a single elevated reading time suggests that they have a distinct strategy which is not as sensitive to the overall main effects.

In order to better visualize the changes in each individual variable, the plots are also presented according to the relative change of each variable/level's reading times from one region to another:



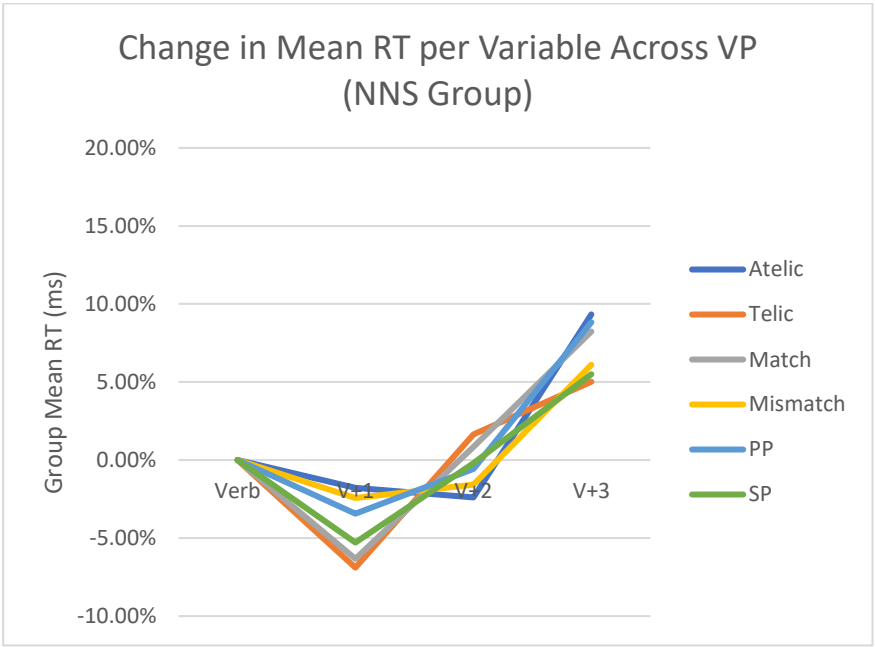


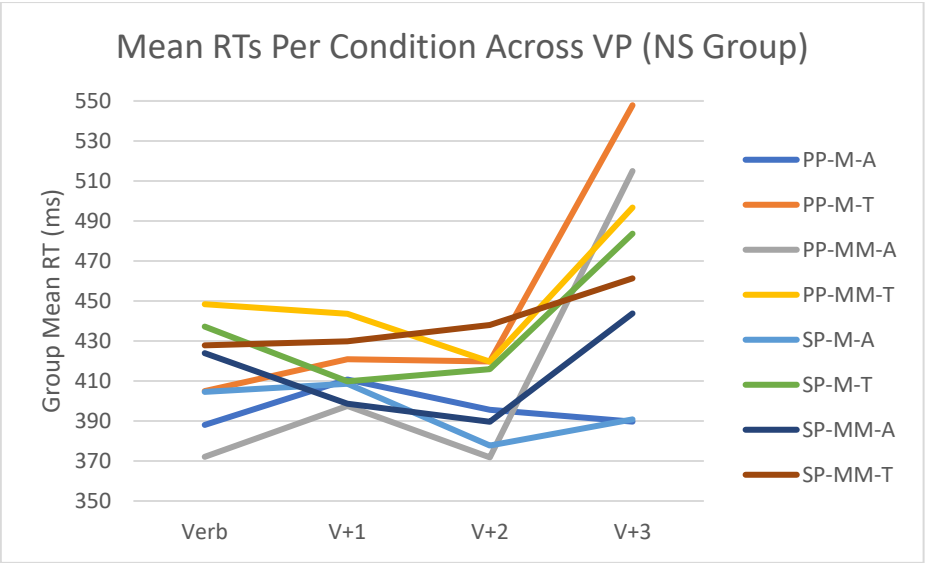
Figure 14: Graphs of change in reading times per variable level

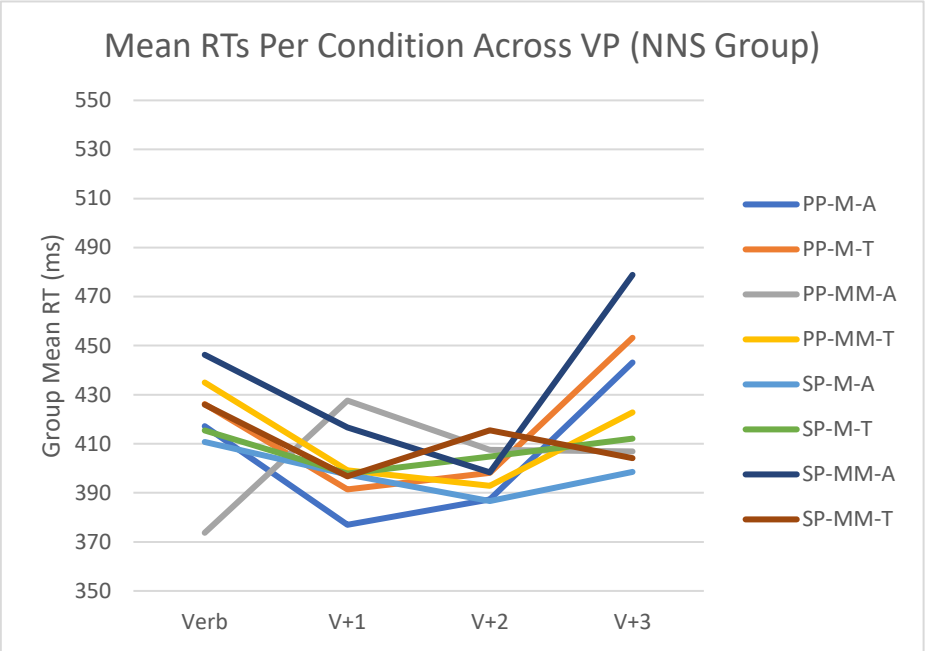
Examining the relative change in reading times across regions for each variable and offers more granularity that allows for consideration of how these variables might be interacting.

The only qualitative difference we can see in terms of speed-up/slow-down effects between groups appears at the onset of the verb phrase where the non-native group showed a uniform *acceleration* of reading times in all the experimental conditions in the immediate spillover region after the verb. In contrast this same region seemed to did not show any facilitation and likely saw a processing cost, namely for the present perfect which saw a slow-down, a symmetrically fast recovery, and then a very dramatic slow-down in the sentence final position, representing the most costly of all variables in this region. So, while the absolute values between the reading times may not reveal that their differences in a given region are significant, when considered in the context of a reading-time contour, the pattern over several regions seems to be very coherent and consistent.

With the greater detail into the incremental changes of each variable from one region to another, we can begin to observe some signs of coherent patterning among the reaction to conditions in the non-native speaker group's sentence-final reading times. Specifically, there seem to be two distinct three way interactions: Atelic/ Present Perfect / Match conditions with slightly higher reading time increase and potential interaction of Telic / Mismatch / Simple Past with a slightly lower reading time at the sentence final region. Although the absolute differences between these values may not statistically significant, the presence and coherence of these patterns will be addressed in the discussion section.

5.3.1
Visual Plot of (SPR) Reading Time Contours Per Condition





When examining all the individual conditions in one graph, we can appreciate the higher level of variability compared to the main effects discussed earlier. However, coherent groupings of conditions still emerge within the native speaker group. Notably, the Present Perfect / Mismatch / Telic condition incurs a higher initial processing cost compared to the Atelic condition, particularly in the verb region. These two mismatch conditions have similar slopes which run in parallel until the end of the sentence when a very similar convergence is seen between these two conditions.

The sentence-final region reveals a significant dispersion in reading times among these conditions. The largest difference at this region is a Match condition which is quite surprising because it seems to represent a great processing cost. The Present Perfect/ Match in the Atelic condition however shows a symmetrically high facilitation effect. This suggests that telicity plays a particularly strong role among native speakers processing of tense/aspect, not only in accentuating mismatches but also in facilitating processing of Match conditions as well. This finding suggests that Native Speakers have facilitation with Atelic verbs in the Present Perfect.

In the non-native speaker group, the reading patterns appear somewhat erratic, featuring multiple U-shaped curves. These curves may indicate a speed-up effect immediately following the verb, possibly due to spillover or a recovery mechanism, followed by a general increase in reading time until the sentence's end.

However, there is one result in the NNS group which stands out as particularly noteworthy. A very low reading time at the verb for the present perfect mismatch condition when paired with a telic verb could be an interesting indication of a processing cost and strategy.

Since telic verbs tend to collocate more naturally with simple past adverbials, telic reading times remain closer to the group's average, indicating there is a marginal level of sensitivity to this as s mismatch. However, interestingly, in this particular condition, where the verb is read much faster may point to a different processing strategy among learners. Instead of slowing down when encountering difficulty in sentence integration, learners may accelerate their reading pace in order to get more information, rapidly gathering more context to aid comprehension of a challenging sentence structure.

5.4
Inferential Results of Self-Paced Reading (SPR)

In this initial analysis, a three-factor, repeated-measures ANOVA was run for all participants to test for between- and within-subjects effects. For ease of reading, the results from the ANOVA have been consolidated so that only the near-significant

results are reported. To consult the non-significant results, the full ANOVA tables and post-hoc tables can be found in the Appendix.

Region	Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Verb	Tense / Aspect	14470.925	1	14470.925	3.33	0.078	0.1
	Telicity	30657.298	1	30657.298	4.073	0.053	0.12
	Tense / Aspect ⁎ TA Match ⁎ Telicity	24658.886	1	24658.886	4.158	0.05	0.122
V+1	TA Match	8307.377	1	8307.377	3.475	0.072	0.104
	Telicity ⁎ Group	13435.727	1	13435.727	3.574	0.068	0.106
V+2	Telicity	32644.412	1	32644.412	12.849	0.001	0.3
	Telicity ⁎ Group	14611.506	1	14611.506	5.751	0.023	0.161
V+3	Tense / Aspect	36859.093	1	36859.093	3.615	0.067	0.108
	Telicity ⁎ Group	73540.785	1	73540.785	3.584	0.068	0.107
	TA Match ⁎ Telicity	100796.94	1	100796.94	3.7	0.064	0.11

Repeated Measures ANOVA: Within-Subjects Effects Per Region (showing only p=<.08)

The Consolidated table above presents a filtered view of cases which approached (or satisfied) statistical significance (p = <0.08), resulting in 10 noteworthy observations which are reported below in detail. Although many effects did not reach conventional significance (p = .05), several of them were close and worth mentioning, post-hoc analyses were run when ANOVA results were significant (p= 0.05)

REGION 1:

The Verb (Critical Region)

1. Tense / Aspect: Starting with the Verb region, a main effect for Tense/Aspect ($F = 3.33$, $p = 0.078$, partial eta-squared = 0.1) did not technically reach statistical significance but seemed to have some marginal effects. This could indicate that there is variation among individuals in their sensitivity to alternations between Simple Past and Present Perfect. This will be confirmed in the next section.

2. Telicity: The second observation in the Verb region was a meaningful effect of Telicity ($F = 4.073$) which was nearly significant ($p = 0.053$) and had a notable effect size (partial eta = 0.12). This indicates that Verb Telicity may have some type of slight and generalized effect across all participants (Native and Non-native) and is captured on the Verb itself. Alternatively, there could be a particular sub-group of participants who show relatively stronger sensitivity to Telicity but knowing which level this applies to (telic/atelic) requires further analysis:

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-23.040	11.417	-2.018	-0.143	0.053	0.053

Note. Results are averaged over the levels of: Group, Tense / Aspect, TA Match

The post-hoc analysis of Telicity at the Verb region shows a nearly-significant mean difference between the Atelic and Telic conditions (-23.040ms) with a t-value ($t=-2.018$) which indicates that the difference is meaningful but the effect size and corrected p-values are marginal (Cohen's d = -0.143, p_bonf/holm = 0.053).

However, considering that these results are across all participants and are averaged over the various levels of Group, Tense/Aspect, and TA Match, there could be a smaller sub-group of participants who show sensitivity to this condition and will be considered in during separate group analyses.

3. Tense / Aspect ✻ TA Match ✻ Telicity: A three-way interaction of Tense/Aspect ✻ TA Match ✻ Telicity ($F = 4.158$) was found at the Verb region and reached a minimum level of significance ($p = 0.05$), and had a marginal effect size (partial eta = 0.122), which together indicate that the interactions of all the experimental variables produce certain conditions that significantly influence reading times.

Post Hoc Comparisons - Tense / Aspect ⁜ TA Match ⁜ Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Present Perfect, Match, Atelic	Simple Past, Match, Atelic	-5.099	20.866	-0.244	-0.032	1.000	1.000
	Present Perfect, Mismatch, Atelic	29.686	22.453	1.322	0.184	1.000	1.000
	Simple Past, Mismatch, Atelic	-32.516	20.565	-1.581	-0.201	1.000	1.000
	<.....>						
Present Perfect, Mismatch, Atelic	Simple Past, Mismatch, Atelic	-62.202	20.866	-2.981	-0.385	0.099	0.095
	Present Perfect, Match, Telic	-42.646	22.525	-1.893	-0.264	1.000	1.000
	Simple Past, Match, Telic	-53.431	20.686	-2.583	-0.331	0.309	0.287
	Present Perfect, Mismatch, Telic	-68.762	21.472	-3.202	-0.426	0.049	0.049
	Simple Past, Mismatch, Telic	-53.995	22.078	-2.446	-0.335	0.448	0.400
	<.....>						

Note. P-value adjusted for comparing a family of 28
Note. Results are averaged over the levels of: Group

Note: Non-relevant comparisons were omitted from this view - Full post-hoc analyses can be found in the appendix.

A post-hoc analysis confirmed this interaction effect via comparison of Present Perfect, Mismatch sentences, finding that the mean difference in Mean reading times between Atelic and Telic conditions (-68.762ms) was significant (t = -3.202, pBonf = 0.049). These findings support the hypothesis that the interactions between Tense/Aspect and Telicity can make Mismatches more salient to readers which, in this case, resulted in faster reading times for atelic verbs in the Present Perfect mismatch condition.

What's particularly surprising about this result is that, despite the observation that Mismatches in Present Perfect Atelic sentences were judged to be less acceptable, we see that participants don't show an immediate processing cost but actually accelerate their reading in these same conditions which could arguably constitute a reaction which is not necessarily related to immediate verb processing but perhaps more related to parsing strategy. This will be addressed in the discussion section.

REGION 2:

Verb + 1 (Spillover region)

4. TA Match: In the V+1 region, there was a small and insignificant main effect for TA Match ($F = 3.475$, $p = 0.072$, $\eta^2p = 0.104$). Although this is not technically significance, it's an indication that a large number of participants likely have some

meaningful variation in their sensitivity to mismatches and this will be investigated during the separate group analyses.

5. Telicity ✻ Group: There may be some differential reactions to Telicity between native and non-native groups at the first spillover region (V+1). A nearly significant interaction effect was found for Telicity ✻ Group (F= 3.574, p = 0.068) and this will be explored during separate group analyses in the next section.

REGION 3: Verb + 2 (Spillover region)

6. Telicity: While the effects and interactions of Telicity have so far been insignificant, the Verb+2 region shows a highly significant effect of Telicity across all participants (F = 12.849, p = 0.001) along with a large effect size. This strong effect of Telicity at the Verb+2 region suggests that either verb Telicity has strong spillover effects or that Mean RTs are affected, in general, by the temporal semantics which work at the phrase level.

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-23.775	6.633	-3.585	-0.164	0.001	0.001

Note. Results are averaged over the levels of: Group, Tense / Aspect, TA Match

The post-hoc test for Telicity at the Verb+2 region confirms that the mean difference in reading times between Atelic and Telic conditions (-23.775ms) was highly significant (t = -3.585, p = 0.001, Cohen's d = -0.164). This supports the idea that, across all participants, verb and/or sentential telicity significantly affect participants' sentence processing but this data must be interpreted during discussion to consider whether this constitutes a type of cost/facilitation or whether it may be related to processing strategy.

In summary, the post-hoc analysis strongly supports the presence of a Telicity effect at the Verb+2 region, indicating that the type of event (Atelic versus Telic) significantly influences reading times in both native and non-native speakers regardless of the Tense/Aspect and TA Match conditions.

This finding adds an important layer to our understanding of how Telicity affected the participants' processing even late into the spillover region, indicating a potentially durable effect either of spillover effects from the Verb or generalized phrase-

level effects from telicity that are likely related to the semantics of telic/atelic situations which is consistent across all regions of the verb phrase.

7. Telicity ✻ Group: This interaction showed a significant effect at the Verb +2 location (F = 5.751, p = 0.023), indicating that the effect of Telicity is not only a consistent effect among all participants but is particularly significant in one group.

Post Hoc Comparisons - Group ✻ Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Native, Speaker, Atelic	(Non-Native, Atelic)	-11.285	48.395	-0.233	-0.078	1.000	1.000
	Native, Speaker, Telic	-39.682	10.746	-3.693	-0.274	0.005	0.005
	(Non-Native, Telic)	-19.154	48.395	-0.396	-0.132	1.000	1.000
(Non-Native, Atelic)	Native, Speaker, Telic	-28.396	48.395	-0.587	-0.196	1.000	1.000
	(Non-Native, Telic)	-7.869	7.777	-1.012	-0.054	1.000	1.000
Native, Speaker, Telic	(Non-Native, Telic)	20.527	48.395	0.424	0.142	1.000	1.000

Note. P-value adjusted for comparing a family of 6
Note. Results are averaged over the levels of: Tense / Aspect, TA Match

The post-hoc analysis for Group*Telicity interaction at the Verb+2 region confirms that only the Native-Speaker group showed a strong effect for Telicity at this region, as evidenced by the mean difference between Atelic and Telic conditions (-39.682ms) which was considered very significant (t = -3.693, p_bonf/holm = 0.005).

This shows a considerable effect of Telicity within the NS group, predicting that native-speakers generally tend to have faster reading times on atelic verbs compared non-native speakers whose mean difference of atelic versus telic conditions (7.869ms) was not statistically significant (t = -1.012, p_bonf/holm = 1.00).

In summary, we see a difference between groups with relation to Telicity at this V+2 spillover region with the NS group showing faster Mean RTs in atelic conditions. This suggests that native speakers have a distinct processing strategy for atelic conditions and that their processing of telicity may be impacting their processing at the phrase-level. In other words, native speakers may not be reacting specifically the telicity inherent in the verb but might actually be setting parameters that work syntactically at the phrase-level whereby telicity is a parameter that is set on the verb but spans across the entire verb phrase with little processing cost.

The extent to which these low atelic reading times in the native speaker group may reflect their more syntactically-rich parsing knowledge or reflect a particular reading strategy applied to atelic-imperfect conditions, or perhaps reflect a more simple interaction between linguistic features will be addressed in the discussion section.

REGION 4:

Verb +3 (Extended spillover region / Sentence final)

8. Tense/Aspect: In the V+3, sentence-final, region, we see a main effect of Tense/Aspect (F = 3.615, p = 0.067, partial eta = 0.108) which is almost at the conventional threshold of statistical significance, suggesting that Tense/Aspect could be correlated to sentential processing/wrap-up effects.

Post Hoc Comparisons - Tense / Aspect

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Present Perfect	Simple Past	25.264	13.287	1.901	0.116	0.067	0.067

Note. Results are averaged over the levels of: Group, TA Match, Telicity

However, a post-hoc analysis of the Tense/Aspect at the V+3 region confirmed that the difference in mean RTs of Present Perfect v. Simple Past (25.264ms) was only marginally meaningful (t =1.901), and its small effect size (Cohen's d = 0.11) along with an insignificant corrected p-value (p_bonf/holm = 0.067) suggest that this effect is not strong and/or durable.

While there are could be co-occurring linguistic factors that correlate/co-occur with the Present Perfect and may cause some high-level sentential processing effects, as suggested by the elevated values in the sentence final position (wrap-up times), the marginal significance and influence of multiple compounding factors in the later across long-distance spans (4 word regions) suggest that there is little to any difference. However, this will be re-evaluated in the separate group analyses.

9. Telicity ✻ Group: This interaction seemed to have some impact in the final V+3 region and was nearly significant (F = 3.584, p = 0.068, partial eta = 0.107) which further supports the notion that there is a significant difference between groups in how they process Telicity across the entire span of the verb phrase. This will be addressed during separate group analyses.

10. Match ✻ Telicity: The TA Match ✻ Telicity interaction at the V+3 region was almost significant (F = 3.7, p = .064, partial eta = 0.11), suggesting that there could be wrap-up effects related to certain types of mismatches but these effects are weak and/or inconsistent across subjects.

However, it could be argued that the presence of this interaction is not negligible (F=3.7) and suggests that there may be a particular sub-set of participants who are more

sensitive to Mismatch sentences in some conditions (Telic or Atelic) and these effects are subtle and are perhaps delayed to the end of the sentence as wrap-up effects. This might signal what a less incremental parsing strategy which likely varies between individuals based on their task completion, proficiency, Group, etc. This will be considered during the separate group analyses.

Summary of Within-Subjects Observations:

The table below shows all 10 observations discussed in this initial between/within-subjects ANOVA analysis and these will be considered during the separate group analyses in the next section.

Effects	**Region**			
	Verb	**V+1**	**V+2**	**V+3**
Significant	Tense/Aspect ✻ TA Match ✻ Telicity		Telicity, Telicity ✻ Group	
Inconclusive (F = >1, p = .05/.1)	Tense/Aspect, Telicity	TA Match, Telicity ✻ Group		Tense/Aspect, Telicity ✻ Group, Match ✻ Telicity

Overall, there were 3 significant effects: one in the Verb region and two in the Verb+2 region. There were also 6 observations of inconclusive effects at the V+1 and V+3 regions. The confirmed effects, the inconclusive effects and the potential trends observed here lead to the following questions which will be investigated further during separate group analyses:

5.4.2
Within-Group ANOVA for SPR Task (NS Group)

A separate ANOVA analysis was conducted for each group individually to more properly control for the variation in the number of participants in each of the

experimental groups (NS = 11). The consolidated table below shows all meaningful (positive f-statistic) results from the analysis and each one is discussed below.

Repeated Measures ANOVA:

Within-Subjects Effects for NS Group

Region	Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Verb	Tense / Aspect	8825.018	1	8825	3.008	0.114	0.231
	Telicity	23132	1	23132	14.286	0.004	0.588
	Tense / Aspect ✻ Telicity	4407.018	1	4407	1.472	0.253	0.128
	Tense / Aspect ✻ TA Match ✻ Telicity	10642.5	1	10643	3.064	0.111	0.235
V+1	Telicity	10769.34	1	10769	2.343	0.157	0.19
	TA Match ✻ Telicity	5973.011	1	5973	1.489	0.25	0.13
V+2	Telicity	34642.23	1	34642	11.452	0.007	0.534
	TA Match ✻ Telicity	1572.545	1	1572.5	1.501	0.249	0.13
V+3	Tense / Aspect	39599.5	1	39599	2.786	0.126	0.218
	Telicity	86203.33	1	86203	3.284	0.1	0.247
	TA Match ✻ Telicity	87176.31	1	87176	1.87	0.201	0.158

Note: Type III Sum of Squares;
Note: This view only shows positive F-stats. See the Appendix for full results.

As can be seen, of the 11 meaningful observations for the Native-Speaker (NS) group, only 2 cases were found to be significant: a main effect of Telicity at the Verb and at the Verb+2 region. There were also marginal levels of Tense/Aspect effects and interactions across multiple regions.

Region 1: Verb

As predicted, at the Verb, native speakers showed a highly significant main effect for Telicity (F = 14.286, p = 0.004).

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-32.426	8.579	-3.780	-0.235	0.004	0.004

Note. Results are averaged over the levels of: Tense / Aspect, TA Match

The Atelic-Telic mean difference of -32.426ms was very significant (t = -3.780, p = 0.004), confirming that the NS group tended to read Atelic verbs faster, on average, compared to Telic verbs and strong evidence that native speakers are immediately sensitive to verb telicity upon reading the verb.

There were also some weak and insignificant effects on the Verb Region including a main effect of Tense/Aspect (t = 3.008, p = 0.114) with a moderate effect size (η^2_p = .231) as well as a very weak interactions between Tense/Aspect*Telicity (t= 1.472, p = 0.253, η^2_p = 0.128) and Tense / Aspect ✻ TA Match ✻ Telicity (t = 3.064, p= 0.111, partial eta = 0.235).

Region 2: Verb +1

At the immediate spillover region (V+1), native-speakers showed no significant within-subjects effects to the experimental manipulations.

There was a weak and insignificant main effect of Telicity (t = 2.343, p = 0.157, partial eta = 0.19). While this is not, by itself, of any statistical significance, its presence is noteworthy when considering the overall patterns of effects across regions.

Region 3: Verb +2

At V+2, there were highly significant main effects for Telicity (F = 11.452, p = 0.007) in the NS group.

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-39.682	11.726	-3.384	-0.286	0.007	0.007

Note. Results are averaged over the levels of: Tense / Aspect, TA Match

A post hoc comparison of Atelic / Telic conditions showed a mean difference of -39.682 ms, (t = -3.384, Cohen's d = -0.286, p_bonf/holm = 0.007), which supports the idea that Telicity exercises a more generalized effect among native speakers that is highly significant and is present across multiple regions of the verb phrase. Additionally, the lack of an effect in the immediate spillover region versus the strong effects at this V+2 region further support the notion that Telicity is not a simple spillover effect from the inherent verb telicity but is likely a more generalized effect of processing atelic-imperfective phrases. This might suggest that inherent verb telicity provides a parameter-setting cue for native speakers. This will be addressed in the discussion.

We also can see, at the Verb +2 region, a very slight interaction of TA Match*Telicity (t = 1.501, p = 0.249). While the high p-value suggests this measurement is heavily influenced by chance, the combination of an elevated F-statistic and not relatively moderate effect size (partial eta = .13) suggests that this observation is worth considering in the discussion given that it is one of the only detections of a possible TA Match effect in the NS group.

Region 4: Verb +3

At the sentence-final region (V+3), there were no significant effects or interactions of any experimental conditions in the NS group.

However, there were three cases of insignificant, yet meaningful, effects: the main effect of Telicity was the strongest (F= 3.284, p = 0.1), followed by a slight main effect of Tense/Aspect (F = 2.786, p = 0.126) and, finally, there was a very weak interaction effect between TA Match and Telicity (F = 1.87, p = 0.201).

5.3.2 Summary of NS analysis:

It seems that Telicity is the only consistently significant condition across multiple regions. It's strong presence at the Verb region and then again at the late-spillover region (Verb +2) supports the notion that Telicity is not just tied to the Verb but across the entire phrase. The discussion will address whether this likely reflects a higher-level processing ability of native speakers or whether there seems to be a linguistic interaction where atelic/imperfective phrases result in generally faster reading strategies.

Although trends were observable in the non-significant statistics, it is premature to assert that these factors could have impacted native speakers' reading times, especially at these later regions of the verb phrase.

However, in a more ample sense, by investigating how these marginal effects are distributed across the entire verb phrase, we can bring more insight into the discussion on the qualitative differences between native and non-native groups, allowing for exploratory hypotheses based on distributions (i.e. whether they are punctual or persistent or if some effects/interactions tend to appear only in certain groups or conditions).

For example, one interesting observation is that the TA Match condition never appears as a main effect for native speakers but does appear in multiple interactions. Conversely, we see marginal main effects of Tense/Aspect appearing multiple times which curiously comes into effect only at the onset and at the end of the verb phrase.

These observations will be addressed in the discussion. Keeping these patterns in mind, we now turn to the analysis of the Non-Native Speaker group in order to investigate how the effects and interactions manifest in non-native processing.

5.4.4
Within-Group ANOVA for SPR Task (NNS Group)

The table below shows a consolidated view of all the meaningful results (F= >1) from the ANOVA for the Non-Native Speaker (NNS) group. The full analysis table is available in the Appendix.

Region	Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Verb	Tense / Aspect	5681.72	1	5681.72	1.125	0.302	0.053
	Tense / Aspect ✻ TA Match	17101.34	1	17101.34	2.109	0.162	0.095
	Tense / Aspect ✻ Telicity	19393.01	1	19393.01	2.648	0.119	0.117
	Tense / Aspect ✻ TA Match ✻ Telicity	15698.67	1	15698.67	2.193	0.154	0.099
V+1	TA Match	15323.93	1	15323.93	8.852	0.007	0.307
	Tense / Aspect ✻ TA Match	4300.595	1	4300.595	1.465	0.24	0.068
	TA Match ✻ Telicity	10442.26	1	10442.26	1.531	0.23	0.071
V+2	Telicity	2600.72	1	2600.72	1.132	0.3	0.054
V+3	Tense / Aspect ✻ TA Match	50874.12	1	50874.12	7.086	0.015	0.262
	Tense / Aspect ✻ Telicity	19901.26	1	19901.26	1.75	0.201	0.08

TA Match ⁎ Telicity	17835.48	1	17835.48	1.016	0.326	0.048
Tense / Aspect ⁎ TA Match ⁎ Telicity	23276.82	1	23276.82	1.735	0.203	0.08

Repeated Measures ANOVA: Within-Subjects Effects for NNS Group

As seen in the ANOVA results of the NNS group, there were twelve cases of meaningful effects (F = >1) but only two of them were significant: a main effect for TA Match at V+1 and an interaction effect of Tense / Aspect ⁎ TA Match at V+3. The results are reported for each region:

Verb Region

In the Verb region, there were no significant effects or interactions but there were four cases of meaningful observations (with a positive F-statistic) which could be relevant to the discussion of the results.

The first observation was a very weak main effect for Tense/Aspect ($F = 1.125$, $p = 0.302$, $\eta^2p = 0.053$) which suggests that the manipulation of tense and aspect alone does not have a measurable influence on real-time Verb processing for non-native speakers.

There were also several interactions effects found in processing of the Verb: Tense/Aspect * TA Match ($F = 2.109$, $p = 0.162$, $\eta^2p = 0.095$) as well as an interaction of Tense/Aspect * Telicity ($F = 2.648$, $p = 0.119$, $\eta^2p = 0.117$). Lastly, there is a three-way interaction between Tense/Aspect, TA Match, and Telicity ($F = 2.193$, $p = 0.154$, $\eta^2p = 0.099$).

The interaction effects were closer to statistical significance and indicate that while no conclusions can be drawn from the data, the variety of these various interactions with Tense/Aspect seem to indicate that the non-native speakers are experiencing some type of very subtle processing change which is too nuanced to be detected within the self-paced reading paradigm.

In other words, the detection of results all pointing to Tense/Aspect as a potentially meaningful condition suggests that while Tense/Aspect does not directly affect reading times, it likely plays some fundamental role in the subtle, underlying processes but these are not detectable on a word-by-word basis. A potential explanation for this could be that some participants are showing an effect immediately on the verb and the other would be that the SPR paradigm, by splitting words, may be losing what is actually a subtle reaction that is starting on the Verb but is cut-off due to the button press. This could be studied further using a paradigm such as eye-tracking or EEG which reduce factors related to task performance, namely due to the participants' coordination of button-presses and reaction time. Perhaps most importantly is that SPR data is obligatorily segmented across word boundaries whereas eye-tracking would allow for investigation in the nuances present in these effects by allowing for regression/retracement analysis.

Region 2: V+1 Region

There was one significant result in the V+1 region and two non-significant results.

The TA Match condition showed statistically significant effects in this immediate spillover region ($F = 8.852$, $p = 0.007$, $\eta^2p = 0.307$), suggesting that non-native readers are sensitive to mismatch manipulations in real-time comprehension and this is most strongly detected in the spillover region instead of immediately on the Verb.

Post Hoc Comparisons - TA Match

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Match	Mismatch	-19.101	6.420	-2.975	-0.128	0.007	0.007

Note. Results are averaged over the levels of: Tense / Aspect, Telicity

The post hoc analysis of the TA Match condition for non-native speakers showed that the mean difference between Match and Mismatch reading times (-19.101ms) was highly significant after multiple-comparison p-value corrections ($t = -2.975$, p_bonf /holm = 0.007). More specifically, the Match condition was read consistently faster across all Telicity and Tense/Aspect conditions.

Surprisingly, TA Match exerts a robust influence on sentence comprehension only in the NNS group. This result must be interpreted to argue whether it likely indicates that non-native speakers are accelerating through the Match condition or are slowing down in order to process the Mismatch condition.

Two other, non-significant, results were found at the V+1 region: A very subtle Tense/Aspect ✻ TA Match interaction which did not reach statistical significance ($F = 1.465$, $p = 0.24$, $\eta^2p = 0.068$) and a similarly weak TA Match ✻ Telicity interaction ($F = 1.531$, $p = 0.23$, $\eta^2p = 0.071$). These results suggest that the telicity and tense/aspect does not moderate non-native speakers' reactions to TA Match conditions in the immediate spillover region (V+1).

Region 3: V+2

The only detectable effect at the Verb + 2 region was for a main effect of Telicity but it's extremely weak ($F = 1.132$, $p = 0.3$, $\eta^2p = 0.054$) and did not warrant post-hoc analysis. It's worth noting simply however that this is also a region where Telicity effects appear in the NS group and this warrants some exploration whether this could be some particular reaction to the stimuli and not effects of Telicity in general. This will be addressed in the discussion.

Region 4: V+3

Four cases were detected at the V+3 region but only one of them had a significant effect: the interaction of Tense/Aspect ✻ TA Match.

The highly significant interaction effect of Tense/Aspect ✻ TA Match ($F = 7.086$, $p = 0.015$, $\eta^2p = 0.262$) at the V+3 (sentence final) region reinforces the sensitivity to the TA Match condition among non-native speakers and suggests that processing related to this condition may be seen as a wrap-up effect.

Post Hoc Comparisons - Tense / Aspect ⁜ TA Match

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Present Perfect, Match	Simple Past, Match	42.905	19.127	2.243	0.207	0.183	0.183
	Present Perfect, Mismatch	33.363	19.859	1.680	0.161	0.605	0.404
	Simple Past, Mismatch	6.661	20.454	0.326	0.032	1.000	1.000
Simple Past, Match	Present Perfect, Mismatch	-9.542	20.454	-0.467	-0.046	1.000	1.000
	Simple Past, Mismatch	-36.244	19.859	-1.825	-0.175	0.454	0.378
Present Perfect, Mismatch	Simple Past, Mismatch	-26.702	19.127	-1.396	-0.129	1.000	0.511

Note. P-value adjusted for comparing a family of 6
Note. Results are averaged over the levels of: Telicity

However, post-hoc analysis indicated that of all the Tense/Aspect * TA Match interactions, the most significant difference was in the Mean reading times between the Present Perfect and Simple Past, Match condition (42.905ms) but this effect is not significant (t = 2.243, p_bonf/holm = 0.183).

While this particular interaction does not stand up to Bonferroni/Holm p-value correction, the presence of this effect could be a subtle indicator of pattern where we see re-emergence of Tense/Aspect in the sentence final region. No conclusive conclusions can be made but this result may indicate, for future study, that the non-native group could have some subtle differences in their processing of Present Perfect versus Simple Past sentences which are sentential and for this and other reasons, this effect is not particularly suited to SPR protocol.

This data aligns with the off-line results which found a much higher level of acceptability among all Simple Past conditions. When considered in conjunction with the argument that non-native readers accelerate through easily identified Match conditions, it would be logical that the Simple Past condition have a faster reading time as this was the most confidently identified acceptable Match in the off-line experiment.

So, assuming that the V+3 region is actually capturing a processing cost related to TA Match or Tense-Aspect or their interactions, it would be in line with the current result which sees higher sentence-final reading times for the Present Perfect. In summary, although these data are not technically significant, and some assumptions must be made about what they reflect, it does fit what would be predicted: the NNS group very confidently identifies Simple Past Match sentences and this would likely cause a facilitation effect during on-line processing. More on this will be presented in the discussion section.

No other conditions at the V+3 (sentence final) region were statistically significant but there were some minor Tense/Aspect ✻ Telicity interaction ($F = 1.75$, $p = 0.201$, $\eta^2p = 0.08$) which is interesting to note for future investigations given that the very detection of Tense/Aspect interaction in this region supports the notion that the Tense/Aspect condition may be a factor which influences reading times in the non-native sentence processing but could be sentence-final type of integrative process.

Summary of Non-Native Speaker (NNS) group:

In summary, this analysis of non-native speaker reading-times offered both conclusive and tentative insights into on-line, non-native sentence processing.

The most significant result was that the NNS group showed a sensitivity to the main effect of TA Match at the V+1 region and to a TA Match interaction at the V+3 region. Non-native speakers had Match reading times that were consistently lower than Mismatch reading times across all conditions. This indicates a sensitivity to the Match/Mismatch distinction but care must be taken during interpretation of these results.

In particular, the difference seen between these two conditions in the NNS group could be caused by either a slowing down on Mismatches (Mismatch sensitivity) or by speeding up on Matches (Match sensitivity). So, while both types of sensitivity create a similar overall effect, they are driven by different parsing strategies. This will be one of the main points of discussion in the discussion section.

Despite very no other statistically significant results, there were some insights based on the relatively limited variation in the distribution of the meaningful but less-than-significant effects. In particular these marginal effects and interactions appeared to be in complementary distribution between Non-Native Speaker (NNS) and Native-Speaker (NS) groups.

For example, the NNS group showed significant main effects for both Tense/Aspect and TA Match with almost no sensitivity whatsoever to the main effects of Telicity. This is in stark contrast to NS group which only saw significant main effects of Telicity and very few meaningful detections of the TA Match and Tense/Aspect or

their interactions. This is also somewhat surprising given that we would conventionally associate mismatch detection with a higher level of proficiency.

The implications of this finding are nuanced yet fascinating as they involve the potential for L1 dialectal variation in the NS group and, as mentioned before, a specific type of implicit knowledge which may be present in the L2 group (Match sensitivity) which could be precisely driven by their instructed language acquisition background.

Observation: A note on marginal and nearly-significant effects.

Despite no other statistically significant results being seen in either group, the subtlety and distribution of many of the observed effects warrant discussion in order to consider what trends in these marginal and near-significant effects may indicate about potential underlying grammatical/psycholinguistic complexities that are unique to each group and may not be fully reachable within the current experimental paradigm. This study therefore offers some exploratory insights on these secondary effects while also raising some methodological and theoretical questions.

Firstly, there are some insights based on the relatively limited variation in the marginal and nearly-significant effects that appeared between Non-Native Speaker (NNS) and Native-Speaker (NS) groups in their individual group analyses.

The NS group's inconclusive interaction effects were almost always between TA Match and Telicity where as the NNS group's interactions with TA Match were paired almost exclusively with Tense/Aspect and never with Telicity (except for one rare occasion in V+3.) This finding seems to support the overall findings but it also provides some baseline insight into how significant the lack of effects of Telicity for non-native speakers was, which is quite surprising given the assumption of less proficient learners is that they tend to over-utilize lexical/pragmatic cues such as Telicity. The clear presence and absence of Telicity effects between groups also suggests that the Atelic acceleration seen in the NS group is likely not related to some particular linguistic interaction effect but is actually a psycholinguistic effect that is specifically affecting the NS group.

Interestingly, non-native speakers seem to employ specific strategies that differ from those used by native speakers, particularly in speeding through areas of a sentence where they find recognizable structures. This may reflect a form of compensation for

more limited processing resources or less automatic syntactic processing, a point that warrants further discussion and investigation.

6
Discussion

Within this chapter, the Conclusion section (6.1) presents the main findings in relation to the Primary and Secondary research questions. These findings are discussed in more detail in the Discussion section (6.2) in consideration of the overall objectives to investigate non-native processing of tense/aspect and the potential for cross-linguistic influence of the L1 on the non-native group's performance. Final considerations (6.3) are presented with limitations and future research directions.

6.1
Conclusions

Primary Questions:

1. Do sequential bilinguals of Portuguese L1/English L2 demonstrate any sensitivity to tense/aspect mismatches between verb inflections and temporal adverbials during their off-line and on-line comprehension of English sentences in the present perfect and simple past?

   Experiment 1 (Off-line): Yes, with variation between conditions. Both the bilingual and monolingual group consistently judged the illicit Mismatch sentences as significantly less acceptable compared to the licit Match sentences, demonstrating that all participants have sufficient knowledge of the target structure. However, there was more variation within the bilingual group compared to the monolingual group: while the bilingual participants were confident in their recognition of licit Match sentences, they were quite dispersed in their judging of illicit, Mismatch sentences. Additionally, there were differences found according to tense/aspect: the present perfect mismatches were more consistently rated as unacceptable as compared to the

simple past mismatches. This large amount of variation in simple past mismatch judgments suggests that this manipulation is more subtle, even for monolinguals.

Experiment 2 (On-line): Yes, with variation between groups. The bilingual group showed a significant main effect for TA Match condition at the spillover region immediately after the verb (V+1), indicating a highly significant main effect for the Match condition, likely a facilitation. Additionally, there was a significant simple main effect for the present perfect mismatch in the atelic condition. On the other hand, the monolingual group did not demonstrate any significant sensitivity to the mismatches.

2. Does the inherent telicity of the verb (telic/atelic) affect the on-line and off-line comprehension of tense/aspect in bilingual sentence processing?

Experiment 1 (Off-line): Yes. Telicity had interaction effects in both groups. Present perfect mismatches with atelic verbs were consistently rated as the least acceptable of all conditions by both groups and the difference between the telic and atelic present perfect mismatch judgment was statistically significant within each group. Therefore, telicity does seem to have a significant effect on off-line acceptability perceptions of present perfect sentences.

Experiment 2 (On-line): Yes. With variation between groups.

The bilinguals showed a significant effect for the interaction of telicity and tense/aspect. The present perfect mismatch with atelic verbs resulted in significantly higher reading time immediately after the verb (V+1). The monolinguals showed a main effect for telicity at multiple regions (Verb and V+2), showing a significantly faster reading time for the atelic condition.

Secondary Question:

1. Upon secondary analysis of the bilingual and monolingual participants' sensitivities to tense/aspect violations across all tense/aspect, match/mismatch, and telicity conditions, are there any conditions (or combinations thereof) in

which the Portuguese-English bilinguals exhibit facilitation and/or processing patterns that are qualitatively similar to those of English monolinguals?

No. The reading time contours and sensitivities to the conditions on-line were inconsistent between bilingual and monolingual groups in relation to both the region and degree of sensitivity, indicating that the bilinguals and monolinguals are likely using qualitatively different processing strategies.

6.2
Discussion of Findings

Primary objectives: This research set out to investigate the processing behaviors of North-American English monolinguals and Brazilian Portuguese-English bilinguals during their on-line comprehension of English sentences in the present perfect and simple past in order to determine how their comprehension of Tense/Aspect may be affected by manipulations in Telicity and Adverbial mismatches.

To do this, the results from each group's off-line (AJT) and on-line (SPR) experiments were compared. Overall, both monolinguals and bilinguals judged Mismatched sentences as unacceptable off-line, confirming that both groups had baseline, explicit knowledge of the tense/aspect distinctions.

As seen in previous studies, simple past mismatches were rated as generally more acceptable across all conditions whereas the present perfect sentences generated a much stronger unacceptability rating in both groups. Additionally, as predicted by the Aspect Hypothesis (ANDERSON, 1995) and studies of on-line L2 processing of tense/aspect in English Present Perfect sentences (ERIKSSON, 2016; FARINA, 2016), conditions in Telicity did have an impact on the perceptions of acceptability within both the monolingual and bilingual groups. In particular, the atelic condition, as predicted, seemed to make mismatches more salient, at least in the off-line experiment. It is predicted, in the Aspect Hypothesis, that telic verbs are canonical for L2 learners across all past-time structures and thus the atelic verbs generate a higher level of attention to incongruencies of tense/aspect at the lexical-grammatical interface.

Furthermore, it was predicted that the bilingual group, as a result of their instructed language acquisition background would have strong metalinguistic knowledge and perform particularly well in the off-line experiment. As anticipated, the learners showed very confident acceptability ratings in their recognition of Match conditions in which they actually gave more confident, higher acceptability ratings than the monolinguals which could perhaps appear during the on-line task as a facilitation – a Match sensitivity.

The second experiment used self-paced reading to measure each group's processing behaviors during comprehension of stimuli containing the same conditions as the off-line experiment with Tense/Aspect, Telicity, and TA Match conditions. The reading times registered the participants' responses to these manipulations were analyzed and reported in order to characterize each group's responses to the sentences in terms of reading-time slow-downs or accelerations on and around the critical areas where the manipulations are made.

The results showed that each group had different reactions both in location and intensity. The bilinguals showed more reactions at the onset of the verb phrase and the monolinguals showed more delayed reactions in the later regions of the verb phrase.

In contrast to the unacceptability ratings of the Present Perfect Mismatch in the off-line AJT task, the monolingual group was not sensitive to the main effects of TA Mismatch during their on-line comprehension. However, there were subtle effects for TA Mismatch interactions which did not reach a level of significance in the current analysis. It's possible that American English monolinguals are detecting the anomalies but are not immediately altering their processing strategy and thus the reaction is spread out across multiple regions. This idea is supported by the high sentence final wrap-up region which was an order of magnitude higher than the bilingual group.

This is in contrast to the results found in comparable studies (Roberts & Liszka, 2013; Eriksson, 2016) where the British English monolinguals were sensitive to the Present Perfect Mismatches on-line. This suggests that American English has a qualitatively different mental representation than British English which is quite surprising given that they are both considered to be variants of the same language. The

extent to which this may be caused by differences in the frequency distributions of the Present Perfect should make for very interesting inquiry. As it stands, the results suggest that, for American English monolinguals, the Present Perfect / Simple Past alternation may not actually be in complementary distribution and thus do not constitute a grammatical/ungrammatical experimental pair. Thus, future studies should address the use of this alternation between these structures and ensure that the subtlety of its unacceptability on-line is factored into the experimental design.

Future studies could also take a descriptive and formal approach to analyzing the grammars of contemporary American English, using corpus analysis for example, to analyze the collocations of the Present Perfect and the degree to which they can be used with deictic past adverbials. Of course, this should be tested with on-line methods as well. Overall, More research is needed to determine if this is just a difference in the way American English speakers process the mismatch or if there really is a weaker grammatical representation of the Present Perfect in the American English variety.

As mentioned above, it is quite curious that the bilingual group actually showed more sensitivity on-line than the monolingual group. More specifically, they showed an immediate sensitivity to the Present Perfect mismatches with atelic verbs directly after the verb, which suggests that they actually have a more robust representation of this structure than the monolinguals. The fact that this reaction was only with atelic verbs however could lend support to the notion that processing facilitations may be more dependent on context than on the L1. However, the lack of sensitivity of the L1 group suggests that this is likely not the case. The bilinguals in this study showed the same pattern in reading time contour as seen in the British English monolingual groups in Eriksson (2016) and Roberts & Liszka (2013) in reaction to present perfect mismatches. Additionally, it is similar to the reaction of French L1 learners who saw a similar sensitivity in similar conditions.

It was predicted that the bilingual group would show sensitivity to Present Perfect Mismatches, especially in the Atelic condition which is non-canonical for Portuguese-English bilinguals during translation activities. This provides a strong indication that the representation of this tense/aspect (Present Perfect) is of an implicit

nature in the bilingual group robust enough to detect incongruencies in telic verbs which are canonical for L2 learners in perfective past-time contexts. However, when the context was with an atelic verb, the mismatch was much more salient to learners who were able to draw on this implicit knowledge when conditions brought more attention to the verb morphology.

Secondary objectives: The secondary objectives of this research were more exploratory in nature and thus were not necessarily expected to be conclusive.

The first part of the objective was to characterize, in a more qualitative way, how similar the two groups tended to process the sentences and explore how native-like their processing was. The first question sought to characterize the reading times for each group by considering the reading-time contours for each condition at each region to allow for a method of comparison. It was found that the two groups seem to be using qualitatively different strategies based on the distinct the differences in each group's distribution of reading-times in reaction to tense/aspect, telicity, and TA match across the verb phrase.

This comparative analysis determined that the monolingual group showed a more constant and slower reading time across the verb phrase, culminating in a very large processing cost at the end of the sentence, a strong indication of integrative processing. Conversely, this pattern is not seen in the bilingual group which seems to show a strategy that indicates a tendency to accelerate reading more than monolinguals and spend comparatively less time processing the sentence-final region.

This arguably supports the notion that the two groups have fundamental differences in their processing strategies. The monolingual participants' reading times seem to follow a relatively more consistent pacing throughout the entire sentence until the end of where there is a large processing cost. This seems to fit with what we would expect in monolingual parsing where there is a consistent processing cost at each word region as the syntactic representation of the sentence is built incrementally followed by closure at the conclusion of the verb phrase. Additionally, the reading times at this sentence final region see precise groupings. However, more analysis is needed to analyze what seems these groupings of related conditions, utilizing a mixed model

analysis given the that these long sentence-final reading times could reflect an integrative processing cost for the monolinguals. This would make a particularly fascinating follow-up experiment. It's critical to note that the small sample size in this monolingual group could have exaggerated these observed patterns.

In contrast to the monolingual group, the bilingual group showed an acceleration in the middle regions of the verb phrase. This could be indicative of a shallower syntactic processing, as per Clahsen and Felhser's (2006) Shallow Processing Hypothesis, in which the bilingual group is making use of a processing strategy which may is more inferential and makes use of the lexical and pragmatic cues, such as that described in Vanpatten's (2002) Processing Theory of SLA, where learners pay special attention to cues which are lexical and significant to overall sentence comprehension. This is supported not only by the lack of an incremental processing cost along the middle the region of the verb phrase but also in the lack of clear slow-downs at the end of the sentence as was dramatically seen in the monolingual group's parsing.

It was initially expected that the bilinguals would perform similarly to monolinguals and that this "native-like" proximity could be an indicator of their processing efficiency. However, the results seem to support the literature on bilingualism which rejects the notion that a sequential bilingual is two monolinguals in one but indeed the two groups employ their own distinctive processing strategies, making objective comparisons between their processing behaviors difficult (if not impossible). Therefore, it is important to consider the bilingual group's proficiency in other terms.

The original prediction for the bilingual group, inspired by Finger (2008), was that the Portuguese-English bilinguals, due to the existence of similar tense/aspect distinctions in Brazilian Portuguese L1, and a strong tendency to select telic verbs with the present perfect together with duration adverbials would make them sensitive to these contexts on-line. In fact, they did show sensitivity when the adverbial was deictic past mismatched with a present perfect verb inflection and, in line with predictions, this reaction was strongest when combined with the non-canonical atelic verbs. So, it

is certainly possible that Portuguese L1 caused this processing sensitivity and in fact perhaps could be categorized as a level of proficiency that was arguably *superior* to the monolinguals in this case. However, as mentioned previously, due to the monolingual group's relatively small sample size in this study, some effects could have been over/understated and more research with larger sample sizes should be conducted for further confirmation.

The intention of this study's secondary objective was exploratory in hopes of providing an empirical basis for further research into cross-linguistic influence. The results in this regard, while inconclusive, do not rule out the potential for cross-linguistic influence. In fact, the bilinguals' sensitivity to the match/mismatch condition on-line is higher than the sequential bilinguals in comparable studies (i.e. ROBERTS; LISZKA, 2013; ERIKSSON, 2016). Thus, more conclusively, one could argue that the Portuguese-English bilinguals in this study seemed to possess a robust implicit representation of this tense/aspect distinction which is not common in among sequential bilinguals. Thus, their high sensitivity to the Present Perfect Mismatches on-line makes this group profile (Portuguese L1/English L2) a compelling choice for inclusion in future studies on cross-linguistic influence.

6.3
Final Considerations

Despite the experiment's relatively small scale, it yielded insightful findings. Notably, Portuguese-English bilinguals exhibited greater immediate sensitivity to mismatches in tense and aspect than the monolingual control group. This lack of monolingual sensitivity may be attributed to the diminishing frequency of the present perfect tense/aspect in American English (i.e. DESHORS, 2020) as compared to other varieties like British English. This should serve as a caution to other researchers to carefully consider not only the utility of using this native-speaker baseline comparison but also to pay attention to the *variety* of native English used given that the American English monolinguals showed completely different processing patterns than the British English monolinguals from similar studies.

The two main findings that differentiated the American monolinguals from their British English counter-parts were their sensitivity to telicity as a main effect at multiple regions (atelic facilitation) as well as a pronounced sentence-final processing cost. These two results suggest that there is seems to be substantial variation even among monolinguals in their on-line processing of tense/aspect. This dialectal variation will certainly make for a fascinating line of research.

As mentioned, this study showed a promising result for Portuguese-English bilinguals to be considered for future cross-linguistic influence studies, given their heightened sensitivity to mismatches in the present perfect condition which is consistent with results seen with British English monolinguals and supports the hypothesis (i.e. ERIKSSON, 2016; UNO, 2014; TERAN, 2014) that their L1 tense/aspect distinctions could be a significant contributor to this heightened processing ability. Therefore, future studies should investigate Portuguese-English bilinguals in comparison to others bilingual groups of various L1s in order to determine, more conclusively, to what extent shared linguistic attributes between the L1 and L2 actually affect L2 sentence processing.

Overall, it's the current study utilized a convenience sample and is limited, in part, by its size. A larger sample could mitigate within-group variation caused by individual differences in proficiency and experience. This is especially helpful in self-paced reading where variation in reading strategies can be extreme and it would be helpful to exclude extremely fast or slow readers in order to reduce some of the variation seen in the current study.

Finally, as mentioned above, self-paced reading has its drawbacks and one which was critical here was the lack of a more robust comprehension measuring process. The bilingual group processed the sentences faster and still maintained high comprehension scores however, it's impossible to know, from the current experimental design, if they are not actually generating similarly deep syntactic representations similar to monolinguals. Future on-line experiments should try to find ways to test the depth of comprehension without drawing too much attention to the experimental

manipulations in order to get a more holistic picture of processing not just in relation to efficiency but effectiveness as well.

Despite these limitations, this study has offered more empirical support to on-line studies describing the processing of tense/aspect in the Present Perfect which is one of the most late-acquired features of English and a point of interest for L2 educators. There were some intriguing insights and directions for future research, pointing to the critical role of verb telicity and lexical aspect during processing both in monolinguals and bilinguals. Balancing and controlling this variable is of the utmost importance in bilingual processing studies and in educational contexts.

My final consideration is in regard to the importance of on-line experiments in SLA. As a former teacher, arguments can go in circles and results from on-line studies bring a more nuanced layer of data to these discussions. In particular, I was surprised by how powerful and convenient it is to administer self-paced reading remotely. Additionally, even with a straightforward and conservative inferential analysis, we have gained a small new insight into this complex (and controversial) subject of the teaching, learning, and acquisition of tense/aspect and its complex interaction with so many factors.

It is rewarding to contribute to the discussion on this particular structure – the present perfect – and provide data which goes beyond the externalized product of language and instead grounds the discussion into a more concrete domain, isolating the learner-internal processes. Without a doubt, as more researchers continue to apply these tests, the academic and educational discussions around bilingual processing and acquisition will continue to be enriched. It is my hope that this study was able to contribute to this movement.

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8. Appendices

8.1 Supplemental Analyses

8.1.1 Between-Group ANOVA for SPR Task (NS and NNS Groups)

Repeated Measures ANOVA for Between-Subjects Effects Per Region

Region	Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Verb	Group	1699.907	1	1699.907	0.011	0.919	3.507×10^{-4}
	Residuals	$4.846\times10^{+6}$	30	161532.198			
V+1	Group	12077.227	1	12077.227	0.092	0.764	0.003
	Residuals	$3.932\times10^{+6}$	30	131082.453			
V+2	Group	1233.142	1	1233.142	0.009	0.924	3.096×10^{-4}
	Residuals	$3.982\times10^{+6}$	30	132716.928			
V+3	Group	86282.865	1	86282.865	0.341	0.564	0.011
	Residuals	$7.599\times10^{+6}$	30	253309.540			

Note: Type III Sum of Squares

As seen in the table above, no significant between-subject effects were seen at any region.

The Consolidated table below shows all the cases of effects that approached statistical significance ($p = <0.08$) shown per for each sentence region. The full ANOVA analysis table can be found in the Appendix.

8.1.2 Results of ANOVA for Present Perfect Auxiliary

Given that the experimental pairs utilized in this study have a different number of elements (present perfect +1 auxiliary), each Tense/Aspect varies in its correspondence to its critical regions for Telicity and TA Match conditions to be invoked. In this case, the present perfect carries tense embedded in the auxiliary verb and the telicity/verb semantics are on the verb itself In other words, there are two different critical regions: tense/aspect mismatch region which for the present perfect would be Verb-1 and then the verb semantics region (Verb). However, note that, in the case of the simple past, there is a cumulative effect where both the tense and semantics are embedded in the verb.

This raises some questions about the reliability of the data. For example, there was a lack of TA Match effect on the V+1 region for Native Speakers (NS). It may be surprising since the NS group seemed to show a significant effect to TA Match in the present perfect. This lack of TA Match result in the present perfect could be due to the differences in critical region onsets and could create a bias for the Simple Past versus the Present Perfect whose tensed-auxiliary is actually in the region prior to the verb and therefore reading times on the auxiliary verb were not included in initial statistical analysis.

In the initial analysis, the Verb in Simple Past was the critical region for both Telicity and TA Match conditions while the Verb in the Present Perfect was the critical region for Telicity and was actually the spillover region for the TA Match condition. In other words, what the mean RTs on the Verb region captured for Present Perfect sentences are critical region effects for Telicity and spillover effects for TA Match. Given that spillover effects tend to be quite strong this was not expected to create significant confounds assuming the participants are all practicing a naturally-paced reading.

This Verb-to-Verb comparison may lose some nuance due to this inconsistency of critical regions between Tense/Aspect conditions but it is a necessary concession in order to run a three-way factorial analysis for all the effects and interactions between/within-subjects. While this may raise questions about the compatibility of these variables to a 2x2x2 design, a secondary ANOVA analysis will be run in order to adjust this Verb region and measure the reading times on the Auxiliary verb. This will be done by conducting analyses separately for each Tense/Aspect condition in a 2x2 factorial analysis which can be discussed alongside the primary ANOVA results. By using the two analyses in conjunction, measurement error or confounds should be easily identified.

In order to test for these factors, a second analysis was done with an adjusted sentence region (Aux) for the present perfect. In this way, the present perfect can be analyzed in a more robust and precise manner in order to complement the study.

For this study, a two-factor, repeated measures ANOVA was run separately on each tense/aspect for each experimental group.

Native Speakers:

REGION 1: AUX

Repeated Measures ANOVA for Native Speakers Mean RTs at Aux. Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2
TA Match	4460.205	1	4460.205	2.181	0.171	0.039	0.179
Residuals	20452.170	10	2045.217				
Telicity	1560.091	1	1560.091	0.820	0.387	0.014	0.076
Residuals	19033.472	10	1903.347				
TA Match ✻ Telicity	384.091	1	384.091	0.056	0.818	0.003	0.006
Residuals	68775.909	10	6877.591				

Note. Type III Sum of Squares

There was a very slight but insignificant effect for TA Match on the Auxiliary of Present Perfect sentences (F = 2.181, p = 0.171). Despite a moderately high F-statistic the p-value threshold for significance wasn't met. Thus, TA Match is not a significant factor affecting reading times of the Native-Speaker (NS) group in the Auxiliary region.

Ther are no other noteworthy effects, indicating that while there may potentially be some weak effects of TA Match on the, there are quite clearly no effects or interactions of Telicity, which is to be expected. This lack of Telicity supports the notion that the instrumentation and stimuli used in this experiment worked as designed. Additionally, the lack of significant effects for TA Match effects, supports the notion that any TA Match effects of the Present Perfect at the auxiliary were not sufficient to confound the experimental results.

REGION 2: Verb

Repeated Measures ANOVA for Native Speakers Mean RTs at Verb Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p
TA Match	2069.388	1	2069.388	0.300	0.596	0.013	0.029
Residuals	68867.847	10	6886.785				
Telicity	23866.195	1	23866.195	12.451	0.005	0.150	0.555
Residuals	19168.602	10	1916.860				
TA Match ✻ Telicity	9683.695	1	9683.695	2.752	0.128	0.061	0.216
Residuals	35191.602	10	3519.160				

Note. Type III Sum of Squares

As expected, there was a robustly significant effect for Telicity on the Verb (F=12.451, p =0.005) with a low p-value and large effect size (η^2p = 0.555), suggesting that the Verb Telicity exerts a significant influence on native speakers' Verb processing in present perfect.

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	p_{bonf}	p_{holm}
Atelic	Telic	-46.580	13.201	-3.529	0.005	0.005

Note. Results are averaged over the levels of: TA Match

A post-hoc comparison confirmed that the mean difference between Atelic and Telic conditions (-46.580ms) was statistically very significant (t = -3.529) and this significance is robust across multiple-comparisons corrections (p_bonf/holmd = 0.005). The negative mean difference suggests that native speakers show an immediate effect to the telicity of the verb and tend to read Atelic verbs slower than Telic verbs, indicating that the atelic semantics are particularly costly given this difference is significant across both TA Match and Mismatch conditions.

The main effects of TA Match are subtle and fairly insignificant (F= 2.752, p = 0.128) and are likely to exert limited to no influence on Native Speaker's processing of the verb in present perfect sentences. However, the elevated F-statistic and effect size (η^2p

= 0.216) suggest that there is potential for some weak effects of TA Match influencing the processing of the verb and this possibility should not be completely ruled out.

In particular, it seems that with a weak effect of TA Match seen distributed, seemingly equally among the Auxiilary and TA Match region, this is likely an effect which is being processed at a very fast speed, likely undetectable and an effect that cannot be detected on a single word. The lack of a concentrated effect of TA Match neither on the Auxiliary nor on the Verb further supports the notion that the TA Match condition for present perfect sentences is not critical or perhaps does not cause a strong enough reaction for measurement using the self-paced reading protocol.

Overall, it seems that native speakers are particularly sensitive to the telicity of a verb phrase when processing sentences in real-time. On the other hand, TA Match didn't show any significant influence, indicating that native speakers may not be as sensitive to tense-aspect matching as they are to telicity.

REGION 3: Verb +1

Repeated Measures ANOVA for Native Speakers Mean RTs at V+1 Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p
TA Match	252.960	1	252.960	0.047	0.833	0.002	0.005
Residuals	53695.165	10	5369.516				
Telicity	8652.023	1	8652.023	1.548	0.242	0.055	0.134
Residuals	55884.915	10	5588.491				
TA Match ✻ Telicity	3546.023	1	3546.023	0.999	0.341	0.023	0.091
Residuals	35488.790	10	3548.879				

Note. Type III Sum of Squares

None of the factors seen at the Verb +1 Region of present perfect sentences exerted a statistically significant influence on native-speaker reading times. The only noteworthy result, was a statistically insignificant main effect of Telicity (F = 1.548, p = .242). While this does support the idea that Verb Telicity is not only a more influential and

long-lasting effect compared to the TA Match condition, it's significance is still questionable at the later regions of the spillover region.

Region 4: Verb +2

Repeated Measures ANOVA for Native Speakers Mean RTs at V+2 Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p
TA Match	1563.070	1	1563.070	0.392	0.545	0.012	0.038
Residuals	39878.665	10	3987.866				
Telicity	14283.013	1	14283.013	13.418	0.004	0.112	0.573
Residuals	10644.909	10	1064.491				
TA Match ✻ Telicity	1539.320	1	1539.320	0.258	0.623	0.012	0.025
Residuals	59777.040	10	5977.704				

Note. Type III Sum of Squares

Neither TA Match or its interactions had any significant effect on the V+2 region reading times for the native speaker group. However, there was a very strong effect for Telicity at this V+2 region (F=13.418, p = 0.004) with a very substantial effect size (η^2p = 0.573).

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	p_{bonf}	p_{holm}
Atelic	Telic	-36.034	9.837	-3.663	0.004	0.004

Note. Results are averaged over the levels of: TA Match

The post-hoc comparisons of Telicity in the V+2 region of present perfect sentences suggest that the mean difference of the NS groups mean reading times between the Atelic and Telic conditions (-36.034ms) is very significant (t = -3.633, p_bonf/holm = 0.004), suggesting that native speakers tend to have a durative or late-region spillover effect.

More discussion will consider to what extent these late-region effects of telcity are likely indicating a spillover effect from the processing of the atelic verb or perhaps, more likely a persistent processing cost across the entire atelic situation.

From a processing point of view, it's easy to understand why telic telic situations would be more easily processed. The inherent "completeness" of the action and clear endpoints in the telic-perfective predicates facilitates fast integration of incremental information into the mental representation of the sentence because it is known to the reader that the temporal boundaries are established.

1. Why do Native Speakers show such a strong effect for Telicity and the non-native speakers do not? Do native speakers have some type of special priming effect activated specifically by atelic verbs or is there some type of morpho-semantic or perhaps a semantic-synax interface that is particularly strong with native speakers?

2. On the other side of the question is to consider why wouldn't the NNS group also be sensitive to these Telicity manipulations? Do learners not develop a sense of canonical collocation with atelic and telic verbs?

Non-Native Speaker Group:

Region 1: Aux. Repeated Measures ANOVA for Non-Native Speakers Mean RTs at Aux. Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2
TA Match	2783.003	1	2783.003	0.611	0.443	0.006	0.030
Residuals	91068.185	20	4553.409				
Telicity	13655.250	1	13655.250	1.640	0.215	0.028	0.076
Residuals	166486.437	20	8324.322				
TA Match ✻ Telicity	12.190	1	12.190	0.001	0.973	2.499×10^{-5}	5.702×10^{-5}
Residuals	213763.622	20	10688.181				

Note. Type III Sum of Squares

No significant effects of TA Match or its interactions were found at the Auxiliary region. The most noteworthy effect for Non-Native Speakers (NNS) in this region was for Telicity but it was substantially insignificant (F= 1.64, p =.215) which supports the experimental validity of the instrument given that this manipulation is not present on the auxiliary and the adverbials used between telic and atelic sentences do not vary.

Region 2: Verb

Repeated Measures ANOVA for Non-Native Speakers

Mean RTs at Verb Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2
TA Match	6274.714	1	6274.714	1.685	0.209	0.012	0.078
Residuals	74460.004	20	3723.000				
Telicity	25935.429	1	25935.429	2.763	0.112	0.050	0.121
Residuals	187732.415	20	9386.621				
TA Match ⁎ Telicity	14339.360	1	14339.360	1.340	0.261	0.027	0.063
Residuals	214093.609	20	10704.680				

Note. Type III Sum of Squares

While some effects and interactions of TA Match and Telicity were seen on the Verb for the native speaker group, none of them were significant. The most significant effect was for Telicity which was moderately insignificant (F=2.763, p = 0.112). This is confirmed by the small effect size (partial eta = .121) which suggests that Non-Native Speakers generally experience little to no sensitivity to Verb telicity in present perfect sentences and an effect of TA Match is almost completely negligible.

Region 3: Verb+1

Repeated Measures ANOVA for Non-Native Speakers:

Mean RTs at V+1 Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η^2_p
TA Match	17930.269	1	17930.269	9.215	0.007	0.101	0.315
Residuals	38916.653	20	1945.833				
Telicity	1027.251	1	1027.251	0.352	0.560	0.006	0.017
Residuals	58359.359	20	2917.968				
TA Match ✻ Telicity	9637.501	1	9637.501	3.685	0.069	0.054	0.156
Residuals	52310.421	20	2615.521				

Note. Type III Sum of Squares

In the V+1 region, we see the first case of a significant effect for Non-Native Speaker reading times in present perfect sentences. There was a very significant effect for TA Match ($F = 9.215$, $p = 0.007$) only upon arrival at the V+1 region, indicating that the TA Match is a spillover effect for this group and is likely detected in a more delayed manner among the NNS group as compared to native speakers.

Post Hoc Comparisons - TA Match

		Mean Difference	SE	t	p_{bonf}	p_{holm}
Match	Mismatch	-29.220	9.626	-3.036	0.007	0.007

Note. Results are averaged over the levels of: Telicity

Post-hoc comparison found that the TA match effect: Match/Mismatch mean difference (-29.220) remained strongly significant even after Bonferroni corrections ($t = -3.036$, $P_{bonf} = 0.007$.)

Region 4: Verb+2

Repeated Measures ANOVA for Non-Native Speakers Mean RTs at V+2 Region in the Present Perfect

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2	η_p^2
TA Match	1168.161	1	1168.161	0.160	0.694	0.004	0.008
Residuals	146380.729	20	7319.036				
Telicity	77.626	1	77.626	0.019	0.893	2.477×10^{-4}	9.325×10^{-4}
Residuals	83169.265	20	4158.463				
TA Match ⁎ Telicity	3429.769	1	3429.769	0.866	0.363	0.011	0.041
Residuals	79215.872	20	3960.794				

Note. Type III Sum of Squares

Finally, in the V+2 region, the interaction of Telicity and TA Match was almost significant (F = 3.685, p = 0.069). This seems to confirm that Telicity may have a special connection with the Present Perfect which makes its semantics perhaps more salient.

Post Hoc Comparisons - TA Match ⁎ Telicity

		Mean Difference	SE	t	p_{bonf}	p_{holm}
Match, Atelic	Mismatch, Atelic	-50.643	14.738	-3.436	0.008	0.008
	Match, Telic	-14.429	16.233	-0.889	1.000	0.759
	Mismatch, Telic	-22.226	15.219	-1.460	0.914	0.457
Mismatch, Atelic	Match, Telic	36.214	15.219	2.380	0.134	0.112
	Mismatch, Telic	28.417	16.233	1.751	0.526	0.351
Match, Telic	Mismatch, Telic	-7.798	14.738	-0.529	1.000	0.759

Note. P-value adjusted for comparing a family of 6

The post-hoc analysis on TA Match*Telicity interactions at the V+2 region in present perfect sentences revealed that the most significant mean difference was between Match, Atelic and Mismatch, Atelic (-50.643ms) was a very and was very significant according to the low p-value in the Bonferroni corrections. (t = -3.436, Pbonf = 0.008).

8.2
Experimental Instruments

8.2.1 Stimuli: for Self-paced reading

Observation:

- Items 1-16 are telic and 17-32 are atelic.

- Each item has 4 conditions which are indicated by the number after the decimal:

  X.1) Present perfect match.

  X.2) Present perfect mismatch

  X.3) Simple past match.

  X.4) Simple past mismatch.

Stimuli ID	**Sentence & Wrap-Up Sentence**
1.1	Since winter, Joe has achieved good grades in school. He started going to school early.
1.2	Last winter, Joe has achieved good grades in school. He started going to school early.
1.3	Last winter, Joe achieved good grades in school. He started going to school early.
1.4	Since winter, Joe achieved good grades in school. He started going to school early.
2.1	Since summer, Beth has planted some new flowers. Her garden looks great.
2.2	Last summer, Beth has planted some new flowers. Her garden looks great.
2.3	Last summer, Beth planted some new flowers. Her garden looks great.
2.4	Since summer, Beth planted some new flowers. Her garden looks great.
3.1	Since last Christmas, Sarah has written four romance novels. She is a productive author.
3.2	Last Christmas, Sarah has written four romance novels. She is a productive author.
3.3	Last Christmas, Sarah wrote four romance novels. She is a productive author.
3.4	Since last Christmas, Sarah wrote four romance novels. She is a productive author.
4.1	Since last year, Alex has lost his phone many times. He always forgets it at parties.
4.2	Last year, Alex has lost his phone many times. He always forgets it at parties.
4.3	Last year, Alex lost his phone many times. He always forgets it at parties.
4.4	Since last year, Alex lost his phone many times. He always forgets it at parties.
5.1	Since New year, Mike has organized many great events. He is so skilled.
5.2	Last New year, Mike has organized many great events. He is so skilled.
5.3	Last New year, Mike organized many great events. He is so skilled.
5.4	Since New year, Mike organized many great events. He is so skilled.
6.1	Since 2002, Amy has bought four different bikes. She is never satisfied.
6.2	Last year, Amy has bought four different bikes. She is never satisfied.
6.3	Last year, Amy bought four different bikes. She is never satisfied.
6.4	Since 2002, Amy bought four different bikes. She is never satisfied.
7.1	Since last year, the soccer team has won every main match They will probably win the championship.
7.2	Last year, the soccer team has won every main match They will probably win the championship.
7.3	Last year, the soccer team won every main match They will probably win the championship.
7.4	Since last year, the soccer team won every main match They will probably win the championship.

8.1	Since December,, Beatriz has crashed her car three times. She is getting her license suspended.
8.2	In December,, Beatriz has crashed her car three times. She is getting her license suspended.
8.3	In December,, Beatriz crashed her car three times. She is getting her license suspended.
8.4	Since December,, Beatriz crashed her car three times. She is getting her license suspended.
9.1	Since the orientation, Paula has met some nice people. She is excited to get to know them.
9.2	At the orientation, Paula has met some nice people. She is excited to get to know them.
9.3	At the orientation, Paula met some nice people. She is excited to get to know them.
9.4	Since the orientation, Paula met some nice people. She is excited to get to know them.
10.1	Since Christmas,, Beto has spent all his money. His family is angry with him.
10.2	Last Christmas,, Beto has spent all his money. His family is angry with him.
10.3	Last Christmas,, Beto spent all his money. His family is angry with him.
10.4	Since Christmas,, Beto spent all his money. His family is angry with him.
11.1	Since last month,, Mary has seen Batman many times. She obviously likes the actor.
11.2	Last month,, Mary has seen Batman many times. She obviously likes the actor.
11.3	Last month,, Mary saw Batman many times. She obviously likes the actor.
11.4	Since last month,, Mary saw Batman many times. She obviously likes the actor.
12.1	Since she left the company, Jane has met many great friends. She goes out with them all the time.
12.2	When she left the company, Jane has met many great friends. She goes out with them all the time.
12.3	When she left the company, Jane met many great friends. She goes out with them all the time.
12.4	Since she left the company, Jane met many great friends. She goes out with them all the time.
13.1	Since he started working, Allan has helped many large clients. He is now getting a promotion for his hard work.
13.2	When he started working, Allan has helped many large clients. He is now getting a promotion for his hard work.
13.3	When he started working, Allan helped many large clients. He is now getting a promotion for his hard work.
13.4	Since he started working, Allan helped many large clients. He is now getting a promotion for his hard work.
14.1	Since last summer, our office has hired lots of new people We can finally start expanding.
14.2	Last summer, our office has hired lots of new people We can finally start expanding.
14.3	Last summer, our office hired lots of new people We can finally start expanding.
14.4	Since last summer, our office hired lots of new people We can finally start expanding.
15.1	Since the first lesson, Anna has improved her tennis technique. Now she is ready for the final game.
15.2	In the first lesson, Anna has improved her tennis technique. Now she is ready for the final game.
15.3	In the first lesson, Anna improved her tennis technique. Now she is ready for the final game.
15.4	Since the first lesson, Anna improved her tennis technique. Now she is ready for the final game.
16.1	Since autum, John and Mary have adopted six brown dogs. Their house is crazy now.
16.2	Last autum, John and Mary have adopted six brown dogs. Their house is crazy now.
16.3	Last autum, John and Mary adopted six brown dogs. Their house is crazy now.
16.4	Since autum, John and Mary adopted six brown dogs. Their house is crazy now.

17.1	Since winter, Maria has played soccer every week. She is going to play for her school next year.
17.2	Last winter, Maria has played soccer every week. She is going to play for her school next year.
17.3	Last winter, Maria played soccer every week. She is going to play for her school next year.
17.4	Since winter, Maria played soccer every week. She is going to play for her school next year.
18.1	Since she moved here, Jane has liked her new colleagues. I think she is going to stay here for a long time.
18.2	When she moved, Jane has liked her new colleagues. I think she is going to stay here for a long time.
18.3	When she moved, Jane liked her new colleagues. I think she is going to stay here for a long time.
18.4	Since she moved here, Jane liked her new colleagues. I think she is going to stay here for a long time.
19.1	Since she met him, Sarah has thought Jack was handsome. However, she is not interested in a relationship.
19.2	When she met him, Sarah has thought Jack was handsome. However, she is not interested in a relationship.
19.3	When she met him, Sarah thought Jack was handsome. However, she is not interested in a relationship.
19.4	Since she met him, Sarah thought Jack was handsome. However, she is not interested in a relationship.
20.1	Since autum , Julia has gone fishing every weekend. She is getting really good.
20.2	Last autum, Julia has gone fishing every weekend. She is getting really good.
20.3	Last autum, Julia went fishing every weekend. She is getting really good.
20.4	Since autum , Julia went fishing every weekend. She is getting really good.
21.1	For the last few days, Tati has felt bad about arguing with her friend. They still are not talking to each other.
21.2	A few days ago, Tati has felt bad about arguing with her friend. They still are not talking to each other.
21.3	A few days ago, Tati felt bad about arguing with her friend. They still are not talking to each other.
21.4	For the last few days, Tati felt bad about arguing with her friend. They still are not talking to each other.
22.1	Since last spring, Chris has studied English every night He is anxious to learn another language.
22.2	Last spring, Chris has studied English every night He is anxious to learn another language.
22.3	Last spring, Chris studied English every night He is anxious to learn another language.
22.4	Since last spring, Chris studied English every night He is anxious to learn another language.
23.1	For many years now, Marcia has been the most popular student. She is nice to everybody.
23.2	Once many years ago, Marcia has been the most popular student. She is nice to everybody.
23.3	Once many years ago, Marcia was the most popular student. She is nice to everybody.
23.4	For many years now, Marcia was the most popular student. She is nice to everybody.
24.1	Since he was young, Tiago has wanted to be a doctor. Recently he decided to become a pilot.
24.2	When he was young, Tiago has wanted to be a doctor. Recently he decided to become a pilot.
24.3	When he was young, Tiago wanted to be a doctor. Recently he decided to become a pilot.
24.4	Since he was young, Tiago wanted to be a doctor. Recently he decided to become a pilot.
25.1	Since last year, our dog has eaten only red meat. Now it refuses to eat regular dog food.
25.2	Last year, our dog has eaten only red meat. Now it refuses to eat regular dog food.
25.3	Last year, our dog ate only red meat. Now it refuses to eat regular dog food.
25.4	Since last year, our dog ate only red meat. Now it refuses to eat regular dog food.

26.1	For many years now, Jeff has wanted to be Sara's boyfriend. However, he doesn't have the courage to ask her.
26.2	Many years ago, Jeff has wanted to be Sara's boyfriend. However, he doesn't have the courage to ask her.
26.3	Many years ago, Jeff wanted to be Sara's boyfriend. However, he doesn't have the courage to ask her.
26.4	For many years now, Jeff wanted to be Sara's boyfriend. However, he doesn't have the courage to ask her.
27.1	Since she first started practicing, Anna has enjoyed playing table tennis. She has lots of natural talent.
27.2	When she first started practicing, Anna has enjoyed playing table tennis. She has lots of natural talent.
27.3	When she first started practicing, Anna enjoyed playing table tennis. She has lots of natural talent.
27.4	Since she first started practicing, Anna enjoyed playing table tennis. She has lots of natural talent.
28.1	Since the last day of school, Joana has thought about getting a job. She doesn't want to study anymore.
28.2	On the last day at school, Joana has thought about getting a job. She doesn't want to study anymore.
28.3	On the last day at school, Joana thought about getting a job. She doesn't want to study anymore.
28.4	Since the last day at school, Joana thought about getting a job. She doesn't want to study anymore.
29.1	For the last year, John has felt sorry about fighting with his mom. He doesn't know how to make things right again.
29.2	Last year, John has felt sorry about fighting with his mom. He doesn't know how to make things right again.
29.3	Last year, John felt sorry about fighting with his mom. He doesn't know how to make things right again.
29.4	For the last year, John felt sorry about fighting with his mom. He doesn't know how to make things right again.
30.1	Since he started working, Vitor has loved his job working with animals. He wouldn't choose any other job.
30.2	When he started working, Vitor has loved his job working with animals. He wouldn't choose any other job.
30.3	When he started working, Vitor loved his job working with animals. He wouldn't choose any other job.
30.4	Since he started working, Vitor loved his job working with animals. He wouldn't choose any other job.
31.1	Since they started, the group has been popular with kids. They play music at birthday parties.
31.2	When the group started, the group has been popular with kids. They play music at birthday parties.
31.3	When the group started, the group was popular with kids. They play music at birthday parties.
31.4	Since they started, the group was popular with kids. They play music at birthday parties.
32.1	For several months now, Jack has thought about quitting his job. However, there are not many good alternatives.
32.2	Several months ago, Jack has thought about quitting his job. However, there are not many good alternatives.
32.3	Several months ago, Jack thought about quitting his job. However, there are not many good alternatives.
32.4	For several months now, Jack thought about quitting his job. However, there are not many good alternatives.

8.2.2:

Stimuli for Off-Line AJT

Sentence #	Version	Sentence
1	1	Since July, Mary has crashed her car twice.
1	2	In July, Mary has crashed her car twice.
1	3	In July, Mary crashed her car twice.
1	4	Since July, Mary crashed her car twice.
2	1	Since December, our business has hired a lot of new people.
2	2	In December, our business has hired a lot of new people.
2	3	In December, our business hired a lot of new people.
2	4	Since December, our business hired a lot of new people.
3	1	Since 2020, Emily has earned a lot of money
3	2	In 2020, Emily has earned a lot of money.
3	3	In 2020, Emily earned a lot of money.
3	4	Since 2020, Emily earned a lot of money.
4	1	Since she retired, she has spent several years in China.
4	2	Before she retired, She has spent several years in China.
4	3	Before she retired, she spent several years in China.
4	4	Since she retired, she spent several years in China.
5	1	Since last year, our city's soccer team has won every game.
5	2	Last year, our city's soccer team has won every game.
5	3	Last year, our city's soccer team won every game.
5	4	Since last year, our city's soccer team won every game.
6	1	Since the party, Charles has spent too much time at the bar.
6	2	At the party, Charles has spent too much time at the bar.
6	3	At the party, Charles spent too much time at the bar.
6	4	Since the party, Charles spent too much time at the bar.
7	1	Since last year, Emily has planted vegetables in her garden.
7	2	Last year, Emily has planted vegetables in her garden.

7	3	Last year, Emily planted vegetables in her garden.
7	4	Since last year, Emily planted vegetables in her garden.
8	1	Since summer, Laura has achieved excellent results in all her classes.
8	2	Last summer, Laura has achieved excellent results in all her classes.
8	3	Last summer, Laura achieved excellent results in all her classes.
8	4	Since summer, Laura achieved excellent results in all her classes.
9	1	Carol has graduated since August.
9	2	Carol has graduated in August.
9	3	Carol graduated in August.
9	4	Carol graduated since August.
10	1	Jenny has met a new man since Christmas.
10	2	Jenny has met a new man on Christmas.
10	3	Jenny met a new man on Christmas.
10	4	Jenny met a new man since Christmas.
11	1	I have recognized your writing on the exams since the day we started testing.
11	2	I have recognized your writing on the exams on the day we started testing.
11	3	I recognized your writing on the exams on the day we started testing.
11	4	I recognized your writing on the exams since the day we started testing.
12	1	I have bought a new house since last spring.
12	2	I have bought a new house last spring.
12	3	I bought a new house last spring.
12	4	I bought a new house since last spring.
13	1	Georgia has lost her credit card three times since January.
13	2	Georgia has lost her credit card three times in January.
13	3	Georgia lost her credit card three times in January.
13	4	Georgia lost her credit card three times since January.
14	1	Marcia, I can't believe how much you have changed since we first met.
14	2	Marcia, I can't believe how much you have changed when we first met.
14	3	Marcia, I can't believe how much you changed when we first met.

14	4	Marcia, I can't believe how much you changed since we first met.
15	1	Juliet has fallen off her horse multiple times since last month.
15	2	Juliet has fallen off her horse multiple times last month.
15	3	Juliet fell off her horse multiple times last month.
15	4	Juliet fell off her horse multiple times since last month.
16	1	I have lost my phone since we talked on Monday.
16	2	I have lost my phone after we talked on Monday.
16	3	I lost my phone after we talked on Monday.
16	4	I lost my phone since we talked on Monday.
17	1	Since they met, Martha has liked John's family.
17	2	After they met, Martha has liked John's family.
17	3	After they met, Martha liked John's family.
17	4	Since they met, Martha liked John's family.
18	1	Since she met him, Mary has thought that Jack could be a great actor.
18	2	When she met him, Mary has thought that Jack could be a great actor.
18	3	When she met him, Mary thought that Jack could be a great actor.
18	4	Since she met him, Mary thought that Jack could be a great actor.
19	1	For five years now, Sara has felt uncomfortable at work.
19	2	Five years ago, Sara has felt uncomfortable at work.
19	3	Five years ago, Sara felt uncomfortable at work.
19	4	For five years now, Sara felt uncomfortable at work.
20	1	For the last couple years, we have walked every day.
20	2	A couple years ago, we have walked every day.
20	3	A couple years ago, we walked every day.
20	4	For the last couple years, we walked every day.
21	1	Since starting at her new job, Dilma has enjoyed talking with colleagues.
21	2	Before starting at her new job, Dilma has enjoyed talking with colleagues.
21	3	Before starting at her new job, Dilma enjoyed talking with colleagues.
21	4	Since starting at her new job, Dilma enjoyed talking with her colleagues.

22	1	Since last spring, George has played tennis every day.
22	2	Last spring, George has played tennis every day.
22	3	Last spring, George played tennis every day.
22	4	Since last spring, George played tennis every day.
23	1	Since last year, Ana has gone out to party every week.
23	2	Last year, Ana has gone out to party every week.
23	3	Last year, Ana went out to party every week.
23	4	Since last year, Ana went out to party every week.
24	1	For several months now, Christine has wanted to be Gary's girlfriend.
24	2	Several months ago, Christine has wanted to be Gary's girlfriend.
24	3	Several months ago, Christine wanted to be Gary's girlfriend.
24	4	For several months now, Christine wanted to be Gary's girlfriend.
25	1	David has wanted to be a doctor since he was young,
25	2	David has wanted to be a doctor when he was young.
25	3	David wanted to be a doctor when he was young.
25	4	David wanted to be a doctor since he was young.
26	1	Beatriz has dreamt of going to see Christ Redeemer since she left.
26	2	Beatriz has dreamt of going to see Christ Redeemer before she left.
26	3	Beatriz dreamt of going to see Christ Redeemer before she left.
26	4	Beatriz dreamt of going to see Christ Redeemer since she left.
27	1	We all have enjoyed ourselves since Christmas day.
27	2	We all have enjoyed ourselves on Christmas day.
27	3	We all enjoyed ourselves on Christmas day.
27	4	We all enjoyed ourselves since Christmas day.
28	1	She has eaten spicy food since she started going to that restaurant.
28	2	She has eaten spicy food after she started going to that restaurant.
28	3	She ate spicy food after she started going to that restaurant.
28	4	She ate spicy food since she started going to that restaurant.
29	1	Everyone has known I made a mistake since the manager came to my office.

29	2	Everyone has known I made a mistake when the manager came to my office.
29	3	Everyone knew I made a mistake when the manager came to my office.
29	4	Everyone knew I made a mistake since the manager came to my office.
30	1	Sara's baby has eaten only baby food since last month.
30	2	Sara's baby has eaten only baby food last month.
30	3	Sara's baby ate only baby food last month.
30	4	Sara's baby ate only baby food since last month.
31	1	John has smoked constantly since the day he was hired.
31	2	John has smoked constantly on the day he was hired.
31	3	John smoked constantly on the day he was hired.
31	4	John smoked constantly since the day he was hired.
32	1	Mike's friend has been in the hospital since Friday.
32	2	Mike's friend has been in the hospital on Friday.
32	3	Mike's friend was in the hospital on Friday.
32	4	Mike's friend was in the hospital since Friday.

8.2.3 Language Contact Profile

The responses that you give in this questionnaire will be kept confidential. This cover sheet is to allow the researcher to associate your responses with your name if needed. However, only the people entering your responses into the computer will see this name. An identification number will be used in place of your name when referring to your responses in publications. Every effort will be made to keep your responses confidential. Thank you for your cooperation.

The information that you provide will help us to better understand the backgrounds of students who are studying English in various contexts. Your honest and detailed responses will be greatly appreciated

Name:

Part 1: Background Information

1. Gender: Male 0 Female

2. Age: ___

3. Country of birth:

4. What is your native language?

1) Portuguese 2) Other

5. What language(s) do you speak at home?

1) Portuguese 2) Other

5a. If more than one, with whom do you speak each of these languages?

6. In what language(s) did you receive the majority of your precollege education?

1) Portuguese 2) Other

6a. If more than one, please give the approximate number of years for each language

7. Have you ever been to an English-speaking region for the purpose of studying English?

Circle one: Yes / No

7a. If yes, when? ____ 7b. Where? _____ 7c. For how long? ____

1 semester or less / 2 semesters / more than 2 semesters

8. Other than the experience mentioned in Question 7, have you ever lived in a situation where you were exposed to a language other than your native language? (eg. by living in a multilingual community; visiting a community for purposes of study abroad or work; exposure through family members, etc.) Circle one: Yes / No

If Yes, please give details below.

If more than three, list others in the space below.

	Experience 1	Experience 2	Experience 3
Country / Region			
Language			
Purpose			
From when to when			

9. In the boxes below, rate your language ability in each of the languages that you know. Use

the following ratings: 0) Poor, 1) Good, 2) Very good, 3) Native-like.

How many years (if any) have you studied this language in a formal school setting?

Language	Listening	Speaking	Reading	Writing	Number of years of study

Portuguese					
English					
(_____)					

10. Have you studied English in school in the past at each of the levels listed below? If yes, for

how long?

a. Elementary school: _No _Yes: _less than 1 year _1–2 years _more than 2 years

b. Junior high (middle) school: _No _Yes: _less than 1 year _1–2 years _more than 2 years

c. Senior high school: _No _Yes: _less than 1 year _1–2 years _more than 2 years

d. University/college: _No _Yes: _less than 1 year _1–2 years _more than 2 years

e. Other (Please specify) _____:

_No _Yes: _less than 1 year _1–2 years _more than 2 years

11. What year are you in school? (circle one):

Freshman Sophomore Junior Senior Graduate student Other

12. What is your major?

Part 2: All of the Questions That Follow Refer to Your Use

of English, Not Your Native Language, Unless the Question

Says Otherwise

13. On average, how often did you communicate with native or fluent speakers of English in

English in the year prior to the start of this semester?

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

14. Use this scale provided to rate the following statements.

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

Prior to this semester, I tried to speak English to:

a. my instructor outside of class

b. friends who are native or fluent speakers of English

c. classmates

d. strangers whom I thought could speak English

e. a host family, if living in a English-speaking area

f. service personnel (e.g., bank clerk, cashier)

15. For each of the items below, choose the response that corresponds to the amount of time

you estimate you spent on average doing each activity in English prior to this semester.

a. watching English language television

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

b. reading English language newspapers

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

c. reading novels in English

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

d. listening to songs in English

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

e. reading English language magazines

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

f. watching movies or videos in English

0) never 1) a few times a year 2) monthly 3) weekly 4) daily

16. List any other activities that you commonly did using English prior to this semester.

17. Please list all the English courses you are taking this semester. This includes English language courses as well as content area courses taught in the English language.

Course name	Course number	Brief description

8.2.4 Updated Vocabulary Levels Test

2,000 Word Level

	capital	career	committee	exam	fence	option
choice						
job						
test						

	guard	lesson	library	license	monkey	soup
food made with lots of water						
person who watches for danger						
place where many books are kept						

	brake	crown	hero	language	mission	tale
hat worn by a king or queen						
job						
things that stops a car						

	affair	carrot	damage	desert	shelter	thief
person who steals						
place that gives protection						
place with little rain						

	advice	hobby	industry	soil	steak	storm
bad weather						
earth						
things that you often enjoy doing						

	burst	cheat	direct	operate	presume	wander
believe something is true						
break open						
make something work						

	develop	identify	improve	possess	provide	sew
give						
have						
make better						

	complain	increase	pray	produce	recognize	whip
get larger						
know and remember						
make						

	curious	defensive	energetic	nervous	various	wicked
different kinds of things						
very bad						
wanting to know						

	advanced	cruel	lone	stiff	typical	upset
at a high level						
not kind						
single						

3,000 Word Level

	colleague	fate	fee	hint	status	talent
ability or skill						
clue						
person you work with						

	circuit	clinic	format	origin	peak	routine
place where you can see a doctor						
top						
what you usually do each day						

	agency	heel	pavement	penalty	principal	youth
back of your foot						
person in charge of a school						
punishment						

	element	jail	joint	objective	portrait	variety
goal						
picture						
place where criminals are kept						

	defeat	infant	nuclear	outrage	prospect	rival
loss						
person you oppose						
small child						

	coincide	derive	devote	permit	publish	regret
feel bad about doing something						
give all your time and attention						
happen at the same time						

	civilize	discharge	graduate	imply	merge	perceive
join						
release						
suggest						

	assault	bargain	compete	dedicate	nominate	restrain
attack						
hold back						
try to win						

	fundamental	humorous	interior	numerous	prompt	religious
basic						
many						
on time						

	legislative	mechanic	mortal	random	rear	reluctant
back of something						
can die						
without order						

4,000 Word Level

	auction	bullet	fever	flock	outlet	skull
group of birds						
high body temperature						
sale where people place bids						

	archive	ash	mat	moisture	physics	tile
place where old books are kept						
powder left after something burns						
science subject						

	pioneer	dictionary	immigration	petition	romance	thigh
book with information given for each word						
first person to do something						
paper that people sign						

	acid	cafe	deadline	deficiency	texture	thesis
lack						
place for buying and drinking coffee						
time limit						

	avenue	brass	departure	hood	hut	premier
cover for your head						
small house						
type of metal						

8.3 Ethics Comittee Documentation: Consent Form (TCLE) and Approval

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Você está sendo convidado(a) a participar da pesquisa intitulada "Processamento de tempo-aspecto em sentenças no Present Perfect por aprendizes brasileiros de Inglês como segunda língua (ESL)," sob a responsabilidade do pesquisador Justin Neal Buley, aluno de mestrado do Programa de Pós-Graduação *Estudos da Linguagem* (PPGEL), da Pontifícia Universidade Católica de Rio de Janeiro (PUC-Rio), sob a orientação da Professora Erica dos Santos Rodrigues.

Justificativa: Este estudo busca contribuir para as discussões acerca do bilinguismo em adultos no contexto de aquisição de segunda língua, buscando contrastar o desempenho de aprendizes de segunda língua e falantes nativos no que tange ao processamento de relações de tempo-aspecto na compreensão de sentenças.

Objetivos: Investigar o processamento de aprendizes adultos brasileiros avançados de inglês como L2 durante a sua compreensão do tempo/aspecto verbal de sentenças na língua inglesa contendo as estruturas *present perfect e simple past* em condições télicas e atélicas.

Metodologia:

Sua participação será de forma remoto, utilizando apenas um computador com teclado e conexão à internet e envolverá duas atividades: **1) Preliminares *(aprox. 20 minutos):*** como primeira atividade, você fará um teste de nivelamento com múltipla-escolha que envolve o reconhecimento de palavras em inglês. Você preencherá também um formulário sobre antecedentes educacionais e experiência linguística; **b) Aplicação de *Testes (aprox. 20-30 minutos)***: Deverá realizar um teste de leitura em que você lerá sentenças em inglês na tela de um computador e, após essa tarefa, responderá a algumas questões de múltipla-escolha.

Benefícios e riscos: Os riscos envolvidos na realização das tarefas são similares ao uso geral do computador. Por isso, é possível que você sinta um desconforto por se manter sentado(a) durante a sessão ou pela exposição à tela do computador. Salienta-se, no entanto, que, caso sinta algum nível de desconforto ou cansaço, poderá interromper a tarefa, sem que isso represente qualquer tipo de ônus ou prejuízo.

Sigilo e Privacidade: Os resultados da pesquisa serão divulgados em eventos e publicações científicas, sendo mantido o anonimato dos participantes. Todas as suas informações serão tratadas com o mais absoluto sigilo e confidencialidade. Ressalte-se que seu nome não será publicado e em hipótese alguma faremos referência à sua identidade.

Os dados coletados são apenas as suas respostas aos questionários preliminares e seu desempenho nos testes. Os dados coletados serão armazenados por um período de cinco anos.

Despesas e Ressarcimento: A sua participação neste estudo presume que você já tem um computador com internet e acessórios funcionais. Assim, não há nenhum custo nem vantagem financeira associados à sua participação. **Assistência e acompanhamento:** O participante tem direito a assistência técnica por telefone durante a fase experimental, com o próprio pesquisador, a fim de facilitar a execução das tarefas. **Participação voluntária e direito de desistência:** A sua participação neste estudo é voluntária. Você tem o direito de recusar-se a participar ou retirar o seu consentimento, em qualquer fase da pesquisa, sem qualquer tipo de penalização.

Esta pesquisa atende todas as especificações da Resolução 466, de 12 de dezembro de 2012, que aprova as diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos, e da Resolução 510, de 07 de abril de 2016, que dispõe sobre normas aplicáveis à pesquisa em Ciências Humanas e Sociais.

Informação de contato em caso de dúvidas:
Pesquisador: Justin Neal Buley, (21) 9980-70648, justinbuley@gmail.com
Orientadora: Erica dos Santos Rodrigues, ericasr@puc-rio.br

Departamento de Letras, PUC-Rio, (21) 3527-1297.

Informação de contato sobre questões éticas:

Câmara de Ética em Pesquisa da PUC-Rio (CEPq-PUC-Rio):

Rua Marquês de São Vicente, 225 - Edifício Kenedy, 2o andar.

Gávea - Rio de Janeiro - RJ, CEP: 22453-900;

Telefone: + 55 (21) 3527-1618.

Consentimento:

Eu,_____, de maneira voluntária, livre e esclarecida, concordo em participar da pesquisa acima identificada. Estou ciente dos objetivos do estudo, dos procedimentos metodológicos, das garantias de sigilo e confidencialidade, dos riscos e suas formas de contorno, da possibilidade de esclarecimentos permanentes sobre eles. Fui informado/a de que se trata de uma pesquisa vinculada ao Programa de Pós-Graduação em Estudos da Linguagem da PUC-Rio. Está claro que minha participação é isenta de despesas e que minha imagem, meu nome e voz não serão publicados sem minha prévia autorização por escrito. Este Termo foi impresso e/ou enviado em duas vias, das quais uma me foi concedida e ficará em minha posse e a outra será arquivada pelo/a pesquisador/a responsável.

Data: _____, _____ de _____ de _____.

_____

Assinatura do/a Participante

_____

Assinatura do/a Pesquisador/a

PONTIFÍCIA UNIVERSIDADE CATÓLICA
DO RIO DE JANEIRO

CÂMARA DE ÉTICA EM PESQUISA DA PUC-Rio
Parecer da Comissão da Câmara de Ética em Pesquisa da PUC-Rio 93-2022 – Protocolo 103-2022
Proposta: SGOC 444858 EMENDA

A Câmara de Ética em Pesquisa da PUC-Rio foi constituída como uma Câmara específica do Conselho de Ensino e Pesquisa conforme decisão deste órgão colegiado com atribuição de avaliar projetos de pesquisa do ponto de vista de suas implicações éticas.

Identificação:
Título: "Processamento de tempo-aspecto em sentenças no *Present Perfect* por aprendizes brasileiros de inglês como segunda língua (ESL)" (Departamento de Letras da PUC-Rio)
Autor: Justin Neal Buley (Mestrando do Departamento de Letras da PUC-Rio)
Orientadora: Erica dos Santos Rodrigues (Professora do Departamento de Letras da PUC-Rio)
Apresentação: A pesquisa visa investigar o processamento de aprendizes adultos brasileiros avançados de inglês como L2 durante a sua compreensão de tempo-aspecto verbal de sentenças na língua inglesa contendo estruturas do *present perfect* e *simple past*. Prevê utilizar uma amostra de conveniência de adultos brasileiros (português como L1), aprendizes de inglês como segunda língua, com vínculo com a instituição da pesquisa e/ou convidados pela rede de mídias sociais. Também, indica como grupo de controle, abordar falantes nativos de inglês. A pesquisa se desenvolverá em duas fases: Fase preliminar a ser desenvolvida, em forma remota, com aplicação de um formulário sobre antecedentes educacionais em experiência lingüística e um teste de múltipla escolha que envolve o reconhecimento de palavras em inglês. A fase seguinte prevê a aplicação de testes no modo remoto: a) leitura de sentenças em inglês e respostas a perguntas de compreensão; b) teste para avaliar a aceitabilidade de algumas sentenças.
Aspectos éticos: O projeto e os Termos de Consentimento Livre e Esclarecido (versão em português e versão em inglês) apresentados estão de acordo com os princípios e valores do Marco Referencial, Estatuto e Regimento da Universidade no que se refere às responsabilidades de seu corpo docente e discente. Os Termos expõem com clareza os objetivos da pesquisa e os procedimentos a serem seguidos. Garantem o sigilo e a confidencialidade dos dados coletados. Informam sobre a possibilidade de interrupção na pesquisa sem aplicação de qualquer penalidade ou constrangimento.

Parecer: Aprovado.

Profa. Marley Maria Bernardes Rebuzzi Vellasco
Presidente do Conselho de Ensino e Pesquisa da PUC-Rio

Profª Ilda Lopes Rodrigues da Silva
Coordenadora da Comissão da Câmara de Ética em Pesquisa da PUC-Rio

Rio de Janeiro, 1 de junho de 2023

Vice-Reitoria para Assuntos Acadêmicos
Câmara de Ética em Pesquisa da PUC-Rio – CEPq PUC-Rio
Rua Marquês de São Vicente, 225 - Gávea – 22453-900
Rio de Janeiro – RJ – Tel. (021) 3527-1612 / 3527-1618
e-mail: vrac@puc-rio.br

8.4 Full results of statistical analyses

8.4.1 Off-Line AJT Inferential Statistics (Full results)

Conover's Post-Hoc Comparisons

Conover Test

Conover's Post Hoc Comparisons - Experimental Conditions

		T-Stat	df	W_i	W_j	p	p_{bonf}	p_{holm}
Pres. Perf. / Match / Atelic	Pres. Perf. / Mismatch / Atelic	8.101	889	654.500	360.000	< .001	< .001	< .001
	Pres. Perf. / Match / Telic	0.770	889	654.500	682.500	0.441	1.000	1.000
	Pres. Perf. / Mismatch / Telic	4.855	889	654.500	478.000	< .001	< .001	< .001
	Simple Past / Match / Atelic	1.444	889	654.500	707.000	0.149	1.000	1.000
	Simple Past / Mismatch / Atelic	4.250	889	654.500	500.000	< .001	< .001	< .001
	Simple Past / Match / Telic	2.613	889	654.500	749.500	0.009	0.255	0.082
	Simple Past / Mismatch / Telic	4.896	889	654.500	476.500	< .001	< .001	< .001
Pres. Perf. / Mismatch / Atelic	Pres. Perf. / Match / Telic	8.871	889	360.000	682.500	< .001	< .001	< .001
	Pres. Perf. /	3.246	889	360.000	478.000	0.001	0.034	0.013

Conover's Post Hoc Comparisons - Experimental Conditions

		T-Stat	df	W_i	W_j	p	p_{bonf}	p_{holm}
	Mismatch / Telic							
	Simple Past / Match / Atelic	9.545	889	360.000	707.000	< .001	< .001	< .001
	Simple Past / Mismatch / Atelic	3.851	889	360.000	500.000	< .001	0.004	0.002
	Simple Past / Match / Telic	10.714	889	360.000	749.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	3.205	889	360.000	476.500	0.001	0.039	0.014
Pres. Perf. / Match / Telic	Pres. Perf. / Mismatch / Telic	5.625	889	682.500	478.000	< .001	< .001	< .001
	Simple Past / Match / Atelic	0.674	889	682.500	707.000	0.501	1.000	1.000
	Simple Past / Mismatch / Atelic	5.020	889	682.500	500.000	< .001	< .001	< .001
	Simple Past / Match / Telic	1.843	889	682.500	749.500	0.066	1.000	0.525
	Simple Past / Mismatch / Telic	5.666	889	682.500	476.500	< .001	< .001	< .001
Pres. Perf. / Mismatch / Telic	Simple Past / Match / Atelic	6.299	889	478.000	707.000	< .001	< .001	< .001

Conover's Post Hoc Comparisons - Experimental Conditions

		T-Stat	df	W_i	W_j	p	p_{bonf}	p_{holm}
	Simple Past / Mismatch / Atelic	0.605	889	478.000	500.000	0.545	1.000	1.000
	Simple Past / Match / Telic	7.468	889	478.000	749.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	0.041	889	478.000	476.500	0.967	1.000	1.000
Simple Past / Match / Atelic	Simple Past / Mismatch / Atelic	5.694	889	707.000	500.000	< .001	< .001	< .001
	Simple Past / Match / Telic	1.169	889	707.000	749.500	0.243	1.000	1.000
	Simple Past / Mismatch / Telic	6.340	889	707.000	476.500	< .001	< .001	< .001
Simple Past / Mismatch / Atelic	Simple Past / Match / Telic	6.863	889	500.000	749.500	< .001	< .001	< .001
	Simple Past / Mismatch / Telic	0.646	889	500.000	476.500	0.518	1.000	1.000
Simple Past / Match / Telic	Simple Past / Mismatch / Telic	7.509	889	749.500	476.500	< .001	< .001	< .001

Note. Grouped by subject.

8.4.2 On-line (Self-paced reading) ANOVA Analyses

Between Subjects ANOVA

1. Region: VERB

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	14470.925	1	14470.925	3.330	0.078	0.100
Tense / Aspect ✻ Group	1018.093	1	1018.093	0.234	0.632	0.008
Residuals	130385.114	30	4346.170			
TA Match	2150.765	1	2150.765	0.311	0.581	0.010
TA Match ✻ Group	594.996	1	594.996	0.086	0.771	0.003
Residuals	207236.565	30	6907.885			
Telicity	30657.298	1	30657.298	4.073	0.053	0.120
Telicity ✻ Group	5087.262	1	5087.262	0.676	0.417	0.022
Residuals	225809.726	30	7526.991			
Tense / Aspect ✻ TA Match	3592.855	1	3592.855	0.400	0.532	0.013
Tense / Aspect ✻ TA Match ✻ Group	8724.203	1	8724.203	0.971	0.332	0.031
Residuals	269595.620	30	8986.521			
Tense / Aspect ✻ Telicity	18340.199	1	18340.199	3.119	0.088	0.094
Tense / Aspect ✻ Telicity ✻ Group	776.703	1	776.703	0.132	0.719	0.004
Residuals	176402.672	30	5880.089			
TA Match ✻ Telicity	3024.506	1	3024.506	0.415	0.524	0.014
TA Match ✻ Telicity ✻ Group	11.143	1	11.143	0.002	0.969	5.096×10^{-5}
Residuals	218666.824	30	7288.894			
Tense / Aspect ✻ TA Match ✻ Telicity	24658.886	1	24658.886	4.158	0.050	0.122
Tense / Aspect ✻ TA Match ✻ Telicity ✻ Group	102.230	1	102.230	0.017	0.896	5.742×10^{-4}
Residuals	177921.528	30	5930.718			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Group	1699.907	1	1699.907	0.011	0.919	3.507×10^{-4}
Residuals	$4.846\times10^{+6}$	30	161532.198			

Note. Type III Sum of Squares

2. Region: V+1

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	137.932	1	137.932	0.028	0.869	9.165×10^{-4}
Tense / Aspect ⁎ Group	1398.178	1	1398.178	0.279	0.601	0.009
Residuals	150365.740	30	5012.191			
TA Match	8307.377	1	8307.377	3.475	0.072	0.104
TA Match ⁎ Group	2917.260	1	2917.260	1.220	0.278	0.039
Residuals	71713.489	30	2390.450			
Telicity	2727.227	1	2727.227	0.726	0.401	0.024
Telicity ⁎ Group	13435.727	1	13435.727	3.574	0.068	0.106
Residuals	112772.108	30	3759.070			
Tense / Aspect ⁎ TA Match	1451.886	1	1451.886	0.364	0.551	0.012
Tense / Aspect ⁎ TA Match ⁎ Group	1505.011	1	1505.011	0.377	0.544	0.012
Residuals	119639.520	30	3987.984			
Tense / Aspect ⁎ Telicity	770.926	1	770.926	0.213	0.648	0.007
Tense / Aspect ⁎ Telicity ⁎ Group	296.735	1	296.735	0.082	0.777	0.003
Residuals	108660.339	30	3622.011			
TA Match ⁎ Telicity	7.266	1	7.266	0.001	0.972	4.116×10^{-5}
TA Match ⁎ Telicity ⁎ Group	15011.368	1	15011.368	2.551	0.121	0.078
Residuals	176529.710	30	5884.324			
Tense / Aspect ⁎ TA Match ⁎ Telicity	251.955	1	251.955	0.088	0.769	0.003
Tense / Aspect ⁎ TA Match ⁎ Telicity ⁎ Group	734.377	1	734.377	0.257	0.616	0.008
Residuals	85711.498	30	2857.050			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Group	12077.227	1	12077.227	0.092	0.764	0.003
Residuals	$3.932\times10^{+6}$	30	131082.453			

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	Group	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	Native Speaker	11	410.727	136.792	41.244	0.333
			Non-Native	21	376.964	132.923	29.006	0.353
		Telic	Native Speaker	11	420.818	150.404	45.349	0.357
			Non-Native	21	391.393	144.442	31.520	0.369
	Mismatch	Atelic	Native Speaker	11	397.568	66.658	20.098	0.168
			Non-Native	21	427.607	168.256	36.717	0.393
		Telic	Native Speaker	11	443.568	146.240	44.093	0.330
			Non-Native	21	399.190	137.715	30.052	0.345
Simple Past	Match	Atelic	Native Speaker	11	408.614	103.842	31.310	0.254
			Non-Native	21	397.500	153.942	33.593	0.387
		Telic	Native Speaker	11	409.818	102.653	30.951	0.250
			Non-Native	21	397.845	144.959	31.633	0.364
	Mismatch	Atelic	Native Speaker	11	398.591	97.007	29.249	0.243
			Non-Native	21	416.595	172.030	37.540	0.413
		Telic	Native Speaker	11	429.795	150.737	45.449	0.351
			Non-Native	21	396.714	132.183	28.845	0.333

Assumption Checks

Test for Equality of Variances (Levene's)

	F	df1	df2	p
PP-M-A	0.016	1	30	0.901
PP-M-T	0.001	1	30	0.974
PP-MM-A	5.241	1	30	0.029
PP-MM-T	0.145	1	30	0.706
SP-M-A	4.117	1	30	0.051
SP-M-T	0.471	1	30	0.498
SP-MM-A	3.007	1	30	0.093
SP-MM-T	0.506	1	30	0.482

Region 3: V+2

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	1035.817	1	1035.817	0.151	0.700	0.005
Tense / Aspect ✻ Group	21.497	1	21.497	0.003	0.956	1.045×10^{-4}
Residuals	205739.103	30	6857.970			
TA Match	2019.248	1	2019.248	0.330	0.570	0.011
TA Match ✻ Group	663.834	1	663.834	0.108	0.744	0.004
Residuals	183821.415	30	6127.380			
Telicity	32644.412	1	32644.412	12.849	0.001	0.300
Telicity ✻ Group	14611.506	1	14611.506	5.751	0.023	0.161
Residuals	76216.131	30	2540.538			
Tense / Aspect ✻ TA Match	3830.451	1	3830.451	0.568	0.457	0.019
Tense / Aspect ✻ TA Match ✻ Group	2291.349	1	2291.349	0.340	0.564	0.011
Residuals	202213.720	30	6740.457			
Tense / Aspect ✻ Telicity	2607.662	1	2607.662	0.616	0.439	0.020
Tense / Aspect ✻ Telicity ✻ Group	544.987	1	544.987	0.129	0.722	0.004
Residuals	127003.463	30	4233.449			
TA Match ✻ Telicity	46.766	1	46.766	0.016	0.901	5.258×10^{-4}
TA Match ✻ Telicity ✻ Group	3295.954	1	3295.954	1.112	0.300	0.036
Residuals	88888.308	30	2962.944			
Tense / Aspect ✻ TA Match ✻ Telicity	109.184	1	109.184	0.019	0.892	6.234×10^{-4}
Tense / Aspect ✻ TA Match ✻ Telicity ✻ Group	1302.984	1	1302.984	0.223	0.640	0.007
Residuals	175019.359	30	5833.979			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Group	1233.142	1	1233.142	0.009	0.924	3.096×10^{-4}
Residuals	$3.982\times10^{+6}$	30	132716.928			

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	Group	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	Native Speaker	11	395.568	130.389	39.314	0.330
			Non-Native	21	387.321	155.361	33.903	0.401
		Telic	Native Speaker	11	419.773	166.141	50.093	0.396
			Non-Native	21	398.179	161.371	35.214	0.405
	Mismatch	Atelic	Native Speaker	11	371.818	127.420	38.419	0.343
			Non-Native	21	407.560	128.236	27.983	0.315
		Telic	Native Speaker	11	419.682	144.392	43.536	0.344
			Non-Native	21	392.857	114.273	24.936	0.291
Simple Past	Match	Atelic	Native Speaker	11	377.727	115.446	34.808	0.306
			Non-Native	21	386.655	133.511	29.134	0.345
		Telic	Native Speaker	11	415.977	142.252	42.890	0.342
			Non-Native	21	404.845	157.661	34.404	0.389
	Mismatch	Atelic	Native Speaker	11	389.614	127.498	38.442	0.327
			Non-Native	21	398.333	173.254	37.807	0.435
		Telic	Native Speaker	11	438.023	150.912	45.502	0.345
			Non-Native	21	415.464	149.999	32.732	0.361

Assumption Checks

Test for Equality of Variances (Levene's)

	F	df1	df2	p
PP-M-A	0.122	1	30	0.729
PP-M-T	0.001	1	30	0.975
PP-MM-A	0.038	1	30	0.848
PP-MM-T	1.115	1	30	0.299
SP-M-A	0.551	1	30	0.464
SP-M-T	0.007	1	30	0.933
SP-MM-A	0.711	1	30	0.406
SP-MM-T	0.315	1	30	0.579

Post Hoc Tests

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-23.775	6.633	-3.585	-0.164	0.001	0.001

Note. Results are averaged over the levels of: Group, Tense / Aspect, TA Match

Post Hoc Comparisons - Group ✻ Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Native, Speaker, Atelic	(Non-Native, Atelic)	-11.285	48.395	-0.233	-0.078	1.000	1.000
	Native, Speaker, Telic	-39.682	10.746	-3.693	-0.274	0.005	0.005
	(Non-Native, Telic)	-19.154	48.395	-0.396	-0.132	1.000	1.000
(Non-Native, Atelic)	Native, Speaker, Telic	-28.396	48.395	-0.587	-0.196	1.000	1.000
	(Non-Native, Telic)	-7.869	7.777	-1.012	-0.054	1.000	1.000
Native, Speaker, Telic	(Non-Native, Telic)	20.527	48.395	0.424	0.142	1.000	1.000

Note. P-value adjusted for comparing a family of 6
Note. Results are averaged over the levels of: Tense / Aspect, TA Match

Region 4 (V+3):

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	36859.093	1	36859.093	3.615	0.067	0.108
Tense / Aspect ✻ Group	17010.290	1	17010.290	1.669	0.206	0.053
Residuals	305847.380	30	10194.913			
TA Match	11038.355	1	11038.355	0.830	0.370	0.027
TA Match ✻ Group	8857.992	1	8857.992	0.666	0.421	0.022
Residuals	398997.590	30	13299.920			
Telicity	41823.875	1	41823.875	2.038	0.164	0.064
Telicity ✻ Group	73540.785	1	73540.785	3.584	0.068	0.107
Residuals	615631.232	30	20521.041			
Tense / Aspect ✻ TA Match	8262.648	1	8262.648	0.579	0.453	0.019
Tense / Aspect ✻ TA Match ✻ Group	30131.799	1	30131.799	2.111	0.157	0.066
Residuals	428290.152	30	14276.338			
Tense / Aspect ✻ Telicity	12266.639	1	12266.639	0.928	0.343	0.030
Tense / Aspect ✻ Telicity ✻ Group	2988.430	1	2988.430	0.226	0.638	0.007
Residuals	396690.947	30	13223.032			
TA Match ✻ Telicity	100796.940	1	100796.940	3.700	0.064	0.110
TA Match ✻ Telicity ✻ Group	25883.858	1	25883.858	0.950	0.337	0.031
Residuals	817279.578	30	27242.653			
Tense / Aspect ✻ TA Match ✻ Telicity	43.547	1	43.547	0.002	0.967	5.926×10^{-5}
Tense / Aspect ✻ TA Match ✻ Telicity ✻ Group	34410.335	1	34410.335	1.405	0.245	0.045
Residuals	734800.902	30	24493.363			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Group	86282.865	1	86282.865	0.341	0.564	0.011
Residuals	$7.599\times10^{+6}$	30	253309.540			

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	Group	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	Native Speaker	11	389.659	143.086	43.142	0.367
			Non-Native	21	443.143	251.869	54.962	0.568
		Telic	Native Speaker	11	547.864	362.265	109.227	0.661
			Non-Native	21	453.202	213.294	46.545	0.471
	Mismatch	Atelic	Native Speaker	11	514.977	317.884	95.846	0.617
			Non-Native	21	406.845	158.352	34.555	0.389
		Telic	Native Speaker	11	496.727	230.068	69.368	0.463
			Non-Native	21	422.774	183.205	39.979	0.433
Simple Past	Match	Atelic	Native Speaker	11	390.773	105.611	31.843	0.270
			Non-Native	21	398.464	174.654	38.113	0.438
		Telic	Native Speaker	11	483.659	195.540	58.958	0.404
			Non-Native	21	412.071	200.817	43.822	0.487
	Mismatch	Atelic	Native Speaker	11	443.773	168.594	50.833	0.380
			Non-Native	21	478.857	285.017	62.196	0.595
		Telic	Native Speaker	11	461.318	243.543	73.431	0.528
			Non-Native	21	404.167	154.254	33.661	0.382

Assumption Checks

Test for Equality of Variances (Levene's)

	F	df1	df2	p
PP-M-A	1.189	1	30	0.284
PP-M-T	2.991	1	30	0.094
PP-MM-A	3.468	1	30	0.072
PP-MM-T	1.938×10^{-4}	1	30	0.989
SP-M-A	3.255	1	30	0.081
SP-M-T	0.004	1	30	0.948
SP-MM-A	1.609	1	30	0.214
SP-MM-T	0.905	1	30	0.349

Post Hoc Tests

Post Hoc Comparisons - Tense / Aspect

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Present Perfect	Simple Past	25.264	13.287	1.901	0.116	0.067	0.067

Note. Results are averaged over the levels of: Group, TA Match, Telicity

Post Hoc Comparisons - Group ✻ Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Native, Speaker, Atelic	(Non-Native, Atelic)	2.968	68.860	0.043	0.014	1.000	1.000
	Native, Speaker, Telic	-62.597	30.541	-2.050	-0.289	0.295	0.295
	(Non-Native, Telic)	11.742	68.860	0.171	0.054	1.000	1.000
(Non-Native, Atelic)	Native, Speaker, Telic	-65.565	68.860	-0.952	-0.302	1.000	1.000
	(Non-Native, Telic)	8.774	22.104	0.397	0.040	1.000	1.000
Native, Speaker, Telic	(Non-Native, Telic)	74.338	68.860	1.080	0.343	1.000	1.000

Note. P-value adjusted for comparing a family of 6
Note. Results are averaged over the levels of: Tense / Aspect, TA Match

Post Hoc Comparisons - TA Match ✻ Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Match, Atelic	Mismatch, Atelic	-55.603	26.496	-2.099	-0.256	0.243	0.203
	Match, Telic	-68.689	28.759	-2.388	-0.317	0.121	0.121
	Mismatch, Telic	-40.737	24.200	-1.683	-0.188	0.586	0.391
Mismatch, Atelic	Match, Telic	-13.086	24.200	-0.541	-0.060	1.000	1.000
	Mismatch, Telic	14.867	28.759	0.517	0.069	1.000	1.000
Match, Telic	Mismatch, Telic	27.953	26.496	1.055	0.129	1.000	0.888

Note. P-value adjusted for comparing a family of 6
Note. Results are averaged over the levels of: Group, Tense / Aspect

ANOVA (Native Speaker Group)

REGION 1 (Verb)

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	8825.018	1	8825.018	3.008	0.114	0.231
Residuals	29337.740	10	2933.774			
TA Match	1907.898	1	1907.898	0.214	0.653	0.021
Residuals	89088.516	10	8908.852			
Telicity	23131.995	1	23131.995	14.286	0.004	0.588
Residuals	16192.075	10	1619.208			
Tense / Aspect ✻ TA Match	426.580	1	426.580	0.040	0.846	0.004
Residuals	107412.021	10	10741.202			
Tense / Aspect ✻ Telicity	4407.018	1	4407.018	1.472	0.253	0.128
Residuals	29942.678	10	2994.268			
TA Match ✻ Telicity	1296.308	1	1296.308	0.925	0.359	0.085
Residuals	14014.919	10	1401.492			
Tense / Aspect ✻ TA Match ✻ Telicity	10642.501	1	10642.501	3.064	0.111	0.235
Residuals	34730.851	10	3473.085			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$1.199 \times 10^{+6}$	10	119850.438		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	11	388.045	132.915	40.075	0.343
		Telic	11	404.955	145.598	43.900	0.360
	Mismatch	Atelic	11	372.091	97.778	29.481	0.263
		Telic	11	448.341	160.895	48.512	0.359
Simple Past	Match	Atelic	11	404.636	114.173	34.425	0.282
		Telic	11	437.227	150.588	45.404	0.344
	Mismatch	Atelic	11	423.864	143.073	43.138	0.338
		Telic	11	427.818	146.380	44.135	0.342

Post Hoc Tests

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-32.426	8.579	-3.780	-0.235	0.004	0.004

Note. Results are averaged over the levels of: Tense / Aspect, TA Match

NS: REGION 2 (V+1)

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	919.776	1	919.776	0.514	0.490	0.049
Residuals	17899.115	10	1789.912			
TA Match	525.284	1	525.284	0.142	0.715	0.014
Residuals	37089.138	10	3708.914			
Telicity	10769.344	1	10769.344	2.343	0.157	0.190
Residuals	45957.828	10	4595.783			
Tense / Aspect ⁎ TA Match	0.182	1	0.182	2.985×10^{-5}	0.996	2.985×10^{-6}
Residuals	60908.584	10	6090.858			
Tense / Aspect ⁎ Telicity	771.139	1	771.139	0.286	0.605	0.028
Residuals	26999.001	10	2699.900			
TA Match ⁎ Telicity	5973.011	1	5973.011	1.489	0.250	0.130
Residuals	40106.223	10	4010.622			
Tense / Aspect ⁎ TA Match ⁎ Telicity	48.011	1	48.011	0.028	0.871	0.003
Residuals	17212.004	10	1721.200			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	959983.016	10	95998.302		

Note. Type III Sum of Squares

REGION 3 V+2)

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	289.094	1	289.094	0.138	0.718	0.014
Residuals	20953.391	10	2095.339			
TA Match	140.011	1	140.011	0.045	0.837	0.004
Residuals	31320.036	10	3132.004			
Telicity	34642.227	1	34642.227	11.452	0.007	0.534
Residuals	30249.882	10	3024.988			
Tense / Aspect ⁎ TA Match	4589.321	1	4589.321	0.480	0.504	0.046
Residuals	95528.351	10	9552.835			
Tense / Aspect ⁎ Telicity	292.730	1	292.730	0.118	0.738	0.012
Residuals	24802.504	10	2480.250			
TA Match ⁎ Telicity	1572.545	1	1572.545	1.501	0.249	0.130
Residuals	10479.376	10	1047.938			
Tense / Aspect ⁎ TA Match ⁎ Telicity	250.594	1	250.594	0.030	0.866	0.003
Residuals	83487.703	10	8348.770			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$1.246\times10^{+6}$	10	124600.419		

Note. Type III Sum of Squares

NS: REGION 4: (V+3)

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η_p^2
Tense / Aspect	289.094	1	289.094	0.138	0.718	0.014
Residuals	20953.391	10	2095.339			
TA Match	140.011	1	140.011	0.045	0.837	0.004
Residuals	31320.036	10	3132.004			
Telicity	34642.227	1	34642.227	11.452	0.007	0.534
Residuals	30249.882	10	3024.988			
Tense / Aspect ⁎ TA Match	4589.321	1	4589.321	0.480	0.504	0.046
Residuals	95528.351	10	9552.835			
Tense / Aspect ⁎ Telicity	292.730	1	292.730	0.118	0.738	0.012
Residuals	24802.504	10	2480.250			
TA Match ⁎ Telicity	1572.545	1	1572.545	1.501	0.249	0.130
Residuals	10479.376	10	1047.938			
Tense / Aspect ⁎ TA Match ⁎ Telicity	250.594	1	250.594	0.030	0.866	0.003
Residuals	83487.703	10	8348.770			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$1.246\times10^{+6}$	10	124600.419		

Note. Type III Sum of Squares

Post Hoc Tests

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-39.682	11.726	-3.384	-0.286	0.007	0.007

Note. Results are averaged over the levels of: Tense / Aspect, TA Match

8.4.3 Descriptive Results of Self-Paced Mean Reading Times (All Participants)

Region	Descriptive Table						
			Valid	Mean	Std. Deviation	Minimum	Maximum
VERB	PP-M-A	Native Speaker	11	388.045	132.915	249.750	643.500
	PP-M-A	Non-Native	21	417.119	195.068	204.250	872.250
	PP-MM-A	Native Speaker	11	372.091	97.778	245.250	554.000
	PP-MM-A	Non-Native	21	373.702	139.988	190.500	685.500
	SP-M-A	Native Speaker	11	404.636	114.173	259.500	601.250
	SP-M-A	Non-Native	21	410.726	140.029	246.000	789.750
	SP-MM-A	Native Speaker	11	423.864	143.073	276.750	661.000
	SP-MM-A	Non-Native	21	446.333	228.194	232.750	1204.750
	PP-M-T	Native Speaker	11	404.955	145.598	223.000	738.000
	PP-M-T	Non-Native	21	426.131	164.010	244.250	815.250
	PP-MM-T	Native Speaker	11	448.341	160.895	315.500	795.750
	PP-MM-T	Non-Native	21	434.976	169.919	198.250	830.750
	SP-M-T	Native Speaker	11	437.227	150.588	226.250	670.750
	SP-M-T	Non-Native	21	415.429	159.563	210.750	809.000
	SP-MM-T	Native Speaker	11	427.818	146.380	272.000	720.250
	SP-MM-T	Non-Native	21	425.964	161.484	220.250	860.500
			Valid	Mean	Std. Deviation	Minimum	Maximum
V+1	PP-M-A	Native Speaker	11	410.727	136.792	254.750	676.750
	PP-M-A	Non-Native	21	376.964	132.923	193.750	705.750
	PP-MM-A	Native Speaker	11	397.568	66.658	281.000	476.750
	PP-MM-A	Non-Native	21	427.607	168.256	216.750	834.500
	SP-M-A	Native Speaker	11	408.614	103.842	252.250	591.250
	SP-M-A	Non-Native	21	397.500	153.942	220.000	694.000
	SP-MM-A	Native Speaker	11	398.591	97.007	286.000	585.750
	SP-MM-A	Non-Native	21	416.595	172.030	229.000	839.750
	PP-M-T	Native Speaker	11	420.818	150.404	275.500	800.250
	PP-M-T	Non-Native	21	391.393	144.442	218.750	752.000
	PP-MM-T	Native Speaker	11	443.568	146.240	292.500	676.000
	PP-MM-T	Non-Native	21	399.190	137.715	206.750	714.750
	SP-M-T	Native Speaker	11	409.818	102.653	254.250	585.000
	SP-M-T	Non-Native	21	397.845	144.959	213.000	860.750
	SP-MM-T	Native Speaker	11	429.795	150.737	281.500	704.500
	SP-MM-T	Non-Native	21	396.714	132.183	231.000	708.500
			Valid	Mean	Std. Deviation	Minimum	Maximum
V+2	PP-M-A	Native Speaker	11	395.568	130.389	221.000	666.250
	PP-M-A	Non-Native	21	387.321	155.361	212.750	852.500
	PP-MM-A	Native Speaker	11	371.818	127.420	185.250	612.500
	PP-MM-A	Non-Native	21	407.560	128.236	208.500	657.750
	SP-M-A	Native Speaker	11	377.727	115.446	257.250	580.750
	SP-M-A	Non-Native	21	386.655	133.511	222.250	661.500
	SP-MM-A	Native Speaker	11	389.614	127.498	258.000	692.250
	SP-MM-A	Non-Native	21	398.333	173.254	213.250	841.000
	PP-M-T	Native Speaker	11	419.773	166.141	222.000	728.250
	PP-M-T	Non-Native	21	398.179	161.371	212.500	791.500
	PP-MM-T	Native Speaker	11	419.682	144.392	274.500	710.250
	PP-MM-T	Non-Native	21	392.857	114.273	236.000	624.250
	SP-M-T	Native Speaker	11	415.977	142.252	236.250	675.000
	SP-M-T	Non-Native	21	404.845	157.661	222.250	861.250
	SP-MM-T	Native Speaker	11	438.023	150.912	275.000	721.000
	SP-MM-T	Non-Native	21	415.464	149.999	237.250	717.750

			Valid	Mean	Std. Deviation	Minimum	Maximum
V+3	PP-M-A	Native Speaker	11	389.659	143.086	257.250	765.500
	PP-M-A	Non-Native	21	443.143	251.869	205.250	1377.750
	PP-MM-A	Native Speaker	11	514.977	317.884	285.250	1204.750
	PP-MM-A	Non-Native	21	406.845	158.352	209.750	727.750
	SP-M-A	Native Speaker	11	390.773	105.611	277.500	586.500
	SP-M-A	Non-Native	21	398.464	174.654	214.000	795.500
	SP-MM-A	Native Speaker	11	443.773	168.594	272.250	726.750
	SP-MM-A	Non-Native	21	478.857	285.017	233.250	1236.250
	PP-M-T	Native Speaker	11	547.864	362.265	237.750	1414.000
	PP-M-T	Non-Native	21	453.202	213.294	221.000	931.000
	PP-MM-T	Native Speaker	11	496.727	230.068	300.000	1066.750
	PP-MM-T	Non-Native	21	422.774	183.205	211.750	773.000
	SP-M-T	Native Speaker	11	483.659	195.540	270.000	928.500
	SP-M-T	Non-Native	21	412.071	200.817	208.000	926.250
	SP-MM-T	Native Speaker	11	461.318	243.543	280.750	1102.500
	SP-MM-T	Non-Native	21	404.167	154.254	224.500	694.000

8.4.4 Within-Group ANOVA Analyses for On-Line SPR Data

Native Speaker:

Repeated Measures ANOVA

Region: VERB

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect	8825.018	1	8825.018	3.008	0.114	0.231
Residuals	29337.740	10	2933.774			
TA Match	1907.898	1	1907.898	0.214	0.653	0.021
Residuals	89088.516	10	8908.852			
Telicity	23131.995	1	23131.995	14.286	0.004	0.588
Residuals	16192.075	10	1619.208			
Tense / Aspect ⁎ TA Match	426.580	1	426.580	0.040	0.846	0.004
Residuals	107412.021	10	10741.202			
Tense / Aspect ⁎ Telicity	4407.018	1	4407.018	1.472	0.253	0.128
Residuals	29942.678	10	2994.268			
TA Match ⁎ Telicity	1296.308	1	1296.308	0.925	0.359	0.085
Residuals	14014.919	10	1401.492			

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect ⁎ TA Match ⁎ Telicity	10642.501	1	10642.501	3.064	0.111	0.235
Residuals	34730.851	10	3473.085			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$1.199 \times 10^{+6}$	10	119850.438		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	11	388.045	132.915	40.075	0.343
		Telic	11	404.955	145.598	43.900	0.360
	Mismatch	Atelic	11	372.091	97.778	29.481	0.263
		Telic	11	448.341	160.895	48.512	0.359
Simple Past	Match	Atelic	11	404.636	114.173	34.425	0.282
		Telic	11	437.227	150.588	45.404	0.344
	Mismatch	Atelic	11	423.864	143.073	43.138	0.338
		Telic	11	427.818	146.380	44.135	0.342

Post Hoc Tests

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-32.426	8.579	-3.780	-0.235	0.004	0.004

Note. Results are averaged over the levels of: Tense / Aspect, TA Match

VERB + 1 REGION

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect	919.776	1	919.776	0.514	0.490	0.049
Residuals	17899.115	10	1789.912			
TA Match	525.284	1	525.284	0.142	0.715	0.014
Residuals	37089.138	10	3708.914			
Telicity	10769.344	1	10769.344	2.343	0.157	0.190
Residuals	45957.828	10	4595.783			
Tense / Aspect ✻ TA Match	0.182	1	0.182	2.985×10^{-5}	0.996	2.985×10^{-6}
Residuals	60908.584	10	6090.858			
Tense / Aspect ✻ Telicity	771.139	1	771.139	0.286	0.605	0.028
Residuals	26999.001	10	2699.900			

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
TA Match ✻ Telicity	5973.011	1	5973.011	1.489	0.250	0.130
Residuals	40106.223	10	4010.622			
Tense / Aspect ✻ TA Match ✻ Telicity	48.011	1	48.011	0.028	0.871	0.003
Residuals	17212.004	10	1721.200			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	959983.016	10	95998.302		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	11	410.727	136.792	41.244	0.333
		Telic	11	420.818	150.404	45.349	0.357
	Mismatch	Atelic	11	397.568	66.658	20.098	0.168
		Telic	11	443.568	146.240	44.093	0.330
Simple Past	Match	Atelic	11	408.614	103.842	31.310	0.254
		Telic	11	409.818	102.653	30.951	0.250
	Mismatch	Atelic	11	398.591	97.007	29.249	0.243

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
		Telic	11	429.795	150.737	45.449	0.351

REGION: V+2

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect	289.094	1	289.094	0.138	0.718	0.014
Residuals	20953.391	10	2095.339			
TA Match	140.011	1	140.011	0.045	0.837	0.004
Residuals	31320.036	10	3132.004			
Telicity	34642.227	1	34642.227	11.452	0.007	0.534
Residuals	30249.882	10	3024.988			
Tense / Aspect ✻ TA Match	4589.321	1	4589.321	0.480	0.504	0.046
Residuals	95528.351	10	9552.835			
Tense / Aspect ✻ Telicity	292.730	1	292.730	0.118	0.738	0.012
Residuals	24802.504	10	2480.250			
TA Match ✻ Telicity	1572.545	1	1572.545	1.501	0.249	0.130

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Residuals	10479.376	10	1047.938			
Tense / Aspect ✻ TA Match ✻ Telicity	250.594	1	250.594	0.030	0.866	0.003
Residuals	83487.703	10	8348.770			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$1.246\times10^{+6}$	10	124600.419		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	11	395.568	130.389	39.314	0.330
		Telic	11	419.773	166.141	50.093	0.396
	Mismatch	Atelic	11	371.818	127.420	38.419	0.343
		Telic	11	419.682	144.392	43.536	0.344
Simple Past	Match	Atelic	11	377.727	115.446	34.808	0.306
		Telic	11	415.977	142.252	42.890	0.342
	Mismatch	Atelic	11	389.614	127.498	38.442	0.327
		Telic	11	438.023	150.912	45.502	0.345

Post Hoc Tests

Post Hoc Comparisons - Telicity

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Atelic	Telic	-39.682	11.726	-3.384	-0.286	0.007	0.007

Note. Results are averaged over the levels of: Tense / Aspect, TA Match

REGION: V+3

Results

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect	39599.495	1	39599.495	2.786	0.126	0.218
Residuals	142121.919	10	14212.192			
TA Match	15113.472	1	15113.472	0.715	0.417	0.067
Residuals	211306.098	10	21130.610			
Telicity	86203.330	1	86203.330	3.284	0.100	0.247
Residuals	262464.240	10	26246.424			
Tense / Aspect ⁎ TA Match	2604.563	1	2604.563	0.091	0.768	0.009

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Residuals	284701.195	10	28470.119			
Tense / Aspect ✻ Telicity	1198.438	1	1198.438	0.071	0.796	0.007
Residuals	169206.445	10	16920.644			
TA Match ✻ Telicity	87176.308	1	87176.308	1.870	0.201	0.158
Residuals	466147.482	10	46614.748			
Tense / Aspect ✻ TA Match ✻ Telicity	14057.955	1	14057.955	0.301	0.595	0.029
Residuals	466472.021	10	46647.202			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$2.426\times10^{+6}$	10	242575.908		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	11	389.659	143.086	43.142	0.367
		Telic	11	547.864	362.265	109.227	0.661
	Mismatch	Atelic	11	514.977	317.884	95.846	0.617
		Telic	11	496.727	230.068	69.368	0.463
Simple Past	Match	Atelic	11	390.773	105.611	31.843	0.270
		Telic	11	483.659	195.540	58.958	0.404
	Mismatch	Atelic	11	443.773	168.594	50.833	0.380
		Telic	11	461.318	243.543	73.431	0.528

Non-Native Speaker Group: SPR ANOVA TABLES

Repeated Measures ANOVA

Region: Verb

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect	5681.720	1	5681.720	1.125	0.302	0.053
Residuals	101047.374	20	5052.369			
TA Match	351.482	1	351.482	0.059	0.810	0.003
Residuals	118148.049	20	5907.402			
Telicity	7831.006	1	7831.006	0.747	0.398	0.036
Residuals	209617.650	20	10480.883			
Tense / Aspect ⁎ TA Match	17101.339	1	17101.339	2.109	0.162	0.095
Residuals	162183.598	20	8109.180			
Tense / Aspect ⁎ Telicity	19393.006	1	19393.006	2.648	0.119	0.117
Residuals	146459.994	20	7323.000			

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
TA Match ✻ Telicity	1940.720	1	1940.720	0.190	0.668	0.009
Residuals	204651.905	20	10232.595			
Tense / Aspect ✻ TA Match ✻ Telicity	15698.667	1	15698.667	2.193	0.154	0.099
Residuals	143190.677	20	7159.534			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$3.647 \times 10^{+6}$	20	182373.078		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	21	417.119	195.068	42.567	0.468
		Telic	21	426.131	164.010	35.790	0.385
	Mismatch	Atelic	21	373.702	139.988	30.548	0.375
		Telic	21	434.976	169.919	37.079	0.391

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Simple Past	Match	Atelic	21	410.726	140.029	30.557	0.341
		Telic	21	415.429	159.563	34.820	0.384
	Mismatch	Atelic	21	446.333	228.194	49.796	0.511
		Telic	21	425.964	161.484	35.239	0.379

NNS Results: REGION V+1

Repeated Measures ANOVA

Within Subjects Effects

Cases	**Sum of Squares**	**df**	**Mean Square**	**F**	**p**	**η^2_p**
Tense / Aspect	478.406	1	478.406	0.072	0.791	0.004
Residuals	132466.625	20	6623.331			
TA Match	15323.930	1	15323.930	8.852	0.007	0.307
Residuals	34624.351	20	1731.218			
Telicity	2950.095	1	2950.095	0.883	0.359	0.042
Residuals	66814.280	20	3340.714			
Tense / Aspect ✻ TA Match	4300.595	1	4300.595	1.465	0.240	0.068
Residuals	58730.936	20	2936.547			

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect ✻ Telicity	80.787	1	80.787	0.020	0.890	9.883×10^{-4}
Residuals	81661.338	20	4083.067			
TA Match ✻ Telicity	10442.263	1	10442.263	1.531	0.230	0.071
Residuals	136423.487	20	6821.174			
Tense / Aspect ✻ TA Match ✻ Telicity	1343.006	1	1343.006	0.392	0.538	0.019
Residuals	68499.494	20	3424.975			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$2.972\times10^{+6}$	20	148624.528		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	21	376.964	132.923	29.006	0.353
		Telic	21	391.393	144.442	31.520	0.369
	Mismatch	Atelic	21	427.607	168.256	36.717	0.393
		Telic	21	399.190	137.715	30.052	0.345

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Simple Past	Match	Atelic	21	397.500	153.942	33.593	0.387
		Telic	21	397.845	144.959	31.633	0.364
	Mismatch	Atelic	21	416.595	172.030	37.540	0.413
		Telic	21	396.714	132.183	28.845	0.333

Post Hoc Tests

Post Hoc Comparisons - TA Match

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Match	Mismatch	-19.101	6.420	-2.975	-0.128	0.007	0.007

Note. Results are averaged over the levels of: Tense / Aspect, Telicity

Simple Main Effects

Simple Main Effects - TA Match

Level of Tense / Aspect	Level of Telicity	Sum of Squares	df	Mean Square	F	p
Present Perfect	Atelic	26929.339	1	26929.339	11.013	0.003
	Telic	638.430	1	638.430	0.302	0.589
Simple Past	Atelic	3828.595	1	3828.595	1.013	0.326
	Telic	13.430	1	13.430	0.002	0.964

Note. Type III Sum of Squares

NNS Results: REGION V+2

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect	986.006	1	986.006	0.107	0.747	0.005
Residuals	184785.713	20	9239.286			
TA Match	3635.371	1	3635.371	0.477	0.498	0.023
Residuals	152501.379	20	7625.069			
Telicity	2600.720	1	2600.720	1.132	0.300	0.054
Residuals	45966.249	20	2298.312			
Tense / Aspect ⁎ TA Match	143.006	1	143.006	0.027	0.872	0.001
Residuals	106685.369	20	5334.268			
Tense / Aspect ⁎ Telicity	4026.823	1	4026.823	0.788	0.385	0.038
Residuals	102200.958	20	5110.048			
TA Match ⁎ Telicity	1860.006	1	1860.006	0.474	0.499	0.023
Residuals	78408.932	20	3920.447			
Tense / Aspect ⁎ TA Match ⁎ Telicity	1575.656	1	1575.656	0.344	0.564	0.017

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Residuals	91531.656	20	4576.583			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$2.736\times10^{+6}$	20	136775.183		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	21	387.321	155.361	33.903	0.401
		Telic	21	398.179	161.371	35.214	0.405
	Mismatch	Atelic	21	407.560	128.236	27.983	0.315
		Telic	21	392.857	114.273	24.936	0.291
Simple Past	Match	Atelic	21	386.655	133.511	29.134	0.345
		Telic	21	404.845	157.661	34.404	0.389
	Mismatch	Atelic	21	398.333	173.254	37.807	0.435
		Telic	21	415.464	149.999	32.732	0.361

NNS Results: REGION V+3

Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Tense / Aspect	2756.430	1	2756.430	0.337	0.568	0.017
Residuals	163725.461	20	8186.273			
TA Match	87.149	1	87.149	0.009	0.924	4.641×10^{-4}
Residuals	187691.492	20	9384.575			
Telicity	3233.149	1	3233.149	0.183	0.673	0.009
Residuals	353166.992	20	17658.350			
Tense / Aspect ✻ TA Match	50874.121	1	50874.121	7.086	0.015	0.262
Residuals	143588.958	20	7179.448			
Tense / Aspect ✻ Telicity	19901.263	1	19901.263	1.750	0.201	0.080
Residuals	227484.502	20	11374.225			
TA Match ✻ Telicity	17835.482	1	17835.482	1.016	0.326	0.048
Residuals	351132.096	20	17556.605			
Tense / Aspect ✻ TA Match ✻ Telicity	23276.823	1	23276.823	1.735	0.203	0.080

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2_p
Residuals	268328.880	20	13416.444			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p
Residuals	$5.174\times10^{+6}$	20	258676.355		

Note. Type III Sum of Squares

Descriptives

Descriptives

Tense / Aspect	TA Match	Telicity	N	Mean	SD	SE	Coefficient of variation
Present Perfect	Match	Atelic	21	443.143	251.869	54.962	0.568
		Telic	21	453.202	213.294	46.545	0.471
	Mismatch	Atelic	21	406.845	158.352	34.555	0.389
		Telic	21	422.774	183.205	39.979	0.433
Simple Past	Match	Atelic	21	398.464	174.654	38.113	0.438
		Telic	21	412.071	200.817	43.822	0.487
	Mismatch	Atelic	21	478.857	285.017	62.196	0.595
		Telic	21	404.167	154.254	33.661	0.382

Post Hoc Tests

Post Hoc Comparisons - Tense / Aspect ✻ TA Match

		Mean Difference	SE	t	Cohen's d	p_{bonf}	p_{holm}
Present Perfect, Match	Simple Past, Match	42.905	19.127	2.243	0.207	0.183	0.183
	Present Perfect, Mismatch	33.363	19.859	1.680	0.161	0.605	0.404
	Simple Past, Mismatch	6.661	20.454	0.326	0.032	1.000	1.000
Simple Past, Match	Present Perfect, Mismatch	-9.542	20.454	-0.467	-0.046	1.000	1.000
	Simple Past, Mismatch	-36.244	19.859	-1.825	-0.175	0.454	0.378
Present Perfect, Mismatch	Simple Past, Mismatch	-26.702	19.127	-1.396	-0.129	1.000	0.511

Note. P-value adjusted for comparing a family of 6

Note. Results are averaged over the levels of: Telicity

Simple Main Effects

Simple Main Effects - TA Match

Level of Tense / Aspect	Level of Telicity	Sum of Squares	df	Mean Square	F	p
Present Perfect	Atelic	13833.930	1	13833.930	0.868	0.363
	Telic	9721.929	1	9721.929	1.497	0.235
Simple Past	Atelic	67861.621	1	67861.621	3.641	0.071
	Telic	656.095	1	656.095	0.101	0.753

Note. Type III Sum of Squares