

THE EFFECTS OF LANGUAGE INSTRUCTION ON L2 LEARNERS' INPUT PROCESSING
AND LEARNING OUTCOMES

BY

SARA FERNÁNDEZ CUENCA

DISSERTATION

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Doctoral Committee:

Associate Professor Melissa Bowles, Chair and Director of Research
Associate Professor Jill Jegerski, Co-Director of Research
Professor Silvina Montrul
Assistant Professor Xun Yan

ABSTRACT

The role of attention and awareness is central to second language acquisition development, as proposed by several theoretical accounts (Schmidt, 1993, 2001; Tomlin & Villa, 1994; VanPatten, 1993, 1996) and shown by experimental research (e.g., Godfroid & Schmidte, 2013; Rosa & O'Neill, 1999; Rosa & Leow, 2004a, 2004b; VanPatten & Cadierno, 1993). The current dissertation aims to contribute to this line of research by examining the effects of language acquisition on L2 learners' attention allocation, input processing, and learning outcomes. First, this dissertation tests the *Lexical Preference Principle* proposed in VanPatten's *Input Processing Model* (1993, 1996), which states that L2 learners are more likely to rely on lexical rather than inflectional cues. Second, the current study aims to examine if language instruction that takes into account the psycholinguistic processes that govern L2 learners input processing, can help L2 learners overcome this lexical processing bias and pay more attention to morphological cues as they read the input in real time. Third, this study investigates the effects of language instruction on Spanish L2 learners' interpretation, production, and input processing of the Spanish subjunctive in adverbial clauses. The results from the present study confirmed that Spanish L2 learners did rely more on lexical than inflectional cues at the pretest stage. This was measured by accuracy scores on two interpretation tests and provides support for the *Lexical Preference Principle*. In addition, the current study found that language instruction can help L2 learners pay more attention to inflectional cues, as measured via eyetracking (*Total Dwell Time* reading measures); however, this only occurred in one of the two interpretation tests employed. Furthermore, the present study also found that language instruction led to L2 learners' interpretation and production learning gains, as measured by their responses to two interpretation and one production test before and after instruction. These findings were consistent with

previous research that examined the effects of language instruction with this particular target form (Bowles & Henshaw, 2015; Lee & McNulty, 2013; McNulty-Díaz, 2017). Finally, the results from this study found partial support for the claim that language instruction that takes into account the psycholinguistic processes that govern L2 learners input processing, can help L2 learners become more sensitive to grammaticality manipulations of the target form as L2 learners read for comprehension. This study used a sentence reading comprehension test with eyetracking to examine L2 learners' changes in processing before and after instruction. This dissertation's results only provide partial support for this claim, as a grammaticality effect in the direction expected (higher reading time for ungrammatical than grammatical items) in the critical region(s) was only found with one of the four eyetracking measures (i.e., with *Total Dwell Time* but not with *First Fixation Duration*, *Regressions in* or *Regressions out*). In addition to these three main objectives, the current dissertation contributes to previous research on Spanish mood that examined L2 learners' knowledge of this construct with only an interpretation, production, or a sentence reading comprehension (with eyetracking) test. I investigate L2 learners' understanding of the Spanish subjunctive in adverbial clauses with a thorough methodology that tests L2 learners' interpretation, production, and input processing.

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CHAPTER 1: ATTENTION AND LANGUAGE INSTRUCTION

1.1 Introduction

This chapter discusses the importance of attention in SLA development, with a special focus on input processing and how language instruction that takes into account the psycholinguistic mechanisms stated by Input Processing, can help L2 learners make accurate form-meaning connections when they read or listen to L2 input for meaning. After this introduction, Section 1.2 introduces the concepts of attention and awareness and the role they play in second language learning. This section is followed by a review of VanPatten's Input Processing Model (IP), with an emphasis on the Lexical Preference Principle and the Preference for Non-Redundancy Principle, which are directly tested in the present study. Section 1.5 is devoted to the review of the main tenets of processing instruction and a critical review of the research that examined its effects on L2 learners' learning gains. A special emphasis is placed on the methodological limitations that this research faced when testing the effects of processing instruction on L2 learners' actual processing, and a thorough description of the few studies that have a valid design to make direct claims on the effects of instruction on L2 learners' processing is provided at the end of this section. The chapter closes with a brief summary that highlights the findings from previous research on the effects of instruction on L2 learners' attention allocation and processing and how the present study addresses the gap in previous research.

1.2 The role of attention in second language learning

There is a consensus in the field of second language acquisition that learners need to pay attention to input in order to learn formal features of the language (Schmidt, 2001; Tomlin & Villa, 1994). Schmidt's (1990) Noticing Hypothesis was one of the first theoretical accounts to address the role of attention directly and how this relates to the construct of awareness at the

early input to intake stage of the L2 learning processing. Schmidt posited that attention controls access to awareness and is responsible for one's subjective experience of noticing, which according to him is "the necessary and sufficient condition for the conversion of input into intake" (1993, p.209). Thus, Schmidt holds that in order to learn any linguistic feature of the L2, this feature must be noticed with a minimal level of awareness by the learners, even if they do not understand the underlying meaning of this form. Izumi (2003) argues that what Schmidt meant by noticing was that "the concept of attention is necessary to understand virtually every aspect of second language acquisition (SLA), including the development of interlanguages over time" and that "there is no doubt that attended learning is far superior [to unattended learning], and for all practical purposes, attention is necessary for all aspects in L2 learning" (Schmidt, 2001, p.3). In addition, Izumi (2013) argues that noticing as Schmidt and Frota (1996) proposed it, refers to noticing form in relationship with the meaning it conveys and the context in which it is used. The tenets of the Noticing Hypothesis have been extensively tested, particularly in the instructed language acquisition strand of research (ISLA), and so far, the findings from multiple studies in this subfield provide support for the idea that higher levels of awareness lead to higher learning gains (Leow 1997; Rosa & O'Neill, 1999; Rosa & Leow, 2004; among others)

Similar to the Noticing Hypothesis, VanPatten's Input Processing model focuses on the initial stages of language acquisition: input-intake stage. This model is also concerned with how L2 learners' make initial form-meaning connection when they first encounter the input. More precisely, this model makes a number of claims about what guides L2 learners' processing, how L2 learners allocate attention and interpret the input as they engage in comprehension. Some of the claims proposed in the input processing model have also been tested empirically, and so far,

the results from these studies support some of the tenets made by VanPatten's Input Processing model (Ellis & Sagarra, 2010; Henry, 2009; VanPatten & Cadierno, 1996; among others).

Together, these theoretical accounts suggest that attention is key in the initial stages of language acquisition: when input becomes intake. However, measuring L2 learners' attention has posed a significant challenge, particularly in the field of instructed language acquisition, which has traditionally been characterized by using only output measures such as accuracy scores to assess if L2 learners make the correct form-meaning connections at the input (intake) stage. This measure cannot capture how input is processed by L2 learners; how what is being noticed or paid attention to may become intake; instead it can only be used to make inferences as to whether L2 learners paid attention to or noticed a certain construction in the input.

In the last two decades, empirical research that aimed to test the role of different types of instruction (input or textual enhancement, feedback, and processing instruction among others) has employed a hybrid design consisting of pre- and posttest accuracy scores, as well as the complementary measures of think alouds or retrospective verbal reports (Leow 2001; Rosa & O'Neil, 1999; Rosa & Leow, 2004a, among others). Although think alouds have helped the field move forward with regard to being able to measure more accurately L2 learners' awareness, noticing, or attention allocation, recent research suggests that think alouds can only capture high levels of awareness and therefore, and therefore, they might be missing lower levels of awareness, noticing and attention (Leow et al, 2014). The following section discusses the findings of these new studies as well as the use of the innovative method of eyetracking that can also capture lower levels of awareness and may be more optimal to examine attention in second language acquisition.

1.3 Methodological issues in testing awareness and attention

This section will discuss how the methodology of eyetracking can address the limitations from previous instructed language acquisition research that aimed to investigate the role of attention in L2 development. First, I describe the advantages of using eyetracking versus other methodologies that can capture processing, and second, I introduce the limited research that investigated attention and how this correlates with language learning outcomes.

Leow, Gray, Marijuan, and Moorman (2014) reviewed the strengths and weaknesses of different methodologies often used to examine attention in SLA. In this paper, Leow et al. (2014) argue that, although think alouds can tap into L2 learners' allocation of attention or noticing of structures in the input, this measure can be an intrusive procedure that is subject to reactivity depending on the demands of the experimental task. In addition, think alouds' responses are open to the researchers' interpretation, whether they make reference to attention allocation, noticing, or depth of processing. On the other hand, methods such as eyetracking are less intrusive and are believed to capture lower levels of cognition. The main assumption with eyetracking research is that overt attention (as manifested by the position of the eye) and covert attention (mental focus) are closely connected (Leow, 2014). Thus, eye movement data provides a window into the L2 learner's mental focus, which makes it an optimal measure of attention, when used at the same time the L2 learners complete a task. Additionally, eyetracking has been proposed as a more ecologically valid measure than other measures of reading (such as self-paced reading), because it can capture L2 learners' initial analysis as well as their reanalysis of the input (Dussias, 2010). I now turn to the limited research that has used eyetracking to examine the role of attention in language learning.

1.3.1 Review of research that used eyetracking to examine attention and learning

In this section I review the limited research that employed eyetracking in conjunction with accuracy data and sometimes measures of awareness collected via retrospective verbal reports, to examine how attention and awareness interact and sometimes correlate with L2 development.

Godfroid and Schmidtke (2013) triangulated different measures of attention and awareness- namely eye movement data and verbal reports- to examine the different contributions that these two methods provide when examining receptive vocabulary learning. More precisely, this study investigated if eye fixation durations on novel words during reading would predict later recognition and recall of vocabulary when compared to participants' verbal reports obtained in a surprise post-task interview. Twenty EFL learners were instructed to read 20 paragraphs containing novel words while their eyes were tracked. After reading these paragraphs, participants were asked to complete an unannounced vocabulary posttest. Finally, they took part in an interview with the researchers, where participants were shown the novel words one by one and were asked to recreate what they were thinking when they saw the word, and what these words meant. Participant responses in the post-task interview were coded into three different categories: (a) unawareness, (b) noetic awareness, which was understood as remembering having seen the word but not knowing the meaning, (c) auto-noetic awareness, which meant that the participant remembered reading the word in a particular sentence. The results from an analysis with responses to the post-task interview and eye movement data as predictors of vocabulary learning (as measured by the vocabulary posttest), showed a positive effect of fixation time on recognition. Increase in fixation time on the target word led to an increase in probability that the learner recognized the word on the vocabulary posttest. Similarly, their results also showed a

positive effect of awareness, and L2 learners who reported being aware of the novel word in the post-task interview were significantly more likely to be able to recall the novel word. As for the relationship between these two methods and novel vocabulary learning, their analysis showed that awareness measures correlated with fixation time spent on the words, but only when L2 learners reported being aware of the novel word in the post-task interview. The authors concluded by saying that in their study attention enabled awareness which was in itself a strong predictor of vocabulary learning.

Similarly, Godfroid and Uggem (2013) examined beginning-level German L2 learners' eye movements during sentence processing to investigate if they attended to irregular verbs and, if so, if the amount of attention paid predicted learning of this verb type. They tested 43 adult L2 German learners enrolled in an elementary German course at the university level. Participants were asked to complete a pre- and posttest where they were asked to write a sentence with the action the verb depicted in a picture. These tests were used to measure learning gains. Between the pre- and posttest, L2 learners were asked to complete a reading task while their eyes were being tracked. This reading task only included verbs that L2 learners at this level were familiar with. Results showed that learners looked more at irregular stem-changing verbs than at regular verbs and that longer total times had a favorable effect on the learning of irregular verbs, as tested by production data on the posttest.

The results from these two studies suggest that attention to grammatical forms and vocabulary is correlated with learning of these forms and vocabulary, providing support for the idea that attention plays an important role in language learning. In addition, it provides evidence that learners need to pay attention to input in order to learn formal features of the language (Schmidt, 2001), and expands these findings to the learning of L2 lexicon. Furthermore, these

studies show that eyetracking is a reliable measure of attention that can allow SLA researchers to examine attention allocation, and noticing as L2 learners engage with the input in real time, instead of only making inferences about these constructs on the basis of accuracy changes before and after instruction, as much prior instructional research has done. For this reason, this dissertation utilized eyetracking in conjunction with accuracy results before and after instruction with the goal to examine if instruction can change L2 learners' attention allocation as well as learning outcomes. I now turn to discussing VanPatten's Input Processing Model (VanPatten, 1996, 2004), which makes claims about how L2 learners allocate attention to input with the goal of meaning extraction, and that is of particular importance to this dissertation as some of these claims made by IP are directly tested with this dissertation's experimental design.

1.4 Input processing

As previously mentioned, VanPatten's Input Processing model is concerned with the internal psycholinguistic strategies that L2 learners use in comprehending sentences in a second language (VanPatten, 1996, 2004, 2012). In a nutshell, this model focuses on two main concerns: what do L2 learners process in the input? And what kind of constraints guide their processing? (VanPatten, 2012). Under the Input Processing model, processing is understood as the process of connecting linguistic forms to meaning or functions; and therefore, the goal of IP is to provide a detailed description as to why L2 learners have difficulties making some form-meaning connections. Among the list of principles that embody the Input Processing Model, two of them are central to this dissertation: *The Lexical Preference Principle* and *The Preference for Non-Redundancy Principle*. I will describe these principles in more detail in the next two subsections.

1.4.1 The Lexical Preference Principle

When L2 learners process input they do it for meaning, in other words, they are hoping to extract a message or part of a message from this string of words they see or listen to. The *Lexical Preference Principle* states that learners will tend to rely on lexical items as opposed to grammatical forms to extract meaning when both encode the same semantic information. For instance, when reading the Spanish sentence *Juan trabajó ayer* (“Juan worked yesterday”), learners are more likely to deduce that this is a past action because of the word *ayer* (“yesterday”) than because of the inflectional morpheme *-ó* (equivalent to “-ed” in English) at the end of the verb. Thus, learners will usually make form- meaning connections by associating *ayer* to past tense in Spanish, but miss the morphological cue, which is less salient, but equally meaningful.

In one empirical test of the Lexical Preference Principle, Ellis and Sagarra (2010) found that Chinese speakers relied more on adverbs than verbal cues when exposed to a series of tasks that targeted interpretation and production of Latin sentences containing verbal and temporal references; whereas Spanish and Russian speakers showed the opposite pattern by making relatively more use of verbal inflections when completing the same tasks. These findings provide strong support for a cue processing bias that results from a lifetime of prior L1 usage. Ellis and Sagarra finished their paper posing the question of whether these attention biases can be surpassed with extended practice. A second study (Ellis & Sagarra, 2011) tackled this question by examining three groups of English speakers that were exposed to a verb, an adverb, and control training condition. English is not a morphologically rich language (such as Spanish or Russian), therefore the expected tendency was to find English speakers making use of adverbs rather than verbal cues. This behavior was confirmed with participants in the control group that

received no training in the interpretation phase of the study. In the control group, adverbial cues determined 86% of their ratings; whereas verbal cues accounted for just 3%. Participants in the adverb training group showed an even higher reliance on the adverb; adverbial cues determined 99% of their ratings; whereas participants in the verb training condition showed a more balanced preference with adverbial cues determining 58% of their ratings, and verbal cues accounting for 37%. Results from the production phase of the study in which participants had to provide the Latin translation of short English sentences in the present, past, and future, mirrored perception results. L1-effects aside, Ellis and Sagarra (2010, 2011) provided strong support for the Lexical Preference Principle. Nevertheless, their study did not include a methodology that could measure real-time processing; therefore, assumptions about the Lexical Preference Principle could only be made based on L2 learners' translation accuracy responses.

Similarly, Cameron (2011) examined the Lexical Preference Principle during language processing with a non-cumulative self-paced reading task. This task contained a form and meaning manipulation that aimed to investigate whether L2 learners were sensitive to form-based or lexical-based mood manipulations. In this study participants read two sentences and had to decide which sentence corresponded with the picture. The form manipulation, which he called modality- mood mismatched, consisted of a mismatch between the lexical expression of modality in the main clause of a sentence and the mood marker (indicative or subjunctive) in the subordinate verb; whereas the lexically-based meaning manipulation consisted of a mismatch between the information conveyed in the sentence and the picture. Reading times results of the embedded verb (word 4), the preposition that followed the verb (word 5), and the article that followed the preposition were analyzed. Cameron's results revealed that L2 learners (regardless of their proficiency) were only sensitive to the meaning manipulation but not to the form

manipulation. Cameron interpreted these results as lending support to the Lexical Preference Principle since L2 learners derived meaning from the lexico-semantics of the target verbs as well as from the lexical expressions of modality but not from mood inflectional morphology.

Finally, VanPatten and Keating (2007) examined Spanish L2 learners (whose L1 was English) and Spanish native speakers' processing of Spanish tense using a reading comprehension task with eyetracking. L2 learners were classified into three levels of proficiency: elementary, intermediate, and advanced. Critical sentences were manipulated so the adverb in the sentence did not match the tense encoded in the verbal morphology (e.g. *Ayer/Hoy estoy hablando con John* "Yesterday/Today I am talking to John"). Eyetracking data showed that whereas Spanish native speakers lingered or "regressed" back to verbs to verify temporal reference, elementary and intermediate L2 learners lingered or regressed back to adverbs. However, advanced L2 learners showed a similar pattern to native speakers, which suggests that as proficiency in Spanish increased, L1-English L2-Spanish learners begin to focus on grammatical inflection to interpret temporal reference.

The findings from these studies provide evidence for the Lexical Preference Principle but only one study (Ellis & Sagarra, 2011) examined if language training (instruction) can help L2 learners surpass their biased processing towards lexical items rather than verbal morphology. This dissertation aims to contribute to this line of research with the goal of providing further evidence that language training can help diminish this biased processing to ensure that L2 learners take advantage of all linguistic cues available in the input to extract meaning. Furthermore, this dissertation will examine the effects of language instruction by examining how L2 learners' process the input in two interpretation tasks. More precisely, I examine if L2 learners show an increase in attention toward verbal cues as the result of language instruction in

the immediate and delayed posttest using an eyetracking paradigm. In addition to the Lexical Preference Principle, the target form examined in this study (“subjunctive”) is also affected by the Non-Redundancy Principle postulated by Input Processing Model. The next section is devoted to discussing this other principle and how this dissertation operationalizes it.

1.4.2 The preference for non-redundancy principle

According to VanPatten’s Input Processing model (1993,1996), processing resources are limited during L2 comprehension; therefore, redundant target linguistic forms tend to not be processed. As previously mentioned, when L2 learners encounter input (in aural or written form) their number one priority is to extract meaning from it. Thus, redundant grammatical forms might be not processed at all. The *Preference for Non-Redundancy Principle* states that learners are more likely to process non-redundant meaningful grammatical forms before they process redundant grammatical forms.

The *Lexical Preference and Non-redundancy Preference Principles* together predict that the Spanish subjunctive form (tested in the present study) will be difficult to acquire due to the fact that this form is often accompanied by a redundant cue such as trigger verbs¹, or more salient cues, such as content words, that denote the same meaning the subjunctive does. For example, in the Spanish sentence *Juan duda que Ana venga a la fiesta* (“Juan doubts that Ana is coming to the party”), the trigger verb already express doubt and the subjunctive morphology in the verb *venir* (*venga*) is then redundant. These less redundant cues (i.e., verbs) will often overshadow the noticing and acquisition of the subjunctive morphology, which could explain why this form is often acquired in later stages of the language acquisition process.

¹ Trigger verbs refer to the verbs used in a matrix clause when the verb in the embedded clause requires subjunctive morphology (*Ana quiere que la clase acabe pronto*)

For instance, the Spanish subjunctive used to denote future appears in an adverbial clause and can sometimes be accompanied by an adverb (See example 1 below). L2 learners might not initially notice the subjunctive morphology (-e) in the adverbial clause verb, but rather pay attention to the adverb *mañana* (“tomorrow”) to infer that they are dealing with a future action. As proficiency increases, L2 learners may be more ready to start paying attention to redundant cues and start making form-meaning connections; however, research has shown that low proficiency Spanish L2 learners fail to notice subjunctive morphology initially and take a long time to acquire this form (Collentine, 1997, 2000). More information regarding the acquisition of Spanish subjunctive can be found in chapter 2 of this dissertation.

- (1) Cuando escuche a la profesora mañana, voy a prestar atención
When (I) listen-SBJV to the teacher tomorrow, (I) go-FUT pay attention
“When I listen to the teacher, I am going to pay attention”

Taking these two Input Processing principles into account, the present study examined if language instruction can increase attention to target forms that might often be overlooked in the input because they are redundant in nature, which is critical to making form-meaning connections with mood morphology (more particularly the subjunctive in adverbial clauses). The stimuli in this dissertation were created to contain either co-occurring lexical and verbal inflectional cues or only verbal inflectional cues. An important contribution of this dissertation is that I examined if language instruction can help L2 learners surpass these processing biases; therefore, the next section will focus on reviewing processing instruction, a pedagogical intervention informed by VanPatten’s Input Processing Model that is particularly designed to aid L2 learners make accurate form-meaning connections as they first encounter the input.

1.5 Processing instruction

On the basis of the Input Processing model, VanPatten designed Processing Instruction, a psycholinguistically-motivated focus on form approach to second language teaching that aims to help L2 learners make optimal form-meaning connections leading to richer intake. In other words, this intervention's main objective is to manipulate input to push learners away from the natural but "non-optimal processing strategies" and process grammatical forms that might normally be overlooked (VanPatten, 2002). This input-driven pedagogical tool consists of explicit information followed by structured input. The explicit information contains information about the target form and warns learners not to rely on faulty input processing strategies. The structured input practice normally follows the explicit information and it manipulates the input so L2 learners are forced to process the target form for meaning in order to successfully complete the task at hand. VanPatten (1993) postulated that structured input activities will follow these guidelines: (1) input will be presented one thing at a time, (2) the focus will be on meaning, (3) practice will move from sentences to connected discourse, (4) it will use both aural and written input, (5) the learner must do something with the input, and (6) psycholinguistic processing mechanisms will be kept in mind when designing the practice. In addition, model processing instruction studies also contained referential and affective activities as part of the structured input practice. The design of these type of activities as well as the impact they have on L2 learners' processing will be discussed in the following section.

1.5.1 Referential and affective activities

The structured input component of processing instruction consists of referential and affective activities. These two types of activities contain input that has been explicitly manipulated to bring the L2 learners' attention to the target form being learned. However, what

distinguishes one from the other is that they allow different types of responses. The purpose of referential activities is to establish form-meaning connections. A referential activity, like the one shown in Figure 1, has only one possible correct response. In this referential task, taken from Lee and McNulty (2013), the adverbial clause containing the subjunctive has been isolated, so the learner must pay attention to verb morphology to derive an interpretation of the kind of action it describes. In this case, an *-e* ending will signal uncertainty; whereas an *-a* ending will signal habituality. The correct response for item 1 is b and the correct response for item 2 is a.

Activity A.

Choose the correct interpretation for each sentence.

1. Cuando Juan toca la guitarra,... (When Juan plays_(ind) the guitar)
 - a. We don't know when Juan will play the guitar
 - b. Juan plays the guitar all the time
2. Cuando Rosa cante con música, ... (When Rosa sings_(subj) with music)
 - a. We don't know when Rosa will sing with music
 - b. Rosa always sings with music.

Figure 1. Sample of referential activity.

On the other hand, affective activities have more than one correct response. In these activities, learners are asked to indicate an opinion or belief. The purpose of affective activities is to reinforce form-meaning connections while “learners are engaged in processing information about the real world” (VanPatten, 2005, p. 274). See example in Figure 2, taken from Henshaw (2012).

Activity B.

Choose the response or responses that align with your personal opinion.

María clearly isn't an ideal student, but what about you? You will hear the second half of a statement. Choose the phrase that best begins each statement according to what might apply to you and your relationship with your instructor

Figure 2. Sample of affective activity.

a. Voy a ser respetuoso cuando ... (I'm going to be respectful when ...)

b. Voy a ser muy directo cuando ... (I'm going to be very direct when ...)

Audio transcript: conteste un email del professor (I answer an email from my professor)

Figure 2. (cont.)

In this affective activity, learners do not need to rely on the subjunctive ending (-e) to complete the activity, given that all responses are in the future form and are grammatical correct. Therefore, it is not guaranteed that learners will pay attention to form in this activity; however affective activities are believed to provide “a healthy dose” of structured input practice in a meaningful, more personalized context (Farley, 2004, p. 87).

Although a large body of PI research has found that structured input activities alone can lead to learning gains (Benati, 2004; Fernandez, 2009; VanPatten & Oikarinen, 1996; Wong, 2004; among others), as shown by increases in accuracy in interpretation and production test from pre- to posttest, compared to studies that used both explicit information and structured input practice, little research has examined which type of structured input activities is responsible for these positive changes in processing. The limited research conducted so far suggests that referential activities are the main responsible for learning gains, since these are the activities that really force learners to pay attention to form and initiate the form-meaning connections. Marsden (2006) examined the effects of referential compared to activities that did not push L2 learners to make form-meaning connections (enhanced input activities) and found that only learners who received practice consisting of referential activities made substantial learning gains over time. Although Marsden (2006) examined French verbal inflections in the perfect and present tense. Similar results were obtained with Spanish subjunctive by Collentine (1998) and Fernández (2008), who also used only referential activities in their studies and also found interpretation learning gains.

Thus far, research on the effects of these two types of tasks suggests that referential activities are more conducive to accurate form-meaning connections (Marsden, 2006); however, these claims have only been made by comparing accuracy scores from pre- to posttest. This dissertation only used referential activities, but also includes a sentence comprehension test (that utilizes eyetracking) and manipulates subjunctive grammaticality, as part of the pre- and posttest assessment. Thus, if learners in the present study show evidence of sensitivity to subjunctive grammaticality, this could add onto previous research suggesting that referential activities can lead to changes in L2 learners' input processing. I now turn to review the most relevant studies that investigated the effects of processing instruction on L2 learners' interpretation and production of different target forms. Chapter 2 provides a more detailed review of processing instruction studies on the Spanish subjunctive, the target form studied in this dissertation.

1.5.2 Review of processing instruction studies

Overall, empirical research testing the effects of processing instruction (PI) on L2 learners' interpretation of different target forms (e.g., future, subjunctive) and constructions (i.e., SVO vs. OSV word order) has shown that PI is more effective than traditional output-oriented instruction (VanPatten & Cadierno, 1993; Benati, 2001; Farley, 2001; among others).

More recent PI research has focused on testing PI in its full (explicit information + structured input practice) compared to structured input only (only structured input practice but no explicit information), with the goal to identify which component within the PI framework is responsible for the interpretation and production positive learning gains found in previous research. So far, results are inconclusive and often depend on the target form. Whereas some studies find that structured input practice alone is enough to engage learners in accurate form-meaning connections (VanPatten & Oikarinen, 1996; Benati, 2004; Wong, 2004; Fernández,

2008; Farley, 2004; Sanz & Morgan-Short, 2004; Henry, Culman & VanPatten, 2009; VanPatten & Borst, 2012; VanPatten, Collopy, Price, Borst, and Qualin, 2013; McNulty-Díaz, 2017); other studies find that explicit information accelerates the pace at which L2 learners make accurate form-meaning connections (Fernández, 2008; Henry et al., 2009; VanPatten et al., 2013) and it is sometimes necessary with complex and redundant target forms.

Overall these findings are very promising for PI; however, an important point ought to be made at this time. VanPatten defines processing, within the Input Processing model, as the process of making form-meaning connections (VanPatten, 2015); however, this extensive body of research has used a research design that examines changes in processing with interpretation tests that only capture the decision that an L2 learner made but not how they arrived at this decision. In other words, this research design misses the time window that could demonstrate that L2 learners' processing does, in fact, change as the result of processing instruction. The following section discusses the methodological issues that processing instruction research has faced so far and introduces the methodological modifications that could address previous research limitations.

1.5.3 Methodological issues with processing instruction

A more recent issue raised with PI research has been the fact that PI research so far has failed to directly capture changes in input processing strategies as learners encounter the input (Wong & Ito, 2018). In other words, previous research that examined the effects of PI on L2 learners' processing only did so comparing accuracy scores from pre- to posttest; and therefore, an increase in accuracy scores post-instruction was seen as an indirect way to assume that L2 learners had made the accurate form-meaning connections as the result of instruction. The use of only accuracy scores is not enough to examine if L2 learners can make the appropriate form-

meaning connection during comprehension in real-time (in the exact moment L2 learners are engaged with the input).

Research studies that aim to more directly test changes in L2 learners' processing strategies as the result of PI would need to employ a methodology such as self-paced reading or eyetracking that can capture how L2 learners make form-meaning connections in real time. So far, only a few studies have utilized such methodology to assess changes in L2 learners' processing strategies in real time; however, their results are inconclusive. These studies differed in two main components related to their research design: (1) the methodology employed, which was self-paced reading in the case of Dracos (2013) and Henry (2015) or eyetracking, in the case of Issa, Morgan-Short, Villegas, and Raney (2015) and Wong and Ito (2018), and (b) at what point in time processing changes were examined. Whereas Dracos (2013) and Henry (2015) investigated changes in L2 learners' processing only after instruction, Issa et al. (2015) did it before and after instruction. Wong and Ito (2018) examined L2 learners' processing during instruction. Another important difference is that Wong and Ito (2018) used a visual world paradigm design, and Issa et al. (2015) used a sentence processing eyetracking paradigm. Additionally, these studies used different tests to examine input processing. Dracos (2013) and Henry (2015) used a sentence reading comprehension task; however, Issa et al. (2015) and Wong and Ito (2018) used an interpretation task (designed following structured input guidelines). Overall, the study design for previous research has varied significantly from study to study. The present study aims to reconcile previous research and expand on it by examining the effects of language instruction on L2 learners' processing strategies before and after instruction using a sentence reading comprehension (with eyetracking) test as well as two interpretation tests

(designed following structured input guidelines). A more detailed description of these previous studies that used self-paced reading and eyetracking is provided in the following section.

1.5.4 Findings from instructional studies with online methods

Although all studies reviewed in this section took into consideration PI principles when designing their instructional intervention, not all of them followed the guidelines that VanPatten listed in his seminal work (VanPatten, 1993, 1996), which were also described at the beginning of section 1.4 in this chapter. For this reason, this section uses the term “instructional studies” rather than “processing instruction studies”. Overall, all these studies had the same goal, which was to examine if language instruction inspired by input processing/ processing instruction principles and guidelines, could help L2 learners make more optimal form-meaning connections.

Dracos (2013) examined the effects of focus-on-form instruction on Spanish L2 learners’ knowledge of subject-verb as well as temporal adverb-verbal incongruencies. She used a series of interpretation and production tasks to assess L2 learners’ learning gains from pre to posttests. In addition, this study used a self-paced reading sentence comprehension task to assess L2 learners’ online sensitivity to subject-verb errors before and after instruction. L2 learners were randomly assigned to one of two experimental groups or a control group. L2 learners in the experimental groups received structured input activities with either corrective feedback in the form of *correct/incorrect* or metalinguistic feedback. L2 learners in the control group took part in all assessment tests but did not receive any instruction or feedback at any point in time. The instructional intervention was divided into five 20-min sessions that took place over approximately 3 weeks, and it only covered language at the sentence-level and was administered via E-prime. The stimuli in this instructional intervention were presented half aurally and half in writing separated in two different blocks with visual preceding aural stimuli, and participants

saw a total of 96 target sentences in each session. The assessment materials consisted of an aural task, a written production task, a cue reliance task, and temporal reference of sentences, and a self-paced reading task. In the aural processing task, L2 learners were asked to read or listen to a sentence and specify, by pressing a certain key, the sentence's subject or tense. In addition, L2 learners had to complete a written fill-in-the-gap activity where they were asked to produce the target verbal inflection. In the cue reliance task, was another type of interpretation task, in which L2 learners had to read sentences that were manipulated to have inconsistencies of tense and subject-verb agreement, and mismatches between adverbs and verbal morphology and between subject and verbal morphology, and had to specify, by pressing a certain key, the sentence's subject or tense. Finally, the self-paced reading task asked L2 learners to read sentences for comprehension that contained subject-verb and temporal adverb-verbal morphology mismatches. Participants in these studies completed a pretest and an immediate and delayed posttest, three weeks after they received instruction. Results from the aural processing task, the cue reliance task, and the written production task revealed significant learning gains for both experimental groups, suggesting that instruction led to learning gains in detecting Spanish subject-verb and verb-temporal references errors. However, the results from the self-paced reading task showed that this training had no effect on L2 learners' sensitivity to subject-verb and tense agreement in the input as they read for comprehension. Dracos concluded by saying that, in her study, language training did not change L2 learners' processing strategies.

Henry (2015) examined the effects of processing instruction (with and without prosodic cues) and traditional instruction on German L2 learners' knowledge and processing of accusative case marking. An important goal of this study was to examine if L2 learners would be able avoid using the *First Noun Principle* (FNP), which is one of the principles stated in VanPatten's Input

Processing Model. This principle states that L2 learners tend to process the first noun or pronoun in a sentence as the subject. Unlike in English, German is more flexible with order and pronouns and noun phrases mark case; thus, this study examined if different types of language instruction could help L2 learners pay attention to case marking in German rather than rely on word order. Participants in both experimental groups received explicit information on German direct objects and accusative case and completed a referential activity followed by two affective production activities, all of them with corrective feedback (correct/incorrect). The two interventions differed in their explicit information. Whereas the explicit information in the PI group focused only on one form (the masculine accusative) and was presented aurally and in writing with an emphasis on L2 input processing principles; the explicit information in the traditional instruction group resembled that of common textbooks; it was presented in multiple choice, focused on production, and did not discuss word order. Learning gains were assessed with a sentence interpretation task and a picture description task to gauge changes in German L2 learners' interpretation of accusative case as the result of instruction. In addition, a self-paced reading task was used to examine German L2 learners' processing difficulty with SVO vs. OVS sentences at the posttest stage. It was predicted that for German L2 learners to show an improvement in processing of accusative case, they would show higher reading times for OVS than for SVO sentences, as is the case with German native speakers. The results from the sentence interpretation and picture description tasks showed significant learning gains for participants in the traditional and processing instruction group; however, L2 learners in the PI group outperformed those in the traditional group. These findings are consistent with previous research that also found an advantage for PI vs. Traditional (output-oriented) instruction. Results from the self-paced reading task showed that, overall, participants in the PI group spent more time reading object

noun phrases than participants in the traditional group, but the differences in reading time were not significantly different when compared to subject noun phrases. In addition, accuracy data from the self-paced reading task comprehension questions revealed that approximately 50% of the participants in the PI group were able to avoid the first-noun strategy and reading times by these participants were different for OVS and SVO sentences only when PI also included prosodic cues. Henry (2015) interpreted these findings as only processing instruction with prosodic cues leading to changes in German L2 learners' processing of accusative case.

Moving to eyetracking studies, Wong and Ito (2018) investigated the effects of PI and traditional instruction on French L2 learners' knowledge of causative constructions with eyetracking. Similar to Henry (2015) this study also examined the *First Noun Principle*. It is important to emphasize that in the first of two experiments in this study, the PI group only completed structured input practice but received no explicit information. Participants in the traditional and PI groups completed an aural picture-sentence matching task built with an eyetracking visual world paradigm. This task was used as the pre- and posttest with the goal to gauge potential changes in L2 learners' processing strategies as the result of traditional or PI instruction. L2 learners in the PI instruction group completed a referential activity consisting of L2 sentences with the verb *faire* in a causative construction and L2 sentences with a non-causative construction, as part of the training module. Participants saw a French sentence and were asked to choose which English translation out of two options better described the French sentence. They received feedback after each item. On the other hand, L2 learners in the traditional group were asked to create causative sentences with the verb *faire* following an initial example. Accuracy results in the sentence-picture matching task showed an advantage for participants in the PI group when compared to participants in the traditional group. However, eye

movement data, measured with fixation patterns toward the picture that was congruent with the first noun interpreted as the subject Input Processing principle from pre- to posttest, showed different findings. Only participants in the PI group overcame the First Noun Principle from pre- to posttest showing a decrease in incorrect fixations to the picture that matched a sentence whose first noun phrase was the subject. This finding suggests that PI led to positive changes in L2 learners' processing strategies. In a second experiment, Wong and Ito (2018) examined whether the addition of explicit information to participants in both experimental groups (traditional and PI) would lead to positive changes in L2 learners' input processing strategies. Accuracy results in the sentence-picture matching task showed that the addition of explicit information boosted accuracy for participants in the PI group. However, eyetracking data did not show such an advantage for the PI group; instead both L2 learners in the traditional and PI groups showed evidence of overcoming the First Noun Principle, as shown by a significant decrease in incorrect fixations to the picture that was congruent with the First Noun Principle. Wong and Ito's (2018) study provides evidence that PI does in fact lead to changes in L2 learners' input processing strategies as captured when they are making form-meaning connections in real time.

Finally, Issa et al. (2015) examined the effects of PI and input enhancement practice on low proficiency Spanish L2 learners on direct object pronouns, using a sentence processing eyetracking paradigm. The goal of the study was to examine if PI or input enhancement practice would increase the attention learners paid to the target form and whether this attention would correlate with the learning gains observed in the posttest. The stimuli used in the instructional intervention, as well as pre- and posttest assessments only contained the third person singular pronouns *lo/la* ("it"). Participants in both experimental groups completed an initial baseline block, in the form of an interpretation task, where they saw a sentence containing the target form

followed by a screen that contained two pictures. In this second screen participants were asked to select which picture better described the sentences they had just read. After this pre-test assessment, participants were randomly assigned to the PI or the input enhancement practice. L2 learners in the PI practice saw a screen with two pictures, followed by a screen with a sentence that contained the target structure; this second screen was followed by the picture shown in screen one and at this point participants were asked to choose which picture better described the sentence they read in screen two. Finally, participants received feedback (correct/incorrect) after making a decision. L2 learners in the input enhancement practice group were asked to read a sentence that contained the target form in red on screen one, then they were asked to select which picture better described the sentence they saw on the first screen, and finally participants received feedback (correct/incorrect) on the third screen. Participants' eye movements were recorded during this baseline block and instructional modules (PI and input enhancement). After completion of the instructional module, participants completed an immediate posttest in the form of a sentence-picture matching task, no eyetracking was used with this immediate posttest. Participants came back two weeks later to complete a delayed posttest, similar to the immediate posttest. Attention was examined via eye movement data by comparing eye movement patterns (total time and skipping rate) in the baseline block to the data during the instructional interventions, as well as comparing the experimental group eye movement data to that of the control group, which was exposed to the form through practice but with no manipulation of attention. Learning gains were assessed with the accuracy results from baseline block and two interpretation tasks administered post-instruction, one immediately after instruction and the other one two weeks after instruction. Eyetracking results from L2 learners in the input enhancement group showed that skipping rates on the target form decreased significantly when comparing the

baseline to the instruction trials. Although total time increased from pre- to posttest, this difference was not significant, similar to the pattern found with the control group. In addition, to the time effect, the researchers found a time and group interaction which revealed that only L2 learners in the input enhancement group showed a decrease in skipping rates. Accuracy results in the input enhancement group showed significant learning gains from pre- to posttest, as well as from pre- to delayed posttest, but not from post- to delayed posttest. Eyetracking results from L2 learners in the PI group showed that total time spent on the target form increased significantly, and skipping rate decreased significantly from baseline to instruction trials. In addition, to the time effect, the researchers found a time and group interaction which revealed that only L2 learners in the PI group showed a decrease in skipping rates. Accuracy results from L2 learners in the PI group showed significant learning gains from pre- to posttest and from pre- to delayed-posttest. Similar to previous studies that examined attention and learning (Godfroid & Schmidtke, 2013; Godfroid & Uggen, 2013). Issa et al. (2015) investigated if increases in attention correlated with learning outcomes. An analysis comparing eyetracking measures and accuracy in the immediate posttest was conducted, but statistical analysis did not find a significant relationship between the eyetracking measures and the accuracy results for either experimental group. The authors concluded by stating that PI led to deeper levels of processing, as shown by a significant increase in fixation time and a decreased skipping rate, when compared to participants in the input enhancement group who only showed a significant decrease in skipping rate. Additionally, the authors explained that perhaps the lack of significant relationship between attention (as measured by eyetracking data) and learning gains (as measured by the interpretation task) might be due to the low number of eyetracking measures employed in the study.

The findings from this limited body of research that examined the effects of language instruction on L2 learners' attention allocation or form-meaning connections are inconclusive. Whereas Dracos (2013) and Henry (2015) find no changes in L2 learners' processing strategies as the result of language instruction, Wong and Ito (2018) and Issa et al. (2015) did. As previously mentioned, a major difference in these two sets of studies is the methodology employed to assess changes in processing, and when in time these changes in processing were investigated (prior to and post instruction or while instruction occurred). Dracos (2013) and Henry (2015) used self-paced reading, but Wong and Ito (2018) and Issa et al. (2015) used an eyetracking paradigm. In addition, the two studies that employed eyetracking utilized two different eyetracking designs (visual world vs. sentence- processing). The current dissertation aimed to contribute to this line of research by examining L2 learners' processing before and after instruction using an eyetracking paradigm. Unlike previous research, this dissertation examined both (a) changes in L2 learners' input processing while they complete interpretation tests, as well as, (b) while they read sentences for comprehension that have been manipulated in terms of grammaticality. I examined changes in processing at the pre- and posttest stages to explore if language instruction leads to more optimal form-meaning connections as L2 learners engage with interpretation and sentence reading comprehension tests after instruction has taken place.

1.6 Summary of chapter

The role of attention and awareness is central to second language acquisition, as postulated by different theoretical accounts (Schmidt, 2001; VanPatten, 1993,1996); however, these claims have not always been easy to prove empirically due to the difficulty of capturing learners' attention and awareness while they read or listen to the L2 (Leow et al., 2014). Recent research that examined the role of attention in second language acquisition and learning with

eyetracking found that language attention, as measured with eye movements, is often correlated with language learning, as measured with accuracy scores from interpretation tasks administered after instruction (Godfroid & Schmidtke, 2013; Godfroid & Uggen, 2013). This dissertation focuses on examining some tenets of the Input Processing Model, the *Lexical Preference Principle* and the *Preference for Non-redundancy Principle*, which state that L2 learners are more likely to rely on lexical cues than verbal inflections, and that they will focus on non-redundant cues before they can concentrate on redundant cues, when they listen to or read for comprehension.

Additionally, this dissertation aims to examine if, in addition to interpretation and production learning gains, language instruction can help L2 learners allocate attention in a manner that promotes L2 learners' accurate form-meaning connections, as they read the input for comprehension. Previous research that examined the effects of processing instruction (as explicit information + structured input practice or structured input practice only) on L2 learners' knowledge of different target forms, in comparison to more traditional output-oriented pedagogical interventions, has shown an advantage for PI, because it leads to interpretation and production gains, whereas traditional instruction only leads to production gains (VanPatten & Cadierno, 1993). Nevertheless, these studies did not utilize a methodology that could capture L2 learners' processing more directly, as they encounter the input in real time, and inferences about these accurate form-meaning connections were assumed based on the accuracy scores reported from the pre- and posttests. Up to date, only a few studies have investigated the effects of language instruction (based on processing instruction) on L2 learners' processing using eyetracking (Issa et al, 2015; Wong & Ito, 2018) and self-paced reading (Dracos, 2013; Henry, 2015), but their findings are inconclusive. A closer look at the differences in these studies'

design revealed that they differ in the methodology employed (eye-tracking vs. self-paced reading) and examined changes in L2 learners' processing at different points in time, as they engaged with the practice portion of the instructional module or before and after instruction. In addition, these studies also employed different tests: interpretation and reading comprehension with self-paced reading which tap into different processing strategies. The present dissertation aims to increment our understanding of the effects of language instruction on L2 learners' input processing using both an interpretation and a sentence reading comprehension task (in conjunction with an eyetracking paradigm), which tap into different processing strategies. In addition, and following Dracos (2013) and Wong and Ito (2018), this dissertation only focuses on L2 learners' input processing changes as the result of instruction, i.e., changes before and after instruction when completing specific tasks (interpretation and reading comprehension tasks). I now turn to chapter 2, which discusses the acquisition of the Spanish subjunctive as well as the effects of language instruction on the Spanish subjunctive in general, and the Spanish subjunctive in adverbial clauses in particular.

CHAPTER 2: THE ACQUISITION OF SPANISH MOOD

2.1 Introduction

The goal of this chapter is to review the most relevant literature on the acquisition of mood in Spanish by Spanish second language (L2) speakers/learners. After a brief introduction to the concepts of mood and modality in Spanish as well as the approach adopted in this chapter, Section 2.3 focuses on the acquisition of mood by Spanish L2 learners. Section 2.3.4 is a brief summary of the major findings on Spanish mood that highlights the limited research conducted with some types of subjunctive such as the subjunctive in adverbial clauses, which is the target form targeted in this dissertation. Thus, Section 2.4 is devoted to reviewing the most relevant research on the use and interpretation of subjunctive or indicative in Spanish adverbial clauses by Spanish L2 speakers. To conclude, section 2.5 provides a comprehensive summary of research with subjunctive mood in adverbial clauses and discusses how this dissertation aims to contribute to the limitations from previous research.

2.2. Mood and modality

Most Spanish grammar textbooks differentiate between the subjunctive and indicative mood by introducing the learner to two different sets of verb paradigms. Verb forms classified under the indicative mood are said to refer to actions or ideas that are concrete or real; whereas verbs forms classified under the subjunctive mood are said to refer to not concrete or hypothetical ideas. Following this clear dichotomous modality distinction, marked by mood verbal morphology, one could think that Spanish mood should not posit an acquisitional problem and expression of modality is always clear to the speaker and listener. However, this idealized division of mood and, therefore, modality does not always hold when one analysis real world Spanish linguistic data in different modalities (spoken or written).

Currently, there are different theoretical accounts that try to explain Spanish mood and modality on the basis of semantics (Palmer, 2001; Whitley, 2002), syntax (Kempchinsky, 2009; Quer, 2009), and sometimes both (Fábregas, 2014). Nevertheless, linguistic change or explaining how modality is encoded in Spanish mood is out of the scope of this dissertation. I acknowledge that linguistic factors such as language change, semantics and syntax contribute to the acquisitional challenge of Spanish mood, shown by monolingual and early and late bilinguals. Instead, my approach in this chapter is to investigate the factors that make Spanish mood is a complicated concept to acquire and I focus, more specifically, on how Spanish L2 learners interpret and use the subjunctive (in opposition to indicative).

2.2.1 Acquisition of the subjunctive

The Spanish subjunctive posits a significant acquisitional challenge due to the fact that (a) subjunctive forms are used with less frequency than indicative forms, (b) it appears in a wide range of linguistic contexts (e.g., *que* relative clauses, *adverbial* clauses) sometimes with different meanings, and (c) the use of the subjunctive in some of these contexts sometimes varies in different Spanish varieties (e.g., Castilian, Mexican Spanish).

Kanwit and Geeslin (2018) performed a search in the web Corpus del Español to examine subjunctive and indicative frequencies and found that subjunctive mood forms have a low frequency (10%) when compared to its indicative form counterparts (90%). These findings could help explain why monolingually-raised Spanish children do not show a good command of the subjunctive in most linguistic contexts until age 10 -12 (Padilla, 1990; López et al., 1994; Blake 1983; Perez-Leroux, 1998; Aguirre 2000), and why Spanish L2 learners, particularly those whose L1 does not have a mood contrast, need extensive Spanish exposure and, in most cases,

years of language instruction, to learn the differences in meaning communicated by the use of mood and indicative morphology (Collentine, 2010).

Moreover, the Spanish subjunctive occurs in a wide variety of linguistic contexts (e.g., in relative clauses), with a morphological change (verbal suffix or in the case of irregular verbs a verb root change) and its meaning cannot be easily accessed by drawing simple comparisons between utterances and the world. The use of the subjunctive in different linguistic contexts makes it difficult for Spanish L2 learners to establish a clear connection with subjunctive morphology and its meaning, especially since this meaning can sometimes vary depending on the linguistic context. A simple explanation, very often used in Spanish language instruction, is to justify when to use indicative or subjunctive based on the traditional approach to mood choice as realis/irrealis (Bello, 1847; Alarcos Llorach, 1994; Whitley, 2002; Montrul, 2007). According to this approach the subjunctive is used when the proposition is not true of the actual world, and the indicative is used when the proposition is true of the actual world. Nevertheless, this is a very simplified view of the Spanish subjunctive. In fact, as stated by Montrul (2007) “the semantic, syntactic, and pragmatics rules that govern the choice of subjunctive are very complex and not always straightforward” (p.246). For instance, the subjunctive can be associated with doubt when used in a relative clause whose main clause has the verb “dudar” (to doubt) or a semantic construction that conveys doubt such as “No creo que” (I do not think that); however, the subjunctive is commonly used in adverbial clauses to denote future, i.e., to refer to an action that has not occurred yet. Thus, the Spanish speaker is presented with a verbal paradigm (subjunctive endings) that can be mapped to different meanings: future, doubt, uncertainty, among many others.

To complicate things more, the use of the subjunctive has also shown to not be uniform in the Spanish-speaking World. Several sociolinguistic studies have found that Spanish speakers from different Spanish-speaking countries or sometimes from different geographical locations within the same country show different use of the subjunctive-indicative contrast (Blas-Arroyo & Porcar Miralles, 1997, Murillo-Mendrano, 1999, Silva-Corvalán, 1994, 2001), making the mapping of subjunctive morphology to different meanings even harder for L2 learners.

2.3 The acquisition of the Spanish subjunctive in L2 learners

The acquisition of the Spanish subjunctive among L2 learners has been extensively studied within experimental research (Borgonovo et al., 2015; Collentine, 2010; 2014; Iverson et al., 2008; Pérez Cortes, 2016, among others) and the results from these studies suggest that the subjunctive-indicative construct posits a challenge for Spanish L2 learners, especially those whose L1 is English; but as proficiency and command of more complex linguistic forms (i.e., the syntax involved in relative clauses) increase, most Spanish L2 learners are often able to successfully acquire the subjunctive in a wide range of contexts.

2.3.1 Production of the subjunctive by L2 learners

Gudmestad (2011) investigated the frequency of lexical items (trigger verbs) as well as the frequency with which they are followed by subjunctive verbs. A group of 130 Spanish L2 learners, divided in five consecutive proficiency levels, and a native speaker group completed three oral elicitation. These lexical items (mostly trigger verbs or phrases) were chosen based on their high or low triggering force of subjunctive or no subjunctive morphology based on Davies (2002)'s Frequency of Spanish Dictionary. L2 results showed that L2 learners' use of subjunctive mood increased with proficiency but never reached the native speaker group range. L2 learners in the advanced proficiency groups showed more variable use of the subjunctive with

lexical items that exhibited high relative frequency when compared to those that exhibit low relative frequency. These findings suggest that L2 learners use a lexical strategy for their use of subjunctive mood, which considers the association of a lexical item with subjunctive mood use, and that is affected by the relative frequency of these lexical items in the Spanish input.

Similarly, Gudmestad (2013) examined the role of proficiency on L2 learners' choice of subjunctive under three different categories: semantic category (e.g., volition, uncertainty, assertion), time reference (present, past, or future), and hypotheticality (hypothetical or not hypothetical). A group of 130 Spanish L2 learners, divided into five consecutive proficiency levels, completed three oral contextualized elicitation tasks. Time reference results showed that L2 learners tend to exclusively use the present of subjunctive when proficiency of Spanish is low; however, as proficiency increases compound subjunctive forms (such as pluperfect) become part of the L2 learner's mood repertoire. In terms of semantic category, time reference and hypotheticality, L2 learners (after proficiency level two) used the present of subjunctive similar to Spanish native speakers, and the imperfect and pluperfect subjunctive in largely the same context as native speakers did. Overall, these findings support previous research suggesting that subjunctive mood emerges and matches native speakers' use as proficiency increases.

When it comes to form regularity, Spanish mood research conducted with L2 learners suggests that L2 learners (of intermediate or advanced level) are more likely to use the subjunctive mood with irregular verbs. Collentine (1997) found that intermediate level L2 learners paid more attention to irregular than regular subjunctive verbs in a computer sentence generation task. Similarly, Lubbers Quesada (1998) also found that irregular subjunctive verbs predicted subjunctive use in an oral interview task. Furthermore, Gudmestad (2006) found that irregular verbs influenced subjunctive selection on a written-contextualized task among

intermediate and advanced L2 learners. Nevertheless, Geeslin and Gudmestad (2008) found that advanced L2 learners used regular verbs more frequently in an oral interview task, but this finding did not occur in the written-contextualized task, suggesting that task type may interact with form regularity (regular vs. irregular) for the mood-choice verb.

A large body of research has examined L2 learners' choice of mood; however this has been done using a wide range of task types such as interviews (Collentine, 1995; Lubbers Quesada, 1998), computerized sentence generation tasks (Collentine, 1997), oral sentences completion (Kornuc, 2004), written sentence and dialogue completion tasks (Gudmestad, 2006), and essays (Gudmestad, 2006) among others. Task type and modality has not often been held constant in this line of research. Kornuc (2004) examined accuracy rates of indicative and subjunctive use on three different tasks that she ranked based on difficulty, with a written sentence completion task being the least difficult, followed by a written dialogue completion task, and an oral interview. She expected accuracy rates to decrease as task difficulty increased; however, these predictions only held for subjunctive mood, but not for the indicative mood, suggesting that the relationship between task difficulty and mood choice is not as simple and straightforward. In response to previous research limitations with regards to task effects on frequency of mood choice, Geeslin and Gudmestad (2008) examined subjunctive and indicative frequency of use by Spanish L2 learners using a written elicitation task and an oral interview. More specifically, they investigated how the variable of semantic category of the matrix clause (assertion, comment, uncertainty, volition, other), verb morphology (regular, irregular, past), and futurity (future, non-future) influenced the choice of mood in Spanish L2 production. Results from the written elicitation task revealed that subjunctive selection was higher in the semantic category of volition as well as in future contexts compared to non-future contexts. On the other

hand, results from the oral interview showed that verb morphology played an important role in subjunctive use. Higher use of subjunctive was associated with regular verbs (vs. irregular verbs) and with past contexts (vs. non-past contexts). These findings strongly suggest that task type, more explicit, free elicitation vs. controlled elicitation, played a role in the factors that predict use of the Spanish subjunctive.

In sum, these studies found that factors such as L2 proficiency, frequency of lexical subjunctive lexical triggers, morphology of the mood-choice verb (regular vs. irregular), and task type used to elicit mood choice modulate the rates of subjunctive and indicative use by Spanish L2 learners. Nevertheless, these studies provide no information on how Spanish L2 learners interpret or process mood. Instructional research that focuses on Spanish mood, on the other hand, has made consistent use of interpretation tasks. This field often utilizes different tasks to assess the effects of different language instructional intervention had on L2 learners' understanding of the Spanish subjunctive. The following section discusses the effects of language instruction on L2 learners' acquisition of the Spanish mood, particularly on Spanish subjunctive.

2.3.2 Instructional research on the acquisition of Spanish subjunctive

Given the complexity of Spanish mood, it is not surprising that language instruction, especially processing instruction (VanPatten, 1993), aids the acquisition of the Spanish subjunctive. A large body of research has shown that language instruction can help Spanish L2 learners from different proficiency levels better interpret and produce the subjunctive (Pereira, 1996; Farley, 2004; Potowski, Jegerski, and Morgan-Short, 2009; Fernández, 2008; Fernández-Cuenca, 2016).

Pereira (1996) tested the effects of processing language instruction on Spanish L2 learners' knowledge and production of subjunctive in evaluation clauses. Her study aimed to examine if language instruction on a more marked use of the Spanish subjunctive (subjunctive in evaluation, temporal, and possibility sentences) would also lead to learning gains on subjunctive uses that were less marked (i.e., subjunctive in volition and purpose clauses). She used a grammaticality judgement task and a contextualized dialogue task to assess learning from pre- to posttests. Although her analyses did not reveal a significant difference from pre- to posttests for any subjunctive clause type, descriptive results in the dialogue task showed an increase in accuracy in the targeted structured (subjunctive in evaluation clauses) as well as an increase in accuracy in the less marked category (i.e., volition and purpose) from pre- to posttest. Results in the grammaticality judgement task were similar. Positive rating decreased with ungrammatical sentences and increased with grammatical sentences in the targeted and less marked categories from pre- to posttests. Overall, these findings suggest that processing instruction led to knowledge and production gains of the subjunctive among L2 learners.

Similarly, Farley (2004) tested the effects of processing instruction on L2 learners' knowledge of the Spanish subjunctive in doubt clauses using an interpretation and production task. The multiple-choice interpretation task consisted of incomplete sentences that contained a verb in the subjunctive form, and L2 learners were asked to choose between two possible beginnings of the sentence (one of them containing a doubt matrix verb). The stimuli in this interpretation task was aural. This study also examined if explicit information on the Subjunctive in doubt clauses was a necessary component for the instruction module. Thus, an L2 group received processing instruction that consisted of explicit information followed by structured-input practice, and the other experimental group received processing instruction that only

consisted of structured-input practice. Results showed that L2 learners in both experimental groups, that only differed in the +/- explicit information factor, showed significant learning in both tasks over time; however, L2 learners who received processing instruction that included explicit information outperformed L2 learners in the structured-input only group. L2 learners in the processing instruction group (with explicit information) also showed improvements in their use of the indicative mood in the interpretation task from pre- to posttest, but L2 learners in the structured-input only group did not. The author interpreted these results as processing instruction (with explicit information) helping L2 learners make form-meaning connection faster than compared to the structured-input only group who probably had to make this non-transparent form-meaning connection item-by-item when completing the structure-input activities. Farley concludes by saying that explicit information helped promote faster form-meaning connection that can be reinforced when completing the structured-input portion of the instructional model.

Fernández (2008) also tested the effects of processing instruction on L2 learners' knowledge of the subjunctive in doubt clauses. Similar to Farley (2004) she examined how processing instruction with and without explicit information affects L2 learners' form-meaning connections as they engaged with the structured-input. Unlike in Farley (2004), the instructional intervention in this study was administered to participants individually via computer. Fernández (2008) studied trials to criterion; which she defined as L2 learners responding correctly to 3 subsequent items that required the subjunctive and one distractor item in a row. Results showed that more L2 learners in the processing instruction group (with explicit information) reached criterion when compared to L2 learner in the structured-input only group. Similarly, she found that L2 learners in the processing instruction group (with explicit information) needed significantly less trials to reach criterion. In other words, L2 learners in this group made form-

meaning connections faster. Furthermore, Fernández found that L2 learners in the processing instruction (with explicit knowledge) group also responded faster and were more accurate after reaching criterion when compared to L2 learners in the structured-input only group. In the end, Fernández concluded by saying that explicit information, within the processing instruction module, was beneficial as it induce more noticing of the target form, helping L2 learners make connections between the meaning of the verb in the matrix clause and the verb morphology in the embedded clause.


Finally, Fernández- Cuenca (2016) examined the effects of explicit and implicit language instruction on L2 learners' knowledge of the subjunctive in in-existential clauses. This study utilized an acceptability judgment task and elicited imitation task to assess learning gains from pre- to posttests. The instructional module was inspired by processing instruction but did not follow all guidelines stated in VanPatten (1993). It consisted of explicit information that contained information regarding optimal processing strategies for the subjunctive and structured input that kept in mind L2 learners' psycholinguistic processing mechanisms, presented one thing at a time; but only included written input. The implicit instructional module was an input flood. Results showed that only L2 learners in the explicit instruction group made consistent learning gains from pre- to posttests. Positive rating for ungrammatical sentences decreased significantly over time, and L2 learners' production of subjunctive in in-existential sentences increased significantly from pre- to posttests. These findings were similar to Potowski et al (2009) who also tested L2 learners' knowledge of the subjunctive in in-existential clauses using an instructional module that resembled processing instruction and found significant learning gains for L2 learners in a grammatical judgment task as well as in an interpretation and production task.

Overall these studies that examined the role of language instruction on the acquisition of the Spanish subjunctive by L2 learners suggest that explicit language instruction helps Spanish L2 learners associate subjunctive morphology to concepts such as volition, evaluation, existentiality, etc., a connection that is not transparent given the complex association between Spanish mood and modality. In addition, these instructional studies make use of a wider variety of tasks (production, interpretation, acceptability judgement tasks) to assess L2 learners' initial interpretation of the target form, which allowed for a more thorough analysis of L2 learners' understanding of Spanish mood. Nevertheless, as pointed out in Chapter 1, many studies were set to test the effects of processing instruction but failed to include a task or methodology that directly assessed any changes in learners' input processing as the result of processing instruction. In fact, little is known about how L2 learners' process Spanish mood in real time (i.e., as they encounter written or spoken input). The limited research conducted in this area is reviewed in the following section.

2.3.3 Processing of Spanish mood by L2 learners


To the best of my knowledge there are only three studies that examined how L2 learners process Spanish mood (in real time) while reading for comprehension (Cameron, 2011; Demos, 2015; Fernández-Cuenca & Jegerski, 2017). Cameron (2011) employed a self-paced reading paradigm to assess mood processing by Spanish L2 learners. This study examined whether Spanish L2 learners are sensitive to form-based mood manipulations, or if they can only spot lexical-based manipulations. Cameron's methodology involved the manipulation of two main variables: form (modality-mood mis/match) and meaning (sentence-image mis/match). The variable of form was operationalized as a (mis)match between the lexical expression of modality in the main clause of a sentence and the mood marker (indicative or subjunctive) in the

subordinate verb. Instead of using trigger² verbs, the author used certainty expressions such as: *it is probable that*, or *it is obvious that*. The meaning variable, on the other hand, was operationalized as a (mis)match between the lexical-semantics of the subordinate verb in a sentence and the action or situation depicted in its corresponding image. Sample items for all 4 conditions can be seen in Figure 3. The task was a non-cumulative self-paced reading time, in which participants saw a picture and were asked to read a sentence. Differences in reading times for critical regions (embedded verb, and the proposition that followed each verb) were compared across conditions.



Es posible que limpie en la sala.
 [Is possible that cleans-SUB in the living room]
 'It is possible that he cleans in the living room.' + Form + Meaning

*Es probable que *limpia en la sala.*
 [Is probable that *cleans-IND in the living room]
 'It is probable that he cleans in the living room.' - Form + Meaning



Es probable que escriba en el cuarto.
 [Is probable that writes-SUB in the room]
 'It's probable that he writes in the room.' + Form - Meaning

Es obvio que escriba en el cuarto.
 [Is obvious that *writes-SUB in the room]
 'It's obvious that he writes in the room.' - Form - Meaning

Figure 3. Cameron (2011) experimental conditions.

² Verbs, in the matrix clause, that would subcategorize for the subjunctive mood.

Results showed that L2 learners reading times were significantly higher in the critical region (the verb in the embedded clause) when meaning of the verb did not match the action depicted in the picture than when the verb and the picture did match. However, reading times in the critical region did not significantly change when the verb in the embedded clause was in the indicative or subjunctive mood. These finding suggests that L2 learners do not make use of mood morphology to process modality in Spanish, supporting the *Lexical Preference Principle* proposed by VanPatten's Input Processing Model.

Demos (2015) examined mood-modality mismatches with self-paced reading sentence comprehension task. Unlike Cameron (2011), Demos used trigger verbs that fell within the following semantic categories: emotion, volition, doubt, and impersonal with “ser”. The manipulation consisted on using the indicative form in the embedded sentence verb when according to prescriptive norms the subjunctive form is expected. See an example in Figure 4 below. In addition, participants also had to complete an off-line fill-in-the-blank production task, in which they were asked to conjugate the verb in parenthesis. These sentences in the production task were the same as in the self-paced reading task.

<p>El médico sugiere que el paciente beba menos café y bebidas gaseosas</p> <p>*El médico sugiere que el paciente bebe menos café y bebidas gaseosas</p> <p>“The doctor suggests that the patient drink less coffee_{SUBJ-IND} and fizzy drinks”</p>
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Figure 4. Sample stimuli Demos (2015)

L2 learners' results did not show a significant difference in reading times across conditions, suggesting that L2 learners were not sensitive to the mood grammaticality manipulation as they read for comprehension regardless of proficiency. Interestingly, their off-line results in the fill-in-the-blank production task showed that advanced L2 learners were as

accurate conjugating the verb in the subjunctive mood when the verb in the matrix clause expressed emotion as the baseline native speaker group was with subjunctive in emotion and volition clauses, but not with subjunctive in doubt and impersonal expressions with “ser”. On the hand, intermediate L2 learners only showed accuracy above chance in the impersonal expressions with ser category. These finding suggests that even advanced L2 learners are not sensitive to mood-modality incongruencies while they read for comprehension but, based on production results, they do have knowledge Spanish mood-modality associations, at least with clauses that express emotion and volition. In this study, proficiency played an important role in L2 learners’ knowledge of Spanish mood-modality, as only participants in the advanced group showed comparable production results to the native speaker group in two out the four subjunctive categories, and L2 learners in the intermediate group did not.

Finally, Fernández-Cuenca and Jegerski (2017) examined mood grammaticality with an eyetracking paradigm. Similar to Demos (2015), this study made use of a sentence comprehension task. Sentences contained a trigger verb, which according to Davies (2006) were highly frequent and highly likely to yield subjunctive mood. Thus, the critical sentences contained a trigger verb that required the subjunctive mood in the embedded clause, but the indicative mood was present in half the critical stimuli. In addition, the study manipulated form regularity in the critical verb in the embedded clause, so that half the critical items contained a regular verb and half of them contained an irregular verb. In their analyses, the authors compared the eyetracking measures of Total Dwell Time, First Fixation Duration, as well as regressions in and out of the critical region (expected subjunctive verb) and the two following regions across conditions (grammatical and ungrammatical). L2 learners in this study had lived in a Spanish-speaking country for at least a year and had been studying Spanish for a minimum of 10 years. In

addition, they reported using Spanish with Spanish native speakers on a weekly basis. L2 learners showed overall longer reading times in the ungrammatical condition in the late measure of total dwell time, and more regressions in to the critical region (expected subjunctive verb) and the spillover region (post-expected subjunctive verb) when compared to the grammatical condition. However, this only occurred when sentences contained an irregular verb in the embedded clause. These findings suggest that advanced Spanish L2 learners are sensitive to mood grammaticality when they read for comprehension; however, L2 learners processing of mood is modulated by morphological regularity.

This limited research on L2 learners' processing of Spanish mood suggests that second language proficiency plays an important role on L2 learners' sensitivity to mood grammaticality while reading for comprehension, and that this sensitivity is also affected by the linguistic factor of verb morphology. In addition, Cameron (2011) found that lower proficiency L2 learners were affected by the Lexical Preference Principle; suggesting that when it comes to mood processing, L2 learners rely more on lexical than morphosyntactic cues.

2.3.4 Summary of research on Spanish mood

Thus far, experimental research on L2 Spanish mood has focused mostly on the subjunctive mood. A common ground for research on L2 Spanish subjunctive mood is the prevalent use of output-oriented tasks in an oral or written modality (Geeslin & Gudmestad, 2008). There is a limited body of research that used interpretation tasks or examined how L2 speakers process mood in real time. Nevertheless, research in this area is necessary if we want to achieve a more complete understanding of Spanish L2 speakers' knowledge of Spanish mood, particularly the subjunctive mood. In addition, the experimental research conducted with L2 speakers found that lexical items, in other words, the semantics expressed by the matrix, as well

as the morphology (regular vs. irregular) of the verb in the embedded clause plays an important role in Spanish L2 learners' production of the subjunctive or indicative mood. Finally, most of the research conducted on the subjunctive mood has focused on the subjunctive in embedded clauses that are dependent of matrix clauses containing verbs in the following semantic categories: volition, doubt, impersonal sentences with "ser" or "haber" (Demos, 2015; Farley, 2004; Fernández, 2008); which according to normative use is often an obligatory context for the use of subjunctive mood. However, less researchers that examined Spanish mood have focused on the subjunctive mood in optional contexts; such as adverbial clauses, desiderative predicates, and reported directives (Kanwit & Geeslin, 2014; 2018; Perez-Cortes, 2016), where the use of subjunctive or indicative mood is plausible but the meaning conveyed by these forms differs significantly. This dissertation focuses on the subjunctive in adverbial clauses; thus, the limited research conducted on the subjunctive in this context is discussed in the following section.

2.4 The Spanish subjunctive in adverbial clauses

In Spanish, adverbial clauses introduced by an adverb such as *cuando* ("when") can contain a verb in the present indicative, and therefore, the action denoted can be interpreted as habitual or as an action that has already occurred. However, if the adverb *cuando* is followed by a verb in the present subjunctive form, the action denotes a future event or an action that has not yet happened. See Example 3.a and 3.b below.

3.a Cuando Ana canta, se siente feliz

When Ana sing-PRES-IND (she) herself feels happy

"When Ana sings, she feels happy"

3.b Cuando Ana cante, se va a sentir feliz

When Ana sing-PRES-SBJV (she) herself is going to feel happy

“When Ana sings, she is going to be happy”

In Example 3.a, the use of the present of indicative in the relative clause suggests that Ana’s singing is a habitual action and most likely an action that has already occurred before. In contrast, in Example 3.b, the use of the present of subjunctive suggests that Ana’s singing is an action that will probably happen in the future but has not yet occurred. This simple explanation of the use of subjunctive or indicative mood and the meaning associated with these forms is often found in intermediate and advanced Spanish grammar textbooks such as Henshaw and Bowles (2013). However, there is not a large body of research that can support this clear dichotomy of subjunctive/indicative use in Spanish adverbial clauses as only a few studies have examined Spanish native and non-native speakers’ interpretation and production of mood in adverbial using a sociolinguistic or experimental approach. A sociolinguistic examination is outside the scope of the current dissertation; nevertheless, I acknowledge that the use and interpretation of subjunctive mood is not as clear-cut as Spanish textbook often suggest. Because of the instructed SLA nature of this dissertation, I adopt the principles underlying the use and interpretation of the present indicative and subjunctive in Spanish adverbial clauses discussed above as true. I know turn to review the limited experimental research on L2 Spanish mood in adverbial clauses. The following section reviews the limited research on interpretation of mood in adverbial clauses and it is followed by the findings in instructional research that examined subjunctive in temporal clauses (particularly *Cuando* clauses) which is the type of adverbial clause investigated in this dissertation.

2.4.1 Review of previous research on the interpretation of Spanish mood in adverbial clauses

This section will review two studies that examined how Spanish L2 speakers interpret mood in Spanish adverbial clauses.

Kanwit and Geeslin (2014) used a Mood interpretation task, in which participants were asked to indicate if an action was habitual, if it had not already occurred, or if both interpretations were possible. They tested L2 speakers at three different levels of proficiency and their results showed that proficiency modulated L2 learners' interpretations of the subjunctive and indicative in adverbial clauses. In addition to proficiency, they examined other factors such as adverb (*cuando*, *después de que*, *hasta que*), and form regularity, and clause position (preposed, postposed). Overall, they found that only advanced L2 speakers behaved like native speakers showing a significant distinction between the subjunctive denoting an action that had not occurred and the indicative depicting an action that had taken place and will most likely take place again. The only exception was that L2 learners in the high proficiency group selected the habitual interpretation with indicative items significantly more than Spanish native speakers. Interestingly, Spanish native speakers did not show 100% interpretation of the subjunctive as referring to a future action and the indicative as referring to a habitual action. Spanish native speakers interpreted indicative mood as referring to a habitual action 62.8%, and the subjunctive mood referring to a future action 81.3% of the time. The adverb *Cuando* was found to trigger more habitual interpretation among low proficiency L2 speakers in comparison to the other two adverbs. Advanced L2 speakers showed more interpretation of the action denoting future action (or not yet occurred event) when the adverbial clause was preposed. Finally, with regard to morphological regularity, low and intermediate proficiency L2 speakers' results showed that

more habitual interpretations were made with regular verbs, and more “not yet occurred” interpretations were made with irregular verbs. This was more likely to occur with sentence that contained the adverb *Cuando* among intermediate L2 speakers. These findings are consistent with previous research which found more use of subjunctive with irregular verbs (Collentine, 1997; Lubbers Quesada, 1998).

A second study by Kanwit and Geeslin (2018), examined the interpretation of the subjunctive in adverbial clauses using a sentence completion task by Spanish native speakers as well as Spanish L2 learners from different levels. This time, the interpretation task contained incomplete sentences in the form of adverbial clauses, that contained either the indicative or subjunctive mood and asked participants to select the most appropriate ending which was a choice of three sentences that differed in their use of the present of indicative of future, or both. The goal of this task was to examine how often Spanish native and L2 speakers interpret present of indicative and future with habitual or “not yet occurred” actions. Similar to their previous studies, this study also examined the impact of several factors such as proficiency, verb type, and form regularity on participants choices. Their findings with the adverb *Cuando*, which is the one used in the present study, showed that Spanish native speakers chose the subjunctive form in a normative subj context 96% of the time, and that Spanish L2 learner’s choice of the subjunctive in a normative subj context increased with proficiency; level 1 chose it 30%, level 2 chose it 30,5% and level 3 chose it 91,7% of the time. These findings suggest that L2 learners’ interpretation of the subjunctive with a future-framed meaning increased with proficiency and exposure to the L2.

Overall, these studies suggest that as proficiency increases, Spanish mood interpretation resembles more that of Spanish native speakers. Factors such as verb morphology (in the

adverbial clause), and lexical item (adverb in the adverbial clause) also seem to influence L2 learners' interpretation of Spanish in this type of clauses. As shown by Kanwit and Geeslin (2014, 2018) proficiency plays an important role in interpretation of mood in adverbial clauses; however, another factor that has also shown to help L2 learners with mood, is language instruction. I proceed to review the few studies that examined the effects of language instruction on Spanish L2 learners' knowledge of mood in adverbial clauses, in the following section.

2.4.2 Review of instructional research on the Spanish subjunctive in adverbial clauses

Moving to instructional research, Isabelli (2007) compared the effects of Spanish explicit grammar instruction on two groups of L2 learners' knowledge of subjunctive in adverbial clauses. One of the groups had recently studied abroad in Spain for one year, and the second group had stayed at home and taken their regular Spanish classes at the university. Results yielded significant differences in learning outcomes between these two experimental groups. L2 learners that had just come back from a study abroad program showed significantly larger gains than the stay at home group in the oral interviews used to test improvement of mood use over time. These findings suggest that recent immersion in conjunction with explicit grammar instruction can aid acquisition of Spanish mood in L2 learners.

Although extensive research has been conducted on the effects of processing instruction on L2 learners' knowledge of the subjunctive in Spanish and other languages (Farley, 2004; Fernández, 2008; Benati et al., 2008; Potowski et al., 2009) only a few studies examined the Spanish subjunctive in adverbial clauses (Lee & McNulty, 2013; McNulty-Díaz, 2017; Bowles & Henshaw, 2015). Lee and McNulty (2013) studied the effects of processing instruction on L2 learners' knowledge of the Spanish subjunctive and indicative in adverbial (*Cuando*) clauses using a series of listening, reading, and composition tasks that targeted interpretation and

production. Their processing instruction contained explicit information and was followed by structured-input practice in an aural and written input. These input activities were only referential. Their instruction and assessment materials only targeted regular verbs in the third person singular. Their findings showed strong interpretation and production gains over time, as well as a significantly reduced number of future and indicative instances in contexts requiring the subjunctive form. Most participants in this study did not seem to overgeneralize the use of subjunctive in indicative contexts, as seen in previous PI research.

McNulty-Díaz (2017) followed a similar design with a sentence interpretation and a form completion production task as assessment materials, in an aural and written modality, to examine changes from pre- to posttests. she manipulated the order in which the components of processing instruction appeared (in one group, explicit information preceded structured input and in the other it followed it). Results showed that L2 learners' understanding and production of the Spanish in adverbial clauses increased significantly over time in both experimental groups regardless of whether explicit instruction was provided before or after structured input practice.

Bowles and Henshaw (2015) tested the effects of processing instruction, as explicit information + structured input or structured input only, on L2 learners' knowledge of the Spanish subjunctive and indicative in adverbial clauses. Testing materials only focused on regular *-ar* verbs in the first person singular. In addition to interpretation and production tasks to assess learning gains, participants' reaction times and trials to criterion were also measured during instruction to examine if there were online advantages to either of these instructional treatments that might have been overlooked in previous studies. Bowles and Henshaw's (2015) findings showed that L2 learners in both experimental groups made significant learning gains over time on the target form. They only found an advantage for the EI group for the production of the

subjunctive. Reaction times during instruction were no significantly different between experimental groups but participants assigned to the EI group achieved trials to criterion faster. In other words, they learned the rule during structured input practice faster than participants in the structured input only group. Overall, these findings suggest that processing instruction (with or without explicit information) is beneficial for L2 learners, and although explicit information may get learners to start interpreting the target structure accurately faster, its effects seem to be equal to structured input practice only.

The findings from these studies that examined the effects of language instruction on Spanish L2 learners' knowledge of Spanish mood show that language instruction, particularly language instruction that contains explicit information about the target form, helps L2 learners interpret Spanish subjunctive in adverbial clauses as making reference to a "not yet occurred" event, and to produce the subjunctive in adverbial clause when the main clause contains a morphological future reference. Most of these studies employed an instructional intervention that followed processing instruction guidelines (VanPatten, 1996) and focused on regular verbs, which have been appointed as posing a difficulty for L2 learners, in terms of interpretation and production, by experimental research on Subjunctive mood (Collentine, 1997; Lubbers Quesada, 1998; Kanwit & Geeslin, 2014); however, none of these studies used an experimental design that could capture changes in L2 learners' input processing. This dissertation aims to address this limitation by examining this phenomenon using an eyetracking paradigm, which will allow the exploration of changes in L2 learners' processing. I now move to the following section, which provides a summary of subjunctive mood research presented in this chapter and outlines the motivation for the present study.

2.5 Summary of research on the Spanish mood and motivation for the present study

The Spanish subjunctive has posed an acquisitional challenge for L2 Spanish speakers. The experimental research that examined the Spanish subjunctive has employed a research designed that focuses mostly on Spanish L2 speakers' production of the subjunctive using a written or oral modality (Geeslin & Gudmestad, 2008). However, less studies have examined how L2 learners interpret and process subjunctive in real time, i.e., as they encounter the input (only) in writing. The limited research that used interpretation tests or use a methodology that examined mood processing, seems to find that Spanish L2 speakers' processing is affected by the frequency and use of certain lexical phrases or items, and the form regularity of the verb that is mood marked (Kanwit & Geeslin, 2014, 2018). These findings complement production findings (Collentine, 1997; Lubbers Quesada, 1998).

Within research on the subjunctive mood, the subjunctive in optional contexts has received significantly less attention. Only a few studies have investigated this construction and have also found that interpretation of this construction is affected by lexical phrases/items and form regularity (regular vs. irregular verbs) (Kanwit & Geeslin, 2014). Nevertheless, there is no research to this day that examined how Spanish L2 speakers' process subjunctive in adverbial clauses in real time. Although offline production and interpretation findings with studies that investigated the Spanish in adverbial clauses suggest that form regularity affects L2 interpretation of this construction, only one study examined its potential effects at the processing level and its findings suggest that this difficulty with regular verbs also occurs at the processing level.

Furthermore, language instruction, especially processing instruction or instruction that implemented several principles from processing instruction, has been found to be beneficial for

Spanish L2 learners, as it leads to interpretation and production gains (Farley, 2004; Fernández, 2008; among other). However, no study to this day has examined the effects of processing instruction on L2 learners' processing of the subjunctive mood using a methodology like eyetracking that can investigate language processing in real time., i.e., as L2 learners encounter the input, not based on L2 learners' interpretation changes from pre- to posttests.

This dissertation aims to contribute this body of research that studies acquisition of Spanish mood by examining the effects of explicit language instruction (inspired by processing instruction) on L2 learners' processing, interpretation, and production of Spanish subjunctive in adverbial *cuando* clauses. I now turn to Chapter 3 which will introduce this dissertation research questions, predictions, and a thorough description of the current study's methodology.

CHAPTER 3: METHODOLOGY

3.1 Goals, research questions and predictions

This study aims to contribute to the following second language acquisition subfields: (a) testing of the *Lexical Preference principle* and (b) the effects of language instruction (informed by Input Processing) on learners' interpretation, production, and processing of the Spanish subjunctive in adverbial clauses. I posit the following research questions:

1. Are L2 learners affected by the Lexical Preference Principle, stating that learners are more likely to rely to lexical rather than morphological cues, at the pretest stage?

Based on previous research conducted with L2 learners (Ellis & Sagarra, 2010) I expect to find more accuracy for items containing a morphological and a lexical cue than those containing only a morphological cue.

2. If the Lexical Preference Principle holds at the pretest stage, does explicit language instruction help L2 learners pay more attention to morphological cues during real-time processing?

No previous research has directly examined online changes in L2 learners' attention allocation to morphological cues after instruction; while participants complete an interpretation task (rather than a sentence comprehension task). Therefore, I adopt the null hypothesis that language instruction will not change L2 learners' tendency to rely more on lexical than morphological cues. In other words, there will be no increase in Total Dwell Time (late eyetracking measure) or First Time Fixation (early eyetracking measure) from pre- to posttests.

Previous research examined increases in attention using First Fixation Duration (Godfroid & Schmidtke, 2013; Godfroid & Uggen, 2013); however, previous

research that examined processing of Spanish mood found sensitivity to mood incongruencies more often in late rather than early measures, such as Total Dwell Time. For this reason, I use a combination of an early and late measure, but I predict that an increase in attention, in the event that one is found, will most likely be captured by the late eyetracking measure.

3. Does explicit language instruction lead to interpretation gains on the subjunctive in adverbial clauses in L2 learners?

Based on previous research conducted with L2 learners (Bowles & Henshaw, 2015; Farley, 2004; Lee & McNulty, 2013; McNulty, 2017), I expect to see interpretation learning gains, as measure by accuracy scores, from pre- to posttests.

4. Does explicit language instruction lead to production gains on the subjunctive in adverbial clauses in L2 and heritage learners?

Based on previous research conducted with L2 and heritage learners (Bowles & Henshaw, 2015; Farley, 2004; Lee & McNulty, 2013; McNulty, 2017), I expect to see production learning gains, as measured by accuracy scores, from pre- to posttests.

5. Does explicit language instruction lead to increase in L2 learners' online sensitivity to the subjunctive incongruencies in adverbial clauses while they read for comprehension?

Based on Dracos (2013), who used self-paced reading to measure online sensitivity to subject-verb agreement and verb-temporal reference incongruencies, I predict that L2 learners will not show sensitivity to subjunctive incongruences

while reading sentences for comprehension, as measured by differences in reading times and regressions between the grammatical and ungrammatical condition.

3.2 Methodology

This section will provide a detailed description of the participants who took part in the study as well as the materials employed, and the procedure followed.

3.2.1 Participants

Participants were recruited from the University of Illinois at Urbana-Champaign community. A total of 20 monolingually-raised native Spanish speakers (10 males, 10 females), used to norm the stimuli given the sociolinguistic variation associated with Spanish mood, and 57 Spanish L2 learners participated in the study. The country of origin for the participants in the native speaker group varied (Chile, Spain, Ecuador, Venezuela, Argentina, El Salvador, Guatemala, and Puerto Rico) but they were all raised in a Spanish-speaking country and moved to the US to pursue an undergraduate or graduate degree. Participants in the L2 group were raised in the US and learned Spanish formally after puberty. These participants were recruited from advanced Spanish classes required to receive a minor/major in Spanish. Twenty-nine of these L2 learner participants were assigned to the control group and 28 were assigned to the instruction group. experimental group. In the end, eighteen of these participants had to be excluded from the study because they showed knowledge of the target on the pretest or because they did not complete all sessions of the study. The final participant pool therefore consisted of 19 participants in the control group and 20 in the instructed group. Self-report proficiency scores as well as scores from a modified version of the DELE (Diploma de Español como Lengua Extranjera) standardized proficiency test (Montrul & Slabakova, 2003), were collected for both native speakers and L2 learners (see Table 1). A Welsch t-test confirmed that participants' DELE

proficiency in the instructed ($M = 24.70$, $SD = 4.88$) and the control group ($M = 23.00$, $SD = 4$) did not differ significantly ($t(36) = 1.19$, $p = 0.24$).

Table 1

Biographic information for Native and L2 group

	NS			L2		
	(n=20)			(n=39)		
	M	SD	range	M	SD	range
Age	28.3	7.4	20-44	19.8	.9	18-21
Age of acquisition						
English	9.1	4.7	5-25	0	0	0
Spanish	0.25	.5	0-2	10.7	3	5-12
DELE scores	48.5	1.3	47-50	24	4.4	15-32
Self-ratings-English						
Understanding	8.7	1.2	5-10	9.9	.2	9-10
Speaking	7.8	1.5	5-10	9.9	.1	9-10
Reading	9	.9	7-10	9.9	.2	9-10
Self-ratings-Spanish						
Understanding	10	0	10	7	1.1	5-9
Speaking	10	0	10	6.1	1.4	5-9
Reading	10	0	10	7.1	1.7	5-10

The DELE was out of 50 points and the self-rating scale was out of 10 points per skill

3.2.2. Materials

This study made use of different sets of materials: to assess participants knowledge of the target form studied (pre-, post-, and a delayed posttest), to help them learn it if they did not have knowledge of it (language instruction module, and structured input practice), and to collect other participant data such as proficiency, biographical information, and additional triangulation of the factor of attention.

3.2.2.1 Pre-, post, and delayed posttest

In order to assess the progress made by L2 learners, we used a series tests: (a) an event selection interpretation test, (b) a sentence completion interpretation test, (c) a cloze production test, and (d) a reading comprehension while eyetracking test. These tests aimed to tap into different areas of the participants' knowledge of the subjunctive in adverbial clauses. These tests were administered at three different points in time and together constituted the pre-, post-, and delayed posttest. A more detailed explanation of these tests is provided in the following section.

3.2.2.1.1 Event selection interpretation task

In the Event Selection Interpretation Test, participants read the beginning of a sentence (a *cuando* adverbial clause) on one screen, and in the following screen they were asked to select which kind of action (past, future, or habitual) best described the sentence they had just read, while we tracked their eyes. This task was very explicit in nature and aimed to examine whether participants were able to connect the subjunctive ending -e in the verb with an action that denoted future. The stimuli in this task consisted of a total of 8 incomplete sentences containing the present subjunctive (see Example 4.a), and 8 incomplete sentences containing the present indicative (see Example 4.b). Half of these incomplete 8 sentences that had a verb in the subjunctive or indicative form also contained an adverbial phrase such as *la próxima semana*

(next week) or *con frecuencia* (frequently) as shown in Example 5.a, 5.b, 5.c, and 5.d. The verbs in the adverbial clause were always regular -ar verbs conjugated in the 3rd person singular. This test was administered via Experiment Builder (SR Research, 2015).

4.a Cuando Sara esté mucho más relajada... “When Sara is more relaxed...

(A) Acción habitual (A) Habitual action

(B) Acción en el futuro (B) Future action

(C) Acción en el pasado (C) Past action”

4.b Cuando Juan toca la guitarra española... “When Juan plays the Spanish guitar

(A) Acción habitual (A) Habitual action

(B) Acción en el futuro (B) Future action

(C) Acción en el pasado (C) Past action”

5.a Cuando Sara esté mucho más relajada... (subjunctive -adverb)

5.b Cuando Sara esté mucho más relajada la próxima semana... (subjunctive + adverb)

“When Sara is _{SUBJ} more relaxed next week...”

5.c Cuando Juan toca la guitarra española... (indicative -adverb)

5.d Cuando Juan toca la guitarra española con frecuencia... (indicative +adverb)

“When Juan plays_{SPRES} the Spanish guitar frequently...”

These experimental items were combined with 32 distractor items that contained the past tense. The distractors and experimental items were pseudo-randomized such that no two items of the same type appeared in succession and items were distributed across two counterbalanced

presentation lists with the goal of ensuring that each participant saw only one version (adverb or no adverb) in the subjunctive and indicative sentences. Four practice items were provided at the beginning of the test to make sure that participants understood the instructions before starting the experimental block. We normed all of the stimuli for these tests with a group of Spanish native speakers who also took part in the study. Native speakers' accuracy results for this test, if we consider a normative use of the subjunctive in adverbial clauses, with subjunctive being used to express future events and indicative being used to express habitual event, can be seen in Table 2 below.

Table 2

NS Accuracy Scores for the Event Selection Interpretation Task

	Accuracy	
	%	SD
<u>Indicative</u>		
Adverb	98	3.4
No adverb	98	3.7
<u>Subjunctive</u>		
Adverb	95	5.7
No adverb	94	8.8

3.2.2.1.2 Sentence completion interpretation test

In the Sentence Completion Interpretation test, participants had to use the information concerning the type of event in the adverbial clause to find the most appropriate ending for the sentence (the independent clause). Participants read the beginning of an adverbial clause (that always started with *cuando*) on one screen, and on the following screen they had to select which ending better completed the beginning of sentence they had just read, while we tracked their eyes. The stimuli in this test consisted of a total of 8 incomplete sentences containing the present subjunctive (see Example 6.a), and 8 incomplete sentences containing the present indicative (see Example 6.b). Half of these incomplete 8 sentences that had a verb in the subjunctive and indicative also contained an adverbial phrase such as *la próxima semana* (next week) or *con frecuencia* (frequently) as shown in Example 7.a, 7.b, 7.c, and 7.d. The verbs in the adverbial clause were always regular -ar verbs conjugated in the 3rd person singular. This test was administered via Experiment Builder (SR Research, 2015).

6.a Cuando Adam cambie su concentración...	“When Adam changes concentration...
(A) va a ser feliz	(A) he is going to be happy
(B) es feliz	(B) he is happy
(C) fue feliz	(C) he was happy”
6.b Cuando Kara visita su ciudad de origen...	“When Kara visits her hometown...
(A) va a ir al lago	(A) she will go to the lake
(B) va al lago	(B) she goes to the lake
(C) fue al lago	(C) she went to the lake”

7.a Cuando Adam cambie su concentración... (subjunctive -adverb)

7.b Cuando Adam cambie su concentración la próxima semana... (subjunctive + adverb)

“When Adam changes_{SUB} his concentration next week...”

7.c Cuando Kara visita su ciudad de origen... (indicative -adverb)

7.d Cuando Kara visita su ciudad de origen con frecuencia... (indicative +adverb)

“When Kara visits_{PRES} her hometown frequently...”

The experimental items in this test were combined with 32 distractor items that contained the past tense. The distractors and experimental items were pseudo-randomized such that no two items of the same type appeared in succession and the items were distributed across two counterbalanced presentation lists with the goal of ensuring that each participant saw only one version (\pm adverb) in the subjunctive and indicative sentences. Four practice items were provided at the beginning of the test to make sure that participants understood the instructions before starting the experimental block. We normed all of the stimuli for these tests with a group of Spanish native speakers who also took part in the study. Native speakers' accuracy results for this test, if we consider a normative use of the subjunctive in adverbial clauses, with subjunctive co-occurring with future tense in the main clause and indicative co-occurring with present of indicative in the main clause, can be seen in Table 3 below.

Table 3

NS Accuracy Scores for the Sentence

Completion Interpretation Task

	Accuracy	
	%	SD
<u>Indicative</u>		
Adverb	96	6.7
No adverb	88	12.4
<u>Subjunctive</u>		
Adverb	98	6.1
No adverb	92	11.2

3.2.2.1.3 Cloze production test

Previous research examining the learning outcomes of learners after being exposed to a language instruction, often use output-oriented tasks such as fill-in-the gap, or open-ended sentence completion activities (e.g., Farley, 2001; VanPatten & Cadierno, 1993; Wong, 2004). For comparison purposes and to investigate if explicit language instruction leads to output learning gains, I included a production test that I will refer to as a cloze production test. In this test, participants read 12 sentences with a *cuando* adverbial clause followed by a clause that used the periphrastic future and 12 sentences with a *cuando* adverbial clauses followed by a clause in the present tense (see Examples 8 and 9). The verbs in the adverbial clause were regular -ar verbs conjugated in the 3rd person singular. The verb in the adverbial clause was presented in

parenthesis in the infinitive form and participants were instructed to fill in the blank by conjugating the verb in the form they thought most appropriate.

8. Cuando Alec _____ (estudiar) para el GRE, va a pasar tiempo en la biblioteca.

“Cuando Alec _____ (to study) for the GRE, he is going to spend a lot of time at the library.”

9. Cuando Anton _____(planear) sus vacaciones de verano, utiliza el buscador de internet Expedia.

“Cuando Anton _____ (to plan) his summer vacation, he uses the internet browser Expedia.”

Similar to the stimuli in the interpretation tests, half of the subjunctive and present sentences contained an adverbial phrase such as *el próximo año* (next year) or *todos los días* (every day). See Examples 10.a, 10.b, 11.a, and 11.d These 24 experimental items were combined with 12 distractor items that required the use of the past tense in the adverbial clause. Participants read the instructions and saw one sample item completed before beginning. This test was administered via google forms.

10.a Cuando Alec _____ (estudiar) para el GRE, va a _____ (subjunctive -adverb)
pasar tiempo en la biblioteca.

10.b Cuando Alec _____ (estudiar) para el GRE el _____ (subjunctive +adverb)
próximo año, va a pasar tiempo en la biblioteca.

“Cuando Alec _____ (to study) for the GRE, he is going to spend a lot of time at the library.”

11.a Cuando Anton _____(planear) sus vacaciones de _____ (indicative -adverb)
verano, utiliza el buscador de internet Expedia.

11.b Cuando Anton _____(planear) sus vacaciones de _____ (indicative +adverb)
 verano, utiliza el buscador de internet Expedia.

“Cuando Anton _____ (to plan) his summer vacation every year, he uses the
 internet browser Expedia.”

We normed all of the stimuli for these tests with a group of Spanish native speakers who also took part in the study. Native speakers’ accuracy results for this test can be seen in Table 4. below.

Table 4		
<i>NS Accuracy Scores for Production Task</i>		
	Accuracy	
	%	SD
<u>Indicative</u>		
Adverb	99	1.7
No adverb	98	3.2
<u>Subjunctive</u>		
Adverb	98	3.2
No adverb	96	6.1

3.2.2.1.4 Reading comprehension while eyetracking test

The stimuli in the Reading Comprehension while Eyetracking Test were a total of 16 experimental items that required the Spanish subjunctive in *cuando* adverbial clauses, based on normative use of the subjunctive in adverbial clauses and the Spanish native speakers’

production data. Of these 16 items, 8 were grammatical and 8 were ungrammatical because the verb in the adverbial clause was in the indicative mood as shown in Examples 12.a and 12.b. In addition, 4 of the 8 grammatical items and 4 of the ungrammatical experimental items contained an adverbial phrase such as *la próxima semana* (next week) as shown in Examples 12.c and 12.d. All the verbs in the experimental sentences were regular and -ar verb conjugated in the 3rd person singular.

12.a Cuando Juan viaje a Sri Lanka va a tomar muchas fotos. (*grammatical -adverb*)

12.b *Cuando Juan viaja a Sri Lanka va a tomar muchas fotos. (*ungrammatical -adverb*)

12.c Cuando Juan viaje a Sri Lanka la próxima semana va a tomar muchas fotos. (*grammatical +adverb*)

12.d *Cuando Juan viaja a Sri Lanka la próxima semana va a tomar muchas fotos. (*ungrammatical -adverb*)

“When Juan travel_{SUBJ/IND} to Sri Lanka (next week) he is going to take a lot of pictures.”

These experimental items were combined with 32 distractor items. Sixteen distractors contained the past tense, and the other 16 distractors were complex sentences containing a relative clause. None contained the subjunctive mood. The fillers, distractors, and experimental items were pseudo-randomized such that no two items of the same type appeared in succession and the items were distributed across four counterbalanced presentation lists with the goal of ensuring that each participant saw only version 1.a, 1.b, 1.c, or 1.d of an item. Four practice

items were provided at the beginning of the test to make sure that participants understood the instructions before starting the experimental block.

In this test, participants were instructed to read sentences and on the next screen select the most appropriate response for the comprehension question (See Example 13) while we tracked their eyes. These questions did not target the information encoded in the verb, but rather the people, objects, and locations involved in the actions.

- | | |
|-----------------------------------|----------------------------------|
| 13. ¿A dónde va a viajar Juan? | “Where is Juan going to travel?” |
| (A) a México (B) a Sri Lanka | (A) México (B) Sri Lanka |

3.2.2.2 Instructional intervention

L2 learners in the experimental group received instruction on the Spanish subjunctive in adverbial clauses that consisted of a computer-built explicit information tutorial followed by structured input practice.

3.2.2.2.1 Explicit information tutorial

Participants assigned to the experimental group completed a lesson about the use of the indicative and subjunctive in adverbial clauses designed following Processing Instruction guidelines. See Appendix E. This treatment consisted of explicit information about the target form and accurate processing strategies followed by structured input practice (VanPatten, 2004). Instruction only focused on -ar verbs and the third person singular; therefore, participants only had to learn to associate the ending -a with present indicative, and -e with present subjunctive. This differs from Dracos (2013) where the instructional intervention covered -ar, -er, and -ir verbs. On the other hand, this was consistent with Issa et al (2015), whose instructional module only focused on the lo/la direct object pronouns, instead of the whole paradigm. In order to

ensure that participants understood the explicit information (EI) that was presented, there were a few EI comprehension items embedded in the lesson; accuracy on these items confirmed that participants did understand the explicit explanation provided and could identify verbs in the subjunctive and indicative moods, respectively (see Example 14 below). This was an innovative feature of the current study. Except from Bowles and Henshaw (2015) no previous study included this component as part of their instructional module.

14. Is the verb in the indicative or subjunctive form?

Baila

(a) Subjunctive (B) Indicative

3.2.2.2.2 Structured input practice

The structured input portion of this treatment was a long referential activity that consisted of four practice items and 32 experimental items and 32 distractors. Sixteen of these experimental items contained the beginning of a statement (in the form of a *cuando* adverbial clause) that had a verb in the subjunctive form (see Example 15) and 16 items had a verb in the indicative form (see Example 16). Out of these 32 items (indicative and subjunctive) half of the items started with the adverb *cuando* and half of them started with a future event (see Example 17) or a habitual event (see Example 18) in the independent clause. The beginning of these sentences presented on screen one were followed by a second screen with two possible responses that contained (a) a verb in the indicative form, and (b) a verb in the subjunctive form (when the beginning of the sentence was a future event), or (a) a verb in the indicative form, and (b) a verb in the periphrastic future (when the beginning of a sentence was an adverbial clause) and participants had to select which ending was more appropriate by pressing a button on a hand-

held device. See Examples 15 to 18. These experimental items were combined with 32 distractors that contained the past tense. Previous studies that examined the effects of language instruction on L2 learners' knowledge of the Spanish subjunctive in adverbial clauses normally used a series of referential and affective activities (VanPatten & Cadierno, 1993; Wong, 2004; Benati, 2004; etc.), in contrast to the current study that only used a 64 item referential activity.

- | | |
|---|--|
| 15. Cuando Pedro prepare su presentación... | “When Pedro prepares _{SUBJ} his presentation...” |
| (A) va a usar PowerPoint | (A) he is going to use PowerPoint |
| (B) usa PowerPoint | (B) he uses PowerPoint” |
| 16. Cuando Juan habla con sus amigos... | “When Juan talks _{SPRES} to his friends...” |
| (A) va a usar Facetime | (A) he is going to use Facetime |
| (B) usa Facetime | (B) he uses Facetime” |
| 17. Juan va a completar su tarea de español cuando... | “Juan is going to complete _{SUBJ} his Spanish homework when...” |
| (A) termine de trabajar | (A) he finishes _{SUBJ} work |
| (B) termina de trabajar | (B) he finishes work” |
| 18. Pedro clarifica sus respuestas cuando... | “Pedro clarifies _{SPRES} his responses when...” |
| (A) hable rápido | (A) he speaks _{SUBJ} fast |
| (B) habla rápido | (B) he speaks fast” |

When comparing the current study's instructional intervention to the language instruction used by previous studies that focused on Spanish mood in adverbial clauses, the present study is similar to McNulty-Díaz (2017), in that the explicit information and structured input was computerized so L2 learners could complete them at their own pace and participants received corrective feedback after selecting the option they thought was correct. The present study only used written stimuli in the structured input practice; nevertheless, this is different from Lee and McNulty (2013) and McNulty-Díaz (2017), who used aural and written stimuli. Finally, in terms of quantity, the present study contained 32 experimental items in the only referential activity used; however, Lee and McNulty (2013) and McNulty-Díaz (2017) used significantly more as they mentioned using 24 referential and 24 affective items (McNulty-Díaz, 2017), and 32 referential and 48 affective items (Lee & McNulty, 2013). The instructional intervention in the present study only consisted of one computerized session that lasted approximately 1 hour; however, Lee and McNulty (2013) had two lectures where participants received explicit information and structured input practice that lasted 45 minutes each. None of these studies included a control group, unlike the present study, which added a participant group that completed only the pre- and posttests. Without a control group it is not always possible to make claims about the instructional intervention being the sole responsible for the learning gains made by the L2 learners.

In terms of differences and similarities with previous studies that examined language instruction and its effects on L2 learners' input processing, Dracos (2013), Issa et al (2015), and Wong and Ito (2018) used structured input in the form of a referential activity as part of the guided practice, which is similar to the guided practice used in the present study. However, Henry (2015) used structured input in the form of referential and affective activities. Only Henry

(2015) and Wong and Ito (2018) used explicit information as part of their training module, which is similar to the design in the present study. All of these studies' guided practice consisted of structured input items with corrective feedback, which resembles the design of the present study. The number of structured input items and training session differed from study to study, with Dracos (2013) having a total of 96 experimental items total divided in 5 different training sessions, Henry (2015) having 30 items and 1 session, Issa et al. (2015) having 150 sentences and 1 session, and finally Wong and Ito (2018) having 24 items and 1 training session. Similar to the current study, most studies focused on only one form (causative *faire*, accusative case 3rd person masculine, and lo/la indirect object), with the exception of Dracos (2013) who focused on subject verb agreement and time reference verb agreement with multiple verb forms (1st and 3rd person singular), verb tense (present, past, future) and types of verbs (-ar, -er, -ir). Of all these studies, only Issa et al. (2015) included a control such as the one in the present study, which consisted of a participant group that only completed the pre- and posttests, but did not receive any kind of training.

3.2.2.3 Other complementary materials

In addition to these experimental tests, participants also completed a standardized proficiency test, and language background questionnaire and a debriefing questionnaire, as described below, after completing session 3.

3.2.2.3.1 DELE, language background and debriefing questionnaire

The paper and pencil language background questionnaire queried whether participants were Spanish native speakers or L2 learners, their self-reported proficiency, daily usage of Spanish, and study abroad experience. See Appendix F. Furthermore, we tested participants' Spanish proficiency, in a more objective manner, with a modified version of the DELE a Spanish

standardized proficiency test (Montrul & Slabakova, 2003). Finally, at the end of session 3, participants filled out a debriefing questionnaire where they were asked how much they thought they had benefitted from instruction. This debriefing questionnaire can be found in Appendix G. In addition, this questionnaire contained questions that were used for additional triangulation of attention. Specifically, for each test, participants were asked to make a source attribution (as is often done in implicit learning research, as in Rebuschat et al., 2015), indicating whether they had completed the test using a rule, intuition, both, or some other possibility that they were asked to fill in.

3.2.2.4 Study procedure

The reading comprehension and interpretation tests, as well as the structured input practice were built in experiment builder (SR Research, 2015). Eye movements were recorded for all these tests using a table-mounted eyetracking system (EyeLink1000, 2009). The equipment was calibrated, in each session, before data collection started. Participants were instructed to look at a fixation point indicating the first character position for each sentence, at which point a stimulus item appeared on the screen. Participants read each sentence at their own pace and then pressed a button on a hand-held device to proceed to the second screen. The explicit instruction (explicit information + structured input) was administered using the psychology software Paradigm (Paradigm, 2016). Participants' eyes were not tracked during the explicit instruction portion of the study. For each pre-, post-, and delayed-posttest, participants completed the task in the following order: Reading Comprehension while Eyetracking Test > Sentence Completion Interpretation Test > Event Selection Interpretation Test > Cloze Production Test.

L2 learners came in to the Second Language Acquisition and Bilingualism (SLAB) lab for session 1 and signed a consent form, in addition to completing the pre-test³⁴, and a language background questionnaire. L2 learners who scored less than 50% on the cloze production test were invited to complete session 2 and 3 and remained in the final sample; those scoring more than 50% were eliminated from the final sample. In session 2, participants assigned to the instruction group completed the instructional module followed by the Reading Comprehension while Eyetracking Test, the Sentence Completion Test, the Event Selection Test, and finally the Cloze Production test in the order listed here. The order in which test were completed was the same in all three sessions. Participants in the control group did not complete the instruction but took part in all tests. Finally, L2 learners came in for session 3, three to four weeks after session 2 and they completed a delayed posttest followed by a Spanish standardized proficiency test, and a debriefing questionnaire. Total testing time ranged from three to four hours for all three sessions. Session 2 was the longest session for participants in the instructed group since they had to complete the training module and the immediate posttests, which often took participants 1 hour and 30 minutes. Session 1 and 3 were approximately 1 hour long. L2 learners received extra credit in one of the Spanish classes they were registered in or \$30 cash after completion of all sessions. All native speakers received \$30 cash after completion of session 3.

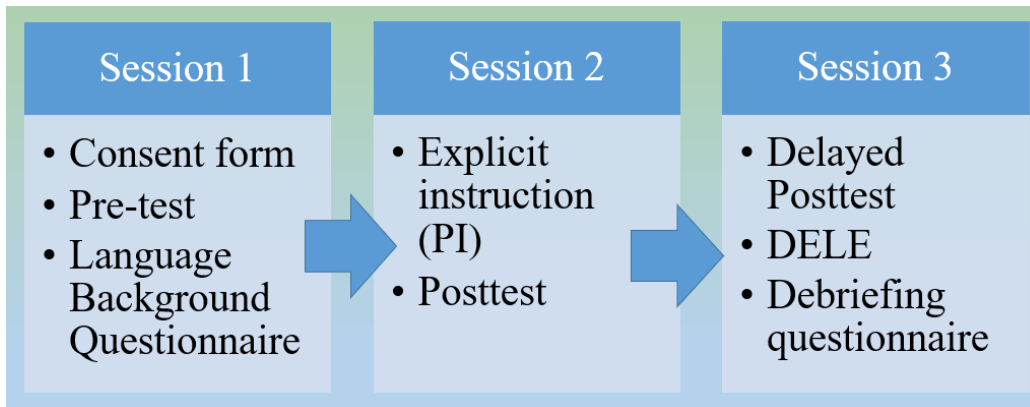


Figure 5. Summary of Study Procedure.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter examines the results of the four tests that together made up the pre- and posttests used to assess changes in processing strategies and accuracy over time. Accuracy and eyetracking results are reported separately for each test, except for the production test, for which it was not possible to collect eyetracking data. Then, in the summary of results, accuracy and eyetracking data results are examined together to answer the research questions. Accuracy data was analyzed via mixed effects logistic regression and eyetracking data was analyzed via mixed effects linear regression using R (R Development Core Team, 2018). *P* values were obtained using Satterthwaite's approximation for degrees of freedom with the *lmerTest* package for R (Kuznetsova, Brockhoff, & Christensen, 2014). Alpha was set at .05 for all analyses. In addition, the *emmeans* package (Lenth, Sigmann, Love, Buerkner, & Herve, 2018) was used for pairwise comparisons. This package made use of the Tukey method to control for multiplicity in a whole family of tests, which is equivalent to using a Bonferroni correction, and aims to avoid making a type error I. Due to the quantity of data, this chapter presents only the results from the subjunctive items that were the target linguistic structure in this study, rather than also including results for indicative items.

4.2 Interpretation results

In the interpretation tests, participants had to read an incomplete sentence and make a selection among 3 different given options to complete it. Accuracy of the responses as well as eye movements were recoded and analyzed. A sample item for each test is provided for reference.

4.2.1 Event selection interpretation test results

4.2.1.1 Event selection interpretation test accuracy results

In this test, participants were asked to read an incomplete sentence and indicate the type of event this incomplete sentence described (See Figure 6 below). Based on normative use of the subjunctive, only one possible response was considered accurate. Descriptive results, shown in Figure 7, showed that when a sentence did not contain a lexical cue (an adverbial phrase), L2 learners were only 20.2-27.7% accurate in determining the time reference of the action, whereas when a sentence contained an adverbial, accuracy was 82.4-86.8%. In order to test the Lexical Preference principle, which states that L2 learners are more likely to rely on lexical cues (i.e., content words) than on morphological cues (i.e., verb endings), I ran a mixed effects logistic regression with adverb (adverb, no adverb) as fixed effect and participant and item as random effects (intercepts only) with the pretest accuracy data. The results from this model can be seen in Table 5. This model yielded a main effect of adverb, which, taken together with the descriptive results, indicates that L2 learners were significantly less accurate with sentences that did not contain an adverbial phrase.

Quando Sara baile bien bachata ...	“When Sara dances bachata well...
(A) Acción habitual	(A) Habitual action
(B) Acción en el futuro	(B) Future action
(C) Acción en el pasado	(C) Past action”

Figure 6. Sample item Event Selection Test.

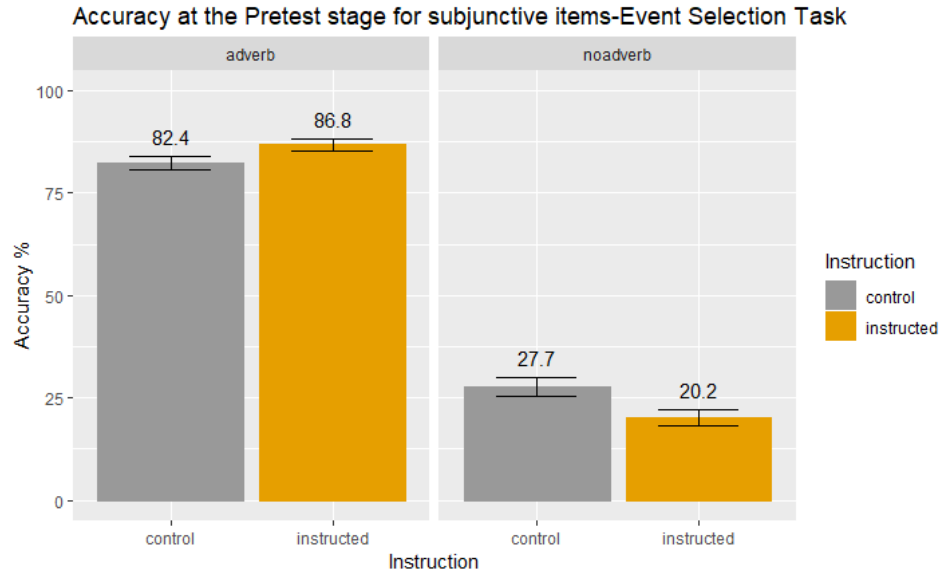


Figure 7. Accuracy at the pretest stage in the Event Selection Test. Error bars represent standard error.

Table 5

Output from mixed effects logistic regression model accuracy for the Event Selection Test (adverb and no adverb) at pretest stage

	Estimate	SE	z	P
Intercept	3.1077	0.6092	5.102	0.000***
Adverb (noadverb)	-5.2058	0.2730	-19.006	0.000***

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05

In order to examine if language instruction was beneficial for L2 learners I ran two mixed effects logistic regressions with time (pretest, posttest, delayed posttest) and instruction (control, instructed) as fixed effects and item and participants as random effects (intercepts only), one with sentence that contained an adverbial phrase and one with sentences that did not. Descriptive results, shown in Figure 8, showed that in sentences containing an adverbial phrase, instructed L2 learners' accuracy ranged from 86.8 % (pre-) to 88.4% (post-) to 85.5% (delayed posttest);

whereas control L2 learners' accuracy showed a bigger range of change over time, starting with 82.4% (pre-), going up to 98.1% (post-), and moving down to 92.2% (delayed posttest).

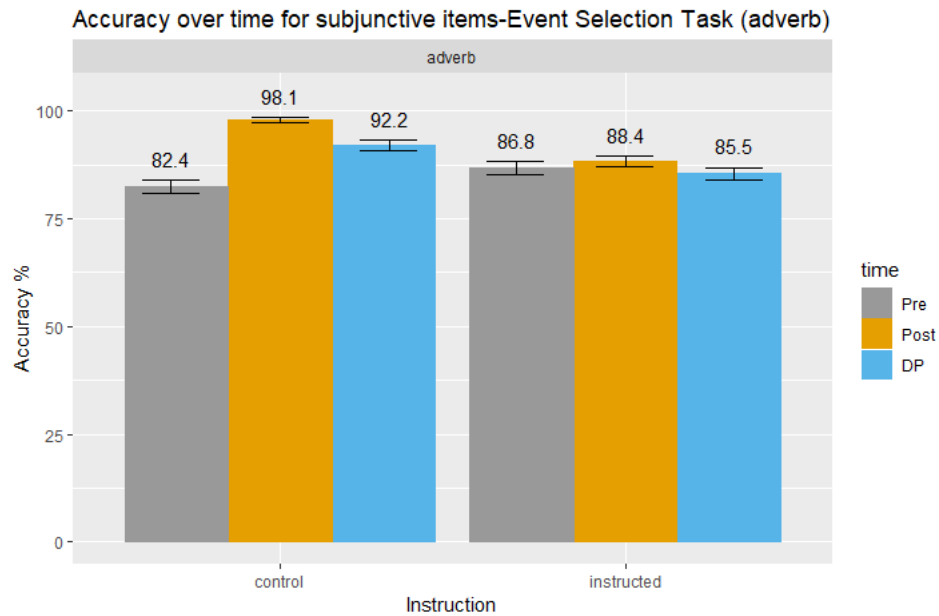


Figure 8. Accuracy results over time for the Event Selection Test (adverb). Error bars represent standard error.

Table 6 reports the statistical output for the adverb condition. This model yielded a significant main effect of Time for the post and delayed posttest as well as a significant Time and Instruction interaction in the post and delayed posttest. A pairwise comparison at the pretest stage confirmed that participants in the control group did not differ significantly from participants in the instructed group in terms of accuracy, $estimate = 0.5573$, $SE = 0.5800$, $z = 0.961$, $p = .336$, ensuring that participants started with a similar baseline. Pairwise comparisons conducted to explore the significant time by instruction interaction revealed that participants in the control group showed a significant increase in accuracy from pre- to posttest, $estimate = -2.8149$, $SE = 0.3591$, $z = -7.838$, $p = .000$, as well as from pre- to delayed posttest, $estimate = -1.4532$, $SE = 0.2303$, $z = -6.310$, $p = .000$, but showed a significant decrease in accuracy from

post- to delayed posttest. Participants in the instructed group did not show significant increases from pre- to posttest, $estimate = -0.2418$, $SE = 0.2135$, $z = -1.4132$, $p = .494$, or from pre- to delayed posttest, $estimate = 0.5202$, $SE = 0.2222$, $z = 1.253$, $p = .0422$. Their only significant change was a decrease in accuracy from post- to delayed posttest, $estimate = 0.2783$, $SE = 0.2107$, $z = 2.469$, $p = .036$.

Table 6

Output from mixed effects logistic regression accuracy for Event Selection Test (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>P</i>
Intercept	4.2787	1.2059	3.548	0.000***
Instruction (instructed)	0.8506	1.4492	0.587	0.557
Time (Post)	2.8149	0.3591	7.838	0.000***
Time (Delayed posttest)	1.4532	0.2303	6.310	0.000***
Instruction (instructed)x Time (Post)	-2.5730	0.4179	-6.158	0.000***
Instruction (instructed)x Time (Delayed posttest)	-1.7316	0.3201	-5.410	0.000***

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

Descriptive results in the no adverb condition (see Figure 9) showed that L2 learners' accuracy =, in both groups (instructed and control) improved from pre- to posttests. Control L2 learners' accuracy went from 27.7% (pre-), to 49.1% (post), to 40% (delayed post), whereas instructed L2 learners' accuracy went from 20.2% (pre), to 79.7% (post-), to 68.8% (delayed post). The output of the mixed effects logistic regression containing the no adverb condition items can be seen in Table 7. This model yielded a significant main effect of Time for the post and delayed posttest as well as a significant interaction of time (post and delayed posttest) with instruction (instructed). Pairwise comparisons conducted to explore the significant time by instruction interaction revealed that participants in the control group showed a significant increase in accuracy from pre- to posttest, $estimate = -1.227, SE = 0.1926, z = -6.364, p = .000$, as well as from pre to delayed posttest, $estimate = -0.6159, SE = 0.1841, z = -3.345, p = .002$, but showed a significant decrease in accuracy from post- to delayed posttest, $estimate = 0.6114, SE = 0.18031, z = 3.391, p = .002$. Unlike in the adverb condition, participants in the instructed group showed a significant increase in accuracy from pre- to posttest, $estimate = -3.757, SE = 0.2451, z = -15.326, p = .000$, as well as from pre- to delayed posttest, $estimate = -3.0475, SE = 0.2150, z = -14.172, p = .000$, and a significant decrease in accuracy from post- to delayed posttest $estimate = 0.7096, SE = 0.2120, z = 3.347, p = .002$.

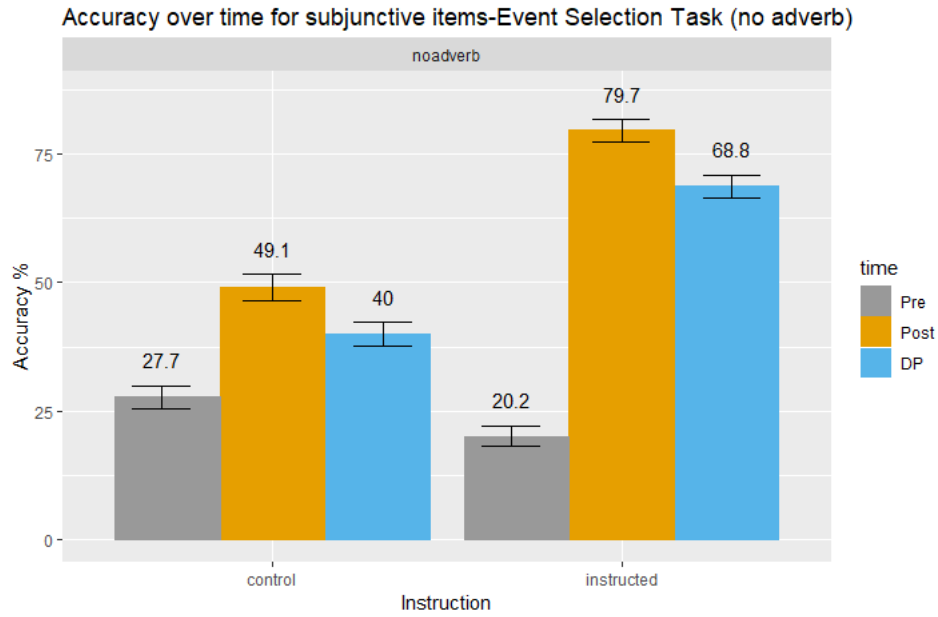


Figure 9. Accuracy results over time for the Event Selection Test (no adverb). Error bars represent standard error

Table 7

Output of mixed effects logistic regression for Event Selection Test (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	-1.2788	0.4148	-3.083	0.000***
Instruction (instructed)	-0.5573	0.5801	-0.961	0.336
Time (Post)	1.2274	0.1927	6.369	0.000***
Time (Delayed posttest)	0.6159	0.1841	3.345	0.000***

Table 7 (cont.)

Instruction	2.5298	0.3111	8.131	0.000***
(instructed)x				
Time (Post)				
Instruction	2.4316	0.2828	8.597	0.000***
(instructed)x				
Time (Delayed				
posttest)				

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

4.2.1.2 Event selection test eyetracking results

In order to test if instruction led to L2 learners to paying more attention to subjunctive morphology in real-time (i.e., as they read the input) I examined eye movement data. More precisely, I examined changes in *Total Dwell Time* and *First Fixation Duration* over time on the subjunctive verb (third word in the incomplete sentence). *Total Dwell Time* is the sum of the durations of all fixations made to the critical region and it is considered to be a late eyetracking measure; whereas *First Fixation Duration* is the duration of the first fixation that participants make on a word and it is considered to be an early eyetracking measure. An increase in reading times on the verb from pre- to posttests was interpreted as an increase in attention towards morphology. All the models reported below included time (pretest, posttest, delayed posttest) and instruction (control, instructed) as fixed effects and item and participants as random effect (intercepts only). Items in the adverb and no adverb condition were analyzed separately.

Descriptive results for sentences that contained an adverbial phrase can be seen in Figure 10. The mixed effects linear regression model that contained the subjunctive verb yielded a

significant main effect of Instruction as well as a significant interaction of Time and Instruction in the post- and delayed posttest. See Table 8. Pairwise comparisons did not reveal any significant changes in Total Dwell Time in the control group from pre to posttest, $estimate = 0.1670$, $SE = 0.1365$, $z = 1.224$, $p = .440$, from pre to delayed posttest, $estimate = 0.1385$, $SE = 0.1310$, $z = 1.057$, $p = .541$, or from post to delayed posttest, $estimate = -0.0285$, $SE = 0.1381$, $z = -0.206$, $p = .976$, in the control group. On the other hand, participants in the instructed group showed a marginally significant increase in Total Dwell Time from pre to posttest, $estimate = -0.1727$, $SE = 0.1269$, $z = -2.140$, $p = .084$, but not from pre to delayed posttest, $estimate = 0.0014$, $SE = 0.1201$, $z = 0.012$, $p = .999$, or from post to delayed posttest, $estimate = -0.2702$, $SE = 0.1316$, $z = -2.053$, $p = .1020$.

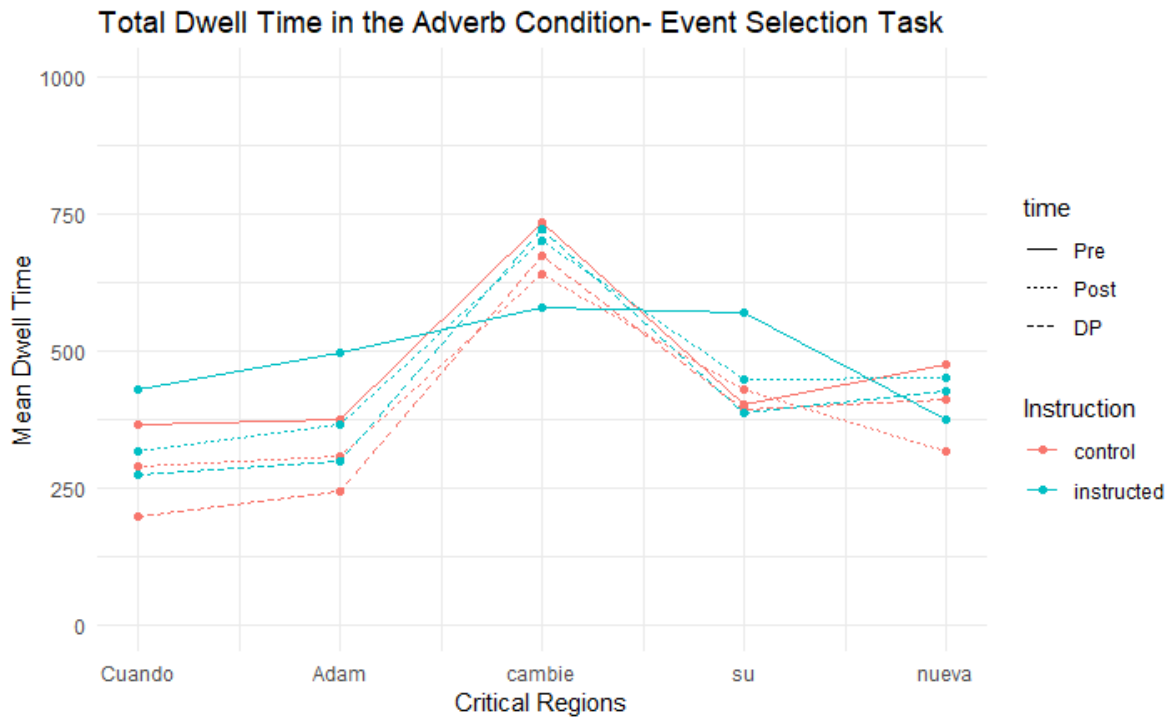


Figure 10. Event Selection Test Total Dwell Time in the adverb condition.

Table 8

Output from mixed effects linear regression model for Total Dwell in the Time Event Selection

Test (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>P</i>
Intercept	6.4414	0.0993	64.832	0.000***
Time (Post)	-0.1670	0.1361	-1.227	0.221
Time (Delayed posttest)	-0.1385	0.1306	-1.060	0.290
Instruction (instructed)	-0.2824	0.1431	-1.973	0.050
Instruction (instructed)x Time (Post)	0.4387	0.1853	2.367	0.018**
Instruction (instructed)x Time (Delayed posttest)	0.4088	0.1849	2.210	0.028*

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

Descriptive results for sentences that did not contain an adverbial phrase can be found in Figure 11. The mixed effects linear regression model containing the subjunctive verb did not yield any significant main effects or interactions. See Table 9.

Similarly, none of the mixed effects linear regression models run with the subjunctive verb that examined First Fixation Duration yielded any significant main effects or interactions. P values were all above .5 and t values were very small.

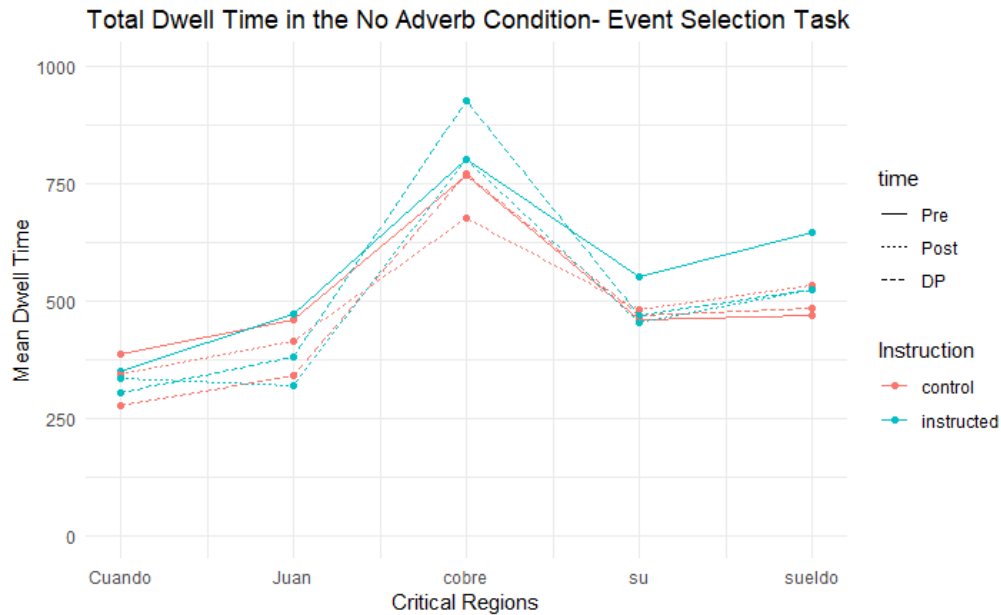


Figure 11. Event Selection Test Total Dwell Time verb in the no adverb condition.

Table 9

Output from mixed effects linear regression model Total Dwell Time for the Event Selection Test (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Intercept	6.4444	0.1303	49.433	0.000***
Time (Post)	-0.0330	0.1350	-0.245	0.807
Time (delayed posttest)	0.0817	0.1247	0.656	0.513

Table 9 (cont.)

Instruction	0.0787	0.1671	0.471	0.639
(instructed)				
Instruction	0.0840	0.1843	0.456	0.649
(instructed)x				
Time (Post)				
Instruction	0.1211	0.1685	0.719	0.473
(instructed)x				
Time (delayed posttest)				

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

4.2.1.3 Summary of results for the event interpretation test

The results of the Event Selection pretest supported the Lexical Preference Principle. Participants were more likely to accurately interpret a sentence fragment as referring to the future when the fragment included an adverb, versus when the only temporal reference cue in the fragment was subjunctive mood morphology on the verb (84.6% vs. 24.0% accuracy) at the pretest stage.

The results with items that did not contain an adverbial phrase showed that instructed and control L2 learners improved at associating the subjunctive with a future event from Event Selection pre- to posttests but these learning gains decreased from post-to delayed posttest with items that did not contain an adverbial phrase (such as *la próxima semana* “next week”). However, the learning gains from pre- to posttest were larger for the instructed (pre 20.2% > post

79.7% > delayed post > 68.8%) than for the control group (pre 27.7% > post 49.1% > delayed post > 40%).

The results with items that contained an adverbial phrase were slightly different. Participants in the control group made significant learning gains from pre- to posttest (82.4% > 98.1), and from pre- to delayed posttest (82.4% > 92.2%); however, these learning gains decreased significantly from post- to delayed posttest (98.1% > 92.2%). On the other hand, participants in the instructed group only showed a significant decrease in learning gains from post- to delayed posttest (88.4% > 85.5%).

With regard to eyetracking data used to examine changes in attention allocation from pre- to posttests, only instructed L2 learners showed a marginally significant increase in Total Dwell Time from pre- to posttest with incomplete sentences that contained an adverbial phrase.

4.2.2 Sentence completion interpretation results

4.2.2.1 Sentence completion accuracy results

In this test, participants were asked to choose the most appropriate ending when provided with an incomplete adverbial clause containing the subjunctive (See Figure 12 below). Based on normative use of the subjunctive, only one possible response was considered accurate, the ending containing a verb in the periphrastic future. A similar model to the logistic regression model in the Event Selection Test was run to test the Lexical Preference principle and the effects of language instruction in both conditions (adverb, no adverb).

Quando Adam cambie su concentración...	... “When Adam changes concentration...
(A) va a ser feliz	(A) He is going to be happy
(B) es feliz	(B) he is happy
(C) fue feliz	(C) he was happy”

Figure 12. Sample item Sentence Completion Test.

Descriptive results, shown in Figure 13, showed that when a sentence did not contain a lexical cue (an adverbial phrase), L2 learners were only 16.8-28.6% accurate in determining the time reference of the action, whereas when a sentence contained an adverbial, accuracy was 62.8-73.1%. The output of the logistic mixed effects model can be seen in Table 10. This model yielded a main effect of Adverb, which, taken together with descriptive results, suggests that L2 learners were significantly less accurate with sentences that did not contain an adverbial phrase.

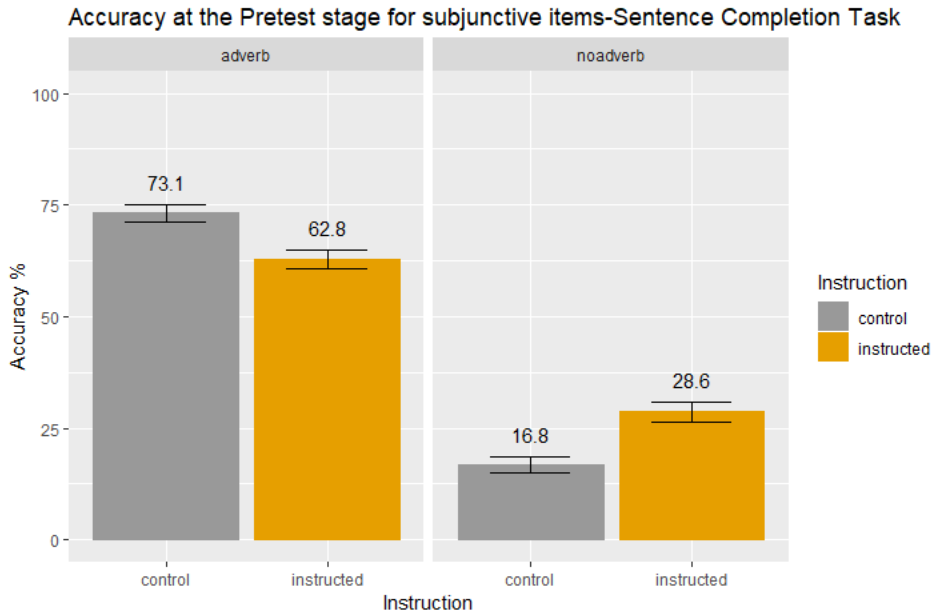


Figure 13. Accuracy at the pretest stage in the Sentence Completion Test. Error bars represent standard error.

Table 10

Output from mixed effects logistic regression model accuracy for the Sentence Completion

Test (adverb and no adverb) at pretest stage

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	1.1235	0.4925	2.281	0.000***
Adverb (noadverb)	-5.2058	0.2730	-19.006	0.000***

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

Descriptive results in the adverb condition (see Figure 14) showed that L2 learners' accuracy, in the control group improved gradually from pre- to posttests, from 73.1% (pre-), 85.9% (post-), to 92.9% (delayed posttest); whereas instructed L2 learners' accuracy increased from pre- to posttest, 62.8% to 86.9%, but decreased in the delayed posttest, to 76%.

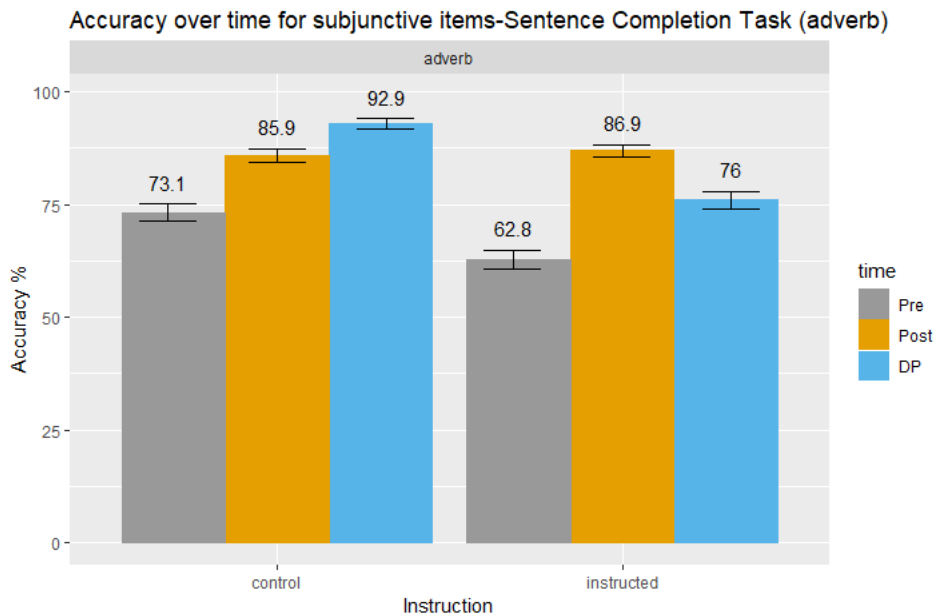


Figure 14. Accuracy at the pretest stage in the Sentence Completion Test (adverb). Error bars represent standard error.

The output of the logistic regression run to examine the effects of instruction in the adverb condition can be seen in Table 11. This model yielded a significant main effect of Time for the post and delayed posttest as well as a significant Time by Instruction interaction with data in the post- and delayed posttest. A pairwise comparison by instruction at the pretest stage confirmed that participants in the control group did not differ significantly from participants in the instructed group in terms of accuracy, $estimate = 1.0373$, $SE = 0.6966$, $z = 1.489$, $p = .136$ ensuring that participants started with a similar baseline. Pairwise comparisons conducted to explore the significant time by instruction interaction revealed that participants in the control group showed a significant increase in accuracy from pre- to posttest, $estimate = -0.9572$, $SE = 0.2833$, $z = -5.221$, $p = .000$, from pre to delayed posttest, $estimate = -1.9148$, $SE = 0.2157$, $z = -8.875$, $p = .000$, as well as a significant increase in accuracy from post- to delayed posttest, $estimate = -0.9576$, $SE = 0.2227$, $z = -4.299$, $p = .000$. On the other hand, participants in the instructed group showed a significant increase in accuracy scores from pre- to posttest, $estimate = 1.4801$, $SE = 0.1690$, $z = 8.756$, $p = .000$, and from pre- to delayed posttest, $estimate = 0.6772$, $SE = 0.1617$, $z = 4.186$, $p = .000$, but they showed a significant decrease from post- to delayed posttest, $estimate = 0.8029$, $SE = 0.1821$, $z = 4.408$, $p = .000$.

Table 11

Output from mixed effects logistic regression accuracy for Sentence Completion Test in the (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	2.0583	0.5429	3.791	0.000***
Instruction (instructed)	-1.0373	0.6967	-1.489	0.1364
Time (Post)	0.9572	0.1833	5.221	0.000***
Time (delayed posttest)	1.9149	0.2158	8.875	0.000***
Instruction (instructed)x Time (Post)	0.5229	0.2494	2.097	0.036*
Instruction (instructed)x Time (delayed posttest)	-1.2377	0.2699	-4.585	0.000***

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

Descriptive results in the no adverb condition, see Figure 15. showed that L2 learners' accuracy, in both groups (instructed and control) improved from pre- to posttests. Control L2 learners' accuracy went from 16.8% (pre-), to 39.1% (post), to 32.3% (delayed posttest), whereas instructed L2 learners' accuracy went from 28.6% (pre), to 72.6% (post-), to 55.9% (delayed post). The output for the mixed effects logistic regression ran to examine instruction effects can be seen in Table 12. This model yielded a significant main effect of time for the posttest as well

as a significant interaction of time (posttest) by instruction. Pairwise comparisons conducted to explore the significant time by instruction interaction revealed that participants in the control group showed a significant increase in accuracy from pre- to posttest, $estimate = -1.6482$, $SE = 0.2046$, $z = -8.052$, $p = .000$, as well as from pre- to delayed posttest, $estimate = -0.9873$, $SE = 0.2043$, $z = -4.830$, $p = .000$, but showed a significant decrease in accuracy from post- to delayed posttest, $estimate = 0.6609$, $SE = 0.1793$, $z = 3.685$, $p = .001$. Similarly, participants in the instructed group showed a significant increase in accuracy from pre- to posttest, $estimate = -2.3111$, $SE = 0.1801$, $z = -12.831$, $p = .000$, as well as from pre- to delayed posttest, $estimate = -1.3608$, $SE = 0.1705$, $z = -7.980$, $p = .000$, but a significant decrease in accuracy from post- to delayed posttest $estimate = 0.7096$, $SE = 0.9502$, $SE = 0.1701$, $z = 5.586$, $p = .000$. Participants in the instructed group showed a stronger effect than participants in the control group in the no adverb condition, indicating that instructed L2 learners were more consistent choosing an ending containing the future tense to finish an adverbial clause with the subjunctive, than L2 learners in the control group post-instruction.

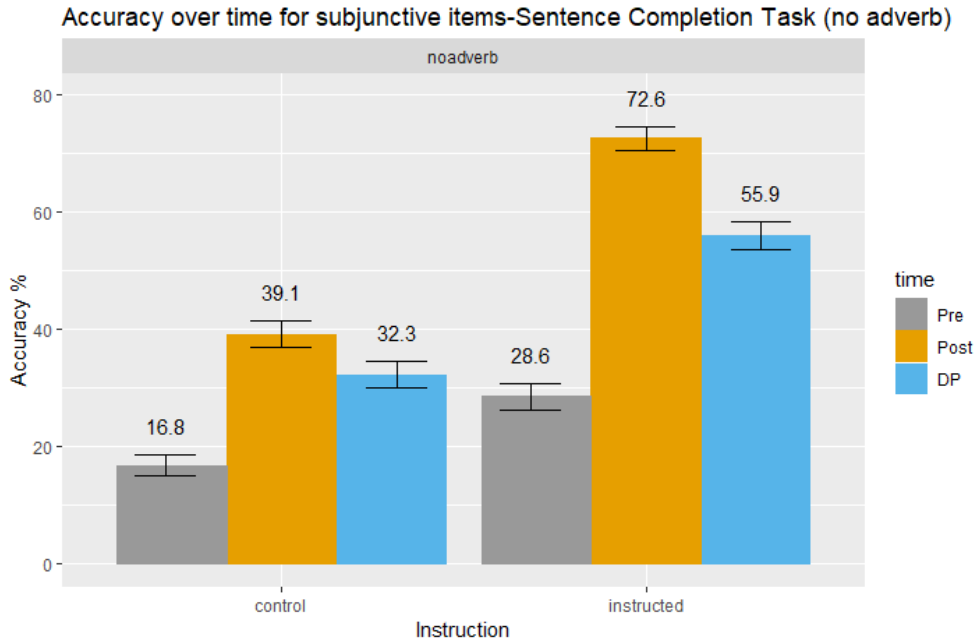


Figure 15. Accuracy at the pretest stage in the Sentence Completion Test (no adverb). Error bars represent standard error.

Table 12

Output from mixed effects logistic regression accuracy for Sentence Completion Test
(no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	-2.4030	0.4579	-5.248	0.000***
Instruction (instructed)	1.0956	0.6160	1.779	0.075
Time (Post)	1.6483	0.2047	8.052	0.000***
Time (delayed posttest)	0.9873	0.2044	4.830	0.000***

Table 12 (cont.)

Instruction	0.6628	0.2720	2.437	0.014*
(instructed)x				
Time (Post)				
Instruction	0.3735	0.2664	1.402	0.160
(instructed)x				
Time (delayed				
posttest)				

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

4.2.2.2 Sentence completion eyetracking results

Similar to the Event Selection Test, I examined potential increases in attention toward the verb from pre- to posttests as the result of instruction using eyetracking data on the subjunctive verb. An increase in reading times from pre- to posttests was interpreted as an increase in attention towards morphology (the subjunctive). Reading times for Total Dwell Time and First Fixation Duration were recorded and analyzed. A similar linear mixed effects model to the one in the Event Selection Test was run to investigate changes in Total Dwell Time and First Fixation Duration with sentences that did and did not have an adverbial phrase.

Descriptive results for sentences that contained an adverbial phrase can be seen in Figure 16. The mixed effects linear regression model containing the subjunctive verb yielded a marginally significant main effect of Time in the posttest, suggesting that Total Dwell Time, in general, was significantly lower in the posttest compared to the pretest. See Table 13.

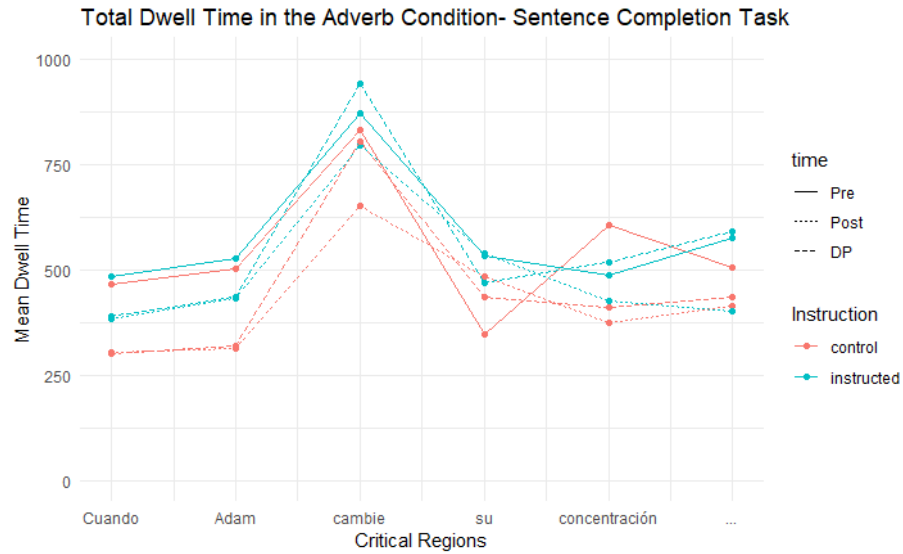


Figure 16. Sentence Completion Test Total Dwell Time in the adverb condition.

Table 13

Output from mixed effects linear regression model Total Dwell Time Sentence Completion Test (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>P</i>
Intercept	6.5256	0.1218	53.547	0.000***
Time (Post)	-0.2214	0.1199	-1.847	0.066
Time (delayed posttest)	-0.0472	0.1139	-0.414	0.679
Instruction (instructed)	0.1349	0.1454	0.928	0.355
Instruction (instructed)x Time (Post)	0.0680	0.1663	0.409	0.683

Table 13 (cont.)

Instruction	0.1237	0.1670	0.741	0.459
(instructed)x				
Time (delayed				
posttest)				

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, **bolded value** < .05

Descriptive results for sentence that did not contain an adverbial phrase can be seen in Figure 17. The mixed effects linear regression model that contain the subjunctive verb yielded a borderline significant Time by Instruction Interaction in the posttest. See Table 14. Pairwise comparisons revealed that only instructed L2 learners showed a significant decrease from pre- to posttest, $estimate = 0.3058, SE = 0.1228, t = 2.490, p = .035$, and a significant increase in Total Dwell Time from post- to delayed posttest, $estimate = -0.4683, SE = 0.1247, t = -3.753, p = .000$.

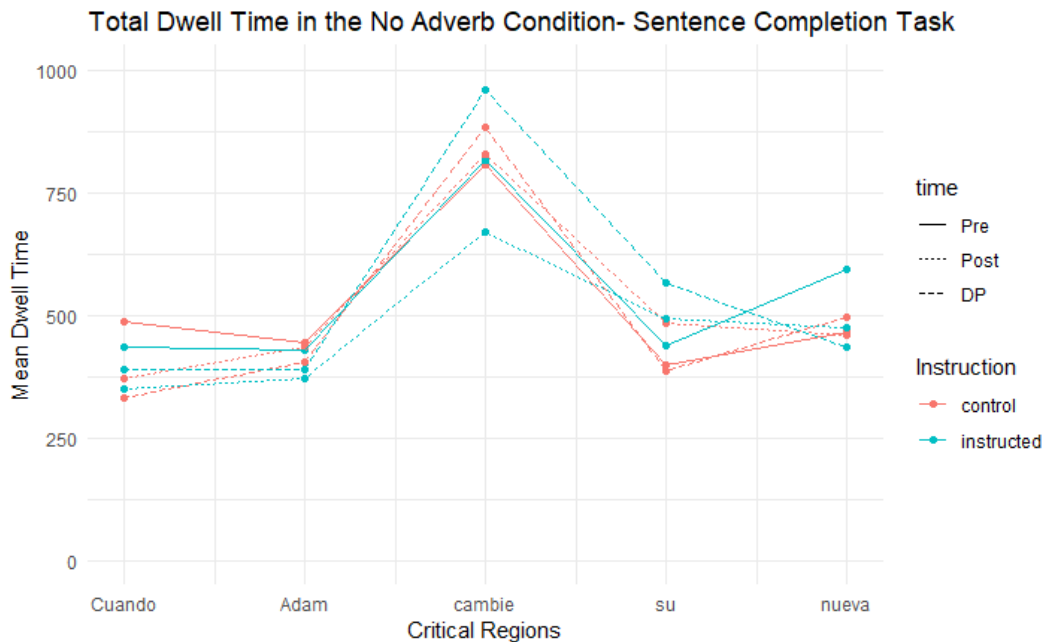


Figure 17. Sentence Completion Test Total Dwell Time in the adverb condition.

Table 14

Output from mixed effects linear regression model Total Dwell for Sentence Completion Test

(no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Intercept	6.5454	0.1169	55.978	0.000***
Time (Post)	0.0070	0.1316	0.054	0.957
Time (delayed posttest)	0.1192	0.1275	0.935	0.350
Instruction (instructed)	0.0443	0.1535	0.289	0.773
Instruction (instructed)x Time (Post)	-0.3129	0.1796	-1.742	0.082
Instruction (instructed)x Time (delayed posttest)	0.0432	0.1781	0.243	0.808

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

Similar to the findings in the Event Selection Test, none of the mixed effects linear regression models ran with the subjunctive verb that examined First Fixation Duration yielded any significant main effects or interactions. *P* values were all above .5 and *t* values were very small.

4.2.2.3 Summary of results for sentence completion interpretation test

The results of the Sentence Completion pretest also supported the Lexical Preference Principle. Participants were more likely to accurately select a sentence ending that contained the periphrastic future when the first part of the sentence included an adverb, as opposed to when the only temporal reference cue in the first part of the sentence was subjunctive morphology on the verb (68.0% vs. 22.7% accuracy) at the pretest stage.

Accuracy results with items that did not contain an adverbial phrase showed a similar pattern with participants in the control and instructed groups. L2 learners' accuracy improved significantly from pre- to posttests, but also decreased significantly from post- to delayed posttest. L2 learners in the instructed group showed larger gains from pre- to posttests (pre 28.6% > 72.6% > 55.9%) than L2 learners in the control group (pre 16.8% > 39.1% > 32.3%).

The results with items that contained an adverbial phrase were different for the control group. Whereas L2 learners in the instructed group showed a significant accuracy improvement from pre- to posttest (62.8% > 86.9%) and from pre- to delayed posttest (62.8% > 76%); accuracy decreased significantly from post- to delayed posttest (86.9% > 76%). On the other hand, participants in the control group showed a consistent, significant increase in accuracy from pre- to posttests (73.1% > 85.9% > 92.9%).

With regard to eyetracking data used to examine changes in attention allocation from pre- to posttests, only instructed L2 learners showed a significant decrease in Total Dwell Time from pre- to posttest with incomplete sentences that did not contain an adverbial phrase, but a significant increase in Total Dwell Time from posttest to delayed posttest.

4.3. Production results

In this test, participants were asked to conjugate the verb in the adverbial clause when the end of the sentence contained a verb in the periphrastic future. (See Figure 18 below). Unlike in previous tests, participants were able to read the whole sentence before making a decision and were asked to type the conjugation that they found most appropriate for the sentence they were given. Based on normative use of the subjunctive, only one possible response was considered accurate, the subjunctive conjugation in the present tense. This study only used *-ar* verbs in the third person singular, therefore, verb conjugations ending in *-e* (example: *estudie*) were considered accurate and were assigned a 1, but any other verb conjugations such as *-a* (present indicative), or *va* + infinitive (periphrastic future) received a 0.

Cuando Alec _____ (estudiar) para el GRE, va a pasar tiempo en la biblioteca.

“Cuando Alec _____ (to study) for the GRE, he is going to spend a lot of time at the library.”

Figure 18. Sample item Production Test.

In comparison to accuracy results in the interpretation test, participants were far less accurate in their responses in this test. This is to be expected given that instead of making a choice out of 3 options, participants had to accurately conjugate the verb (in the present subjunctive). The most common inaccurate responses were verbs conjugated in the simple future (example: *cantará*) and present tense (example: *canta*). A more detailed description of inaccurate responses for the production test can be seen in Table 15 below.

Table 15

Summary of inaccurate responses L2 data

Future simple	36%
Present indicative	36%
Periphrastic future (va+ infinitive)	18.6%
Past	6%
Other	1.60%
Future simple (<i>1st per sg</i>)	1.20%
Present indicative (<i>yo form</i>)	0.60%
TOTAL	100%

Descriptive accuracy results at the pretest by condition showed that when a sentence did not contain a lexical cue (an adverbial phrase), L2 learners were only 1.9-3.3% accurate in conjugating the verb in the present subjunctive form; similarly, when a sentence contained an adverbial, accuracy was also low ranging from 1.9-6.7% (See Figure 19). A similar logistic mixed-effects model to the one used in the interpretation tests was run to test the Lexical Preference principle at the pretest stage. The results from this model can be seen in Table 16.

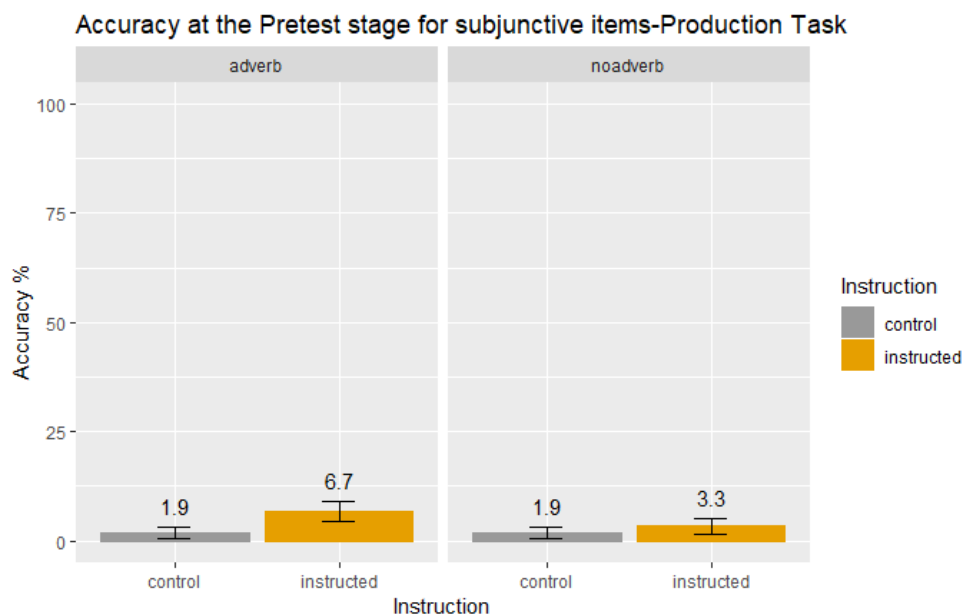


Figure 19. Accuracy at the pretest stage in the Production Test. Error bars represent standard error.

Table 16

Output from mixed effects logistic regression accuracy for Production Test (adverb and no adverb) at the pretest stage

	Estimate	SE	z	p
Intercept	-3.7444	0.5750	-6.512	0.000***
Adverb (noadverb)	-0.5605	0.5405	-1.037	0.300

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05

Descriptive results in the adverb condition can be found in Figure 20. Control L2 learners' accuracy increased from pre (1.9%) to posttest (12.7%) and then decreased from post- to delayed posttest (7.9%). L2 learners in the instructed group showed a similar pattern but their learning gains from pre-(6.7%) to posttest (76.5%) were larger; similarly, accuracy in the instructed group decreased from post- to delayed posttest (55%). The output of the logistic

regression ran to examine the effects of instruction in the no adverb condition can be seen in Table 17. This model yielded a significant interaction of Time with Instruction in the post- and delayed posttest. A pairwise comparison at the pretest stage confirmed that participants in the control group did not differ significantly from participants in the instructed group, in terms of accuracy, $estimate = -0.5333$, $SE = 1.4373$, $z = -0.371$, $p = .710$, ensuring that participants started with a similar baseline. Pairwise comparisons conducted to explore the significant time by instruction interaction revealed that participants in the control group showed a significant increase in accuracy from pre- to posttest, $estimate = -2.5514$, $SE = 0.8925$, $z = -2.859$, $p = .011$, no significant changes from pre to delayed posttest, $estimate = -2.8046$, $SE = 0.9644$, $z = -0.834$, $p = .681$, and a significant decrease in accuracy from post- to delayed posttest, $estimate = 1.7468$, $SE = 0.7135$, $z = 2.448$, $p = .038$. Participants in the instructed group showed an increase in accuracy scores from pre- to posttest, $estimate = -5.1756$, $SE = 0.7131$, $z = -7.258$, $p = .000$, and from pre- to delayed posttest, $estimate = -7.9689$, $SE = 0.9318$, $z = -8.551$, $p = .000$, but they showed a significant decrease from post- to delayed posttest, $estimate = 2.7932$, $SE = 0.6124$, $z = 4.561$, $p = .000$.

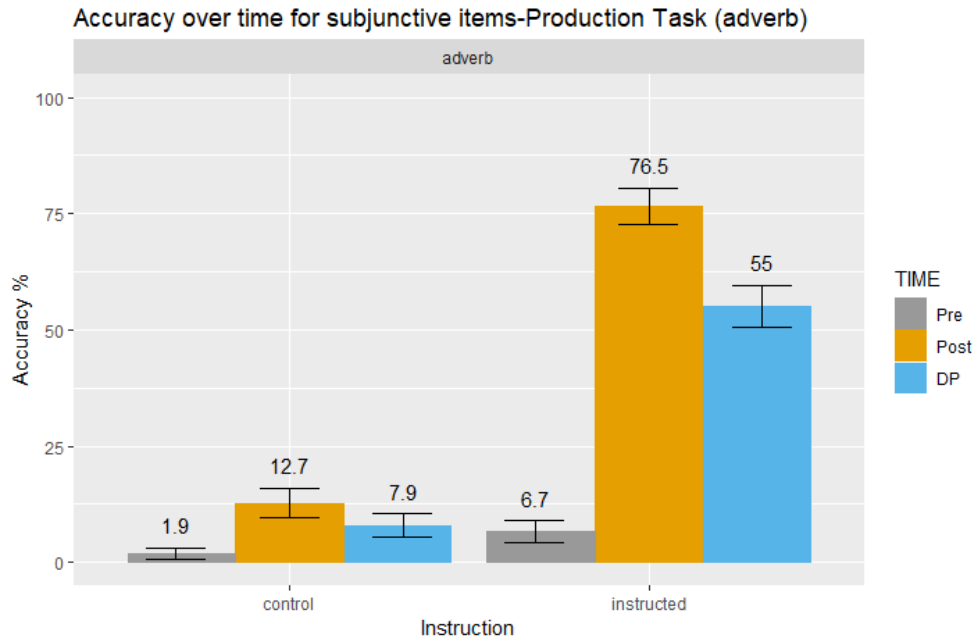


Figure 20. Accuracy from to posttests in the Production Test (adverb condition). Error bars represent standard error.

Table 17

Output from mixed effects logistic regression accuracy for the Production Test (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	-6.8030	1.4104	-4.824	0.000***
Instruction (instructed)	1.6438	1.6185	1.016	0.309
Time (Post)	2.5515	0.8926	2.859	0.404
Time (delayed posttest)	0.8046	0.9645	0.834	0.404

Table 17 (cont.)

Instruction	5.4175	1.2767	4.243	0.000***
(instructed)x				
Time (Post)				
Instruction	4.3711	1.2074	3.620	0.000***
(instructed)x				
Time (delayed				
posttest)				

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

Descriptive results in the no adverb condition can be found in Figure 21. Control L2 learners' accuracy increased from pre (1.9%) to posttest (14.5%) and then decreased from post- to delayed posttest (11.5%). L2 learners in the instructed group showed a similar pattern but their learning gains from pre-(3.3%) to posttest (79.2%) were larger; similarly, accuracy in the instructed group decreased from post- to delayed posttest (61.5%). The logistics mixed effects model ran to examine the effects of instruction in the no adverb condition yielded a significant main effect of Time in the posttest. See Table 18. In addition, this model yielded a significant interaction of Time by Instruction interaction in the post- and delayed posttest. Pairwise comparisons conducted to explore the significant Time by Instruction interaction revealed that participants in the control group showed a significant increase in accuracy from pre- to posttest, $estimate = -2.4974$, $SE = 0.8227$, $z = -3.037$, $p = .006$, but no significant difference from pre- to delayed posttest, $estimate = 1.4176$, $SE = 0.8656$, $z = -1.657$, $p = .222$, or from post- to delayed posttest, $estimate = 1.0797$, $SE = 0.5560$, $z = 1.942$, $p = .127$. On the other hand, participants in the instructed group showed a significant increase in accuracy from pre- to posttest, $estimate = -$

8.0065, $SE = 0.9108$, $z = -8.790$ $p = .000$, as well as from pre- to delayed posttest, $estimate = -6.1414$, $SE = 0.8077$, $z = -7.604$ $p = .000$, but showed a significant decrease in accuracy from post- to delayed posttest $estimate = 1.8650$, $SE = 0.4688$, $z = 3.978$, $p = .000$. Participants in the instructed group showed a stronger effect than participants in the control group, indicating that instruction helped participants in the instructed group be more accurate conjugating the verb in the present subjunctive when the verb in the independent clause contained a verb in the future tense.

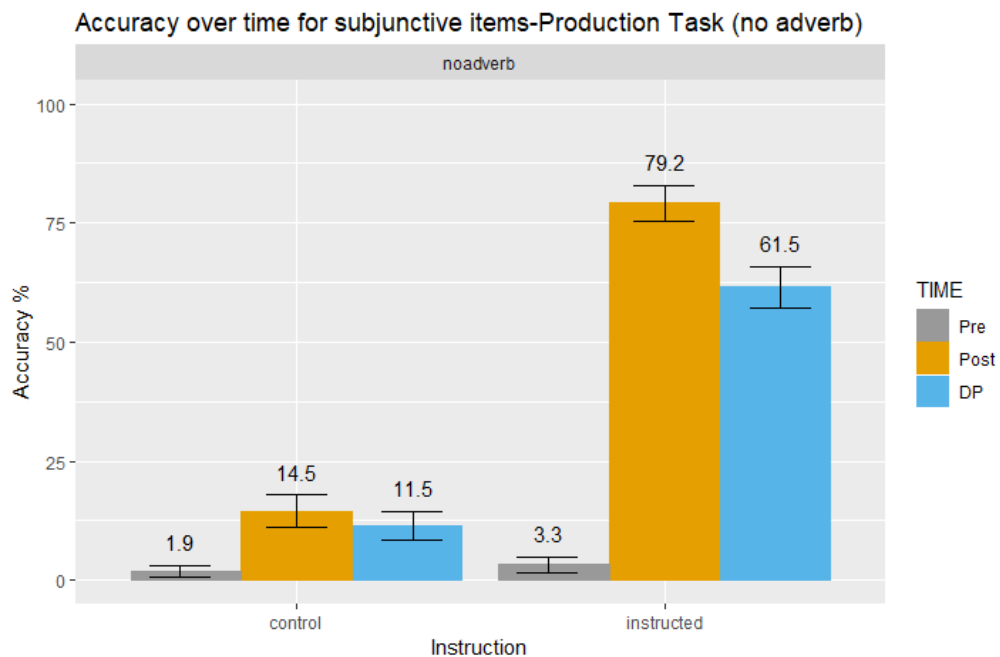


Figure 21. Accuracy from to posttests in the Production Test (no adverb condition). Error bars represent standard error.

Table 18

Output from mixed effects logistic regression accuracy for the Production Test (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Intercept	-5.8906	1.1815	-4.985	0.000***
Instruction (instructed)	0.5334	1.4364	0.371	0.710
Time (Post)	2.4974	0.8223	3.037	0.002*
Time (delayed posttest)	1.4176	0.8556	1.657	0.097
Instruction (instructed)x Time (Post)	0.5091	1.2185	4.521	0.000***
Instruction (instructed)x Time (delayed posttest)	4.7238	1.1816	3.998	0.000***

*Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05*

4.3.1 Summary of results for the production test

Results with items that did not contain an adverbial phrase showed that instructed L2 learners' accuracy improved significantly from pre- to posttest (3.3% > 79.2) as well as from pre- to delayed posttest (3.3% > 61.5%), but their accuracy decreased significantly from post- to delayed posttest (79.2% > 61.5%). L2 learners in the control group, however, only showed a significant increase in accuracy from pre- to posttest (1.9% > 14.5%).

Results with items that contained an adverbial phrase showed that L2 learners in the instructed group showed significant learning gains from pre- to posttest (6.7% > 76.5%), as well as from pre- to delayed posttest (6.7% > 55%); but their accuracy decreased significantly from post- to delayed posttest (76.5% > 55%). On the other hand, L2 learners in the control group improved significantly from pre- to posttest (1.9% > 12.7%), but their accuracy decreased significantly from post- to delayed posttest (12.7% > 7.9%).

4.4. Reading comprehension with eyetracking results

4.4.1. Reading comprehension with eyetracking accuracy results

The goal of this test was to examine if Spanish L2 learners were sensitive to subjunctive grammaticality manipulations while reading for comprehension. In order to do this, we used eyetracking data. Accuracy to the comprehension question participants saw after each subjunctive item can be seen in Table 19 below. Accuracy results for comprehension questions for L2 learners suggest that participants were paying attention when reading these sentences and they understood their content.

Table 19

Accuracy for comprehension question in subjunctive item in the Sentence reading comprehension while eyetracking test

	Adverb		No adverb	
<u>Group</u>	<u>grammatical</u>	<u>ungrammatical</u>	<u>grammatical</u>	<u>ungrammatical</u>
L2	94%	94%	96%	95%

4.4.2 Reading comprehension eyetracking results

Critical subjunctive items were sentences consisting of 11 or 14 words, each of which was considered a region of interest in the study design. For the purpose of this study, the subjunctive verb was always region 3, and regions 7, 8, and 9 corresponded to the periphrastic future in the no adverb condition, and to an adverbial phrase making reference to a future event in the adverb condition. Subjunctive items in the no adverb condition consisted of 11 words, see Figure 22 below; whereas subjunctive items in the adverb condition consisted of 14 words, see Figure 23 for reference. Half of the subjunctive items were manipulated so that the present indicative appeared in the verb in region 3 when regions 7, 8, and 9 were either an adverbial phrase or the periphrastic future.

1	2	3	4	5	6	7	8	9	10	11
Cuando	Juan	viaj _e SUBJ	a	Sri	Lanka	va	a	tomar	muchas	fotos
*Cuando	Juan	viaj _a IND	a	Sri	Lanka	va	a	tomar	muchas	fotos

Figure 22. Critical regions in the subjunctive items in the no adverb condition.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cuando	Juan	viaj _e SUBJ	a	Sri	Lanka	la	próxima	semana	va	a	tomar	muchas	fotos
*Cuando	Juan	viaj _a IND	a	Sri	Lanka	la	próxima	semana	va	a	tomar	muchas	fotos

Figure 23. Critical regions in the subjunctive items in the adverb condition.

Given that both the present indicative and subjunctive can be grammatically acceptable in an adverbial clause starting with *Cuando*, I did not expect to see participants show any sensitivity to these incongruencies until they read region 7, 8, or 9, (i.e., the adverbial phrase or periphrastic future). Similar to the interpretation tests, I examined *Total Dwell Time* and *First Fixation*. In addition, I examined regression in to regions 1, 2, 3 and 4, (Cuando+ name+ subjunctive+ post-verb region) as well as regressions out of regions 7, 8, and 9 (adverbial phrase or periphrastic

future). *Regressions in* refer to the number of times the critical region was entered (with an eye regression) from a later region, whereas *Regressions out* refers to the number of times this area was exited (with an eye regression) to a previous region. Early eye-tracking measures such as *First fixation duration* are believed to reflect readers' initial parses and interpretations of each word when it is first encountered, whereas *Regressions in* and *out*, as well as *Total dwell time*, are classified as late eyetracking measures, which are believed to be indicative of reanalysis that results from processing difficulty. We believe that a combination of early and late eyetracking measures will provide a more precise analysis with the potential to reveal subtle time course differences.

4.4.2.1 Sentence comprehension total dwell time results

All primary analyses in the reading comprehension test were mixed effects linear or logistic regressions with grammaticality and time as fixed effects and participant and item as random effects (intercept only). Sentences with and adverbial phrase and sentence without an adverbial phrase were run separately.

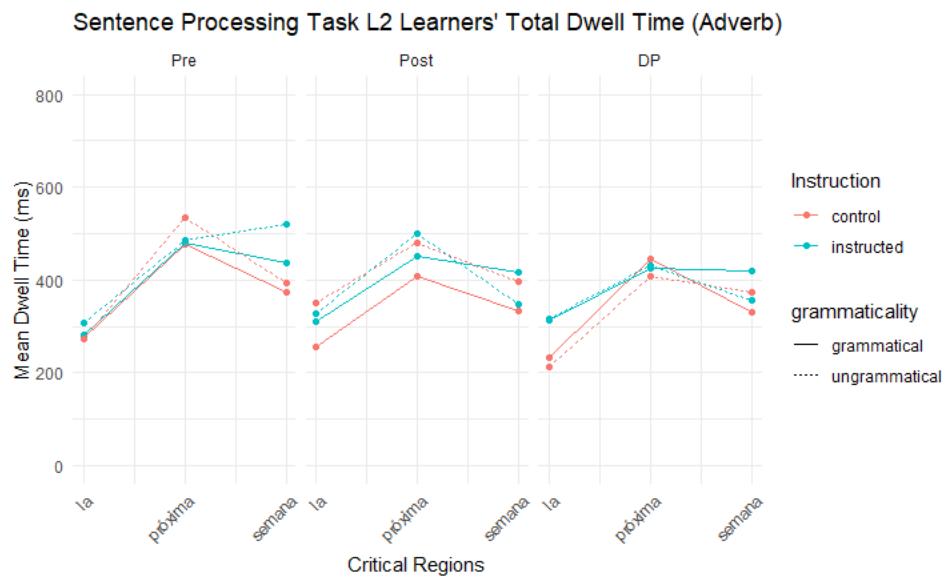


Figure 24. L2 learners' Total Dwell Time in the adverb condition.

Total Dwell Time results for sentences containing an adverbial phrase with L2 participants can be seen in Figure 24. The mixed effects linear regression containing the data in region 8 yielded a significant main effect of Time for the control group in the posttest, showing that overall Total Dwell Time was significantly lower in region 8 in the posttest compared to the pretest. See Table 20 below.

Table 20

Output from mixed effect linear regression model Total Dwell Time data for the control group (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.4405	0.1130	48.140	0.000***
Grammatical (ungrammatical)	0.0815	0.1505	0.541	0.589
Time (Post)	-0.0155	0.1531	-0.101	0.920
Time (DP)	-0.1038	0.1772	-0.586	0.559
Grammatical (ungrammatical) x time (Post)	0.1307	0.2162	0.605	0.547
Grammatical (ungrammatical) x time (delayed posttest)	-0.1411	0.2436	-0.579	0.564
Region 8“a”				
Intercept	6.0647	0.0768	78.907	0.000***
Grammatical (ungrammatical)	0.0512	0.1022	0.501	0.616
Time (Post)	-0.1832	0.0964	-1.900	0.058
Time (DP)	-0.0664	0.1006	-0.661	0.509

Table 20 (cont.)

Grammatical (ungrammatical) x time (Post)	0.1061	0.1395	0.761	0.447
Grammatical (ungrammatical) x time (delayed posttest)	-0.1584	0.1443	-0.098	0.273
Region 9 “estudiar”				
Intercept	5.8181	0.0741	78.504	0.000** *
Grammatical (ungrammatical)	0.0334	0.0931	0.359	0.720
Time (Post)	-0.1200	0.0851	-1.356	0.176
Time (DP)	-0.1240	0.0932	-1.331	0.184
Grammatical (ungrammatical) x time (Post)	0.0878	0.1280	0.686	0.493
Grammatical (ungrammatical) x time (delayed posttest)	0.0924	0.1327	0.696	0.487

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Descriptive results for sentences containing an adverbial phrase with L2 participants in the instructed group can also be seen in Figure 24. The mixed effects linear regressions containing the data in region 9 yielded a significant main effect of grammaticality as well as a Grammaticality by Time interaction in the post- and delayed posttest (Table 21). Pairwise comparisons revealed that instructed L2 learners showed significantly higher Total Dwell Time in the ungrammatical condition compared to the grammatical condition in the pretest, $estimate = -0.2021, SE = 0.0907, t = -2.344, p = .019$.

Table 21

Output from mixed effects linear regression Total Dwell Time data for the instructed group (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.5604	0.0991	56.062	0.000***
Grammatical (ungrammatical)	0.0272	0.1316	0.207	0.836
Time (Post)	0.0025	0.1251	0.020	0.984
Time (DP)	-0.0153	0.1465	-0.105	0.916
Grammatical (ungrammatical) x time (Post)	-0.0090	0.1834	-0.049	0.961
Grammatical (ungrammatical) x time (delayed posttest)	0.0534	0.1986	0.269	0.278
Region 8“a”				
Intercept	6.0412	0.0880	68.805	0.000***
Grammatical (ungrammatical)	-0.5832	0.1016	-0.574	0.567
Time (Post)	-0.0779	0.1009	-0.772	0.441
Time (DP)	-0.1539	0.1039	-1.480	0.140
Grammatical (ungrammatical) x time (Post)	0.1141	0.1423	0.802	0.423
Grammatical (ungrammatical) x time (delayed posttest)	0.0707	0.1463	0.483	0.629

Table 21 (cont.)

Region 9“estudiar”				
Intercept	5.8930	0.0860	68.508	0.000***
Grammatical (ungrammatical)	0.02128	0.0907	2.345	0.019*
Time (Post)	-0.0445	0.0900	-0.495	0.621
Time (DP)	-0.0244	0.0967	-0.252	0.801
Grammatical (ungrammatical) x time (Post)	-0.3166	0.1278	-2.478	0.013*
Grammatical (ungrammatical) x time (delayed posttest)	-0.3302	0.1330	-2.478	0.013*

Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, **bolded value** < .05

Descriptive results for sentences that did not contain an adverbial phrase with L2 participants can be seen in Figure 25. None of the mixed effects linear regressions ran for region 7, 8, and 9 yielded any significant main effects or interactions. See Table 22.

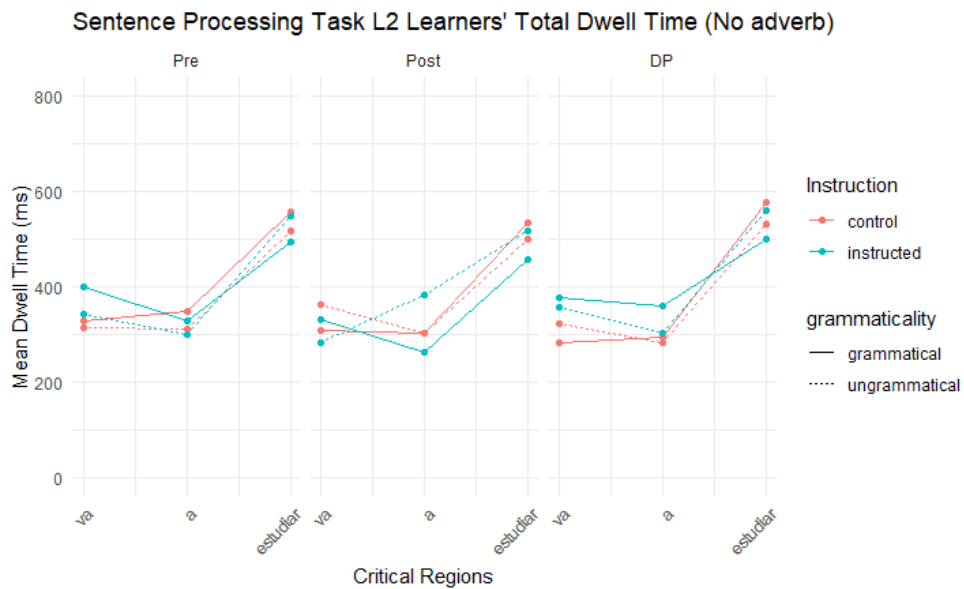


Figure 25. L2 learners’ Total Dwell Time in the no adverb condition.

Table 22

Output from mixed effects linear regression model Total Dwell Time data for the control group (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.6533	0.0920	61.414	0.000***
Grammatical (ungrammatical)	-0.0651	0.1169	-0.558	0.578
Time (Post)	-0.0333	0.1213	-0.275	0.784
Time (DP)	-0.1468	0.1302	-1.127	0.261
Grammatical (ungrammatical) x time (Post)	0.1634	0.1704	0.959	0.339
Grammatical (ungrammatical) x time (delayed posttest)	0.1634	0.1761	0.928	0.355
Region 8“a”				
Intercept	5.7420	0.0891	64.392	0.000***
Grammatical (ungrammatical)	-0.1486	0.1168	-1.272	0.205
Time (Post)	-0.2280	0.1271	-1.794	0.074
Time (DP)	-0.1331	0.1169	-1.138	0.256
Grammatical (ungrammatical) x time (Post)	0.1552	0.1660	0.935	0.350
Grammatical (ungrammatical) x time (delayed posttest)	0.1593	0.1723	0.925	0.356

Table 22 (cont.)

Region 9“estudiar”				
Intercept	6.1536	0.0908	67.700	0.000***
Grammatical (ungrammatical)	-0.0611	0.1134	-0.538	0.591
Time (Post)	0.0476	0.1142	-0.417	0.677
Time (DP)	-0.0941	0.1108	-0.849	0.396
Grammatical (ungrammatical) x time (Post)	0.0916	0.1549	0.592	0.554
Grammatical (ungrammatical) x time (delayed posttest)	0.0028	0.1586	0.018	0.968

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Descriptive results for the sentences that did not contain an adverbial phrase with L2 participants in the instructed group can also be seen in Figure 25. The mixed effects linear regression containing the data in region 8 yielded a significant Grammaticality by Time interaction in the posttest (Table 18). Pairwise comparisons revealed that instructed L2 learners showed significantly higher Total Dwell Time in the ungrammatical than in the grammatical condition in region 8 (“a”) in the posttest, $estimate = -0.3213$, $SE = 0.1355$, $t = -2.375$, $p = .018$.

Table 23

Output from mixed effects Total Dwell Time data for the instructed group

(no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.8608	0.0909	64.461	0.000***
Grammatical (ungrammatical)	-0.2161	0.1307	-1.653	0.099
Time (Post)	-0.2210	0.1280	-1.726	0.085
Time (DP)	-0.0715	0.1262	-0.567	0.151
Grammatical (ungrammatical) x time (Post)	0.0634	0.1908	0.332	0.740
Grammatical (ungrammatical) x time (delayed posttest)	0.1365	0.1860	0.734	0.463
Region 8“a”				
Intercept	5.6570	0.1077	52.502	0.000***
Grammatical (ungrammatical)	-0.2058	0.1348	-1.526	0.128
Time (Post)	-0.0677	0.1354	-0.500	0.617
Time (DP)	-0.0631	0.1444	-0.437	0.662
Grammatical (ungrammatical) x time (Post)	0.3844	0.1971	1.950	0.052*
Grammatical (ungrammatical) x time (delayed posttest)	-0.0178	0.1991	-0.090	0.928

Table 23 (cont.)

Region 9“estudiar”				
Intercept	6.0385	0.1023	59.016	0.000***
Grammatical (ungrammatical)	-0.1046	0.1076	-0.972	0.332
Time (Post)	-0.0012	0.1091	-0.012	0.991
Time (DP)	0.0972	0.1121	0.867	0.387
Grammatical (ungrammatical) x time (Post)	0.0447	0.1583	0.283	0.778
Grammatical (ungrammatical) x time (delayed posttest)	0.0152	0.1580	0.097	0.923

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

4.4.2.2 L2 learners’ reading comprehension first fixation duration results

Similar to Total Dwell Time, I examined First Fixation Duration in regions 7, 8, and 9 with sentence that contained and did not contain an adverbial phrase for the instructed and control group separately. Descriptive results for sentence containing an adverbial phrase with L2 learners can be seen in Figure 26. The mixed effect linear model, run with the data in region 9, yielded a significant main effect of Time for the control group in the delayed posttest, showing that First Fixation Duration was significantly lower in the delayed posttest when compared to the pretest. See Table 24. In addition, this model also yielded a borderline Grammaticality by Time interaction in the delayed posttest, which after running grammaticality by time pairwise comparisons, proved to be the product of the change in reading patterns (First Fixation Duration in the grammatical and ungrammatical condition) from pre- to delayed posttest. No significant differences in First Fixation Duration due to grammaticality were found in the pre-, *estimate =*

0.8724, $SE = 0.0570$, $t = 1.271$, $p = .204$, post-, $estimate = 0.0704$, $SE = 0.0539$, $t = 1.305$, $p = .192$, or delayed posttest, $estimate = -0.0792$, $SE = 0.0583$, $t = -1.357$, $p = .175$.

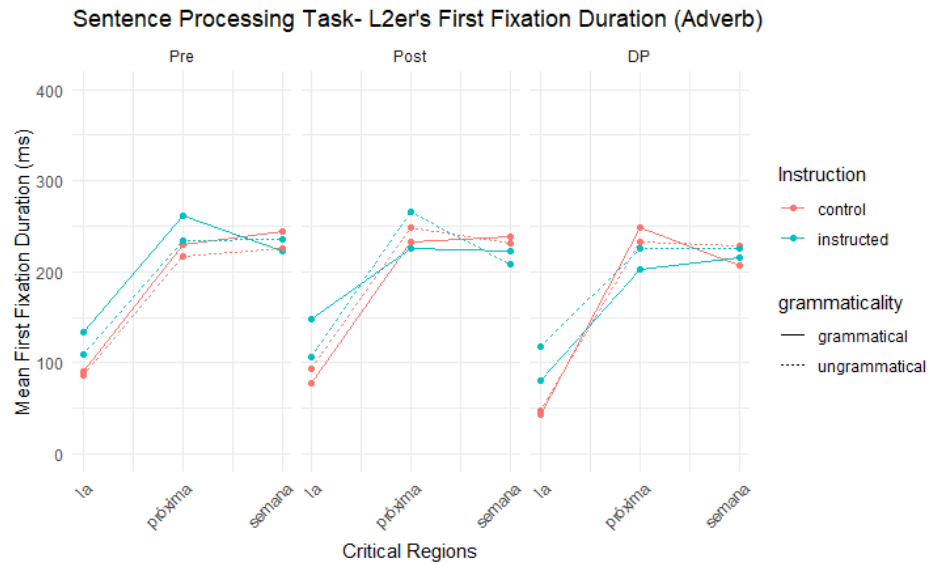


Figure 26. L2 learners' First Fixation Duration in the adverb condition.

Table 24

Output from mixed effects linear regression First Fixation Duration data for the control group (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.2951	0.0853	62.011	0.000***
Grammatical (ungrammatical)	0.0657	0.1120	0.587	0.559
Time (Post)	0.1113	0.1140	0.976	0.331
Time (DP)	-0.1357	0.1320	-1.028	0.306
Grammatical (ungrammatical) x time (Post)	-0.0542	0.1609	-0.337	0.737

Table 24 (cont.)

Grammatical (ungrammatical) x time (delayed posttest)	-0.0942	0.1812	-0.520	0.604
Region 8“a”				
Intercept	5.4469	0.0555	98.036	0.000***
Grammatical (ungrammatical)	-0.0309	0.0734	-0.421	0.674
Time (Post)	-0.0264	0.0689	-0.383	0.702
Time (DP)	0.0268	0.0715	0.375	0.708
Grammatical (ungrammatical) x time (Post)	0.0757	0.1003	0.755	0.451
Grammatical (ungrammatical) x time (delayed posttest)	-0.0376	0.1024	-0.368	0.713
Region 9“estudiar”				
Intercept	5.5368	0.0448	123.561	0.000***
Grammatical (ungrammatical)	-0.0724	0.0569	-0.272	0.204
Time (Post)	-0.0243	0.0541	-0.451	0.652
Time (DP)	-0.1220	0.0573	-2.127	0.034
Grammatical (ungrammatical) x time (Post)	0.0020	0.0783	0.026	0.979
Grammatical (ungrammatical) x time (delayed posttest)	0.1516	0.8156	1.860	0.064

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Descriptive results for instructed L2 learners in the adverb condition can also be seen in Figure 26. The mixed effects linear models ran with the data in region 7, 8, and 9 did not yield any significant main effects or interactions. See Table 25 below.

Table 25

Output from First Fixation Duration data for the instructed group (adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.3927	0.0817	65.979	0.000***
Grammatical (ungrammatical)	-0.0640	0.1083	-0.591	0.555
Time (Post)	0.0215	0.1030	0.209	0.834
Time (DP)	-0.1113	0.1206	-0.923	0.357
Grammatical (ungrammatical) x time	-0.0401	0.1510	-0.266	0.791
(Post)				
Grammatical (ungrammatical) x time	0.1420	0.1634	0.869	0.386
(delayed posttest)				
Region 8“a”				
Intercept	5.4663	0.0623	87.637	0.000***
Grammatical (ungrammatical)	-0.0073	0.0759	-0.096	0.923
Time (Post)	0.0059	0.0766	0.077	0.938
Time (DP)	-0.369	0.0790	-1.732	0.084
Grammatical (ungrammatical) x time	0.0679	0.1074	0.632	0.527
(Post)				

Table 25 (cont.)

Grammatical (ungrammatical) x time (delayed posttest)	0.0851	0.1109	0.768	0.443
Region 9“estudiar”				
Intercept	5.4021	0.0567	95.274	0.000***
Grammatical (ungrammatical)	0.1314	0.0705	1.862	0.063
Time (Post)	0.0036	0.0697	0.052	0.958
Time (DP)	0.1094	0.0745	1.469	0.142
Grammatical (ungrammatical) x time (Post)	-0.1311	0.0993	-1.320	0.187
Grammatical (ungrammatical) x time (delayed posttest)	-0.1696	0.1030	-1.646	0.100

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Descriptive results for sentences that did not contain an adverbial phrase with L2 learners can be seen in Figure 27. Only the mixed effects linear regression model containing the data in region 8 yielded a main effect of time in the delayed posttest, where First Fixation Duration was significantly lower compared to the pretest. See Table 26.

Descriptive results for sentences that did not contain an adverbial phrase with L2 learners in the instructed group can also be seen in Figure 27. Only the mixed effects linear model that contained the data in region 7 yielded a significant main effect of time in the posttest in region 7 (“la”), showing that First Fixation Duration was significantly lower in region 7 in the posttest when compared to the pretest. See Table 26.

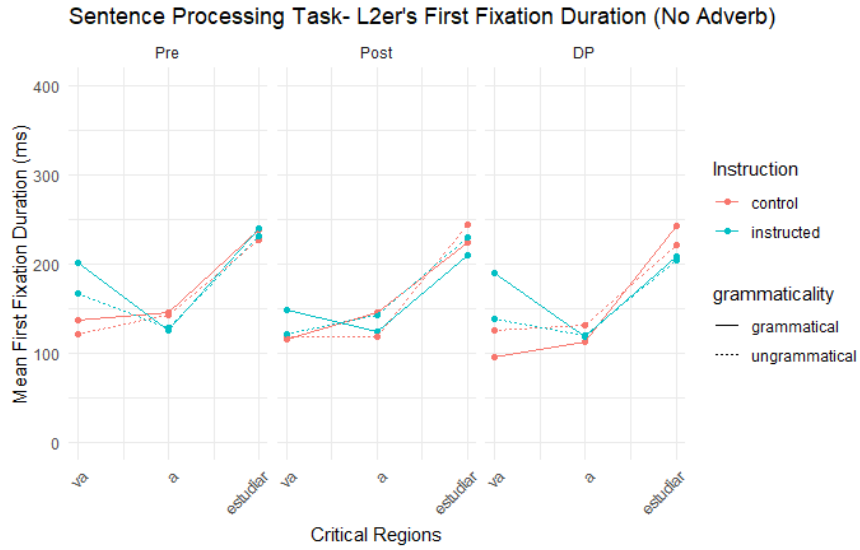


Figure 27. L2 learners' First Fixation Duration in the no adverb condition.

Table 26

Output from mixed effects linear regression model First Fixation Duration data for the control group (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.4043	0.0739	73.088	0.000***
Grammatical (ungrammatical)	-0.0615	0.1018	-0.605	0.546
Time (Post)	-0.0280	0.1052	-0.267	0.790
Time (DP)	-0.0767	0.1122	-0.683	0.495
Grammatical (ungrammatical) x time	0.1491	0.1490	1.001	0.318
(Post)				
Grammatical (ungrammatical) x time	0.1432	0.1520	0.942	0.348
(delayed posttest)				

Table 26 (cont.)

Region 8“a”				
Intercept	5.5306	0.0687	80.491	0.000***
Grammatical (ungrammatical)	-0.0892	0.0893	-0.999	0.319
Time (Post)	-0.1322	0.0892	-1.482	0.140
Time (DP)	-0.1900	0.0982	-1.934	0.054
Grammatical (ungrammatical) x time (Post)	0.0761	0.1269	0.600	0.549
Grammatical (ungrammatical) x time (delayed posttest)	0.1959	0.1324	1.479	0.140
Region 9“estudiar”				
Intercept	5.4795	0.0511	107.167	0.000***
Grammatical (ungrammatical)	-0.0288	0.0602	-0.480	0.632
Time (Post)	-0.0241	0.0615	0.392	0.695
Time (DP)	-0.0019	0.0620	-0.032	0.975
Grammatical (ungrammatical) x time (Post)	0.0434	0.0842	0.516	0.606
Grammatical (ungrammatical) x time (delayed posttest)	0.0331	0.0862	0.385	0.701

Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, bolded value < .05

Table 27

Output from mixed effects linear regression model First Fixation Duration data for the instructed group (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Region 7“va”				
Intercept	5.5478	0.0829	66.911	0.000***
Grammatical (ungrammatical)	-0.1640	0.1095	-1.500	0.1352
Time (Post)	-0.2181	0.1073	-2.033	0.043*
Time (DP)	0.0155	0.1052	0.148	0.882
Grammatical (ungrammatical) x time (Post)	0.0969	0.1613	0.601	0.548
Region 8“a”				
Intercept	5.4451	0.0788	69.092	0.000***
Grammatical (ungrammatical)	0.0021	0.1070	0.020	0.984
Time (Post)	-0.0840	0.0999	-0.841	0.402
Time (DP)	-0.1593	0.1003	-1.588	0.114
Grammatical (ungrammatical) x time (Post)	0.0972	0.1461	0.666	0.507
Grammatical (ungrammatical) x time (delayed posttest)	0.1068	0.1476	0.724	0.470

Table 27 (cont.)

Region 9“estudiar”				
Intercept	5.4490	0.05771	97.801	0.000***
Grammatical (ungrammatical)	0.0602	0.0716	0.841	0.401
Time (Post)	-0.0986	0.0688	-1.433	0.153
Time (DP)	-0.0279	0.0696	-0.402	0.688
Grammatical (ungrammatical) x time (Post)	0.0002	0.1009	0.003	0.998
Grammatical (ungrammatical) x time (delayed posttest)	-0.1123	0.1015	0.110	0.269

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

4.4.2.3 L2 learners’ reading comprehension regressions in results

I examined regressions in to regions 1 through 4 to explore if L2 learners tended to regress into these words after having read regions indicating the future reference (i.e., *la próxima semana* or *va a estudiar* in the no adverb condition) more in the ungrammatical than the grammatical condition. I ran separate analyses for the control group and instructed group as well as for the sentences that did and did not contain an adverbial phrase. The descriptive results for sentences containing an adverbial phrase for participants in the control group can be found in Figure 28. The output of the mixed effects logistic regression model containing the data in region 2 yielded a significant main effect of Time in the posttest as well as a significant Grammaticality by Time interaction with posttest data. See Table 28. Pairwise comparisons revealed that participants in the control group regressed in to region 2 significantly more with ungrammatical than grammatical sentences, *estimate* = -1.0939, *SE* = 0.4314, *z* = -2.536, *p* = .011 in the posttest.

A significant main effect of Time in the posttest and delayed posttest was found for region 1 (“Cuando”), showing that L2 learners in the control group regressed into this region significantly less in the post- and delayed posttest when compared to the pretest.

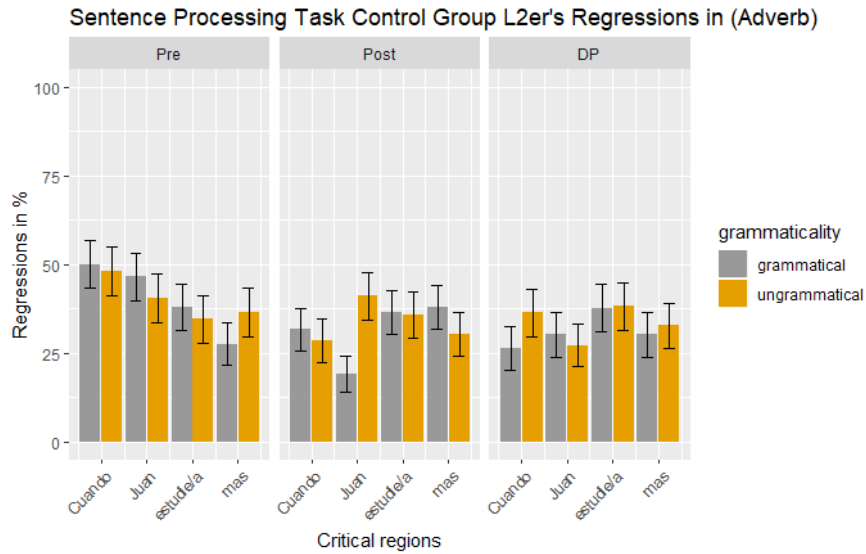


Figure 28. Control L2 learners’ Regressions in in the adverb condition.

Table 28

Output from mixed effect logistic regression for Regressions in data for the control group (adverb)

	Estimate	SE	z	p
Region 1“Cuando”				
Intercept	0.0021	0.2797	0.008	0.994
Grammatical (ungrammatical)	-0.0731	0.3891	-0.188	0.850
Time (Post)	-0.7916	0.3842	-2.061	0.039*
Time (DP)	-1.0650	0.4157	-2.562	0.010*
Grammatical (ungrammatical) x time (Post)	-0.0769	0.5627	-0.137	0.891

Table 28 (cont.)

Grammatical (ungrammatical) x time (delayed posttest)	0.5530	0.5768	0.959	0.337
Region 2“Juan”				
Intercept	-0.1563	0.3007	-0.520	0.603
Grammatical (ungrammatical)	-0.2503	0.4004	-0.625	0.531
Time (Post)	-1.3689	0.4282	-3.197	0.001**
Time (DP)	-0.7761	0.4150	-1.870	0.061
Grammatical (ungrammatical) x time (Post)	1.3442	0.5886	2.284	0.022*
Grammatical (ungrammatical) x time (delayed posttest)	0.1105	0.5943	0.186	0.852
Region 3“estudie”				
Intercept	-0.6128	0.3373	-1.816	0.069
Grammatical (ungrammatical)	-0.0719	0.4224	-0.170	0.586
Time (Post)	-0.0279	0.4002	-0.070	0.944
Time (DP)	0.0645	0.4187	0.154	0.877
Grammatical (ungrammatical) x time (Post)	0.0405	0.5856	0.069	0.944
Grammatical (ungrammatical) x time (delayed posttest)	0.0935	0.5986	0.156	0.875

Table 28 (cont.)

Region 4 “más”				
Intercept	-1.0021	0.3193	-3.138	0.001**
Grammatical (ungrammatical)	0.4592	0.4221	1.088	0.276
Time (Post)	0.4882	0.4012	1.217	0.223
Time (DP)	0.1457	0.4293	0.339	0.734
Grammatical (ungrammatical) x time (Post)	-0.827	0.5813	-1.420	0.154
Grammatical (ungrammatical) x time (delayed posttest)	-0.3408	0.5986	-0.579	0.569

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Descriptive results from participants in the instructed group with sentences that contained an adverbial phrase can be seen in Figure 29. Only the mixed effects logistic regression model containing the data in region 1 yielded a significant main effect of grammaticality, suggesting that, overall, ungrammatical sentences yielded significantly more regressions into region 1 when compared to grammatical sentences. See Table 29.

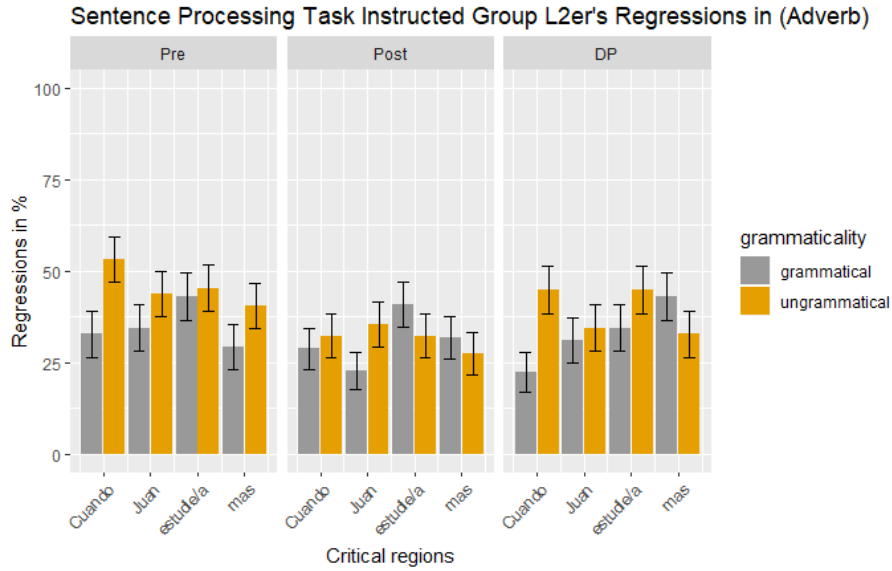


Figure 29. Instructed L2 learners' Regressions in the adverb condition.

Table 29

Output from mixed effect logistic regression model Regressions in data for the instructed group (adverb)

	Estimate	SE	z	p
Region 1“Cuando”				
Intercept	-0.7916	0.3462	-2.286	0.022*
Grammatical (ungrammatical)	0.8985	0.4002	2.245	0.024*
Time (Post)	-0.2675	0.4149	-0.645	0.519
Time (DP)	-0.539	0.4464	-1.209	0.226
Grammatical (ungrammatical) x time (Post)	-0.6446	0.5711	-1.129	0.259
Grammatical (ungrammatical) x time (delayed posttest)	0.1788	0.5915	0.302	0.762

Table 29 (cont.)

Region 2“Juan”				
Intercept	-0.6353	0.3274	-1.940	0.052*
Grammatical (ungrammatical)	0.3842	0.3915	0.981	0.326
Time (Post)	-1.7383	0.4233	-1.744	0.081
Time (DP)	-0.2580	0.4163	-0.620	0.535
Grammatical (ungrammatical) x time (Post)	0.3207	0.5698	0.563	0.573
Grammatical (ungrammatical) x time (delayed posttest)	-0.2028	0.5710	-0.355	0.722
Region 3“estudie”				
Intercept	-0.2854	0.3371	-0.847	0.397
Grammatical (ungrammatical)	0.0121	0.3912	0.031	0.975
Time (Post)	-0.1579	0.3924	-0.403	0.687
Time (DP)	-0.4797	0.4123	-1.164	0.245
Grammatical (ungrammatical) x time (Post)	-0.4114	0.5566	-0.739	0.460
Grammatical (ungrammatical) x time (delayed posttest)	0.5043	0.5676	0.889	0.374
Grammatical (ungrammatical) x time (delayed posttest)	-0.9316	0.5544	-1.680	0.092

Table 29 (cont.)

Region 4 “más”				
Intercept	-0.8877	0.3065	-2.897	0.003**
Grammatical (ungrammatical)	0.4794	0.3912	1.225	0.220
Time (Post)	0.0776	0.3992	0.194	0.845
Time (DP)	0.5956	0.3995	1.491	0.135
Grammatical (ungrammatical) x time (Post)	-0.6769	0.5566	-1.216	0.223
Grammatical (ungrammatical) x time (delayed posttest)	-0.9316	0.5544	-1.680	0.092

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Descriptive results for L2 learners in the control group with sentences that did not contain an adverbial phrase can be seen in Figure 30. The mixed effects logistic regression model containing the data in region 1 yielded a main effect of Time in the posttest, showing that L2 learners in the control group regressed into region 1 significantly less in the posttest than they did in in the pretest. Similarly, the mixed effects logistic regression model containing the data in region 2 yielded a significant main effect of time in the delayed posttest, showing that learners in the control group regressed significantly less in to region 2 in the delayed posttest when compared to the pretest. See Table 29.

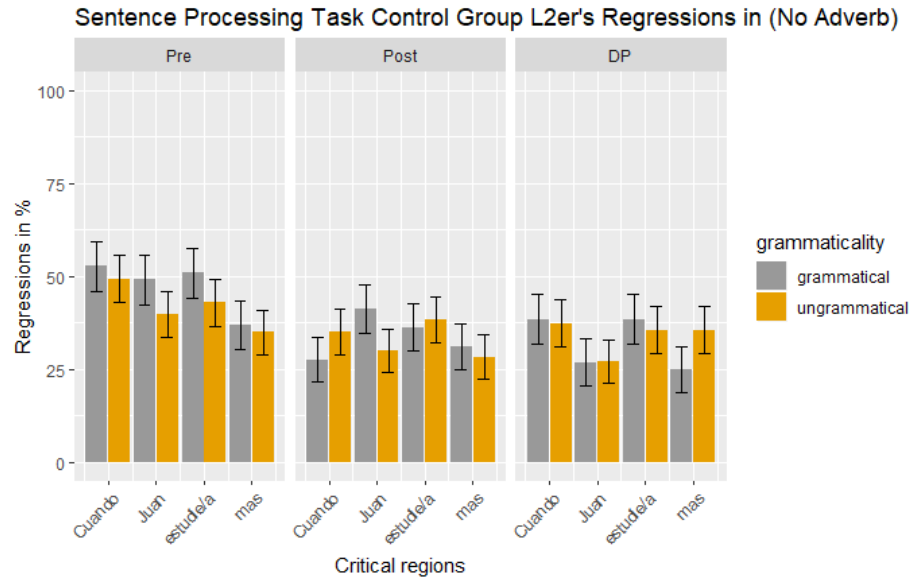


Figure 30. Control L2 learners' Regressions in in the no adverb condition.

Table 30

Output from mixed effects logistic regression Regressions in data for the control group (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Region 1“Cuando”				
Intercept	0.1424	0.3278	0.434	0.663
Grammatical (ungrammatical)	-0.2206	0.3876	-0.5769	0.569
Time (Post)	-1.2383	0.4215	-2.938	0.003**
Time (DP)	-0.6916	0.4147	-1.668	0.954
Grammatical (ungrammatical) x time (Post)	0.6426	0.5731	1.121	0.262
Grammatical (ungrammatical) x time (delayed posttest)	0.1508	0.5678	0.266	0.790

Table 30 (cont.)

Region 2“Juan”				
Intercept	-0.0224	0.3291	-0.068	0.945
Grammatical (ungrammatical)	-0.4726	0.3925	-1.204	0.228
Time (Post)	-0.3895	0.4000	-0.974	0.330
Time (DP)	-1.1144	0.4354	-2.560	0.010*
Grammatical (ungrammatical) x time (Post)	-0.0043	0.5664	-0.008	0.993
Grammatical (ungrammatical) x time (delayed posttest)	0.5060	0.5962	0.849	0.396
Region 3“estudie”				
Intercept	-0.0316	0.3258	-0.097	0.923
Grammatical (ungrammatical)	-0.3116	0.3896	-0.800	0.424
Time (Post)	-0.6074	0.4038	-1.504	0.133
Time (DP)	-0.5356	0.5600	0.810	0.196
Grammatical (ungrammatical) x time (Post)	0.4533	0.5664	-0.008	0.993
Grammatical (ungrammatical) x time (delayed posttest)	0.1979	0.5717	0.346	0.729

Table 30 (cont.)

Region 4 “más”				
Intercept	-0.5637	0.2875	-1.961	0.049
Grammatical (ungrammatical)	-0.0826	0.3854	-0.214	0.830
Time (Post)	-0.2490	0.3993	-0.624	0.532
Time (DP)	-0.5658	0.4263	-1.327	0.184
Grammatical (ungrammatical) x time (Post)	-0.0358	0.5605	-0.064	0.948
Grammatical (ungrammatical) x time (delayed posttest)	0.6005	0.5733	1.047	0.294

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Descriptive results for participants in the instructed group with sentences that did not contain an adverbial phrase can be seen in Figure 31. The mixed effect logistic regression model containing the data in region 1 yielded a main effect of Time in the post- and delayed posttest suggesting that L2 learners in the instructed group regressed significantly less into region 1 in the post- and delayed posttest compared to the pretest. In addition, this model (containing the data in region 1) also yielded a significant main effect of grammaticality, suggesting that, overall, ungrammatical sentences that did not contain an adverbial phrase led to significantly fewer regressions in to region 1 among instructed L2 learners. Finally, this model (containing the data in region 1) also yielded a significant Grammaticality by Time interaction in the delayed posttest. See Table 31. Pairwise comparisons of Grammaticality by Time only revealed a significant effect of grammaticality in the pretest, where grammatical sentences that did not contain an

adverbial phrase led to more regressions in to region 1 than ungrammatical sentences did, $estimate = 0.8907$, $SE = 0.4403$, $z = 2.023$, $p = .043$. The mixed effects logistic regression model containing the data in region 3 also yielded a significant main effect of Grammaticality and a borderline significant interaction of Grammaticality by Time in the delayed posttest. Grammaticality by Time pairwise comparisons revealed that instructed L2 learners regressed significantly more into region 3 with grammatical sentences that did not contained an adverbial phrase than with ungrammatical sentences.

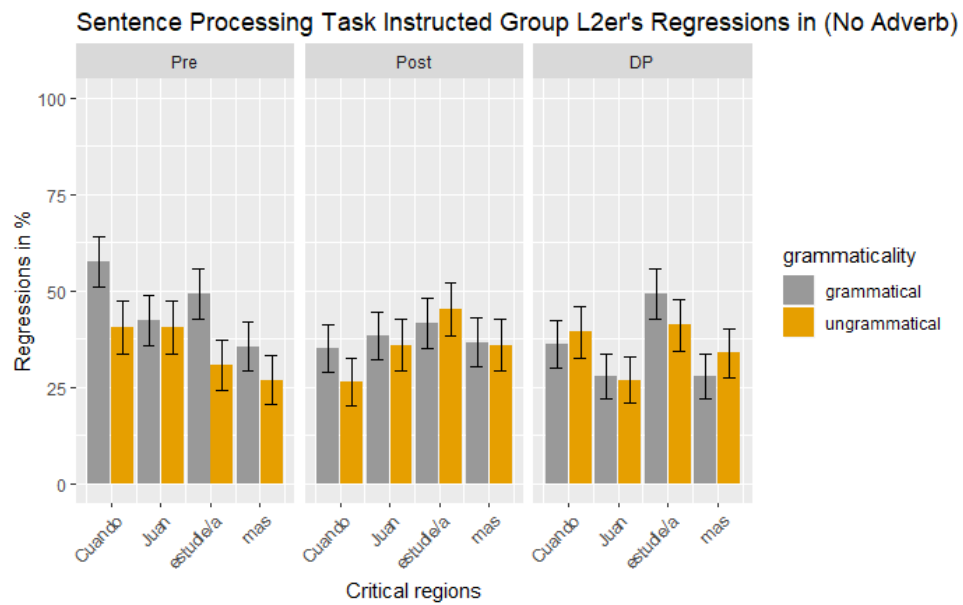


Figure 31. Instructed L2 learners' Regressions in in the no adverb condition.

Table 31

Output from mixed effects logistic regression Regressions in data for the instructed group (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Region 1“Cuando”				
Intercept	0.3125	0.4176	0.748	0.454
Grammatical (ungrammatical)	-0.8907	0.4404	-2.023	0.043*
Time (Post)	-1.2025	0.4330	-2.777	0.005**
Time (DP)	-1.1613	0.4343	-2.674	0.007**
Grammatical (ungrammatical) x time (Post)	0.3036	0.6393	0.475	0.634
Grammatical (ungrammatical) x time (delayed posttest)	1.1828	0.6241	1.895	0.058*
Region 2“Juan”				
Intercept	0.6353	0.3274	-1.940	0.052*
Grammatical (ungrammatical)	0.3842	0.3915	0.981	0.326
Time (Post)	-0.7383	0.4233	-1.744	0.081
Time (DP)	-0.2580	0.4163	-0.620	0.535
Grammatical (ungrammatical) x time (Post)	0.3207	0.5698	0.563	0.573
Grammatical (ungrammatical) x time (delayed posttest)	-0.2028	0.5710	-0.355	0.722

Table 31 (cont.)

Region 3 “estudie”				
Intercept	0.0357	0.3168	-0.113	0.910
Grammatical (ungrammatical)	-0.9014	0.4174	-2.159	0.030*
Time (Post)	-0.3190	0.3887	-0.821	0.411
Time (DP)	-0.0099	0.3867	-0.026	0.979
Grammatical (ungrammatical) x time (Post)	1.0447	0.5814	1.797	0.072
Grammatical (ungrammatical) x time (delayed posttest)	0.5613	0.5751	0.976	0.329
Region 4 “más”				
Intercept	-0.7669	0.3504	-2.188	0.028*
Grammatical (ungrammatical)	-0.4581	0.4401	-1.041	0.297
Time (Post)	0.1450	0.4089	0.355	0.722
Time (DP)	-0.2532	0.4202	-0.602	0.547
Grammatical (ungrammatical) x time (Post)	0.3796	0.6101	0.622	0.533
Grammatical (ungrammatical) x time (delayed posttest)	0.7484	0.6142	1.219	0.223

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

4.4.2.4 L2 learners' reading comprehension regressions out results

In addition to regressions in, I analyzed regressions out of regions, 7, 8, and 9, which corresponded to the periphrastic future in the no adverb condition and the adverbial phrase in the adverb condition. The analysis of regressions out did not reveal any significant main effects or interactions for any regions with sentences that did or did not contain an adverbial phrase for either instructed or control L2 learners. Descriptive results for the control and instructed group in the adverb and no adverb condition can be seen below in Figure 32 through 35. Similar to the analysis in regressions in, I ran a mixed effect logistic regression for each region separately with sentences that did and did not contain an adverbial phrase and with both L2 group (instructed and control). The output of these models can be seen in Tables 32 through 35, except for the output of the model containing the data in region 7 in the adverb condition for the control group, and the model containing the data in region 9 in the adverb condition for the instructed group. Due to the low number of regressions (below 25%), in these specific cases, and therefore minimal variation, these models did not converge.

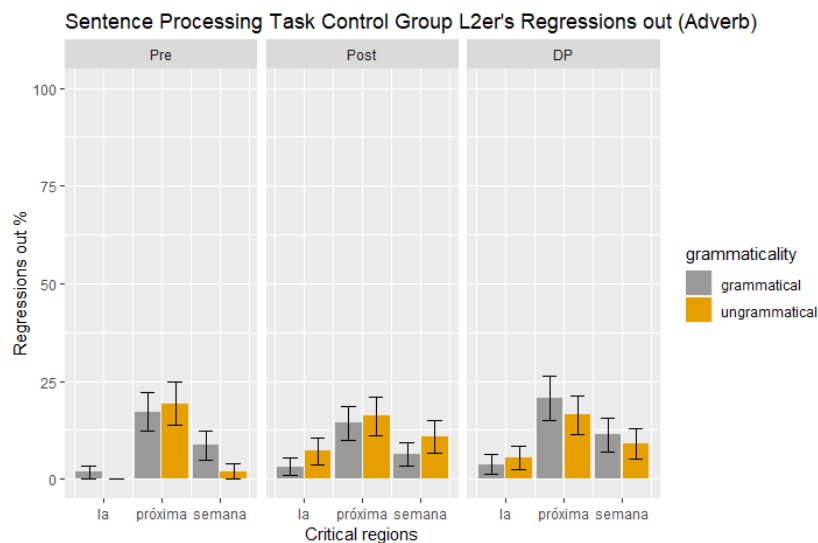


Figure 32. Control L2 learner's Regressions out in the adverb condition.

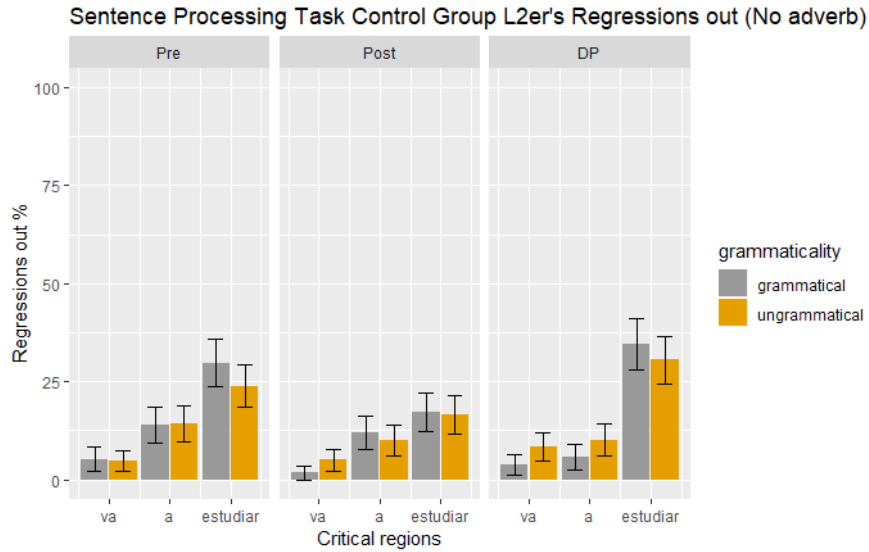


Figure 33. Control L2 learners' Regressions out in the no adverb condition.

Table 32

Output from mixed effect logistic regression Regressions out data for the control group (adverb)

	Estimate	SE	z	p
Region 8“próxima”				
Intercept	-1.6022	0.3743	-4.280	0.006**
Grammatical (ungrammatical)	0.0712	0.5039	0.141	0.888
Time (Post)	-0.3056	0.5009	-0.600	0.548
Time (DP)	0.2140	0.4941	0.433	0.665
Grammatical (ungrammatical) x time (Post)	0.1153	0.7224	0.159	0.873
Grammatical (ungrammatical) x time (delayed posttest)	-0.3844	0.7137	-0.539	0.590

Table 32 (cont.)

Region 9“semana”				
Intercept	-2.8663	0.6132	-4.658	0.000***
Grammatical (ungrammatical)	-1.6162	1.1331	-1.426	0.153
Time (Post)	-0.3105	0.7244	-0.429	0.668
Time (DP)	0.4135	0.6731	0.614	0.539
Grammatical (ungrammatical) x time (Post)	2.2503	1.3352	1.685	0.091
Grammatical (ungrammatical) x time (delayed posttest)	1.2643	1.3176	0.960	0.337

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Table 33

*Output from mixed effect logistic regression Regressions out data for the
instructed group (adverb)*

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Region 7“va”				
Intercept	-3.2363	0.7070	-4.587	0.000***
Grammatical (ungrammatical)	-0.1523	0.8665	-0.178	0.859
Time (Post)	-0.2413	1.1850	-1.048	0.295
Time (DP)	-0.2865	0.9519	-0.301	0.763
Grammatical (ungrammatical) x time (Post)	1.3392	1.4619	0.916	0.360

Table 33 (cont.)

Grammatical (ungrammatical) x time (delayed posttest)	0.9542	1.2260	0.778	0.436
Region 8“a”				
Intercept	-1.3527	0.4146	-3.263	0.001**
Grammatical (ungrammatical)	-0.7712	0.4993	-1.544	0.122
Time (Post)	-0.5285	0.4926	-1.073	0.283
Time (DP)	-0.4666	0.4983	-0.936	0.349
Grammatical (ungrammatical) x time (Post)	0.4508	0.7312	0.617	0.537
Grammatical (ungrammatical) x time (delayed posttest)	1.1087	0.7041	1.575	0.115
Region 9“estudiar”				
Intercept	-0.9834	0.3632	-2.707	0.006**
Grammatical (ungrammatical)	-0.3397	0.4380	-0.776	0.438
Time (Post)	-0.7642	0.4759	-1.606	0.108
Time (DP)	0.1547	0.4388	0.353	0.724
Grammatical (ungrammatical) x time (Post)	0.2930	0.6709	0.437	0.662
Grammatical (ungrammatical) x time (delayed posttest)	0.1834	0.6162	0.298	0.766

Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05

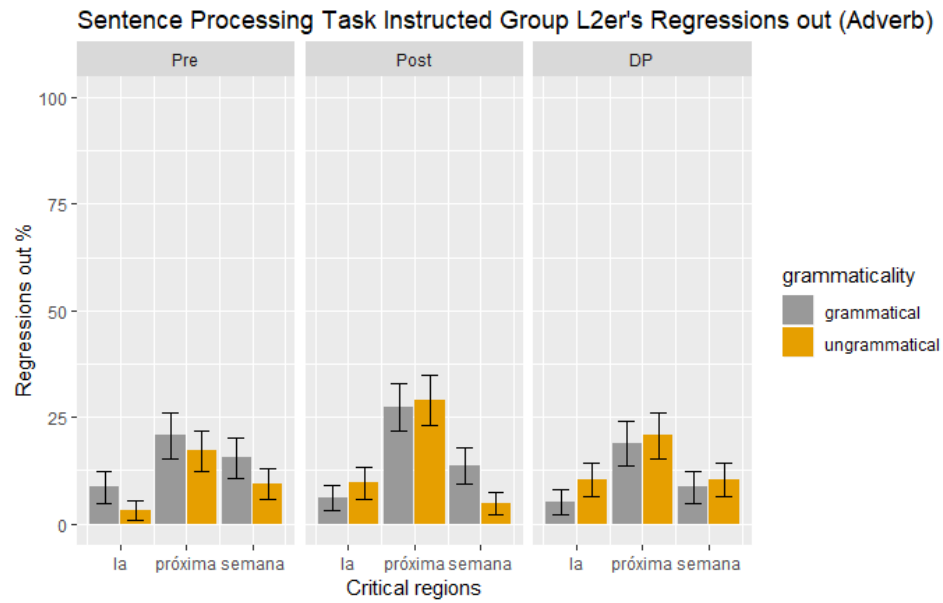


Figure 34. Instructed L2 learners' Regressions out in the adverb condition.



Figure 35. Instructed L2 learners' Regressions out in the no adverb condition.

Table 34

Output from mixed effect logistic regression Regressions out data for the control group (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Region 7“la”				
Intercept	-2.7334	0.5709	-4.788	0.000***
Grammatical (ungrammatical)	-1.0332	0.8762	-1.179	0.238
Time (Post)	-0.3770	0.7203	-0.523	0.601
Time (DP)	-0.4551	0.7795	-0.584	0.559
Grammatical (ungrammatical) x time (Post)	1.6974	1.1197	1.516	0.130
Grammatical (ungrammatical) x time (delayed posttest)	1.7353	1.1573	1.499	0.134
Region 9“proxima”				
Intercept	-1.4973	0.3970	-3.771	0.000***
Grammatical (ungrammatical)	-0.3122	0.4820	-0.648	0.517
Time (Post)	0.2732	0.4488	0.610	0.541
Time (DP)	-0.1596	0.4880	-0.327	0.743
Grammatical (ungrammatical) x time (Post)	0.5497	0.6402	0.859	0.390
Grammatical (ungrammatical) x time (delayed posttest)	0.4232	0.6849	0.618	0.536

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

Table 35

Output from mixed effect logistic regression Regressions out data for the instructed group (no adverb)

	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
Region 7“va”				
Intercept	-2.7897	0.6275	-4.445	0.000***
Grammatical (ungrammatical)	-0.6173	0.7917	-0.780	0.436
Time (Post)	-0.3123	0.7040	-0.444	0.657
Time (DP)	-0.5565	0.7382	-0.754	0.451
Grammatical (ungrammatical) x time (Post)	-0.3530	1.2264	-0.296	0.767
Grammatical (ungrammatical) x time (delayed posttest)	1.1078	1.1013	1.006	0.314
Region 8“a”				
Intercept	-1.9736	0.5046	-3.911	0.000***
Grammatical (ungrammatical)	-0.7816	0.6199	-1.261	0.207
Time (Post)	-0.0408	0.5316	-0.077	0.939
Time (DP)	0.2345	0.5154	0.455	0.649
Grammatical (ungrammatical) x time (Post)	1.0380	0.8213	1.264	0.206
Grammatical (ungrammatical) x time (delayed posttest)	-0.4536	0.8687	0.522	0.602

Table 35 (cont.)

Region 9“estudiar”				
Intercept	-1.4597	0.4007	-3.643	0.000***
Grammatical (ungrammatical)	-0.7155	0.5345	-1.339	0.180
Time (Post)	0.3816	0.4512	0.846	0.397
Time (DP)	-0.3798	0.4847	-0.777	0.436
Grammatical (ungrammatical) x time (Post)	0.7042	0.6998	1.006	0.314
Grammatical (ungrammatical) x time (delayed posttest)	0.5401	0.7537	0.717	0.473

*Significance codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1, bolded value < .05*

4.4.3 Summary of results for the reading comprehension test’s eyetracking results

The goal of this test was to assess if language instruction could also lead to an increase in online sensitivity to subjunctive incongruencies in adverbial subjunctive clauses while L2 learners read for comprehension. Despite the extensive analysis of eyetracking data with four different eyetracking measures, the inferential statistical analyses only found three significant findings: two with Total Dwell Time and one with Regressions in.

The Total Dwell Time analyses revealed an unexpected finding at the pretest stage, the grammaticality effect found in region 9 (“semana”) for sentences that contained an adverbial phrase. A possible explanation for this finding will be discussed in the discussion chapter. With regard to pre- to posttests comparisons, it was found that only the L2 learners in the instructed

group showed a significant effect of mood grammaticality in the Total Dwell Time measure for Region 8 (“a”) in the posttest with sentences that did not contain an adverbial phrase.

Finally, the Regressions in analyses revealed that L2 learners in the control group were significantly more likely to regress in to region 2 (pre-subjunctive region) with ungrammatical than grammatical sentences that contained an adverbial phrase in the posttest.

4.5. Predictions and results

In this section I revisit the predictions stated for each of the research questions together with the results obtained. A summary table is provided below.

Predictions	Findings
RQ1: L2 learners will be affected by the Lexical Preference Principle and they will rely more on lexical than inflectional cues.	The accuracy findings from the two interpretation tests at the pretest stage confirmed this prediction.
RQ2: (null hypothesis) Language instruction will not lead to an increase in attention toward morphological cues in real time	This prediction was confirmed. Although results in the Event Selection Test seemed to refute this prediction, the Total Dwell Time reading patterns for instructed L2 learners at the pretest stage were strange and obscured a clear interpretation that could clearly reflect an increase in attention as the result of instruction.
RQ3: Instruction will lead to interpretation learning gains	This prediction was confirmed.

Figure 36. Summary of predictions and findings

<p>RQ4: Instruction will lead to production learning gains</p>	<p>This prediction was confirmed.</p>
<p>RQ5: Instruction will not lead to an increase in sensitivity to subjunctive incongruencies in real time.</p>	<p>This prediction was <i>partially</i> confirmed. Instructed L2 learners only showed sensitivity to subjunctive incongruencies in one of the four eyetracking measures used.</p>

Figure 36 (cont.)

CHAPTER 5: DISCUSSION AND CONCLUSION

The two main goals of this dissertation were to (a) test the *Lexical Preference Principle* with subjunctive mood morphology at the pretest stage, and (b) examine if language instruction can help L2 learners' interpretation, production, and input processing of the Spanish subjunctive in adverbial clauses.

5.1 Introduction

Given the magnitude of the study, this chapter will be divided into five major discussion subsections that will address the findings from this dissertation's research questions. The first research question, which asked if L2 learners would show evidence of relying more on lexical than verbal cues, will be discussed in Section 1.2. The second research questions, asking if language instruction can help L2 learners focus more on morphological cues as the result of instruction, will be discuss in Section 1.3 The third research question, which asked if language instruction would lead to interpretation gains among L2 learners, will be discussed in Section 1.4. Research question number four, which asked if language instruction will also lead to production gains, will be discussed in Section 1.5 The fifth research question, which asked if language instruction can help L2 learners become more sensitive to subjunctive grammaticality violations, will be discussed in Section 1.6. Finally, this chapter closes with a brief section, Section 1.7, that discusses pedagogical implications in light of the pedagogical intervention used in this study with regard to Spanish mood, and section 1.7 provides a conclusion and future directions.

5.2 The lexical preference principle

The first research question asked if L2 learners were subject to the *Lexical Preference Principle* as proposed by VanPatten's Input Processing Model at the pretest stage. This principle

states that L2 learners are more likely to rely on lexical cues (i.e., content words) than inflectional cues (i.e., verb endings) when they read or listen to input for comprehension. I studied these claims by examining differences in accuracy scores in the Event Selection Test and the Sentence Completion Test with sentences that contained an inflectional and lexical cue to those that only had an inflectional cue at the pretest stage. This study's findings provide support for the *Lexical Preference Principle* as L2 learners' accuracy responses with sentences that contained a lexical cue in addition to an inflectional cue (Spanish subjunctive mood inflection) showed significantly higher accuracy results than those that only contained an inflectional cue. This finding suggests that L2 learners relied more on adverbial phrases such as *la próxima semana* ("next week") to interpret these incomplete sentences as describing future events and as needing to be coexist with a main clause that also expressed future.

These results are consistent with previous research that found that L2 learners have an overreliance on lexical over verbal cues by L2 learners (Cameron, 2011, Ellis & Sagarra, 2010). Similar to Ellis and Sagarra (2010), L2 learners in the current study showed greater accuracy in their interpretation of the target form when there was a temporal cue. The participants in this study were native speakers of English, which is a language known for not being morphologically-rich, so perhaps the fact that these participants' L1 makes more use of lexical forms to express temporal reference, as well as the fact that the subjunctive mood is practically non-existent in English, might have favored this behavior.

5.3 The effects of instruction on L2 learners' attention to morphological cues

The second research question asked if language instruction could help L2 learners pay more attention to morphological cues. Ellis and Sagarra (2011) is the only study to my knowledge to examine if language instruction can help L2 learners over-rely on lexical cues

when they read in the L2. They found that English L1 Latin L2 learners, who were exposed to a language training condition, that brought L2 learners' attention to verbal cues by asking them to translate sentences and words from Latin into English accompanied with corrective feedback, showed a decrease in reliance on lexical cues when compared to the control group who received no language training, as measured by accuracy responses. This dissertation takes one step further and investigated if language instruction, that takes into account principles that guide how L2 learners make form-meaning connection when they read input for meaning, led to changes in the way L2 learners' process the input in real time, as measured by accuracy responses but also with eyetracking data collected at the immediate time L2 learners read the input. In other words, this dissertation examined if L2 learners would show an increase in reading time when reading verbal morphology (Spanish subjunctive), which could be interpreted as an increase in attention from pre- to posttests⁵, with sentences that contained an adverbial phrase in addition to a verbal cue and with sentences that only contained a verbal cue. Overall the results from the present study suggest that instruction does not lead to an increase in attention, confirming my prediction. A more specific discussion of the results in both interpretation tests follows.

Results from the Event Interpretation Test showed a significant increase in Total Dwell Time on the subjunctive verb from pre to posttest, as well as from pre-to delayed posttest with sentences that contained both a verbal and a lexical cue in the instructed group. Although at first glance this finding⁵ may be interpreted as an increase in attention, the reading patterns shown by instructed L2 learners at the pretest might have obscured this finding. See Figure 9 below. Unlike L2 learners in the control group at the pretest stage, L2 learners in the instructed group showed an odd plateau-like Total Dwell Time pattern that led to a significant difference in Total Dwell

⁵ This assumption is made based on previous research that operationalized increase in attention using increase in *First Fixation Duration* and *Gaze Duration*.

Time from pre to posttests. For this reason, I take this finding with caution and rather argue that language instruction did not necessarily led to more attention toward subjunctive morphology in this task.

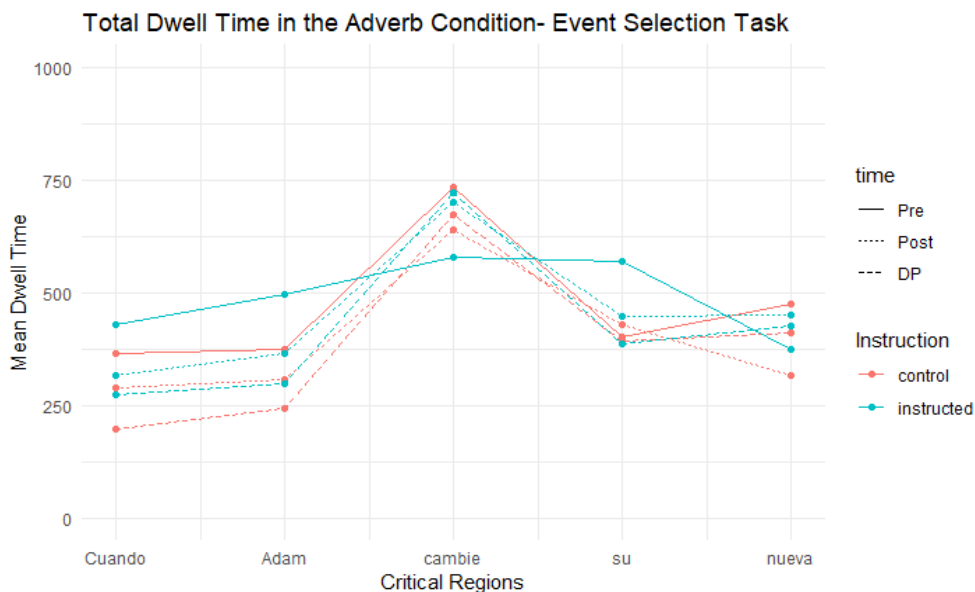


Figure 37. Event Selection Test Total Dwell Time (adverb).

Results from the Sentence Completion test for the instructed group showed a significant decrease in Total Dwell Time on the subjunctive verb from pre-to posttest with incomplete sentences that did not contain an adverbial phrase from pre- to posttest. In addition, a significant increase in Total Dwell Time from posttest to delayed posttest was found. As stated in the prediction for this research question in the methodology chapter, an increase in attention was operationalized as an increase in reading time from pre- to posttest, and this assumption was made based on previous research that used eyetracking to study attention and learning (Godfroid & Uggen, 2013; Godfroid & Schmidtke, 2013). In order to understand this finding, that goes against my prediction, I would resort to previous research that utilized online data elicitation procedures (think alouds) or retrospective verbal reports to investigate levels of awareness and depth of processing and their facilitative effect in L2 development (Calderón, 2013; Craik &

Tulving, 1975; Gass, Svetics, and Lemelin, 2003; Leow, 1997, 2001; Rosa & O'Neill, 1999).

This methodology is qualitative, and it may perhaps shed some light into why instructed L2 learners would show this reading patterns when their offline accuracy data reflects learning gains.

Calderón (2013) found that L2 learners from different proficiency levels showed different levels of depth of processing of the Spanish perfect subjunctive (*hubiera/hubiese*). She used retrospective verbal reports and operationalized depth of attention as high when L2 learners attempted to make form-meaning connections and low when L2 learners made generic superficial observations. See Calderon (2013, p.112) for a more detailed description. In addition, she also measured levels of awareness at the noticing and understanding level (Schmidt, 1990) which were operationalized as *noticing* when L2 learners simply acknowledged seeing the word or not knowing what it meant, and as *understanding* when learners verbalized a rule or mentioned the use of the subjunctive being required in that context. In her discussion, Calderón explicitly mentions that, with regard to depth of processing, “intermediate proficiency learners most likely do not need to process as deeply as low proficiency learners to get the same results. Only partial form-meaning connections in intermediate learners may have the same effect as complete form-meaning connections in low proficiency learners.” (2013, p.116). Similarly, Gass et al (2003) also found that attention had the greatest effect with low proficiency learners and concluded that focused attention (higher level of processing) seemed to take a diminished role at higher proficiency levels, and as such, higher proficiency learners can figure out challenges they come across drawing from their own internal resources.

In light of these findings, one could maybe explain the present study’s findings (or the Sentence Completion test) as suggesting that instructed L2 learners, who were intermediate

proficiency⁶, might have been able to start making form-meaning connections faster and more efficiently immediately after receiving instruction. It is important to point out that L2 learners who took part in this study were already making some form-meaning connections prior to instruction, as shown by their accuracy results at the pretest stage. Based on accuracy results from pre- to posttests, one could say that language instruction helped these L2 learners strengthen these initial form-meaning connections, so perhaps language instruction also led L2 learners to making form-meaning connections faster as they encountered the input. This could explain the significant decrease in Total Dwell Time in the subjunctive verb region, when compared to the L2 learners in the control group, whose Total Dwell Time did not change significantly from pre- to posttest, and would also be consistent with Fernandez (2008), who found that L2 learners exposed to processing instruction consisting of explicit information plus structured input practice were faster and more accurate at making form-meaning connections during the language instruction module. Similarly, the significant increase in Total Dwell Time from post- to delayed posttest, could be the product of instructed L2 learners' conflicting knowledge of their initial interpretations of subjunctive morphology at the pretest stage and the attempt to remembering the rule they learned in session 2, when they received instruction. Offline accuracy data results from post- to delayed posttest, showing a significant decrease, seems to support this explanation.

In sum, the results from this dissertation, with regard to the *Lexical Preference Principle*, suggest that L2 learners relied more on lexical over inflectional cues when making interpretations of these incomplete sentences that contained the subjunctive, shown by accuracy results at the pretest stage. If one considers an increase in reading time to reflect an increase in attention, the results from the present study suggest that language instruction does not lead to an

⁶ according to Montrul & Slabakova (2013)'s modified DELE

increase in attention to morphological cues. However, if one considers that at higher levels of proficiency, as is the case of the L2 learners in the present study, one can make the form-meaning connection faster and more efficiently, then this dissertation provides preliminary support for the idea that language instruction (albeit only in the Sentence Completion Test), which takes into account the psycholinguistic mechanisms that govern L2 input processing, can help L2 learners' pay attention to subjunctive morphology to make accurate form-meaning connections. It is important to note that this finding was not robust, as it only appeared in one eyetracking measure and in only the Sentence Completion test. Further research is needed. I now turn to the discussion of the effects of language instruction on L2 learners' knowledge of the subjunctive in adverbial clauses.

5.4 The effects of instruction on L2 learners' subjunctive interpretation

Our third research question asked if language instruction led to subjunctive interpretation learning gains, which were assessed using changes in accuracy from pre-to posttests. The prediction that language instruction would have a positive outcome was confirmed. L2 learners in the instructed group showed significant learning gains from pre- to posttests in the sentence completion test with sentences that contained adverbial phrases (62.8% > 86.9% > 76%) and with sentences that did not contain an adverbial phrase (28.6% > 72.6% > 55.9%), but L2 learners in the instructed group only made significant learning from pre- to posttests in the Event Selection test with sentences that did not contain an adverbial phrase (20.2% > 79.7% > 68.8%), no gains were observed with sentences that contained an adverbial phrase (86.8% > 88.4% > 85.5%). A possible explanation as to why instructed L2 learners did not make significant learning gains in the Event Selection test could be that their accuracy was already at ceiling at the pretest stage and therefore room for learning was reduced when compared to the accuracy scores at the

pretest stage with sentences that did not contain an adverbial phrase. Additionally, it is very likely that L2 learners relied on the adverbial cue in the adverb condition and there was no need for them to rely on morphological cues in these cases.

The positive learning gains observed in the current study are consistent with previous research that investigated the effects of processing instruction on L2 learners' interpretation of Spanish subjunctive (Farley, 2004; Bowles & Henshaw, 2015; Lee & McNulty, 2013; McNulty-Díaz, 2017). Although the current study did not employ a pedagogical intervention that can be called PI, several principles that characterize PI, such as "present one form at a time" and "consider the psycholinguistic mechanisms that guide L2 learners input processing" to design structured input practice, were implemented (VanPatten, 1996). Similar to studies that examined the effects of PI on L2 learners' interpretation of subjunctive in adverbial clauses, I found that L2 made significant interpretation gains from pre-to posttest that were still present in the delayed posttest (Bowles & Henshaw, 2015; Lee & McNulty, 2013; McNulty-Díaz, 2017). Similar to these studies, this dissertation only examined the effects of instruction with *Cuando* adverbial clauses, and therefore, no generalizations about the effects of language instruction on other types of adverbial clauses can be made at this point in time. Furthermore, these studies and the present study examined only Spanish regular *-ar* verbs in the third person singular (Lee & McNulty, 2013; McNulty-Díaz, 2017, present study) or first person singular (Henshaw & Bowles, 2015), suggesting that language instruction is helpful with the interpretation and production of subjunctive with regular verbs, when only one form is introduced at a time. Finally, unlike previous research that investigated the subjunctive in adverbial clauses (Bowles & Henshaw, 2015; Lee & McNulty, 2013; McNulty-Díaz, 2017), the present study only employed referential activities in the instructional intervention and found that L2 learners still benefitted from

language instruction significantly. This finding is consistent with Marsden (2006) who found that L2 learners who completed practice containing referential activities made substantial learning gains when compared to those L2 learners who completed practice that did not force them to make accurate form-meaning connections with French verbal inflection and temporal references.

An unexpected result in this study was that participants in the control group also made significant learning gains from pre- to posttest in the two interpretation tests, both with sentences that contained and did not contain an adverbial phrase. Although unusual, I think that this finding can be explained by the design of the interpretation tests used in this dissertation. Similar to referential activities used in structured input practice, the Event Selection and Sentences completion included only one form (third person singular), only presented the adverbial clause so the learner had to pay attention to the only verbal cue (when no lexical cue was present) to interpret the type of event or complete the sentence, and followed a multiple choice format, making this design very conducive to form meaning connections. Although a comparison of subjunctive items in previous PI research studies' structured input and the current study is not possible because this information was not specified at the item level but rather activity level (McNulty-Diaz, 20017, p. 48), time on task in these PI studies was sometimes equivalent to 80% of a class period, which is often 50 minutes, this is close to the time it took L2 learners to complete these two tests (30-45minutes) in the present study. Thus, it is possible that repeated exposure to these tests, in the pre-, post- and delayed posttest might have been enough to bring control L2 learners' attention to make form-meaning connections. This finding aligns with structured input practice commonly used in processing instruction (VanPatten & Oikikennon, 1996; VanPatten & Borst, 2012); however, these studies that tested the effects of structured input practice, often included corrective feedback, which the current study's interpretation tests did

not. Perhaps another explanation could be a test effect, and therefore shows the importance of having a control group that only partakes in the experiment by completing the assessment tests. Something that many processing studies often lack.

Although not part of the research questions, the interpretation data collected at the pretest stage also provided information on how L2 learners interpret mood morphology in adverbial clauses, which can be compared to the limited previous research that examined this phenomenon. Overall, the accuracy results from the Event Selection and Sentence Completion tests, at the pretest, were low for both L2 learners in the control group (27.7%, 16.8%) and the instructed group (20.2%, 28.6%) with sentences that did not contain an adverbial phrase. These interpretation tests had a choice out of three (multiple choice); therefore, a chance score is 33% and L2 learners consistently scored below chance on the pretest, which suggests that they were not aware of the subjunctive/indicative mood morphology mapping. These findings are consistent with Kanwit and Geeslin (2014, 2018) who used similar interpretation tests and also tested intermediate L2 learners. Kanwit and Geeslin (2014) used an interpretation test similar to the Event Selection Task and found that intermediate L2 learners chose the option “not yet occurred event/action” 43% of the time. The pretest results for the Event Selection test in the present study showed accuracy scores that were also below chance. Similarly, Kanwit and Geeslin (2018) used an interpretation task similar to the Sentence Completion test in this study and found that intermediate learners chose an ending containing future 30% of the time. In the current study, the pretest accuracy scores on the Sentence Completion Test were also below chance at 23%.

In sum, the language instruction used on this dissertation appeared to help L2 learner’s make accurate form-meaning connections with subjunctive morphology in adverbial clauses.

These gains happened in both tests with sentences that did and did not contain an adverb, with the exception of sentences containing an adverbial cue in the Event Selection test. These findings are consistent with previous research that examined L2 learners' interpretation of mood in Spanish adverbial clauses (Kanwit & Geeslin, 2014, 2018) in addition to previous research that also found that language instruction is beneficial for L2 learners' interpretation of the subjunctive mood (Farley, 2004; Bowles & Henshaw, 2015; Lee & McNulty, 2013; McNulty-Díaz, 2017) I now move to the discussion of production results.

5.5 The effects of instruction on L2 learners' subjunctive production

In addition to interpretation gains, this dissertation also examined if language instruction that focused on fostering accurate form-meaning connections at the input processing stage would also translate into production learning gains. My predictions were confirmed, and this study found strong production learning gains as the result of language instruction. Instructed L2 learners' accuracy increased from 6.7% to 76.5% from pre- to posttest and stayed at 55% 3-4 weeks post-instruction with sentence that contained an adverb. Learning gains with sentences that did not contain an adverb were even larger, with a starting accuracy of 3.3% that when up to 79.2% and stayed at 61.5 % in the delayed posttest. This finding is also consistent with instructional research that employed a PI design and examined the Spanish subjunctive in adverbial clauses (Bowles & Henshaw, 2015; Lee & McNulty, 2013; McNulty-Díaz, 2017). For example, Lee and McNulty (2013) also used a fill-in-the-gap written production task and their pretest findings also showed extremely low accuracy; however, instructed L2 learners accuracy increased by 92% on average from pre-to posttest. McNulty-Díaz (2017) used a written sentence completion task and also found similar results. In her study instructed L2 learners' accuracy scores improved by 69% and 44% in both experimental groups, which only differed in the order

in which the explicit information was administered. Finally, Bowles and Henshaw also found that L2 learners benefitted significantly from instruction in their production of subjunctive in adverbial clauses.

Similar to what was found with the control group's learning gains in interpretation, I found that participants in the control group also improved significantly from pre- to posttest in terms of production accuracy. However, their learning gains were not as strong as those made by the instructed group. Control L2 learners' accuracy only increased from 1.9% to 12.7% from pre- to posttest and stayed at 7.9% 3-4 weeks post-instruction with sentences that contained an adverbial phrase. Learning gains were similar with sentences that did not contain an adverbial phrase, where accuracy increased from 1.9% to 14.5% from pre- to posttest and stayed at 11.5% in the delayed posttest. As previously mentioned with the control group's interpretation results, this significant increase in production accuracy results from pre- to posttest, found in control L2 learners in both interpretation tests, could be the product of a test effect.

The production data collected at the pretest stage also provided information about when L2 learners produce the subjunctive mood (vs. the indicative mood) in adverbial clauses, which can be compared to the larger body of previous research that examined this phenomenon. Unlike in the two interpretation tasks, L2 learners showed very low accuracy scores that averaged at 4% with sentences that contained an adverbial phrase, and 2.6% with sentences that did not contain an adverbial phrase. This finding is not entirely surprising given the nature of the test. Whereas L2 learners only had to choose between three possible options to make tense-related interpretations (in the Event Selection Test) or complete a sentence (in the Sentence Completion Test), L2 learners in the production test had to conjugate a verb in the correct tense and mood from a non-infinitive version of the verb presented in parenthesis. L2 learners' low production of

subjunctive in linguistic contexts where its use is required, once again according to normative rules, has also been a common finding in previous research that studied intermediate L2 learners (Collentine, 1997; Geeslin & Gudmestad, 2008; Gudmestad, 2006, 2013; Lubbers Quesada, 1998).

In sum, the present study's production results showed that language instruction, that is informed by Input Processing principles, can still lead to production learning gains, as found by previous research (VanPatten & Cadierno, 1993; Farley, 2004, among others). In addition, the current study's production data at the pretest stage is consistent with previous research that examined L2 learners' production of the subjunctive mood with respect to intermediate Spanish L2 speakers not showing high rates of subjunctive use with regular verbs (Collentine, 1997; Geeslin & Gudmestad, 2008; Gudmestad, 2013; among others). The following section is devoted to discussing the findings from this study's final research question.

5.6 The effects of language instruction on L2 learners' processing of the subjunctive

The present study's last research question asked if language instruction, informed by PI and designed taking into account the psycholinguistic mechanisms that govern L2 input processing, can lead to positive changes in L2 learners' input processing strategies, measured as online sensitivity to subjunctive incongruencies after receiving language instruction. For instructed learners, I found a significant increase in Total Dwell Time in region 8 a ("to") with ungrammatical sentences, from pre- to posttest, when compared to ungrammatical sentences. This finding suggests that instructed L2 learners became more sensitive to subjunctive incongruencies as the result of language instruction. However, this finding should be taken with a grain of salt since only one of the four eyetracking measures showed a significant effect and L2 learners in the control group regressed significantly more into region 2 (pre-subjunctive region)

in ungrammatical than grammatical sentences from pre- to posttest. This finding suggests that L2 learners in the control group also showed some sensitivity to the subjunctive manipulation at the posttest stage. Overall, the eyetracking results can only provide limited evidence to this research question that examined the effects of language on L2 learners' online sensitivity to subjunctive incongruencies.

Now moving to previous research that examined the effect of language instruction on L2 learners' processing, it could be said that this study's findings are inconsistent with Dracos (2013) and Henry (2015), who found no evidence that language instruction helped L2 learners become more sensitive to subject-verb agreement, and verb-temporal incongruencies, or to help L2 learners process case marking. This study's findings are more consistent with Issa et al. (2015) and Wong and Ito (2018) who found evidence that language instruction, consisting of structured input practice (sometimes preceded by explicit information, as in experiment 2 of Wong and Ito (2018), helped L2 learners make more accurate form-meaning connections. One possible explanation for this difference in findings could be the methodology employed. Whereas the present study, Issa et al. (2015), and Wong and Ito (2018) used eyetracking; Dracos (2013) and Henry (2015) used self-paced reading. Unlike self-paced reading, eyetracking allows the use of a wide variety of early and late time measures providing more precise data and having the potential to reveal timecourse differences from pre- to posttest, which could only be attributed to instruction.

Nevertheless, there are a number of other factors that might also explain this difference in findings. Dracos (2013) was the only other study that examined Spanish, more precisely, subject-verb agreement and temporal-verb incongruencies. The phenomenon studied in Dracos (2013) is particularly similar to the manipulation in the current study, because it involves making changes

in the sentence that lead to ungrammaticality, subject-verb agreement in Dracos (2013), mood violations in the present study, and verb- temporal incongruencies in both studies. However, in Dracos (2013) instruction did not seem to have an effect on L2 learners' sensitivity to such manipulations, and the present study found partial evidence that it might help L2 learners.

In addition, Dracos (2013) did not seem to have followed processing instruction guidelines for their instructional module and a closer look at the study revealed that the instruction and assessment tasks contained three different types of verbs (*-ar*, *-er*, and *-ir* verbs) and two conjugations (first and third singular and plural forms). The current study did not follow all PI guidelines but included only one form: *-ar* verbs in the third person singular, in keeping with guidelines for Processing Instruction. This could be a determining factor, since L2 learners in Dracos (2013) were required to have a good command of multiple sets of endings that differed by verb type in the third person singular (*-a*, *-e*) and plural (*-amos*, *-emos*, *-imos*), and the present study only required one association (*a*= indicative, *e*= subjunctive). L2 learners in Dracos' study were exposed to 5 language training sessions that lasted 20 minutes and consisted of 96 experimental items; whereas the present study only contained one language training session that lasted 30-40 minutes approximately and contained only 32 experimental items. Despite the higher number of experimental items and longer period of time on task, L2 learners did not show any evidence of sensitivity to subject-verb agreement or verb-temporal incongruencies, but study found partial evidence.

Another difference between the present study and Dracos (2013)'s design, that could explain the difference in findings, is the presentation of stimuli during the practice portion of the instructional intervention. L2 learners, in Dracos (2013)'s study, were exposed to visual and written sentences; whereas L2 learners in the current study only saw written sentences. Finally,

the L2 learners' proficiency was different in the two studies. L2 learners in the present study had a low-intermediate proficiency level, but the L2 learners in Dracos (2013) had a novice level. It is possible that at such low proficiency, L2 learners' efforts to comprehend the input may have drained their cognitive resources, not allowing them to pay attention to information at the level of morphosyntax, such as agreement, and therefore, no effects were found in the self-paced reading task, contrary to the learning shown in other offline tasks.

Similarly, L2 learners in Henry (2015) also had a lower proficiency (third semester of German) when compared to the L2 learners in the current study, who were enrolled in advanced Spanish content courses equivalent to at least sixth semester Spanish. Furthermore, the phenomenon studied by Henry (2015) accusative case marking is different from the agreement manipulations used in Dracos (2013) and the present study. Henry (2015) found that L2 learners in the PI group relied less on the first-noun principle proposed by the Input Processing model (VanPatten, 1993,1994), but their reading patterns in the OVS did not differ significantly from those in the SVO. Perhaps, the findings of these studies should not be directly compared given the difference in study design.

In addition to the eye movement patterns observed from pre- to posttest, eyetracking at the pretest stage revealed that instructed L2 learners spent significantly more time reading region 9 *semana* ("week") as measured by Total Dwell Time, with sentence that contained an adverbial phrase, in the ungrammatical than the grammatical condition. This finding is unexpected. A possible explanation could be that L2 learners are not sensitive to the incorrect use of present of indicative in this context, L2 learners in the production pretest often conjugated the verb in the periphrastic or simple future form when the verb in the main clause also denoted a future reference (*Cuando Juan va a viajar, va a divertirse* "When Juan is going to travel, he is going to

have fun”); thus, it is possible that they also expected to encounter the future tense in the adverbial clause when reading these sentences in the reading comprehension test. However, this explanation does not account for the fact that these L2 learners did not show the same pattern with grammatical sentences. A small percentage of the incorrect responses in the production test also revealed that L2 learners sometimes used the first person singular in the future instead of the present of subjunctive in the adverbial clause, which, in writing, differ only by an accent mark (future= *canté*, present of subjunctive= *cante*). It is possible that L2 learners misinterpreted the present of subjunctive as a future form and that this would explain their lack of sensitivity with grammatical sentences.

Aside from this finding, the results from the four eyetracking measures employed in this study suggest that intermediate Spanish L2 learners are not sensitive to subjunctive incongruencies in adverbial clauses at the pretest stage. These findings are consistent with previous research that examined L2 learners’ processing of mood using self-paced reading and eyetracking (Demos, 2015; Cameron, 2011; Fernández- Cuenca & Jegerski, 2017). Similar to Demos (2015) and Cameron (2011), who used self-paced reading to examine intermediate L2 learners’ sensitivity to subjunctive grammaticality while reading for comprehension, I found that, at this level of proficiency, L2 learners do not appear to be sensitive to subjunctive incongruencies. Although the type of subjunctive studied in Demos (2015) and Cameron (2011) is different from the one in the present study, in terms of morphology and usage, this common finding speaks to the phenomenon of Spanish mood processing, and how L2 learners at lower levels of proficiency may not be able to notice these inconsistencies in the input. Fernández-Cuenca and Jegerski (2017) found that only very advanced Spanish L2 learners with immersion experience in a Spanish speaking country were sensitive to subjunctive incongruencies in the

input when reading sentences for comprehension, as measured with eyetracking. In addition, Fernández- Cuenca and Jegerski (2017) also examined if form regularity (the form regularity of the verb encoding mood) modulated L2 learners sensitive to subjunctive incongruencies. Their results showed that whereas only advanced L2 Spanish speakers showed sensitivity to subjunctive incongruencies, they only did so when the manipulated verb was irregular (or “form-specific” according to Gudmestad, 2012). The stimuli in the present study only contained regular verbs, and the lack of sensitivity to subjunctive incongruencies shown by intermediate L2 learners, in all four eyetracking measure tasks, are consistent with Fernández- Cuenca and Jegerski (2017)’s findings.

In sum, the present study provides some limited evidence that language instruction leads to L2 learners’ online sensitivity of subjunctive incongruencies, as one of the four eyetracking measures captured a significant effect from pre- to posttests. These findings are consistent with previous research that also used an eyetracking paradigm (Issa et al, 2015; Wong & Ito, 2018), but are inconsistent with those that used a self-paced reading paradigm (Dracos, 2013; Henry, 2015), suggesting that perhaps the methodology used in these studies is one of the responsible factors that explains the difference in findings. Nevertheless, other important differences in the instructional design and target form studied are also very likely to explain the difference in results.

5.7 Summary of chapter: major contributions of this dissertation

First, this dissertation provides further support for the Lexical Preference Principle embodied in VanPatten’s Input Processing Model (VanPatten, 1996; 2015), which states that L2 speakers tend to rely more on lexical cues (i.e., content words) than on inflection cues (i.e., verb endings) when processing input for comprehension. Furthermore, this dissertation contributes to

the field of instructed second language acquisition by examining the effects of language instruction on the psycholinguistic constructs of attention. It adds on to previous limited research that examined L2 learners allocate attention, in real time, toward morphological cues post-instruction. Unlike in previous research, our findings suggested that language instruction, informed by the psycholinguistic mechanisms that govern L2 input processing (VanPatten, 1996), might help L2 learners make form-meaning connection more efficiently in real time, evident as a significant decrease in reading time on the region containing the verbal cue from pre- to posttests.

In addition, the present study provides further evidence that language instruction is helpful for L2 learners' acquisition of the subjunctive mood, leading to interpretation and production learning gains (Bowles & Henshaw, 2015; Lee & McNulty, 2013; McNulty-Díaz, 2017). Unlike previous research that examined the effects of language instruction on L2 learners' knowledge of the Spanish subjunctive in adverbial clauses using only offline interpretation and production tests, this dissertation provides preliminary evidence that language instruction can help L2 learners' real time processing of Spanish mood, as the instructed L2 learners in this study showed sensitivity to subjunctive incongruencies when they read for comprehension, at least in one of the four eyetracking measures employed.

A third important contribution of the following dissertation is the use of multiple tests: interpretation, production, and sentence processing to assess L2 learners' knowledge of Spanish mood. As mentioned in chapter 2, there is less research that examined acquisition of the Spanish subjunctive in variable contexts, as it is the case of the subjunctive in adverbial clauses. Previous research that studied the L2 acquisition of the subjunctive in adverbial clauses by L2 speakers often utilized interpretation tasks (Kanwit & Geeslin, 2014; 2018); however, the current study is

one of the first studies to examine L2 learners' production of the subjunctive in adverbial clauses.

Another contribution made by the current study is the fact that language instruction can help L2 learners become more sensitive to subjunctive incongruencies when the verb encoding mood is regular. Previous research had observed that L2 learners were less likely to interpret regular in the subjunctive form as expressing future reference (Kanwit & Geeslin, 2014) and that L2 learners produce less subjunctive with regular than irregular verbs (Collentine, 1997; Lubbers Quesada, 1998; Kanwit & Geeslin, 2014; among others). Similarly, previous research also shown that intermediate L2 learners do not show sensitivity to mood incongruencies when the verb encoding mood is regular. This dissertation went one step further and examined if language instruction can help L2 learners' interpretation, production, and processing of the subjunctive with regular verbs. The current study's findings suggest that language instruction helps with L2 learners' interpretation and production but can only provide partial evidence for L2 learners' changes in sensitivity to mood incongruencies.

Finally, the most important contribution of this dissertation is the fact that the current study, together with only a handful of studies, used psycholinguistic measures to investigate how language instruction, inspired by processing instruction, affect processing in real time. The present study helped shed some light on to the inconclusive findings from previous research (Dracos, 2013; Henry, 2015; Issa et al., 2015; Wong & Ito, 2018).

5.8 Pedagogical implications

The pedagogical intervention used in the current study took into account the *Lexical Preference Principle*, which predict that L2 learners would most likely focus on content words than verb endings when processing input for comprehension and included activities that pushed

L2 learners to pay attention to the verb ending to complete sentences and conjugate verbs. In addition, these activities were preceded by explicit information that explained these faulty processing strategies and encouraged L2 learners to also pay attention to verb endings, which in Spanish adverbial clauses, provide as much temporal information as content words.

This type of instruction can easily be adapted to a hybrid format of teaching where L2 learners complete an online module at home, which often consists of explicit information and some practice prior to face-to-face class time and consists of extended practice during face-to-face class time. This explicit information and structured input practice could be implemented as the online module in preparation for the face-to-face class time. Then the class time could be devoted to extended practice where L2 learners reinforce the form-meaning connections made during this online preparation module, with more open-ended practice and the instructor's feedback.

The current study's pedagogical intervention was limited to 40 minutes and led to significant interpretation and production gains; thus, it is possible that multiple sessions of this same treatment supported by 50 minute face-to-face sessions with extended practice could lead to a more robust effect that would ease L2 learners' understanding of the complex phenomenon of Spanish mood, especially in an optional context, as it is the case of the subjunctive in adverbial clauses.

A final important remark to consider is the proficiency of these L2 learners. The Spanish L2 learners in the current study had approximately intermediate- mid proficiency according to ACTFL standards. Therefore, it is possible that more novice L2 learners are not ready to handle the explicit information provided in the present study or are simply not ready cognitively speaking to acquire the subjunctive-mood contrast when most of their cognitive processes are

being drain by extracting meaning from the input. In other words, they are not ready to pay attention to verb endings, when they are still struggling with understanding the meaning of words or verbs. The pedagogical intervention used in the present study was informed by Processing Instruction guidelines (VanPatten & Cadierno, 1993), and as such, I only focused on presenting one form at a time, the third person singular of *-ar* verbs. This deescalated the complexity of form-meaning mapping in the input fostering L2 learners' strong optimal form-meaning associations.

5.9 Conclusion and future directions

The present study was set to examine the predictions made by the Lexical Preference Principle with regard to mood morphology. In addition, this dissertation examined if language instruction, that was informed by L2 learners biased processing to lexical cues, could lead to interpretation, production, and processing learning gains for intermediate Spanish L2 learners' knowledge of the subjunctive in adverbial clauses. Overall, the findings from this dissertation provide support for the Lexical Preference Principle as shown by accuracy data at the pretest stage. The results from the two interpretation tests and one production test also provide further support for the benefits of language instruction with the acquisition of Spanish mood. An important contribution of the current study was the inclusion of eyetracking to examine the effects of language instruction on L2 learners' processing of mood from pre- to posttests. The current study's findings only provided limited support for the positive effects of language instruction on L2 learners' processing, as only one of the four eyetracking measures employed captured L2 sensitivity to subjunctive incongruencies from pre- to posttest. This finding highlights the importance of using multiple eyetracking measures, especially early and late measures. Future research should include multiple eyetracking measures.

In addition to the difference in methodology employed (eyetracking vs. self-paced reading), the present study and previous research that examined the effects of language instruction on L2 learners' processing did not consistently use the same type of instruction. The degree to which these instructional interventions truly represented processing instruction varied from study to study. Some studies presented stimuli aurally (Wong & Ito, 2018), other only in writing (Issa et al, 2015; the present study), and some used a combination of both (Dracos, 2013; Henry, 2015). Moreover, the number of training sessions and experimental stimuli used also varied greatly from study to study. Thus, future research would have to keep these factors constant to be able to truly answer if processing instruction, or perhaps simply structured input can lead to positive changes in L2 learners' processing strategies.

Furthermore, most of these studies examined changes in processing from pre- to posttests (Dracos, 2013; Henry, 2015), or from the beginning of the instructional intervention to the end (Issa et al, 2015), in comparison to Wong and Ito (2018) who examined the effects of structure input practice during instruction. Although these differences in design were justified by the research questions posited in these studies, future research that aims to examine the effects of PI on L2 learner's input processing strategies would have to be more precise and use more concrete language to refer to the point in time in which these potential changes in input processing are being examined: "during structured input practice" or "as the result of processing instruction as measured by a sentence processing task".

With regards to the two studies that used eyetracking (similar to the present study), it is important to note that the paradigms employed were different. Issa et al (2015) used a sentence processing paradigm and Wong and Ito (2017) used visual world paradigm. These different paradigms also involved a different analysis of the data which may lead to a different

interpretation of processing gains. For instance, Wong and Ito (2018) examined the proportion of looks toward the picture that depicted the most accurate description of the sentence read, but Issa et al (2015) and the present study examined differences in reading times. Future research should bear in mind this methodological and analysis difference when comparing designing a study and comparing their findings to previous research.

Finally, this dissertation only examined the effects of language instruction with Spanish L2 learners, however heritage speakers of Spanish with lower proficiency of Spanish do not always interpret mood in Spanish adverbial clauses in the same way Spanish monolingually-raised individuals do (Montrul, 2007). A future version of the current study should include a control and an instructed heritage learner group to examine if language instruction can help heritage speakers and contribute to the limited instructional research conducted with heritage speakers (Bowles, 2017).

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APPENDIX A: Stimuli for Reading while Eyetracking

Stimuli for Reading while Eyetracking Pretest

- Cuando Ane cocine/a con más tiempo (la próxima semana) va a comer muy sano
- Cuando Antonio visite/a a su familia (la próxima semana) va a estar muy feliz
- Cuando Juan viaje/a a Sri Lanka (la próxima semana) va a tomar muchas fotos
- Cuando Pamela tome/a una cerveza lager (la próxima semana) va a estar muy relajada
- Cuando Miguel completa/e la nueva tarea (la próxima semana) va a descansar mucho mejor
- Cuando Rosa compre/a un carro nuevo (la próxima semana) va a manejar a Chicago
- Cuando Antón termine/a su nuevo proyecto (la próxima semana) va a sorprender a su novia
- Cuando Lisa mire/a su serie favorita (la próxima semana) va a comer comida china
- Cuando Roberto camine/a por el parque (la próxima semana) va a quemar 100 calorías
- Cuando Kara necesite/a un favor personal (la próxima semana) va a hablar con John
- Cuando Alberto llame/a a su madre (la próxima semana) va a estar más tranquilo
- Cuando Sara encuentre/a una solución flexible (la próxima semana) va a resolver muchos problemas
- Cuando Pepe escuche/a las malas noticias (la próxima semana) va a estar muy confuso
- Cuando Petra revise/a los exámenes finales (la próxima semana) va a estar muy descontenta
- Cuando Daniel pasee/a por el parque (la próxima semana) va a apreciar el sol
- Cuando Vanesa esté/á en el hospital (la próxima semana) va a sentirse muy nerviosa

Stimuli for Reading while Eyetracking Task Posttest

- Cuando Antonio mire/a la luna llena (la próxima semana) va a convertirse en hombre lobo
- Cuando Ane maneje/a al aeropuerto Midway (la próxima semana) va a encontrar mucho tráfico

Cuando Juan ande/a en su bicicleta (la próxima semana) va a perder mucho peso

Cuando Pamela complete/a su segundo examen (la próxima semana) va a poder relajarse completamente

Cuando Miguel empiece/a sus nuevas clases (la próxima semana) va a comprar un iclicker

Cuando Rosa mire/a the Blair witch (la próxima semana) va a dormir muy mal

Cuando Antón compre/a un sofá nuevo (la próxima semana) va a visitar tiendas diferentes

Cuando Lisa reserve/a un billete electrónico (la próxima semana) va a consultar muchas páginas web

Cuando Roberto trabaje/a en Microsoft Worldwide (la próxima semana) va a conocer a Paul Allen

Cuando Kara ayude/a a sus estudiantes (la próxima semana) va a tener mucha paciencia

Cuando Alberto colabore/a con otra compañía (la próxima semana) va a aprender mucho

Cuando Sara termine/a su nuevo doctorado (la próxima semana) va a conseguir un buen trabajo

Cuando Pepe enseñe/a clases de inglés (la próxima semana) va a viajar por Asia

Cuando Petra trabaje/a en su tesis (la próxima semana) va a necesitar muchos snacks

Cuando Daniel visite/a San Luis Potosí (la próxima semana) va a practicar náhuatl

Cuando Vanesa cante/a en el teatro (la próxima semana) va a estar muy nerviosa

Stimuli for Reading while Eyetracking Task Delayed posttest

Cuando Antonio termine/a su última entrevista (la próxima semana) va a relajarse mucho

Cuando Ane cuente/a todos los billetes (la próxima semana) va a ir al banco

Cuando Juan hable/a con su psicólogo (la próxima semana) va a sentirse mejor

Cuando Pamela presente/a su último proyecto (la próxima semana) va a recibir comentarios

Cuando Miguel cante/a en la televisión (la próxima semana) va a sorprender a su familia

Cuando Rosa firme/a su nuevo contrato (la próxima semana) va a abrir una cuenta bancaria

Cuando Antón perfeccione/a su solicitud doctoral (la próxima semana) va a revisar su ensayo

Cuando Lisa baile/a tango de salón (la próxima semana) va a disfrutar mucho

Cuando Roberto comente/a las malas notas (la próxima semana) va a escuchar quejas

Cuando Kara acabe/a su nueva composición (la próxima semana) va a descansar con sus amigos

Cuando Alberto compare/a sus nuevas respuestas (la próxima semana) va a entender sus errores

Cuando Sara elabore/a más sus respuestas (la próxima semana) va a conseguir el trabajo

Cuando Pepe solicite/a su Green Card (la próxima semana) va a vivir más tranquilo

Cuando Petra viaje/a con sus amigas (la próxima semana) va a ir a las montañas

Cuando Daniel interprete/a el texto filosófico (la próxima semana) va a escribir un ensayo

Cuando Vanesa argumente/a su nueva perspectiva (la próxima semana) va a convencer a sus amigas

APPENDIX B: Stimuli for Event Selection Interpretation Test

Stimuli for Event Selection Interpretation Test Pretest

- | | |
|---|-------------------------|
| Cuando Ana canta una canción rápida (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Juan toca la guitarra española (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Amalia baila salsa y tango (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Hugo se despierta a las 10 (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Kara estudia para sus exámenes (con frecuencia), | (a) acción habitual |
| ... | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Miguel maneja su nueva motocicleta (con | (a) acción habitual |
| frecuencia), ... | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Rosario mira la televisión común (con frecuencia), | (a) acción habitual |
| ... | (b) acción en el futuro |
| | (c) acción en el pasado |

- Cuando Bruno visita a su familia (con frecuencia), ... (a) acción habitual
(b) acción en el futuro
(c) acción en el pasado
- Cuando Sara esté mucho más relajada (la próxima semana), ... (a) acción habitual
(b) acción en el futuro
(c) acción en el pasado
- Cuando Adam organice la cena familiar (la próxima semana), ... (a) acción habitual
(b) acción en el futuro
(c) acción en el pasado
- Cuando Clara viaje a Los Ángeles (la próxima semana), ... (a) acción habitual
(b) acción en el futuro
(c) acción en el pasado
- Cuando Tomas hable con su profesora (la próxima semana), ... (a) acción habitual
(b) acción en el futuro
(c) acción en el pasado
- Cuando Jennifer cobre su sueldo semanal (la próxima semana), ... (a) acción habitual
(b) acción en el futuro
(c) acción en el pasado
- Cuando Arturo se gradue de la universidad (la próxima semana), ... (a) acción habitual
(b) acción en el futuro
(c) acción en el pasado
- Cuando María dibuje su nuevo diseño (la próxima semana), ... (a) acción habitual
(b) acción en el futuro

Cuando Julio mire Game of Thrones (la próxima semana), (c) acción en el pasado
... (a) acción habitual
... (b) acción en el futuro
... (c) acción en el pasado

Stimuli for Event Selection Interpretation Task Posttest

Cuando Ana juega al voleibol profesional (con frecuencia), (a) acción habitual
... (b) acción en el futuro
... (c) acción en el pasado

Cuando Juan toma fanta con hielo (con frecuencia), ... (a) acción habitual
... (b) acción en el futuro
... (c) acción en el pasado

Cuando Amalia usa su computadora portátil (con frecuencia), ... (a) acción habitual
... (b) acción en el futuro
... (c) acción en el pasado

Cuando Hugo escucha blues y jazz (con frecuencia), ... (a) acción habitual
... (b) acción en el futuro
... (c) acción en el pasado

Cuando Kara canta en la iglesia (con frecuencia), ... (a) acción habitual
... (b) acción en el futuro
... (c) acción en el pasado

Cuando Miguel busca un apartamento grande (con frecuencia), ... (a) acción habitual
... (b) acción en el futuro

	(c) acción en el pasado
Cuando Rosario practica su portugués avanzado (con frecuencia), ...	(a) acción habitual (b) acción en el futuro (c) acción en el pasado
Cuando Bruno habla con su hermano (con frecuencia), ...	(a) acción habitual (b) acción en el futuro (c) acción en el pasado
Cuando Sara viaje a St Louis la próxima semana, ...	(a) acción habitual (b) acción en el futuro (c) acción en el pasado
Cuando Adam compre más fruta fresca (la próxima semana), ...	(a) acción habitual (b) acción en el futuro (c) acción en el pasado
Cuando Clara ayude a su vecina (la próxima semana), ...	(a) acción habitual (b) acción en el futuro (c) acción en el pasado
Cuando Tomas cambie de carrera profesional (la próxima semana), ...	(a) acción habitual (b) acción en el futuro (c) acción en el pasado
Cuando Jennifer cierre su último negocio (la próxima semana), ...	(a) acción habitual (b) acción en el futuro (c) acción en el pasado
Cuando Arturo prepare la fiesta sorpresa (la próxima	(a) acción habitual

- | | |
|---|-------------------------|
| semana), ... | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando María enseñe matemáticas y física (la próxima semana), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Julio llame a su novia (la próxima semana), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |

Stimuli for Event Selection Interpretation Task Delayed posttest

- | | |
|--|-------------------------|
| Cuando Ana canta una balada rápida (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Liam explica su perspectiva objetiva (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Jacinta ayuda a sus pacientes (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Roberto compara las opciones posibles (con frecuencia), ... | (a) acción habitual |
| | (b) acción en el futuro |
| | (c) acción en el pasado |
| Cuando Begoña soluciona todos los problemas (con | (a) acción habitual |

frecuencia), ...	(b) acción en el futuro
	(c) acción en el pasado
Cuando Luis presenta sus nuevos proyectos (con frecuencia), ...	(a) acción habitual
	(b) acción en el futuro
	(c) acción en el pasado
Cuando Iris investiga temas de interés (con frecuencia), ...	(a) acción habitual
	(b) acción en el futuro
	(c) acción en el pasado
Cuando Pedro calcula sus impuestos federales (con frecuencia), ...	(a) acción habitual
	(b) acción en el futuro
	(c) acción en el pasado
Cuando Carolina estudie en su casa (la próxima semana), ...	(a) acción habitual
	(b) acción en el futuro
	(c) acción en el pasado
Cuando Héctor conteste las preguntas establecidas (la próxima semana), ...	(a) acción habitual
	(b) acción en el futuro
	(c) acción en el pasado
Cuando Bella complete sus estudios universitarios (la próxima semana), ...	(a) acción habitual
	(b) acción en el futuro
	(c) acción en el pasado
Cuando Aníbal considere otras posibilidades nuevas (la próxima semana), ...	(a) acción habitual
	(b) acción en el futuro
	(c) acción en el pasado

Cuando Beth escuche el nuevo discurso (la próxima semana), ...

- (a) acción habitual
- (b) acción en el futuro
- (c) acción en el pasado

Cuando Joe utilice su nuevo celular (la próxima semana), ...

- (a) acción habitual
- (b) acción en el futuro
- (c) acción en el pasado

Cuando Casey experimente con su iPad (la próxima semana), ...

- (a) acción habitual
- (b) acción en el futuro
- (c) acción en el pasado

Cuando Jimmy piense en su novia (la próxima semana), ...

- (a) acción habitual
- (b) acción en el futuro
- (c) acción en el pasado

APPENDIX C: Stimuli for Sentence Completion Interpretation Test

Stimuli for Sentence Completion Interpretation Test Pretest

- Cuando María viaja en su coche (con frecuencia), ...
- (A) va a Chicago
 - (B) va a ir a Chicago
 - (C) fue a Chicago
- Cuando Liam enseña Chino y Japonés (con frecuencia), ...
- (A) va a usar la pizarra
 - (B) usa la pizarra
 - (C) usó la pizarra
- Cuando Jacinta camina por el campus (con frecuencia), ...
- (A) apreció la naturaleza
 - (B) aprecia la naturaleza
 - (C) va a apreciar la naturaleza
- Cuando Roberto paga sus impuestos (con frecuencia), ...
- (A) recibe más dinero
 - (B) va a recibir más dinero
 - (C) recibió más dinero
- Cuando Begoña viaja en aviones comerciales (con frecuencia), ...
- (A) va a dormir peor
 - (B) duerme peor
 - (C) durmió peor
- Cuando Luis maneja en su carro (con frecuencia), ...
- (A) necesitó sus lentes
 - (B) necesita sus lentes
 - (C) va a necesitar sus lentes
- Cuando Iris toma café o té (con frecuencia), ...
- (A) tiene más energía
 - (B) va a tener más energía
 - (C) tuvo más energía

Cuando Pedro consulta su correo electrónico (con frecuencia), ...	(A) ve mucho spam (B) va a ver mucho spam (C) vió mucho spam
Cuando Carolina cierre la puerta principal (la próxima semana), ...	(A) va a usar la llave (B) usa la llave (C) usó la llave
Cuando Hector hable con su profesor (la próxima semana), ...	(A) planeó su presentación (B) va a planear su presentación (C) planea su presentación
Cuando Bella apruebe sus exámenes (la próxima semana), ...	(A) se gradua (B) va a graduarse (C) se graduó
Cuando Anibal calcule sus notas finales (la próxima semana), ...	(A) va a usar una calculadora (B) usa una calculadora (C) usó una calculadora
Cuando Beth confirme su calendario universitario (la próxima semana), ...	(A) buscó trabajo (B) va a buscar trabajo (C) busca trabajo
Cuando Joe participe en Quad day (la próxima semana), ...	(A) va a conocer a gente (B) conoce a gente (C) conoció a gente
Cuando Casey compre una casa nueva (la próxima	(A) paga impuestos

semana), ...

(B) pagó impuestos

(C) va a pagar impuestos

Cuando Jimmy monte en bicicleta vieja (la próxima semana), ...

(A)llevó casco

(B) va a llevar casco

(C) lleva casco

Stimuli for Sentence Completion Interpretation Task Posttest

Cuando Pablo ordena café de Colombia (con frecuencia), ...

(A) dice gracias

(B) va a decir gracias

(C) dijo gracias

Cuando Juan busca un apartamento nuevo (con frecuencia), ...

(A) va a consultar internet

(B) consulta internet

(C) consultó internet

Cuando Amalia compra regalos de Navidad (con frecuencia), ...

(A)usa su tarjeta

(B) va a usar su tarjeta

(C) usó su tarjeta

Cuando Hugo entra en la clase (con frecuencia), ...

(A) va a desconectar su teléfono

(B) desconectó su teléfono

(C) desconecta su teléfono

Cuando Kara enseña francés y español (con frecuencia), ...

(A) usa videos

(B) va a usar videos

(C) usó videos

Cuando Miguel escucha la radio local (con frecuencia),

(A) va a prestar

...	(B) presta atención atención
	(C) prestó atención
Cuando Rosario regresa de sus vacaciones (con frecuencia), ...	(A) va a tener jetlag
	(B) tuvo jetlag
	(C) tiene jetlag
Cuando Bruno canta covers de Adele (con frecuencia), ...	(A) toca el piano
	(B) va a tocar el piano
	(C) tocó el piano
Cuando Sara conteste se teléfono celular (la próxima semana), ...	(A) va a hablar despacio
	(B) habla despacio
	(C) habló despacio
Cuando Adam adopte a un gato (la próxima semana), ...	(A) tiene compañía
	(B) va a tener compañía
	(C) tuvo compañía
Cuando Clara bese a su novio (la próxima semana), ...	(A) está contenta
	(B) estuvo contenta
	(C) va a estar contenta
Cuando Tomas cause más problemas innecesarios (la próxima semana), ...	(A) va a sufrir las consecuencias
	(B) sufre las consecuencias
	(C) sufrió las consecuencias
Cuando Jennifer tome café con leche (la próxima semana), ...	(A) va a Starbucks
	(B) va a ir a Starbucks
	(C) fue a Starbucks

- Cuando Arturo llegue a su casa (la próxima semana), ... (A) ve netflix
(B) vio netflix
(C) va a ver netflix
- Cuando María se conecte a su Facebook (la próxima semana), ... (A) va a ver las fotos
(B) ve las fotos
(C) vio las fotos
- Cuando Julio esté en Urbana Champaign (la próxima semana), ... (A) va a visitar a su amiga
(B) visita a su amiga
(C) visitó a su amiga

Stimuli for Sentence Completion Sentence Completion Interpretation Task Delayed posttest

- Cuando Juan habla rápido en inglés (con frecuencia), ... (A) comete errores
(B) va a cometer errores
(C) cometió errores
- Cuando Amalia practica para el examen (con frecuencia), ... (A) miró los ppts de clase
(B) va a mirar las ppt de clase
(C) mira los ppts de clase
- Cuando Hugo llama a sus abuelos (con frecuencia), ... (A) va a hablar muy alto
(B) habla muy alto
(C) habló muy alto
- Cuando Kara visita su ciudad de origen (con frecuencia), ... (A) va al lago
(B) va a ir al lago
(C) fue al lago

Cuando Miguel organiza excursiones de verano (con frecuencia), ...	(A) va a usar excel (B) usa excel (C) usó excel
Cuando Rosario baila música hip hop (con frecuencia), ...	(A) va a usar zapatos especiales (B) usó zapatos especiales (C) usa zapatos especiales
Cuando Bruno comenta sus notas finales (con frecuencia), ...	(A) dice palabras indecentes (B) va a decir palabras indecentes (C) dijo palabras indecentes
Cuando Sara completa su composición final (con frecuencia), ...	(A) va a revisar el texto (B) revisa el texto (C) revisó el texto
Cuando Adam cambie su nueva concentración (la próxima semana), ...	(A) va a ser feliz (B) es feliz (C) fue feliz
Cuando Clara adapte más sus expectativas (la próxima semana), ...	(A) está más relajada (B) va a estar más relajada (C) estuvo más relajada
Cuando Tomas colabore con sus compañeros (la próxima semana), ...	(A) avanza más (B) avanzó más (C) va a avanzar más
Cuando Jennifer abandone su último trabajo (la próxima semana), ...	(A) va a estar triste (B) está triste

Cuando Arturo maneje St Joseph (la próxima semana),

...

Cuando María prepare un pastel delicioso (la próxima semana), ...

Cuando Julio compare precios de carros (la próxima semana), ...

Cuando Isabel firme su nuevo contrato (la próxima semana), ...

(C) estuvo triste

(A) echa gasolina

(B) va a echar gasolina

(C) echó gasolina

(A) usa azúcar

(B) usó azúcar

(C) va a usar azúcar

(A) va a consultar internet

(B) consulta internet

(C) consultó internet

(A) negocia

(B) va a negociar

(C) negoció

APPENDIX D: Stimuli for Production Test Pretest

Cuando Marta _____(estudiar) en la biblioteca todos los lunes se concentra muy bien

Cuando Ana _____(tomar) fotografías utiliza una lente angular

Cuando Antón _____ (planear) sus vacaciones de verano todos los años utiliza el buscador de internet Expedia a

Cuando Miren _____ (organizar) las reuniones de la oficina, piensa en sus compañeros

Cuando Alex _____ (tomar) café todos los días empieza la mañana mejor

Cuando María _____ (preparar) smoothies para el gimnasio añade vitaminas

Cuando Juan _____ (trabaja) por la noche todos los sábados está muy cansado

Cuando Soraya _____ (editar) sus artículos de investigación, presta atención al contenido

Cuando Javier _____ (hablar) con sus estudiantes todos los días dice "está en el sílabo"

Cuando Elena _____(multiplicar) en los problemas de matemáticas usa una calculadora

Cuando Lucas _____ (cruzar) la calle todos los días mira a la derecha y a la izquierda

Cuando Carlos _____(comprar) libros para la escuela gasta mucho dinero

Cuando Alec _____(estudiar) para el GRE la próxima semana va a pasar tiempo en la biblioteca

Cuando Rosa _____ (manejar) su moto por la autovía I-57 va a tener un accidente

Cuando Nicolás _____ (levantarse) más temprano la próxima semana va a ser más eficiente

Cuando Gabriela _____ (viajar) al sur de Brasil va a pasarlo muy bien

Cuando Leo _____ (comparar) su salario en el 2020 va a notar el cambio

Cuando Maite _____ (diseñar) su vestido de boda va a estar satisfecha

Cuando Pablo _____ (escuchar) opera el próximo verano va a llorar de emoción

Cuando Kara _____ (completar) el sudoku del periódico de hoy va a sentirse orgullosa

Cuando Gavin _____ (disfrazarse) de Superman en el próximo Halloween va a ganar la competición de disfraces

Cuando Yolanda _____ (pagar) la renta de su apartamento va a tener poco dinero

Cuando Andrew _____ (votar) en las elecciones en el año 2020 va a pensarlo muy bien

Cuando Candace _____ (firmar) los documentos de adopción, va a celebrarlo con su familia

Stimuli for Production Task Posttest

Cuando Marta _____ (completar) la tarea todos los lunes se concentra muy bien

Cuando Ana _____ (nadar) en la piscina se siente más relajada

Cuando Antón _____ (pasear) por el campus todos los días pasa por el Quad

Cuando Miren _____ (escuchar) las noticias, sabe que pasa en el campus

Cuando Alex _____ (trabajar) en Subway todos los viernes lleva un uniforme

Cuando María _____ (llamar) al médico la enfermera responde el teléfono

Cuando Juan _____ (despertarse) a las 7am todos los días prepara café

Cuando Soraya _____ (celebrar) su fiesta de cumpleaños come pizza con sus amigos

Cuando Javier _____ (limpiar) su apartamento todos los sábados sus compañeros lo ayudan

Cuando Elena _____ (manejar) su carro en viajes largos prepara una lista de canciones

Cuando Carlos _____ (cantar) en la ducha todos los días se ríe mucho

Cuando Lucas _____ (aprobar) sus exámenes de cálculo, lo celebra en Kams

Cuando Alec _____(encontrar) un trabajo en el año 2020 va a comprar una casa

Cuando Nicolás _____(conversar) con su futuro esposa va a estar muy nervioso

Cuando Rosa _____ (andar) en bicicleta la próxima semana va a llegar tarde a clase

Cuando Gabriela _____ (colaborar) con más trabajadores sociales va a mejorar el protocolo

Cuando Leo _____ (solucionar) el problema la próxima semana va a ganar más dinero

Cuando Maite _____ (preparar) su proyecto de ciencias va a utilizar productos biodegradables

Cuando Pablo _____ (mostrar) su talento la próxima semana va a sorprender a su familia

Cuando Kara _____ (cocinar) comida típica de Perú bien va a abrir un restaurante

Cuando Gavin _____ (tomar) alcohol en 2023 va a odiarlo

Cuando Yolanda _____ (aterrorizar) a los niños en Halloween va a sentirse satisfecha

Cuando Andrew _____ (firmar) su divorcio el próximo mes va a sentirse libre

Cuando Candace _____ (completar) su entrenamiento de beisbol va a celebrarlo con una cerveza

Stimuli for Production Task Delayed posttest

Cuando Marta _____(tocar) el piano todos los lunes se concentra muy bien

Cuando Ana _____ (escuchar) la radio en su casa cocina su comida favorita

Cuando Antón _____ (enseñar) ciencias naturales todos los miércoles usa minerales y animales

Cuando Miren _____ (bailar) música electrónica en Kams mueve mucho los brazos

Cuando María _____ (contesta) sus emails todos los días intenta ser precisa con sus respuestas

Cuando Alex _____ (participar) en sesiones de videojuegos en línea juega con más entusiasmo

Cuando Juan _____ (entrar) en su oficina todos los días saluda a sus compañeros de trabajo

Cuando Soraya _____ (comprar) ropa de verano va a una tienda de segunda mano

Cuando Javier _____ (limpiar) su casa todos los domingos utiliza productos muy tóxicos

Cuando Elena _____ (organizar) picnics con sus amigas va a Crystal Lake

Cuando Lucas _____ (levantarse) tarde todos los sábados cocina comida de brunch

Cuando Carlos _____ (viajar) a Europa por negocios reserva un asiento de primera clase

Cuando Alec _____ (cantar) en un bar de karaoke el próximo año va a pasárselo muy bien

Cuando Nicolás _____ (ganar) más dinero en su trabajo va a viajar a Hawaii

Cuando Rosa _____ (hablar) chino mandarín bien en el año 2030 va a buscar trabajo en Bejjin

Cuando Gabriela _____ (organizar) su boda en Italia va a necesitar mucha ayuda

Cuando Leo _____ (visitar) la universidad de Purdue el próximo mes va a estar decepcionado

Cuando Maite _____ (regresar) a Italia en verano va a ir a la playa

Cuando Pablo _____ (tomar) alcohol en el año 2030 va a empezar con la cerveza

Cuando Kara _____ (editar) su tesis de doctorado en UIUC va a necesitar a un profesional

Cuando Gavin _____ (negociar) un contrato mejor el próximo mes va a estar nervioso

Cuando Yolanda _____ (participar) en las elecciones de ministro va a prepararse muy bien

Cuando Candace _____ (utilizar) un carro en el año 2050 va a manejarse solo

Cuando Andrew _____ (trabajar) para el gobierno de Estados Unidos va a vivir en Washington DC

APPENDIX E: Sample of explicit instruction and structured input

Computer-delivered instruction

What is the subjunctive?

The subjunctive is a verb mood. Mood is used to express the speaker's attitude towards an event or action. In Spanish, the most common mood is the indicative. It is used to report events, as questions, etc.

Here are some examples of the present indicative:

Yo veo a mi familia todos los fines de semana *I see my family every weekend*

Yo cocino muy bien *I cook very well*

How do you form the present subjunctive?

Spanish also has the subjunctive mood, which is used to express desire, doubt, uncertainty, and future time events. The subjunctive almost always appears in a subordinate clause, after a conjunction (the most common conjunction is “que”).

Here are some examples of the present subjunctive:

Mis amigos quieren que salga a bailar *My friends want that I go out dancing*

Mis profesores recomiendan que estudie todos los días *My teachers recommend that I study every day*

To form the Spanish subjunctive, take the “yo” form in the present indicative, drop the “-o” at the end, and add the subjunctive endings. For verbs ending in -AR, for the first person singular (“yo”) the subjunctive ending is “-e”.

For example:

HABLAR: the “yo” form is “hablo”, so the present subjunctive is “hable”

CANTAR: the “yo” form is “canto”, so the present subjunctive is “cante”

Quick review: is the verb in the indicative or subjunctive?

Baile

- a. indicative
- b. subjunctive

Compra

- a. indicative
- b. subjunctive

me conecto

- a. indicative
- b. subjunctive

agonice

- a. indicative
- b. subjunctive

escriba

- a. indicative
- b. subjunctive

Sample structured input

You will see the first half a person's statement. For each one, choose which phrase (A or B) best finishes it.

Experimental ítem (starts with adverbial)

2. Voy a pintar las paredes de casa cuando...

- a. Encuentro mis pinturas
- b. Encuentre mis pinturas

L2 learners received corrective feedback "correcto" or "incorrecto" after each item when they completed this structured input practice

Experimental ítem (starts with future reference)

3. Cuando cobre mi sueldo...

- a. Voy a pagar la renta
- b. Pago la renta

Filler

4. Cuando escuchó las quejas Raquel

- a. Organiza una reunión
- b. Organizó una reunión

APPENDIX F: Language Background Questionnaire

LANGUAGE BACKGROUND INFORMATION

All personal information you will provide is confidential. Feel free to use the back of the last sheet if you need more room.

Age:..... Sex: male female Participant No.:

City/Country of origin: What do you do for living?

What language(s) does your mother speak? your father?

How old were you when you started to learn English? Spanish?.....

If both English and Spanish were spoken in your home from the time of your birth, check here:

Briefly explain when you began learning English and Spanish:

English:

Spanish:

Briefly explain where you began learning English and Spanish:

English:

Spanish:

Briefly explain with whom you began learning English and Spanish:

English:

Spanish:

Do you speak any languages other than English and Spanish? (Please say whether you speak each "fluently" or "only a little".)

Have you ever lived outside of the continental United States?

No.

Yes. If yes, how old were you when you first arrived to the continental US?

Indicate where you lived outside of the continental US, when, and for how long:

Education background (check all that apply, and please list the language, if applicable, on the right):

elementary school in English in Spanish in another language

high-school in English in Spanish in another language

college in English in Spanish in another language

graduate school in English in Spanish in another language

Location (check all that apply, and please list the place, if applicable, on the right):

Where did you attend elementary school? in the continental US in a Spanish-speaking country elsewhere.....

Where did you attend high-school? in the continental US in a Spanish-speaking country elsewhere.....

Where did/do you go to college? in the continental US in a Spanish-speaking country elsewhere.....

For the following questions, indicate how many Spanish classes you have had.

Overall, how much of the time do you use Spanish and English in an average week? The two percentages should total 100%. (ex. 50/50, 80/20, 40/60, 100/0)

English:	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
Spanish:	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%

For the following questions, circle the number that corresponds with the amount of Spanish or English that you generally use.

Follow the scale below:

1	2	3	4	5	n/a
Spanish all the time (always)	Spanish usually more than English	Spanish as much as English	English usually more than Spanish	English all the time (always)	does not apply

How much Spanish/English do you speak in an average week?

always always
Spanish English

at home, to your spouse, living companion, roommate?.....	1	2	3	4	5	n/a
at home, to your children?	1	2	3	4	5	n/a
at home, to your younger relatives (siblings, cousins, nieces/nephews, etc.)?.....	1	2	3	4	5	n/a
at home, to your older relatives (parents, grandparents, etc.)?.....	1	2	3	4	5	n/a
to your close friends?	1	2	3	4	5	n/a
to instructors at the university?	1	2	3	4	5	n/a
to fellow students?	1	2	3	4	5	n/a
to your colleagues at work?	1	2	3	4	5	n/a
in other social contexts?.....	1	2	3	4	5	n/a

How much Spanish/English do the following people speak to you on average?	always			always		
	Spanish			English		
your spouse, living companion, roommate	1	2	3	4	5	n/a
your children	1	2	3	4	5	n/a
your younger relatives (siblings, cousins, nieces/nephews, etc.)	1	2	3	4	5	n/a
your older relatives (parents, grandparents, etc.)	1	2	3	4	5	n/a
your close friends	1	2	3	4	5	n/a
your instructors at the university	1	2	3	4	5	n/a
your fellow students	1	2	3	4	5	n/a
your colleagues at work	1	2	3	4	5	n/a
other people	1	2	3	4	5	n/a

Rate your language skills according to the following categories (circle one on each line), following the scale below:

0	1	2	3	4	5	6	7	8	9	10
None					Adequate					Perfect

How would you rate your overall ability to **understand** English/Spanish?

English:	0	1	2	3	4	5	6	7	8	9	10
Spanish:	0	1	2	3	4	5	6	7	8	9	10

How would you rate your overall ability to **speak** English/Spanish?

English:	0	1	2	3	4	5	6	7	8	9	10
Spanish:	0	1	2	3	4	5	6	7	8	9	10

How would you rate your overall ability to **read** English/Spanish?

English:	0	1	2	3	4	5	6	7	8	9	10
Spanish:	0	1	2	3	4	5	6	7	8	9	10

How would you rate your overall ability to **write** English/Spanish?

English: 0 1 2 3 4 5 6 7 8 9 10

Spanish: 0 1 2 3 4 5 6 7 8 9 10

How would you rate your overall ability to **pronounce** English/Spanish without a “foreign accent”?

English: 0 1 2 3 4 5 6 7 8 9 10

Spanish: 0 1 2 3 4 5 6 7 8 9 10

Overall, which language do you feel more comfortable speaking?

English

Spanish

Why?

Do you have any other comments on your language background which you think are important but which you were not asked about in this questionnaire?

.....

.....

.....

Thanks for Your Cooperation!

Please take a moment now to ensure that you have filled in all the blanks.

APPENDIX G: Debriefing questionnaire

- 1) Do you think you learn anything in this study? Yes/ No. If so, what did you learn?

- 2) Did you notice any particular recurrent Spanish construction (i.e., the past tense,...) while completing this study?

- 3) Did you receive a short grammar explanation last time you came in to the lab?

- 4) In this study we were investigating one particular grammar structure and rule. Now that you have completed all of the tasks, please explain what the rule was (or what you think it was!) in your own words to the best of your abilities. You can explain it in English or in Spanish.

- 5) If you received grammar instructions, how helpful were they to complete the multiple choice practice? Circle one of the options below.

Not helpful somehow helpful neither helpful nor unhelpful extremely helpful

Any comments (optional):

- 6) Did you look up any words, phrases, or grammar that you were exposed to during the study or ask anyone about them?"

Yes/no

If yes, please specify what you looked up/asked about:

___ Vocabulary (what words, if you recall)

___ grammar (what specifically, if you recall)

Please specify how you looked the information up:

___ on the internet

___ in a textbook

___ by asking a friend

___ by asking a relative

___ by asking a teacher

___ other

- 7) How did you answer the questions in the following activities?

In the **reading activity** where you read sentences and responded questions.

- Using a rule intuition both other (specify below)

In the **interpretation activities** where you completed a sentence by selecting one of three responses.

- Using a rule intuition both other (specify below)

In the **fill-in-the-gap activity** where you conjugated verbs

- Using a rule intuition both other (specify below)

Thank you for your participation. You make our research possible!