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Processing Strategies by Beginning L2 Learners of English and Spanish: A Crosslinguistic Study

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PROCESSING STRATEGIES BY BEGINNING L2 LEARNERS OF ENGLISH AND SPANISH: A CROSSLINGUISTIC STUDY

By

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I dedicate this work to John in the hope that it will inspire him to be the best that he can be despite life’s disappointments, and to my beloved parents.
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ABSTRACT

A central issue in second language acquisition (SLA) research is the relationship between morphosyntactic and lexical-semantic knowledge among L2 learners. It has been proposed that, L2 language acquisition starts with transfer of L1 semantic and morphosyntactic processing strategies; however, it has been observed that, at lower proficiency levels, the language processor may not have sufficient resources to transfer and use L1 morphosyntactic cues such as inflectional morphology, case markers, etc. to process the L2. Therefore, this dissertation investigates whether L2 learners default to more local and lexical-semantic parsing (i.e. universal parsing) at the beginning stages of second language acquisition.

This dissertation examines the processing strategies of two groups of L2 learners (L1 English – L2 Spanish and L1 Spanish – L2 English) on two experimental tasks: a self-paced listening task and a sentence interpretation task.

The results suggest that L1 transfer may not occur at the beginning stages of acquisition; that is, the beginning L2 learners in this study were not able to process inflectional morphology and agreement cues; thus, they did not demonstrated the ability to integrate grammatical information encoded in verbal morphology in real time processing. Instead, the results indicated that L2 learners, regardless of L1, defaulted to local and lexical-semantic strategies (e.g., first-noun strategy) to process the L2 at the beginning stages of acquisition. These results lend support to the first noun principle (VanPatten 2007) and are discussed in term of the representational and processing problem of L2 acquisition. Implications for models of L2 sentence processing (Input Processing and the Competition Model) are also presented in this dissertation.
CHAPTER ONE
INTRODUCTION

In recent decades, second language acquisition (SLA) researchers have become more interested in investigating the role of the first language (L1) in second language (L2) processing, as well as the relationship between morphosyntactic and lexical-semantic knowledge among L2 learners (Jackson, 2010). An important issue for SLA researchers involves the kinds of information sources that L2 learners utilize to interpret sentences at early stages of L2 acquisition. Some researchers argue that sentence interpretation for learners is initially effortful in terms of cognitive processing. Therefore, at lower proficiency levels, learners may rely on local processing (i.e., the identification and processing of individual lexical items apart from their relationship to other words in a sentence) to interpret the meaning of an utterance (Clahsen & Felser, 2006; Jackson, 2007, 2008; VanPatten, 1996, 2004, 2007; VanPatten & Keating, 2007). Other researchers have proposed that learners are highly dependent on the first language for sentence interpretation because they begin second language acquisition with the form-to-function mappings from the native language (McDonald, 1987, 1989; MacWhinney, 2005). From this perspective, it is assumed that learners initially transfer specific L1 strategies (either morphosyntactic or semantic) to process the L2 (Bates & MacWhinney, 1989; MacWhinney, 1997; Dussias, 2001, 2003; Fernandez, 1999, 2002; Frenck-Mestre 1997, 2002, 2005; Sabourin, 2003, 2006).

The main purpose of this dissertation is to investigate whether L2 learners initially transfer and use L1 morphosyntactic strategies from their native language or whether they default to more general local processing strategies at the beginning stages of second language acquisition. To this end, this dissertation examines the processing strategies of two groups of L2 learners (L1 English–L2 Spanish and L1 Spanish–L2 English) on two experimental tasks: a self-paced listening task and a sentence interpretation task.

This chapter provides the theoretical background for the experiments and is organized in the following way. I begin with a discussion of argument structure and the linguistic cues native speakers use to determine the agent of a sentence (i.e., the participant that carries out the action expressed by the verb). Then, I explore how L2 learners interpret sentences by considering two theoretical proposals: input processing (IP) and the competition model (CM). Finally, I present the
significance of the present study and an outline of the remaining chapters. A list of terms used throughout the dissertation and their definitions is provided at the end of this chapter.

**Argument Structure and Agent Assignment**

An important part of language comprehension is the correct interpretation of *argument structure*. In other words, listeners need to establish the semantic function or role that each participant carries in order to understand the meaning of a sentence. Chomsky (1981) proposed several *semantic roles* to describe the different semantic functions that arguments can have in a sentences. The roles proposed by Chomsky (1981) are presented in Table 1.1.

Table 1.1

*Thematic Roles Based on Chomsky (1981)*

<table>
<thead>
<tr>
<th>Thematic Role</th>
<th>Definition &amp; Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent/Actor</td>
<td>The one who intentionally initiates the action expressed by the predicate.</td>
</tr>
<tr>
<td></td>
<td><em>William</em> bought the book from <em>Martha.</em></td>
</tr>
<tr>
<td>Patient/Theme</td>
<td>The person or thing undergoing the action expressed by the predicate.</td>
</tr>
<tr>
<td></td>
<td><em>William</em> bought <em>the book</em> from <em>Martha.</em></td>
</tr>
<tr>
<td>Experiencer</td>
<td>The entity that experiences (psychological) state expressed by the predicate.</td>
</tr>
<tr>
<td></td>
<td><em>Martha</em> likes love stories.</td>
</tr>
<tr>
<td>Benefactive/</td>
<td>The entity that benefits from the action expressed by the predicate.</td>
</tr>
<tr>
<td>Beneficiary</td>
<td><em>John</em> gave the book to <em>Jane.</em></td>
</tr>
<tr>
<td>Goal</td>
<td>The entity towards which the activity expressed by the predicate is directed.</td>
</tr>
<tr>
<td></td>
<td><em>Charles</em> rolled the ball towards <em>William.</em></td>
</tr>
<tr>
<td>Source</td>
<td>The entity from which something is moved as a result of the activity expressed by the predicate.</td>
</tr>
<tr>
<td></td>
<td><em>William</em> bought the book from <em>Martha.</em></td>
</tr>
<tr>
<td>Location</td>
<td>The place in which the action or state expressed by the predicate is situated.</td>
</tr>
<tr>
<td></td>
<td><em>Martha</em> is in <em>London.</em></td>
</tr>
</tbody>
</table>
A fundamental process during sentence interpretation is agent assignment because the role of agent is one of the most important semantic roles in the syntax of natural languages. The role of agent describes the participant who carries out the action expressed by the verb (Chomsky, 1981). Once listeners identify the agent, they can more easily discern the role of the remaining arguments. Therefore, the correct interpretation of the entire argument structure (i.e., who does what to whom) depends on correct agent assignment. For instance, in Example 1.1, the grammatical subject Martha initiates the action expressed by the predicate; thus, it carries the role of agent. Because there is only one agent in a sentence, listeners can deduce that the grammatical object William undergoes the action expressed by the predicate, thereby carrying the patient role.

Example 1.1
Thematic roles and their semantic function in the sentence
Martha_{agent} saw William_{patient}

Native speakers possess in their implicit linguistic systems the form-to-function mappings that allow them to correctly assign agency in their native language (McDonnal, 1987). To explain, they have the knowledge of mappings between linguistic forms and communicative functions to interpret semantic roles. These form-to-function mappings are based on the cues present in their native language that lead to correct interpretations. For instance, in highly inflected languages, like Spanish, verbal morphology provides listeners with consistent information for the correct assignment of semantic roles because verbal inflections correctly mark the functions of grammatical subject, actor or topic. In languages with limited verbal morphology, like English, however, verbal inflections are not reliable cues for agent assignment because these forms map into several functions. In these languages, preverbal positioning is a reliable cue because it correctly marks the grammatical subject/agent.

Sentence Interpretation and Syntax
Before considering the sentence interpretation strategies of English and Spanish speakers, this section highlights some of the morphosyntactic differences between the two languages in order to illustrate the morphosyntactic cues available to assign semantic roles in each language.
Verbal Morphology

English and Spanish share many similarities with respect to verb classes and the expression of arguments (Montrul, 2004). However, these languages have important morphosyntactic differences that impact the way native speakers assign agency in their native language. According to minimalist accounts of syntax (Chomsky, 1995, 2000, 2001), differences among functional categories [agreement (AgrP), tense (TP), aspect (AspP), etc.] and the strength of functional features (± agreement, ± movement, etc.) reflect the important morphosyntactic differences we observe between the two languages (Cinque, 1999; Lardiere, 2009; Montrul, 2004; White, 2003). Both English and Spanish utilize grammatical agreement to encode information on person, number, etc., and both languages possess an agreement functional category (AgrSP). The difference between these two languages stems from the strength [± strong] associated with this feature. Thus, English is considered a [–strong] agreement language, and Spanish is a [+strong] agreement language (Chomsky, 1995; Pollock, 1989). In Spanish, the [+strong] agreement feature has an overt realization as rich verbal morphology. However, English has a [–strong] feature and only distinguishes between 3rd person singular and non-3rd person singular in the present tense. There are no such distinctions in other verbal forms or tenses (Guijarro-Fuentes & Larraña, 2011). Table 1.2 presents a comparison of the basic verbal paradigm between these two languages.

Table 1.2
*Person and Number Inflections in Spanish and English for the Present Indicative*

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th></th>
<th>Spanish</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Singular</td>
<td>Plural</td>
<td>Singular</td>
<td>Plural</td>
</tr>
<tr>
<td>1st</td>
<td>write</td>
<td>write</td>
<td>escribo</td>
<td>escribimos</td>
</tr>
<tr>
<td>2nd</td>
<td>write</td>
<td>write</td>
<td>escribes</td>
<td>escribís</td>
</tr>
<tr>
<td>3rd</td>
<td>writes</td>
<td>write</td>
<td>escribe</td>
<td>escriben</td>
</tr>
</tbody>
</table>

Moreover, Spanish verbs are not only inflected for person, and number, but also for tense, aspect, and mood. This grammatical information surfaces as one or more suffixes. Figure 1.1 shows the structure of Spanish verbs and the inflection system (adapted from Montrul, 2004). Additionally, Spanish distinguishes between finite and non-finite forms. The non-finite forms are not inflected, but
they carry information on aspect. The different distinctions for person, tense, mood, and aspect results in a complex conjugation system.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Spanish</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[root + thematic vowel] stem + suffix 1 (tense/aspect/mood) + suffix 2 (person/number)</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>[cant + a]stem + ba suffix1 (past imperfect indicative) + mos suffix2 (first person plural)</td>
<td>[sang] + Æ + Æ</td>
</tr>
</tbody>
</table>

Figure 1.1 Structure of Spanish verbs compared with English.

**Verbal Morphology and Syntax**

Strong agreement features not only reflect rich inflectional morphology on the verb, but also have an effect on the syntax (Chomsky, 1995, 2000, 2001). Some researchers suggest that richness of verbal morphology triggers verb movement causing differences in the word order of natural languages (Thrainsson, 2003; Biberauer & Roberts, 2010). Because English is a language with weak agreement features (Chomsky, 1995; Pollock, 1989), upward movement for feature checking does not occur. The [–strong] agreement feature results in English having overt rigid subject-verb-object word order, which is the only word order configuration allowed in English. Although it has been proposed that there is covert movement in English for feature checking, this covert movement does not affect the overt word order (Antes, Moritz, & Roebuck, 1995; Herschensohn & Arteaga, 2009). Figure 1.2 shows the syntactic structure of the English sentence ‘We write books’, including the structure with covert movement assumed (adapted from Montrul, 2004, p.91).

Figure 1.2 No upward movement and covert movement in English.
In Spanish, the strong agreement features cause all finite verbs to move from the spec of the verb phrase (VP) to the agreement phrase (AgrSP) to check agreement (Pollock, 1989; Pesetsky & Torrego, 2001; Thrainsson, 2003). Agreement is checked when the subject argument and the verb enter into a **spec-head relation.** The landing sites for verb movement are the functional categories of the tense phrase (TP) and the subject-verb agreement phrase (AgrSP), as shown in Figure 1.3 (adapted from Montrul, 2004). This [+strong] agreement feature in Spanish prompts different word order configurations\(^1\) (Biberauer & Roberts, 2010; Mandell, 1998; Bruhn de Garavito, 1999, 2003; Thrainsson, 2003).

\[\text{Figure 1.3 Overt movement for feature checking in a VOS Spanish sentence.}\]

An example of the possible word orders in English and Spanish for declarative sentences is presented in Example 1.2 (adapted from Reyes, 2003).

---

\(^1\) Other factors that contribute to word order flexibility in Spanish are: topic/focus relations (Hernanz-Carbó & Brucart, 1987) and subject omission in sentences with finite verbs (i.e., Pro-drop feature).
Example 1.2

*English and Spanish word orders for declarative sentences*

<table>
<thead>
<tr>
<th>English</th>
<th>Spanish</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVO: Juan washes the car</td>
<td>SVO: Juan lava el carro</td>
</tr>
<tr>
<td></td>
<td>Juan washes the car\textsubscript{masc}</td>
</tr>
<tr>
<td>VOS: Lava el carro Juan</td>
<td>washes the car\textsubscript{masc} Juan</td>
</tr>
<tr>
<td>VSO: Lava Juan el carro</td>
<td>washes Juan the car\textsubscript{masc}</td>
</tr>
</tbody>
</table>

Summarizing thus far, English and Spanish differ in the morphology of their verbs. Also, they differ in the word order configurations allowed within each language. Specifically, Spanish is a language with rich verbal morphology and flexible word order, whereas English has limited verb morphology and rigid word order. These morphosyntactic differences between English and Spanish contribute to the different kinds of linguistic information native speakers use to interpret argument structure in their native language. The following section presents some of the sentence interpretation strategies utilized by English and Spanish native speakers.

**Sentence Interpretation in English and Spanish**

English is a weakly inflected language with limited verbal morphology. The mappings between verbal inflections and semantic roles are numerous, and one marker in English can point to several nouns as agents. For instance, the English regular simple past inflection \textit{–ed} marks all grammatical persons as agents of the sentence. Because English verbs have several mappings that lead to multiple interpretations, verbal morphology is unreliable for agent assignment in English. On the other hand, preverbal positioning (i.e., canonical word order) is reliable in English due to its rigidity. In English, the subject/agent in active sentences appears in preverbal position invariably. Research investigating the dominant information sources or “cues” for agent assignment in English has reported that \textit{preverbal positioning} leads English native speakers to correct agent assignment in their native language. After preverbal positioning, animacy (animate vs. inanimate entities) is the most valid cue (Bates & MacWhinney, 1981, 1989; McDonald, 1986, 1987; Kilborn & Cooreman, 1987).
Unlike English, Spanish is a language with flexible word order, and the subject/agent can appear pre-verbally or post-verbally; therefore, Spanish native speakers cannot assume that the first noun in a sentence is always the agent, and reliance on word order in Spanish would lead to the misinterpretation of the argument structure. This variability makes word order unreliable for agent assignment in Spanish. Because of word order variability and rich tense morphology, Spanish native speakers rely more heavily on verbal morphology for sentence interpretation. In fact, research on sentence interpretation among L1 Spanish speakers has shown that verbal morphology cues in Spanish are highly reliable to agent assignment because verbal morphology invariably maps to the noun that performs the action of the verb. After inflectional cues, the object maker a is the strongest cue (Hernández, Sierra & Bates, 2000; Kilborn, 1989) in Spanish. A summary of the relevant cues for agent assignment in English and Spanish is presented in Table 1.3 (adapted from Devescovi & D’Amico, 2005).

Table 1.3
Agent Assignment Cues by Language

<table>
<thead>
<tr>
<th>Language</th>
<th>Cues</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>PREVERBAL POSITIONING &gt; ANIMACY &gt; VERBAL MORPHOLOGY</td>
</tr>
<tr>
<td>Spanish</td>
<td>VERBAL MORPHOLOGY &gt; CASE MARKING &gt; PREVERBAL POSITIONING</td>
</tr>
</tbody>
</table>

Considering that adult native speakers of English and Spanish rely on different information sources to assign agency in their native language, one of the questions that concerns this dissertation is whether adult L2 learners transfer their L1 cues when interpreting the L2. This dissertation explores how native English speakers interpret sentences in Spanish and how native Spanish speakers interpret sentences in English. The following section presents two SLA theoretical models that address sentence interpretation at the beginning stages of acquisition.

Sentence Interpretation in Second Language Acquisition

During second language comprehension, one of the learner’s tasks is to correctly assign semantic roles to the arguments in a sentence in order to establish accurate semantic interpretations. It has not been established yet how the morphosyntactic cues of the native language affect the way
beginning learners assign agency to sentences in the new language. Some research in the field has suggested that comprehension for second language learners is effortful in terms of cognitive processing (VanPatten, 2007, p. 116). As a result, learners rely more on local processing strategies, such as preverbal positioning, to interpret L2 sentences. Others have suggested that novice learners are highly dependent on native language cues for interpretation, and they are able to transfer and use L1 morphosyntactic strategies to process the L2. In the field of SLA, there are two frameworks that put forward hypotheses about how learners initially interpret sentences in the second language: the model of input processing (VanPatten, 1996, 2004) and the competition model (e.g., Bates & MacWhinney, 1989).

**Input Processing**

Input processing (VanPatten, 1996, 2004, 2007) is a model of second language acquisition concerned with the strategies used for comprehension during sentence processing, and the impact of these strategies on acquisition. Particularly, IP is interested in the conditions that drive learners to make certain initial form-meaning connections and not others. This theoretical framework makes a number of claims about the factors that affect interpretation at the beginning stages of acquisition. These claims, (taken from VanPatten, 2007), include:

1. Learners are driven to get **meaning** while comprehending.
2. Comprehension is initially **effortful** in terms of cognitive processing and working memory because learners’ processors have limited capacity at the beginning stages of acquisition.
3. Learners may use certain **universals** of input processing, but they may also use the L1 parser to interpret L2 sentences.

These factors led to the IP principles in Table 1.4. These principles or processing strategies were derived from the assumption that initial comprehension of any second language is effortful and cognitively costly. To explain, according to VanPatten cognitive resources limit the capacity of the processor to get meaning from grammatical forms, which are cognitively more costly to process. For this reason, learners default to more local processing strategies, such as identifying the first noun in an utterance as the agent, before being able to engage in distributed processing, which involves processing linguistic forms that encode the relationship among words in a sentence (e.g., agreement and case morphology). In this sense, local processing strategies are less costly in terms of processing
Table 1.4

*Principles of Input Processing (VanPatten, 2007)*

- **The Primacy of Content Words Principle.** Learners process content words in the input before anything else.
- **The Lexical Preference Principle.** If grammatical forms express a meaning that can also be encoded lexically (i.e., that grammatical marker is redundant), then learners will not initially process those grammatical forms until they have lexical forms to which they can match them.
- **The Preference for Nonredundancy Principle.** Learners are more likely to process nonredundant meaningful grammatical markers before they process redundant meaningful markers.
- **The Meaning-before-Nonmeaning Principle.** Learners are more likely to process meaningful grammatical markers before nonmeaningful markers.
- **The Sentence Location Principle.** Learners tend to process items in the initial position of the sentence before those in the final position and those in the medial position.
- **The First Noun Principle.** Learners tend to process the first noun or pronoun they encounter in a sentence as the subject or agent.
- **The Lexical Semantics Principle.** Learners may rely on lexical semantics, where possible, instead of the First Noun Principle to interpret sentences.
- **The Event Probabilities Principle.** Learners may rely on event probabilities, where possible, instead of the First Noun Principle (or an L1 parsing procedure) to interpret sentences.
- **The Contextual Constraint Principle.** Learners may rely less on the First Noun Principle (or L1 transfer) if preceding context puts constraints on the possible interpretation of a clause or sentence.

This efficiency-to-process-meaning approach is at the core of all IP principles. For example, in the lexical preference principle (LPP), the assumption is that learners do not have extra cognitive resources to get meaning from grammatical markers that are redundant and empty of communicative value such as inflections. Therefore, they get meaning from content words at the beginning stages of acquisition. In the first noun principle (FNP), learners tend to rely on the first noun to interpret sentences. That is, they automatically process the first noun or pronoun they encounter in a sentence.
as the subject or agent because the language processor does not have enough resources to attend to other morphosyntactic cues, such as verbal morphology, to assign the sentential agent. According to VanPatten (2004), the first noun strategy is one of the most important strategies for agent assignment, and it may be a *universal strategy* because the human mind is predisposed to assign the role of subject/agent to the first noun in sentence given that subject-verb-object (SVO) and subject-object-verb (SOV) are the most common word orders in languages around the world. The assumption is that learners rely on the first noun for agency assignment when animacy cues or even probabilities are not present in the input.

Although earlier versions of the IP model argue for a more universal position regarding agent assignment, the most recent version (VanPatten, 2007) also considers the possibility that learners may begin acquisition with L1 strategies instead of using more locally-based strategies. The concept of L1 transfer is integrated in the model resulting in two hypotheses: the *universal hypothesis*, (first noun strategy) and the *transfer hypothesis*, which assumes transfer of L1 processing strategies. Table 1.5 presents the two tenable positions regarding agent assignment.

<table>
<thead>
<tr>
<th>Table 1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IP Hypothesis for Agent Assignment (VanPatten, 2007)</strong></td>
</tr>
<tr>
<td><strong>Universal</strong></td>
</tr>
<tr>
<td><strong>Transfer</strong></td>
</tr>
</tbody>
</table>

**IP predictions**

For native English speakers learning Spanish, both the FNP and the L1 transfer principle predict that learners would rely on the first noun for sentence interpretation; that is, they would tend to assign the grammatical role of subject and the thematic role of agent to the first noun they encounter in a sentence at the beginning stages of acquisition.

Because both hypotheses make the same prediction for native English speakers, it is important to investigate native speakers of a language with more flexible word order, in which the first noun is not always the subject/agent. For this reason, this dissertation also examines native
Spanish speakers learning English. The FNP would predict that these L2 learners would assign agency using a first noun strategy even when these learners use morphosyntactic strategies (i.e. verbal inflections and agreement cues) in their L1. The L1 transfer principle would predict, however, that these learners would begin acquisition with L1 parsing procedures; that is, they would rely on verbal morphology to assign agency.

The results of some studies have confirmed that beginning learners identify the first noun as the agent/subject of subject-verb-object sentences, regardless of their first language (VanPatten, 1984; VanPatten & Houston, 1998; VanPatten & Sanz, 1995; VanPatten & Wong, 2004, Jackson, 2007, 2008). However, most research to date has focused on L1 English learners. These studies are presented in more detail in Chapter 2.

To summarize, the model of input processing proposes two hypotheses regarding agent assignment at the beginner stages of acquisition. A universal hypothesis that states that learners, regardless of their L1, rely on local processing (e.g., reliance on the first noun) to comprehend the argument structure of second language sentences, and the L1 transfer hypothesis that states that L2 learners begin acquisition with L1 parsing procedures. The L1 transfer hypothesis has not been investigated within the input processing framework; however, L1 transfer is a core concept in the competition model and it has been extensively investigated by competition model researchers. The following section discusses L1 transfer with the competition model.

The Competition Model

The competition model (Bates & MacWhinney, 1989; MacWhinney, 1997, 2005, 2008) is a functionalist model of L1 and L2 language acquisition that views languages as created and constrained by cognition to fulfill a communicative function. The competition model uses the concept of transfer (the use of native language cues to process a second language) to explain initial second language acquisition. In sentence interpretation research, transfer is defined as the use of processing strategies from the L1 to process the L2 (Harrington, 1987; Juffs, 2005; Jackson & Dussias, 2009). The assumption is that L2 learners transfer and utilize L1 cues to interpret utterances in the second language. Cues are the linguistic sign of the mapping between a form and a communicative function (MacWhinney, 1997, 2005, 2008; McDonald, 1987).

This model hypothesizes that L2 learners use the most dominant L1 cues (semantic and morphosyntactic) to interpret the L2 (MacWhinney, 2005). Competition model researchers have
determined the dominant cues for agent identification in many languages (including English and Spanish) based on cue availability, cue reliability, and cue strength patterns. To explain, according to this model, the from-to-function mappings are assigned activation strengths based on cue availability and cue reliability. *Cue availability* is a measure of how often a cue is present in the adult native language, and *cue reliability* is a measure of how often a cue leads to correct interpretations (McDonald, 1987). For instance, in English, canonical word order is a cue with high availability and high reliability; thus, English native speakers rely on the preverbal positing of a noun as a cue to agent assignment in their native language. In Spanish, verbal inflections, agreement and case markings (i.e., the accusative preposition *a*) are the cues with the highest availability and reliability; thus, Spanish native speakers rely on these cues for agent assignment in the L1. Table 1.6 presents a list of the dominant cues in several word languages.

Table 1.6

<table>
<thead>
<tr>
<th>Language</th>
<th>Dominant Cue</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>case marking</td>
<td>Li, Bates &amp; MacWhinney (1993)</td>
</tr>
<tr>
<td>Croatian</td>
<td>case marking</td>
<td>Mimica, Sullivan &amp; Smith (1994)</td>
</tr>
<tr>
<td>Dutch</td>
<td>case marking</td>
<td>McDonald (1987, 1989)</td>
</tr>
<tr>
<td><strong>English</strong></td>
<td><strong>preverbal positioning</strong></td>
<td>Bates &amp; MacWhinney (1989)</td>
</tr>
<tr>
<td></td>
<td><em>(canonical word order)</em></td>
<td></td>
</tr>
<tr>
<td>French</td>
<td>subject-verb agreement</td>
<td>Kail (1989)</td>
</tr>
<tr>
<td>Hindi</td>
<td>noun animacy</td>
<td>Vaid &amp; Pandit (1991)</td>
</tr>
<tr>
<td>Italian</td>
<td>subject-verb agreement</td>
<td>Bates et al. (1984)</td>
</tr>
<tr>
<td>Japanese</td>
<td>noun animacy</td>
<td>Kilborn &amp; Ito (1989)</td>
</tr>
<tr>
<td><strong>Spanish</strong></td>
<td><strong>subject-verb agreement</strong></td>
<td>Kilborn (1989)</td>
</tr>
<tr>
<td></td>
<td><em>case marking</em></td>
<td></td>
</tr>
</tbody>
</table>
CM predictions

According to MacWhinney (2001), the competition model predicts that children and L2 learners would acquire sentence interpretation strategies in an order that is predictable from the cue validity of the grammatical structures in the adult language. Therefore, learners of English whose first language is Spanish would initially use verbal morphology, including agreement cues, as the main cues to allocate the agent in L2 sentences, and learners of Spanish with English as their first language would rely on preverbal positioning to assign the agent in an L2 sentence. Competition model studies have tested mainly early bilinguals (i.e., both languages acquired in childhood) with only a few studies with late bilinguals/L2 learners (i.e., the second language acquired in adulthood) (Harrington, 1987; Ito, 1990; Gass, 1989; Reyes, 2003; Reyes & Hernandez, 2006). Early bilingualism results, in most case, in the use of the two systems in parallel; therefore, L1 transfer is less apparent with early bilingualism. For this reason, this dissertation explores L1 transfer with adult L2 learners who possess a well developed linguistic system. The studies on early bilingualism within the competition model are presented in Chapter 2.

Comparison of IP and CM Predictions

On the basis of L1 transfer, the input processing model and the competition model make the same prediction regarding agent assignment in the L2. However, IP proposes an alternate prediction on the basis of a local processing strategy. A comparison of the models’ predictions is presented next.

IP and CM predictions based on the L1 Transfer Hypothesis:

- Both models would predict that beginning L2 learners of English (L1 Spanish) will rely on verbal morphology to interpret the argument structure of second language sentences. In Example 1.3., they would be more likely to assign (a) the preverbal noun as the agent of active sentences, and (b) the post-verbal noun as agent of passives sentences.
- Both models would predict that beginning L2 learners of Spanish (L1 English) will rely on preverbal positioning to interpret second language sentences. In other words, they would interpret sentences in Example 1.3 as canonical sentences with subject-verb-object word order; thus, they would be more likely to assign (a) the preverbal noun as the agent of active and passive sentences.
Example 1.3

Active and passive sentences in English and Spanish

Active: The boys are greeting the girl.

‘Los chicos están saludando a la chica’

Passive: The girl is pushed by the boys.

‘La chica es empujada por los chicos’

IP predictions based on the Universal Hypothesis:

- Beginning L2 learners, regardless of their L1, will rely on the First Noun Strategy to assign the agent in second language sentences. That is, input processing predicts that L2 learners of English and L2 learners of Spanish would be more likely to assign the role of agent to the preverbal noun of both sentence types in Example 1.3.

The Present Study and its Significance

The question concerning SLA researchers is whether learners initially use L1 morphosyntactic strategies to derive meaning in the second language. The IP universal hypothesis proposes that learners rely on the first noun strategy because it is cognitively less costly (VanPatten, 1996, 2004, 2007). The IP and CM transfer-based hypotheses, however, propose that learners process the L2 using the most dominant L1 semantic and morphosyntactic strategies (McDonald, 1987; Bates & MacWhinney, 1989; MacWhinney, 1997; MacWhinney, 2005).

There is ample research investigating L1 transfer and agent assignment with the competition model; however, L1 transfer of morphosyntactic strategies has not been investigated within the input processing model. Moreover, research investigating agent assignment with IP has predominantly tested sentence interpretation among English native speakers whose L1 dominant cue for interpretation (i.e., reliance on preverbal positioning) coincides with universal parsing (i.e., the use of the first noun strategy).

The main purpose of this dissertation is to investigate whether L2 learners transfer and use L1 morphosyntactic strategies to derive meaning from the input or whether they process the L2
using a default strategy at the beginning stages of acquisition. To explore this question, this
dissertation examines the processing strategies for agency assignment utilized by beginning learners
of English (L1 Spanish) and beginning learners of Spanish (L1 English) in two experiments.
Experiment 1 consists of an online self-paced listening task with picture matching. The task
comprises active and passive sentences to manipulate the agent’s position and to determine whether
learners process verbal morphology. The second experiment follows the competition model
methodology, and it consists of a sentence interpretation task with agent identification. Cues for
agent identification are manipulated to determine cue dominance.

Organization of Dissertation

Chapter 2 of this dissertation provides the motivation for the present study by reviewing
relevant research on sentence interpretation within input processing, and the competition model.
Chapter 3 presents the general research design and methodology of the experiments. Chapter 4
describes Experiment 1, which examines Spanish and English sentence interpretation using a self-
paced listening task. Chapter 5 presents the research design, methodology, and results of Experiment
2, which uses a sentence interpretation task following previous research conducted within the
competition model framework. Chapter 6 provides a general discussion of the findings, including
theoretical and instructional implications, along with limitations and directions for future research.
Definition of Terms

Agent: thematic role assigned to the constituent who initiates the action.

Argument structure: the syntactic pattern associated with a verb; i.e. it provides the necessary information to determine the appropriate thematic roles.

Cue cost: the amount and type of processing involved in using a form, including demands on perception and memory.

Cue validity: the information value associated with a particular linguistic form; i.e., cue validity involves how often a given cue is present and the reliability with which it is associated with the correct interpretation of a sentence or word.

Lexical cues: content words that help language users comprehend meaning.

Morphosyntactic cues: syntactic and morphological features that help language users comprehend the meaning of a sentence.

Patient: thematic roles assigned to the constituent who undergoes the action.

Processing: moment-by-moment operations during sentence comprehension.

Parsing: syntactic computations during sentence comprehension.

Semantic cues: hints based on meaning that help language users decode and comprehend input.

Thematic roles: the semantic role of a constituent in a sentence (e.g. agent, patient, theme, etc.)

Transfer: the use of native parsing strategies during L2 sentence processing.
CHAPTER TWO

MOTIVATION FOR THE PRESENT STUDY

The purpose of this chapter is to review critically the published research on agent assignment within input processing (IP) and the competition model (CM) in order to motivate the present study. The chapter begins with a review of IP studies that examined the use of the first noun strategy in L2 sentence processing. Next, I present CM studies that examine the transfer of L1 strategies. Finally, I present the research questions and hypotheses that guide this study.

Input Processing and the First Noun Principle

As discussed in Chapter 1, input processing researchers assume that comprehension is cognitively effortful at the beggning stages of acquisition; therefore, they predict that L2 language learners, regardless of their L1, will use lexical-semantic and local processing strategies such as the first noun strategy to interpret L2 sentences (VanPatten, 2004, 2007). The studies presented in this section provide evidence that supports the use of a first noun strategy at the beginning stages of L2 acquisition.

Bever (1970) observed that children often interpret the first nouns in passive with reversible semantic units as agents. He proposed the agent first strategy as a processing strategy during the first stages of language acquisition. VanPatten (1984) tested the agent first strategy with L2 learners of Spanish. This study investigated how adult learners of Spanish interpreted sentences with object-verb-subject (OVS) word order where the object was expressed with clitic pronouns (direct and indirect object pronouns). Example 2.1 provides an example of the OVS sentences used in the study. The researcher chose OVS sentences because L2 learners of Spanish often misinterpret the thematic roles in these sentences. The researcher assumed that if learners were utilizing the agent first strategy to interpret OVS sentences with clitics in preverbal position, they would interpret the clitic as the agent of the sentence.
Example 2.1

*Stimulus sentences used in VanPatten (1984)*

a. *La* visita *el* chico.

   Her-OBJ visits the boy-SUBJ

   “The boy visits her.”

b. *Les* da dinero *el* chico.

   To them-OBJ gives money the boy-SUBJ

   “The boy gives them money.”

VanPatten tested the agent first strategy with 59 learners of Spanish: 33 first semester Spanish students and 26 second semester Spanish students. The experiment consisted of two comprehension tasks with picture-matching. Test 1 consisted of Spanish sentences with direct object clitics only. Test 2 tested participants with indirect object clitics only. All sentences were OVS sentences in Spanish, and each test contained twelve of these Spanish sentences: seven target sentences and five distracters. In both tests, learners were presented with four pictures at once. The visual stimulus depicted two target pictures and two distracter pictures. One target picture depicted the sentence correctly. The other picture depicted the same action; however, the agent and the patient were reversed. An example is provided in Example 2.2. For the task, learners were presented with the visual stimuli. While looking at the four pictures, participants listen to the stimulus sentences. There was a five second pause after each sentence. Participants were instructed to choose then the picture they believed matched what they heard.

Example 2.2

*Stimulus picture for: Les da dinero el chico “the boy gives them money”*
The researcher hypothesized that if learners were using the agent first strategy, they would choose the picture that depicted the clitics as agents. In Example 2.2 participants would chose picture C for the stimulus sentence: \textit{Les da dinero el chico} “The boy gives them money”. That is, they would interpret \textit{les} (to them) as the subject pronoun \textit{ellos} (they). Only responses to target pictures were included in the two-way analysis of variance (ANOVA). The results of this study were the following:

1. Learners were less accurate interpreting direct object clitics than indirect object clitics.
2. The percentage of incorrect picture selection was 70%.
3. Learners did not rely on verb morphology or the object marker “a” to determine grammatical subjects and objects of the experimental sentences.

VanPatten explained that the difficulty to interpret direct object pronouns as opposed to indirect object pronouns was the result of the multiple grammatical functions that direct objects pronouns have, such as their function as definite articles. The last two findings were explained as a direct the result of the agent first strategy. The high error rate and the overlook of grammatical cues was due to the fact that L2 learners assigned agentive status to the first noun/pronoun they encountered in the sentence, as suggested by Bever (1970). Based on the results of this study, VanPatten formulated the \textit{first noun principle} within his model of input processing (1992). The first noun principle assumes local processing at the core of L2 sentence interpretation, and it states that learners tend to process the first noun or pronoun they encounter in a sentence as the subject/agent because local processing is cognitively less demanding.

VanPatten & Houston (1998) investigated whether context affects the assignment of semantic and grammatical roles during L2 sentence processing. Specifically, they tested whether providing additional contextual cues could prevent learners from using the first noun strategy to interpret L2 sentences. The experimental sentences were also OVS constructions with clitic pronouns in preverbal position. An example of the sentences is provided in Example 2.3. The researchers hypothesized that learners would incorrectly assign agentive status to clitics in the no context condition due to the first noun strategy.
Example 2.3

Stimulus sentences in the No context/Context conditions in VanPatten & Houston (1998)

a. No Context

_Gloria contó a sus amigas que la atacó Ramón en su casa._

[OBJ-femenine attacked Ramón-SUBJ]

“Gloria told her friends that Ramón attacked her in her house”

b. Context

_Roberto está en el hospital porque lo atacó María con un cuchillo._

[OBJ-masculine attacked María-SUBJ]

“Roberto is in the hospital because María attacked him with a knife”

Participants were 46 intermediate Spanish learners with English as their L1. Agent assignment was tested with a sentence interpretation task. There were two conditions in the task: context and no context. The results revealed that learners relied less on the first noun strategy in the context condition. That is, the context helped learners to correctly assign the agent to clitics in L2 sentences. However, it was also found that many of the participants defaulted to the first noun strategy for interpretation even when context was provided. The researchers explained that beginning learners have limited language processors; therefore, they do not have the extra working memory resources to keep the context in mind at the moment to interpret the clitic pronoun. Consequently, they use the first noun strategy for interpretation because it is cognitively less costly.

Subsequent research by VanPatten and his colleagues sought to determine whether a specific pedagogical intervention (processing instruction) would help L2 learners overcome a reliance on the first noun strategy. Although, the main focus of these studies presented is to test the effectiveness of processing instruction as pedagogical intervention to help L2 learners overcome the first noun strategy, these studies also provide evidence that L2 learners use a first noun strategy to interpret L2 sentences. Therefore, this review will focus on the use of the first noun strategy before and after treatment.

The first study testing processing instruction with the first noun principle was VanPatten and Cadierno (1993). The study compared processing instruction (PI) with traditional instruction (TI) to test which instruction type was more effective in altering the use of the first noun strategy. Researchers examined the interpretation and production of direct object pronouns in preverbal
position by intermediate learners of Spanish. They used three different word orders: OVS, SVO, and SOV. The researchers included the non canonical OVS and SOV words orders because L2 Spanish learners with L1 English often misinterpret preverbal pronouns as the agents. Participants were 129 Spanish learners with English as their L1. They were randomly assigned to one of three treatment group: a control group with no instruction (NI), the processing instruction group (PI), and traditional instruction group (TI). The control group received no instruction or practice regarding the direct object pronouns. The PI group was trained on direct object pronouns with PI. PI training had three stages. First, learners were provided with explicit information about direct object pronouns. Then, learners were informed about the non optimal first noun strategy used to interpret Spanish sentences. Finally, learners received structured input activities that trained them to rely on the direct object pronouns in order to correctly assign the agent of Spanish sentences. Example 2.4 is a structured input activity used in VanPatten and Cadierno (1993).

Example 2.4

*Structured input activity in VanPatten and Cadierno (1993)*

Instructions: Listen as your instructor reads a sentence. Select the best interpretation from the English renderings.

1. a. My parents call me.
   b. I call my parents.

   (Instructor reads aloud: *Me llaman los padres.*)

The TI group received grammatical explanations about direct object pronouns and their position within a sentence. TI training utilized three types of drills: mechanical, meaningful, and communicative. These activities did not required learners to know the meaning of sentences in order to complete the activities. Practice in the traditional group pushed learners to produce pronouns immediately after the explanation. Learners were tested on their interpretation and production of clitics. The interpretation test consisted of an offline comprehension task with picture matching with fifteen target sentences. The production test was a written task with five sentences. The assessment consisted of a pretest, posttest and delayed posttest. The results revealed no significant differences between the groups in the pretest. The immediate and delayed posttests revealed that PI outperformed all groups for interpretation, and there was no significant difference between the
control and the TI groups. For the production tasks, both the PI and TI groups outperformed the control, but there was no significant difference between the PI and TI groups. Relevant to this dissertation are the interpretation results. In the pretest, all groups had high error rates in the interpretation task. These results suggest that learners used a first noun strategy before receiving any treatment. In the posttest, results revealed that only the learners in the PI group altered the way they interpreted sentences. Neither the traditional group nor the control group improved in their interpretation of preverbal clitics because they continued to default to the first noun strategy to interpret Spanish sentences.

VanPatten and Sanz (1995) is a partial replication of VanPatten and Cadierno (1993) that examined processing instruction with additional production assessment tasks. The researchers also used the Spanish direct object pronouns to test the use of the first noun strategy. Participants were 44 intermediate students of Spanish with L1 English. They were divided into two experimental groups: 17 in the no-instruction group, and 27 in the processing instruction group. Learner’s interpretation and production were assessed by an interpretation task and three production tasks. The interpretation test was also a comprehension task with picture matching. The production tasks were: the sentence completion task from VanPatten and Cadieron (1993), a structured interview, and a video narration task. Again, the results revealed no significant differences between the groups in the pretest. Both groups had low interpretation rates. In the posttest, the results show that the PI group significantly outperformed the control on interpretation. On production, the PI group significantly outperformed the control group in all three production tasks. The results were taken as evidence that PI trained learners to overcome the first noun strategy at the sentence level and at the discourse level. Again, the low interpretation rates in the pretest, and the lack of improvement by the no instruction group in the posttest indicated that learners used a first noun strategy to assign meaning to L2 sentences.

VanPatten and Oikkenon (1996) investigated the role of explicit information in PI. Specifically, they manipulated the explicit information variable in the treatment groups to determine whether the correction of the first noun strategy reported in VanPatten and Cadierno (1993) was due to the explicit information provided to the learners or to the structured input activities they received. Participants were 59 Spanish learners with English as their L1. Participants were divided into three groups. The control group that received regular PI, the explanation only group that received explicit information about the form with no practice, and the structure input group that did not receive explicit information, but it was trained with structured input activities. The target forms used in the
study were also Spanish direct object pronouns. Participants’ interpretation and production of direct object pronouns was tested using VanPatten and Cadierno’s (1993) procedure and tasks. Results showed that on the pretest, there were no differences between the groups before instruction on either the interpretation or the production test. On the interpretation test, the control group (PI) and structure input groups were not significantly different, and both outperformed the explicit information group. On the production test, the PI and structure input groups were not significantly different, and both outperformed the explicit information group. These results were taken by the researchers as evidence that structured input activities altered the first noun strategy because the activities pushed learners to rely on the direct object pronouns to interpret sentences instead of relying on the first noun. As in the previous studies, all groups had high error rates in the interpretation task before treatment because learners used the first noun strategy to interpret preverbal clitics. After treatment, only learners in the PI and the SI abandon the first noun strategy. Again, these results suggest that learners default to the first noun strategy to initially interpreter L2 sentences.

VanPatten & Wong (2004) also investigated the effectiveness of processing instruction against traditional instruction in altering the first noun strategy, but with another L2. The researchers chose French as L2 and the causative construction to test the first noun strategy. They hypothesized that the first noun strategy would push L2 learners of French with English as L1 to incorrectly interpret causative sentences like those in Example 2.5. To explain, in Example 2.5 (from VanPattenn & Wong, 2004), L2 learners would incorrectly assign the role of agent to the first noun Jean when the agent role is carried by the post verbal noun Marc.

Example 2.5

French sentence with causative construction

a. Jean fait nettoyer la chambre à Marc.
   John-Subj makes-V to clean-V infinitive the room to Marc.
   ‘John makes Mark clean the room’

b. Jean fait laver la voiture.
   John-Subj makes-V to wash-V infinitive the car
   ‘John is having the car washed’
Participants were 77 intermediate learners of French with L1 English from two universities. The experimental design followed VanPatten and Cadierno (1993); therefore, the learners from each university were divided into three groups: control group, processing instruction group, and the traditional instruction group. The assessment consisted of a pretest, posttest and delayed posttest with interpretation and production tasks. Yet again, the pretest results showed high error rates in interpretation and production of causative constructions in French, with the control group scoring slightly better than the PI group. The results from the posttest showed that the control group continued misinterpreting French causative sentences. Also, the results showed that the TI group continued interpreting the first noun in the causative sentence as the agent even after they received traditional instruction. Only the participants in the PI group significantly improved in the causative construction. These results provide evidence that L2 learners process locally at the beginning stages of acquisition.

VanPatten specifies that learners rely on the first noun for agency assignment when animacy cues or even probabilities are not present in the input (lexical semantics principle and event probabilities principle). The studies reviewed above controlled for these variables by using animates nouns only and eliminating improbable actions. Two recent studies that included these variables to test the first noun strategy are presented next.

Jackson (2007, 2008) carried out two studies to investigate the use of semantic and syntactic processing strategies by L2 learners of German (L1 English). She used timed comprehension tasks with German sentences that varied according to word order and subject animacy. Jackson manipulated the position of the subject with case markings in both studies. Therefore, learners needed to process case markings to correctly interpret the target sentences. Jackson (2007) found that L2 learners relied on semantic-based strategies such as animacy and event probabilities to interpret the experimental sentences with one animate noun and one inanimate noun. In sentences with two animate nouns, learners defaulted to a first noun strategy because animacy did not provide them with enough information to correctly assign grammatical roles. Learners could interpret sentence by attending to the meaning provided by case markings; however, they did not use this morphological cue. In Jackson (2008) similar results were found. Intermediate and advanced L2 learners were more accurate and faster interpreting subject-first sentences as opposed to object-first sentences. This was also the case for sentences with inanimate subjects. Moreover, it was found that with increasing proficiency, L2 learners were better at utilizing morphological cues for sentence
comprehension. Jackson pointed out, however, that even when advanced learners were more aware of the importance of case marking, they still defaulted to lexical-semantic strategies such as animacy and word order strategies such as the first noun reliance for interpretation.

Summarizing, all the IP studies reviewed here agree that English native speakers learning a L2 (Spanish, French, and German) rely on the first noun to initially interpret L2 sentences. These studies found that intermediate learners continued using semantic-based strategies even after they receive traditional instruction. Moreover, Jackson (2007, 2008) found that advanced L2 learners of German did not use morphological cues for interpretation and they continued to rely on local processing and lexical semantics. The following section discusses the limitations of these studies and the implications for this dissertation.

Limitations of IP Studies

IP studies have provided evidence that L2 learners process L2 sentences using lexical-semantic and local strategies such as the first noun strategy. Although, the studies above tested L2 learners of different languages, virtually all the participants were English native speakers. As mentioned previously, English native speakers use preverbal positioning/word order for agency assignment by default due to the limited inflection system in English. Reliance on word order coincides with the universal first noun strategy. Therefore, regardless of the L2 being learned, it is very difficult to tease apart in these studies whether learners utilize L1 processing strategies transferred to the L2 or whether they default to use local and lexical-semantic strategies due to processing cost. Moreover, all the studies explored L2 processing with offline comprehension tasks, and although they confirmed that learners process the language locally, using semantic information initially, their conclusions raised the question whether L2 learners can use implicit morphosyntactic information during online processing. Jackson showed that advanced learners of German did not make use of morphosyntactic information (i.e., case markings); however, she did not use online methods (self-paced reading/listening, eye-movement tracking, etc.), which are the appropriate tools to tap into learners implicit processing (Mitchell, 2004). Moreover, Jackson tested English native speakers who rely less on morphosyntactic information to assign agency. One option to explore these questions is to test processing strategies by L2 learners who naturally rely on morphosyntactic cues to assign agency using an online comprehension tasks.
**Competition Model and L1 Transfer**

As discussed in Chapter 1, the competition model predicts that children and second language learners would acquire sentence interpretation strategies in an order that is predictable from the cue validity in the adult language. That is, the model claims that L2 sentence processing begins with L2 cue weight settings that are close to those from the L1 (MacWhinney, 2005). Therefore, L2 learners transfer L1 processing strategies to interpret L2 sentences initially. This section presents two types of competition model studies; those that provide support to L1 transfer and those who challenge this view.

**L1 Transfer Supported**

Several online and offline competition model studies have explored whether L1 processing strategies affect L2 processing. The findings of many studies have support the notion that valid L1 cues tend to be transferred to the L2. A summary of these sentence interpretation studies is presented in Table 2.1. Studies that document strong patterns of L1 transfer are: McDonald’s (1987b) offline study of English-Dutch and Dutch-English bilinguals, Kilborn’s (1989) online study of German-English bilinguals, and Hernandez et al.’s (2000) online study of Spanish-English monolinguals and bilinguals.

<table>
<thead>
<tr>
<th>Languages</th>
<th>Study</th>
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<tbody>
<tr>
<td>Italian-English</td>
<td>Bates &amp; MacWhinney (1981) and</td>
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<tr>
<td>German-English</td>
<td>Kilborn (1989; 1994)</td>
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<tr>
<td>Chinese-English</td>
<td>Liu et al. (1992) and Liu (1996)</td>
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<tr>
<td>English-Dutch</td>
<td>McDonald (1986, 1987)</td>
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<tr>
<td>Dutch-English</td>
<td>Kilborn &amp; Cooreman (1987)</td>
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<tr>
<td>Spanish-English</td>
<td>Wulfeck et al. (1986); Hernandez et al. (1994), and</td>
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<td>Hernandez et al. (2000)</td>
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McDonald (1987) carried out one of the first competition model studies to explore sentence interpretation with L2 learners. This study investigates sentence interpretation by L2 learners of English (L1 Dutch) and L2 learners of Dutch (L1 English) of various proficiency levels. The purpose of the study was to test whether L2 learners start L2 acquisition with L1 cue weights. Participants included 9 English native speakers and 9 Dutch native speakers. Also, there were 24 L2 learners of Dutch and 39 L2 learners of English. English speakers use word order as the main cue for interpretation and Dutch speakers use case markings; therefore, MacDonald hypothesized that L2 Dutch learners would use word order initially, and L2 English learners would use case markings to interpret L2 sentences. Also, he hypothesized that with increased proficiency and exposure, L2 learners would rely more on the L2 cues. McDonald used the competition model experimental paradigm to test these hypotheses. Experimental sentences consisted of two nouns and a transitive verb. The sentences included various cues for interpretation such as word order, subject-verb agreement, object-verb agreement, case marking, and animacy. These cues were manipulated to create sentences with converging and conflicting cues in English and Dutch. The manipulation created grammatical and ungrammatical sentences. Example 2.6 (from McDonald, 1987) presents sentences with converging and conflicting cues in English.

Example 2.6

*Sentences with converging and conflicting cues in English.*

a. The golfer is hitting the ball.

b. The ball is hitting the golfer.

c. Is hitting the golfers the caddy.

To explain, in the first sentence, word order, animacy, and the verb form favor the golfer as the actor. In the second sentence, however, the cues conflict and favor different interpretations. Word order and the verb form favor the ball as the agent; however, animacy favors the golfer. The third sentence is an ungrammatical sentence typical of competition model studies. In this sentence, the verb from favors the caddy as the agent; however, animacy favors both participants. The task was a sentence interpretation task with agent identification; therefore, participants listened to the experimental sentences to decide which of the two nouns was responsible for doing the action in the sentence. In addition, they were presented with two pictures depicting the two nouns in the sentence.
They had to choose the picture that corresponded to the agent. The percentage of first noun choice was registered. McDonald found that L2 learners of English used case markings and L2 learners of Dutch used word order to comprehend L2 sentences. These results were taken as evidence that L2 learners initially use the L1 cues for comprehension. Also, it was found that L2 learners relied more on L2 cues with increased proficiency.

Hernandez et al. (2000) investigated sentence interpretation by Spanish native speakers. The study used the CM paradigm with agent identification to investigate Spanish monolinguals and Spanish-English bilinguals’ interpretation patterns. The task was a sentence interpretation that manipulated agency cues such as animacy, and agreement to create sentences with converging and competing cues. As in previous CM studies, stimuli consisted of grammatical sentences, and ungrammatical sentences. Example 2.7 presents sentences used in Hernandez et al. (2000) which are representative of the CM paradigm.

Example 2.7

Spanish sentences with converging and conflicting cues.

a. El perro las está correteando a las vacas.
   The dog cl_{fem/pl} is chasing acc the cows

b. El perro lo está correteando las vacas.
   The dog cl_{mas/sg} is chasing the cows

In the stimuli, the Spanish accusative marker “a”, which is only present in Spanish, was also manipulated in order to test bilingual strategies. Participants were 21 Spanish monolingual speakers, and 27 Spanish-English bilinguals who started learning English at age 5. Participants carried out a CM sentence interpretation with agent assignment. The percentage of first noun choice and the reaction times (RTs) to agent assignment were recorded. Bilinguals were tested with the sentence interpretation task in English and Spanish. The monolingual control group performed the task in Spanish only. The results from the monolingual control group showed that monolingual Spanish speakers relied strongly on the accusative preposition “a” for agent identification. When the preposition was absent, they relied strongly on verb agreement. These results confirmed the Spanish cue validity patterns from other competition model studies. The results from the bilingual group showed a strong reliance on verb agreement and the accusative marker cue as well. Therefore,
researchers concluded that bilinguals used the strongest cues from their L1 to processed sentences in the second language.

**L1 transfer not Supported**

Hernandez et al. (2000) did not manipulate word order in their experiment, so all their sentences were canonical SVO sentences. The researchers acknowledged that if they had included word order, they would have expected stronger first noun reliance given that they observed a first noun preference within the younger learners. The *first noun preference* has been documented in other competition model studies. This section presents competition model studies that explore agent assignment with L2 learners, monolinguals, bilinguals, and whose results challenge the L1 transfer patterns proposed by the competition model.

**L2 Learners**

Gass (1989) looked at sentence interpretation strategies with L2 learners of English (L1 Italian) and L2 learners of Italian (L1 English). The researcher tested Italian native speakers who naturally rely on subject-verb agreement in their L1 to assign agency. Gass hypothesized that Italians learning English would use agreement to process English sentences. She used an offline sentence interpretation task with agent identification. The percentage of first noun choice was calculated. Gass found that both groups of learners had a strong tendency to use animacy as a cue for agency assignment regardless of the cue validity in their L1. In other words, Italian learners of English did not demonstrate the use of agreement which is the strongest cues in their L1 (Bates et al., 1984). Gass claimed that these results support a potential universal in L2 sentence processing. According her, L2 learners interpret L2 sentences using a semantic primacy strategy, which refers to the use of the semantic information encoded in lexical items to assign meaning. An example is the use of animacy cues to determine the agent in a sentence.

Harrington (1987) and Ito (1990) investigated sentence processing strategies in L2 English and L2 Japanese. These studies included monolingual controls in both languages, and used the offline CM paradigm to explore the use of word order, animacy, and contrastive stress. Participants were L2 learners of varying L2 proficiency level. Based on the percentage of first noun choice, the results of these studies supported the cue validity patterns proposed by the CM for English and Japanese. That is, English native speakers exhibited the characteristic first noun strategy on NVN
sentences and the second noun strategy on VNN and NNV when assigning the agent to English sentences. Japanese native speakers relied on animacy to assign the agent to Japanese sentences. However, the CM predictions for L2 learners were not confirmed in either study. Harrington (1987) found that Japanese speakers used a first noun strategy to assign the agent to English sentences. Ito (1990) also found that L2 learners of English and L2 learners of Japanese relied on the first noun to assign the agent in canonical word order sentences. Ito accounted for these results by claiming that both groups of learners transferred what he calls the S-first property from their L1.

Monolingual Speakers

Devescovi et al. (1998) investigated the use of morphological agreement by Italian monolingual children between the ages of 3 and 10 years old. The researchers used the competition model paradigm, and they included a control group of Italian adult speakers. The percentage of first noun choice was registered offline. The results confirmed that adult Italian native speakers rely on agreement to assign the role of agent in Italian sentences regardless of word order conditions. Therefore, the Italian cue validity pattern proposed by the competition model was confirmed. However, the results showed that Italian monolingual children did not use agreement to assign the agent to Italian sentences. Instead, they relied on word order for sentence interpretation, and they interpreted all sentences as SVO sentences. Therefore, the CM predictions for children and L1 transfer patterns were not confirmed in this study. This study offered very interesting insights on L2 developmental processing patterns. The researcher found that agreement has an effect on child processing after the age of 5 years old. By age 7, Italian children displayed the morphological reliance that characterizes Italian adult processing. The researchers interpreted these results as evidence that children process sentences locally and they use semantic processing strategies mainly; that is, they process lexical items before they process grammatical forms. They concluded that morphosyntactic cues such as agreement are not used by children due to the processing cost involved in their processing. That is, they proposed that children may not have the working memory configurations that allow them to process long-distant agreement relationships. The researchers also concluded that cue cost may alter the development of sentence interpretation strategies.

Reyes (2003) explores agent assignment with Spanish native speakers; thus, it is a relevant study for this dissertation. This is an online study that investigated the developmental pattern of morphological and syntactic strategies by Spanish monolingual speakers. Participants in this study
were 100 monolingual Mexican speakers (from ages 5 through 21 years old) who performed a CM sentence interpretation task. Reyes hypothesized that, if the cue validity patterns and the L1 transfer component of the competition model were accurate, Spanish speakers would demonstrate a high reliance on verbal morphology, particularly subject-verb agreement, from early age. First noun choice and reaction times to agent assignment were calculated. The results showed that Spanish monolingual children use a first noun strategy and relied on word order for agent identification. Therefore, L1 transfer was not supported in this study. Early reliance on word order switched to reliance on verbal morphology by age 11. From 11 years old and on, participants in this study relied heavily on agreement cues; however, the reaction times measures showed a slowdown in processing as age increased. These findings were taken as evidence that adults pay a higher cost to process sentences using agreement morphology. The researchers concluded that in order for listeners to use agreement for interpretation, it is necessary that they keep in working memory the constituents of sentences across sentence boundaries beyond the local domain; therefore, Reyes suggested that working memory may influence the development of morphosyntactic strategies at early stages of acquisition.

Bilingual Speakers

Along the same lines, Reyes and Hernandez (2006) examined the processing strategies of Spanish-English bilingual speakers with the CM and online measures. Particularly, this study investigated the effects of cue cost on the development of morphosyntactic strategies. The research questions that guided this study were:

a. What interpretation strategies do Spanish-English bilinguals use in real time when presented with grammatical and semi-grammatical sentences?

b. At what age and in what fashion do these bilinguals make use of semantic versus morphosyntactic cues for sentence interpretation?

The participants in this study were 100 bilinguals dominant in Spanish with English as their second language, ranging from 5 to 23 years old. Participants were beginning learners of English, and the adult bilinguals had been exposed to English since age 5. Participants carried out an online sentence interpretation with the CM paradigm. The results of the reaction times measures and the percentage of first noun choice indicated that adult bilinguals used ‘in between’ strategies; that is, they used an amalgamated pattern that includes the moderately strong cues in both languages. This study
produced interesting results regarding early processing patterns that are relevant to this dissertation. The results showed that bilingual children use semantic cues to process canonical and non-canonical sentences. That is, they used a first noun strategy regardless of word order or agreement conditions. Inflectional morphology had little influence on child agent assignment. Reliance on agreement morphology developed later in bilinguals, around the age of 11. The second noun strategy to interpret non-canonical sentences did not develop until the age of 14. One of the conclusions from the study was that adult bilinguals use agreement morphology as a cue for sentence interpretation, but they experience a slowdown in their processing; that is, they experience a cue cost effect. Based on these results, the researchers suggested that bilingual children default to semantic cues for sentence processing because of the cue cost involved in interpreting morphosyntactic cues such as agreement.

To summarize, the studies reviewed in this section showed that monolingual children, bilinguals, and L2 learners use semantic-based cues for sentence interpretation regardless of the strongest cues from the adult language. Moreover, Spanish monolinguals and bilinguals showed signs of late acquisition of the agreement cue because of the cue cost associated with it. One question that remains is whether adult L2 learners of English with Spanish as L1 would also default to the first noun strategy to process English sentences at the beginning stages of acquisition due to cue cost effects. The next section presents the limitations of the studies above reviewed.

**Limitations of Studies Investigating L1 Transfer**

The studies presented above support L1 transfer; however, other studies have found that monolingual children, bilinguals, and L2 learners do not initially transfer L1 strategies to process the L2. Reyes (2003), and Reyes and Hernandez (2006) show that Spanish monolingual children and young Spanish-English bilinguals did not use agreement morphology to initially interpret sentences in the L2. These studies also found that the use of morphological cues emerges later at the age of 11 years old. Although Spanish native speakers utilize agreement morphology to interpret sentences, this strategy slows down processing. That is, processing of morphosyntactic information is cognitively more costly particularly at beginning stages of acquisition. For this reason, learners process sentences locally and they initially utilize lexical-semantic cues, which was confirmed in these studies. These results raise the question whether adult learners who are beginning L2 learners use L1 morphosyntactic cues to process the L2. Gass (1989), Harrington (1987), and Ito (1990) have
partially responded to this question. They explored sentence interpretation by adult L2 learners and found that they did not use morphosyntactic cues to initially process the L2 even though these cues were present in the L1. However, they did not use online methods to research sentence processing. This dissertation includes a second experiment that uses an online sentence interpretation task with the competition model paradigm, and it explores sentence interpretation strategies by adult, beginning L2 learners of English and Spanish.

**Additional Considerations for the Present Study**

In this dissertation, active and passive sentences are used to test agent assignment strategies in Experiment 1. The purpose is to explore whether beginner learners use a first-noun strategy or whether they are able to initially use the morphosyntactic strategies from their first language. Actives and passives allow the manipulation of the agent’s position (pre-verbal/post-verbal) in English and Spanish without exposing learners to ambiguous and ungrammatical sentences. Moreover, these constructions have morphological cues for their correct interpretation. The next section describes active and passive constructions in English and Spanish.

**Actives and Passives**

*Grammatical voice* is manipulated in Experiment 2 of this dissertation to explore whether beginner learners use local cues or whether they are able to initially use L1 morphosyntactic cues. Active and passive structures allow the manipulation of the agent’s position (pre-verbal/post-verbal) in English and Spanish without exposing learners to ambiguous and ungrammatical sentences. Moreover, these constructions have morphosyntactic cues for their correct interpretation.

Actives are constructions where the subject performs the action expressed by the verb. Sentences in the present progressive are examples of active voice in English and Spanish. In both languages, active sentences with the present progressive are formed by the verb to be ‘*estar*’ plus a transitive verb and the gerund suffix (–*ing* in English, and –*ando*, –*iendo* in Spanish). Passives are grammatical constructions where the subject does not perform the action in the sentence; the action is performed on it. Passive voice in English and Spanish is formed with the verb to be ‘*ser*’ plus a transitive verb with the past participle morphemes (regular forms in English have the –*ed* marker, and the –*ado*, –*ido* markers in Spanish). Full passives have an additional lexical passive marker for
agent identification in the post verbal prepositional phrase: the word *by* in English and *por* in Spanish.

In terms of semantic relationships, grammatical subjects in actives generally express the agent of the main verb, and learners often interpret them correctly. Argument structure in passives is less apparent to learners because this construction lacks the expected subject – agent relationship of actives (Hernanz-Carbó & Brucart, 1987). In passives, the grammatical subject generally carries the semantic role of patient. The agent is expressed by the post verbal noun in the *by*-phrase. It is important to note that in Spanish, the past participle and the auxiliary verb must agree in gender and number with the subject argument (which carries the patient theta role). However, in English and in Spanish, this construction has morphological and lexical cues that allow speakers to correctly establish the subject – patient paradigm of passives. Example 2.8 presents the semantic relations in English and Spanish passives with the passive suffix.

Example 2.8

*Semantic relationships in actives and passives.*

**Active:** The boys are greeting the girl.

‘Los chicos están saludando a la chica’

NP1 (agent) - V - NP2 (patient)

**Passive:** The girl is pushed by the boys.

‘La chica es empujada por los chicos’

NP1 (patient) - V - NP2 (agent)

From a syntactic perspective, subjects in actives are generated in the SpecVP position. They take on the *agent* theta role in this position when they merge with the verb projection. In other words, the agent theta role is assigned when the subject argument and the verb enter into a Spec-head relation. Then the subject moves to SpecIP, the sentential subject position. Objects are generated in the CompV position, and they are theta marked by the verb, generally with the patient role (Chomsky, 1995, 2000, 2001). This is the case for English and Spanish sentences. Figure 2.1 shows theta role assignment under a Spec-head relationship for the active sentence *Martha hit William* (adapted from McCloskey, 1997).
In passive sentences, however, the subject in passives is generated in a lower position, and it does not receive a theta role (Chomsky, 1982). Some scholars argue that the agent theta role and the accusative case assigned by the verb are absorbed by the passive suffix –en via role absorption (Jaeggli, 1986; Roberts, 1987; Baker, 1988). Then, the passive suffix transfers the agent theta role to the NP in the by phrase. The object in the CompV position has to rise to the SpecIP, which is a nominative case position in order to receive case and the patient theta role (Jaeggli, 1986; Collins, 2005). This is the case for English and Spanish sentences. Figure 2.2 demonstrates theta role assignment for the passive sentence Martha was carried by William (adapted from Collins, 2005).
**Processing of Passives**

Passive subjects can be mistaken as agents during L2 processing if learners use the first noun strategy. However, passive subjects can be correctly identified as patients if learners process verbal morphology. Thus, passives constructions can provide evidence of morphosyntactic processing at the beginning stages of acquisition.

Research on the acquisition of passive voice has shown that comprehension and production of passives is effortful and cognitively demanding at the beginning stages of acquisition (Caramazza & Zurif, 1976; Horgan, 1978; Maratsos, Fox, Becker, Chalkley, 1985; Borer & Wexler, 1987; Pinker, Lebeaux & Frost, 1987; Fox & Grodzinsky, 1998; Townsend & Bever, 2001; Rohde & Gibson, 2003; Stromswold, 2004). On the one hand, researchers in first language acquisition have proposed that misinterpretation of passive sentences is a representational problem (Borer and Wexler, 1987), claiming that children have immature grammatical systems; thus, they struggle with passive constructions because they cannot assign thematic roles to moved constituents in the structure. On the other hand, Fox and Grodzinsky (1998) argue that misinterpretation of passives is not a representational problem. Instead, the processing load in comprehending passive sentences causes a break-down in comprehension. They explain that because thematic roles need to be transmitted from one constituent to the other, the processing load associated with passive structures goes outside children’s processing capacities, making it difficult for them to correctly process passives.

Researchers investigating the processing of passives by adult native speakers have found that passive are not much harder to process than actives (Rohde & Gibson, 2003), particularly full passives that do not tax working memory (Dabrowska & Street, 2006). Ferreira (2003) found that the difficulty with passives among native speakers is not related to processing of verbal morphology, but instead, is due to semantic plausibility. That is, native speakers have a harder time processing implausible sentences regardless of the grammatical voice. Moreover, Stromswold (2004) found in an eye-movement study that adult native speakers process morphological cues to decide whether a sentence is passive. In his study, adults decided that a sentence was passive at the past participle. Children, on the other hand, assumed that the first noun was the agent and decided that a sentence was passive at the end of the sentence. These results suggest that while passives forms are fully represented in the adult linguistic system, they are developing in the child system.
Second language processing research has not addressed yet whether adult L2 learners process passive morphology at the beginning stages of acquisition; however, researchers have found that L2 learners have difficulties processing inflectional morphology in general; that is, learners do not seem to attend to inflectional morphology for sentence interpretation (Felser et al., 2003; Hawkins, 2001; Hawkins & Chan, 1997; Papadopoulou & Clahsen, 2003). The inability to process verbal morphology has been attributed to L2 learners relying on semantic cues and not on syntactic ones to interpret sentences. Some proposed that learners do not use verbal morphology because abstract features such as agreement are not represented in the learners’ syntax, or at least not at the beginning stages of acquisition (Clahsen & Felser, 2006; VanPatten, Keating & Leeser, 2012). Others believe that this is a mapping problem because the syntactic agreement feature is fully represented, but it is not associated to inflectional morphology (Prévost & White, 2000; Lardiere, 2007). Whether the difficulty with inflectional morphology is representational or not, it prevents learners from correctly interpreting passive constructions. Thus one can hypothesize that, if beginner learners do not attend to verbal morphology, they will misinterpret passives sentences as opposed to active sentences due to the reliance on the first-noun strategy.

Research Questions and Hypotheses

This dissertation investigates whether L1 processing strategies affect the way beginning learners assign meaning to sentences in another language. The general research question that guides this dissertation is the following: Do beginning L2 learners initially transfer L1 morphosyntactic strategies to process the L2, or do they rely more on local and lexical-semantic strategies? Two experiments were used to explore the research questions: Experiment 1 consists of a picture-sentence verification task with self-paced listening, and Experiment 2 consists of a sentence interpretation task with agent identification.

The research questions that guide Experiment 1 are the following:

1. Does sentence type (active, passive) affect agent assignment for…
   a. L1 and L2 English speakers?
   b. L1 and L2 Spanish speakers?
2. Does sentence type (active, passive) affect reaction times at critical regions for…
   a. L1 and L2 English speakers?
   b. L1 and L2 Spanish speakers?

The following hypotheses regarding Research Question 1 were based on the premise that comprehension for learners is effortful at the beginning stages of acquisition (VanPatten, 1996, 2004, 2007), and on the results obtained by research on sentence processing with input processing (VanPatten, 1984; VanPatten & Cadierno, 1993; VanPatten & Oikkennon, 1996; VanPatten & Sanz; 1995; VanPatten & Wong, 2004; Jackson, 2007, 2008):

- Sentence type will not affect L1 English/Spanish speakers’ agent assignment. They will be accurate in choosing the agent regardless of sentence type.
- Sentence type will affect agent assignment by L2 learners of English/Spanish. They will be more accurate in choosing the agent of active sentences compared to passive sentences. Their accuracy rate in passive sentences will be affected because they will interpret passives as actives due to the first noun strategy.

The following hypotheses regarding Research Question 2 were based on the premise that comprehension for learners is effortful at the beginning stages of acquisition (VanPatten, 1996, 2004, 2007), and on research with passive sentences (Rohde & Gibson, 2003; Dabrowska & Street, 2006; Ferreira, 2003; Stromswold, 2004):

- Sentence type will not affect L1 English/Spanish speakers’ reaction times in any of the target or post-target regions. Differential reaction times between actives and passives are not expected because native English speakers are able to process verbal morphology regardless of sentence type. Besides similar reaction times, they should also have high accuracy in both sentence types.
- Sentence type will not affect L2 English/Spanish learners’ reaction times in the region where the verb is located. Differential reaction times between actives and passives are not expected in this region because learners will process passive sentences as active sentences. They should also have lower accuracy rates in passives as opposed to actives.
• The same results are expected in the post verbal regions. That is, sentence type will not affect L2 Spanish/English learners’ reaction times in these regions because L2 learners will not process the morphosyntactic information in the sentence.

The research questions that guide Experiment 2 are the following:
3. Do English native speakers rely on…
   a. *word order* for agent assignment?
   b. *agreement* cues for agent assignment?
4. Do Spanish native speakers rely on…
   a. *word order* for agent assignment?
   b. *agreement* cues for agent assignment?
5. Do L2 learners of English rely on…
   a. *word order* cues for agent assignment?
   b. *agreement* cues for agent assignment?
6. Do L2 learners of Spanish rely on…
   c. *word order* cues for agent assignment?
   d. *agreement* cues for agent assignment?

The following hypotheses regarding research questions 3-4 were based on the results obtained by research on cue validity with the competition model (Bates et al., 1982; MacWhinney & Bates, 1978; MacWhinney et al., 1984; Kilborn, 1989; Hernandez et al., 1994; Hernandez et al., 2000; Wulfeck et al., 1986):

• English native speakers will rely more on *word order* than on *agreement* cues for agent assignment.
• Spanish native speakers will rely more on *agreement* cues than on *word order* for agent assignment.

Based on the results obtained by research on agent assignment with the competition model by monolingual children and L2 learners (Gass, 1989; Harrington, 1987; Ito, 1990; Devescovi et al.,...
1998; Reyes, 2003; Reyes & Hernandez, 2006), the following hypotheses were formed regarding research questions 5-6:

- L2 learners will have a high percentage of first noun choice in all conditions because they will use a first noun strategy.
- L2 learners of English will rely on word order for agent assignment.
- L2 learners of English will not utilize agreement cues for agent assignment.
- L2 learners of Spanish will also rely on word order for agent assignment.
- L2 learners of Spanish will not utilize agreement cues for agent assignment.
CHAPTER THREE
GENERAL EXPERIMENTAL DESIGN

Overview of Experimental Approach

This chapter provides a general description of the study conducted to explore the research questions posed in Chapter 2. The study investigated whether L2 learners of English and L2 learners of Spanish initially relied on strategies from their first language or whether they use more universal strategies to process L2 sentences. The experimental design included two main experiments. Experiment 1 consisted of a picture-sentence verification task with self-paced listening to test reliance on the first noun by beginning L2 learners. The material manipulated the agents’ syntactic position by using reversible active and full passive sentences. Experiment 1 followed Marinis (2007) picture-sentence verification task, and it is presented in detailed in Chapter 4. Experiment 2 consisted of a sentence interpretation task with agent identification to test whether L2 learners used L1 morphosyntactic cues to assign agency to L2 sentences. The materials manipulated syntactic and morphological information to create competition among cues. Experiment 2 followed Reyes and Hernandez (2006) procedure, and it is presented in detailed in Chapter 5. The following sections present the general experimental design, participants, materials, and procedure pertaining to the present study.

General Method

This introduction to the methods used in the experiments serves to provide the overall framework of the dissertation. Chapters 4 and 5 present the specifics about the stimuli for each experiment. The following sections describe the participants, materials, and general procedure for conducting the experiments.

Participants

A total of 182 participants took part in this study. Participants included 94 adult L2 learners of English (40 males and 54 females) at the Benemérita Universidad Autónoma de Puebla, Mexico, and 88 adult L2 learners of Spanish (40 males and 48 females) at Florida State University. All participants were beginning second language learners and signed an informed consent from (Appendix A) prior to participating in the study. The characteristics of each group of L2 learners are provided below.
**L1 Spanish/L2 learners of English**

The L2 learners of English were recruited from 4 intact classes of English I (LEM 001) at Benemérita Universidad Autónoma de Puebla, Mexico. This is the first course in a five-course sequence that undergraduate students take to complete the foreign language requirement in English majors, and the course meets five days a week for 100 minutes per day. Class time is devoted to grammatical explanations accompanied by meaning-based activities that require the use of the grammatical structures studied in class.

Students enrolled in these courses are categorized as beginners based on the Universidad Autónoma de Puebla’s placement test. The placement test is a paper-based institutional version of the standardized Test of English as a Foreign Language (TOEFL). Only participants who score 380 points or less (score ranges between 310 and 677) are allowed to enroll in English 1. Participants from this level were chosen for the following reasons: (1) they provided an appropriate context for testing given that the focus of this investigation is on sentence processing during early stages of second language acquisition, (2) learners did not receive formal, explicit instruction on the passive voice by the time of testing, (3) the amount of exposure to the second language categorizes them as beginner learners of English; the average years of formal study of English was 2.39 years. (4) All participants are college students; therefore, they have comparable literacy skills.

In order to clarify proficiency level, all participants were provided with a Language History Questionnaire that asked participants to describe their experience learning English. (See Appendix B for the questionnaire). The data from the language history questionnaire revealed that none of the learners lived or studied in an English speaking country at the time of data collection, and none was a native or heritage English speaker. Table 3.1 presents the average for age at the time of testing and years of formal study of English. In order for participant’s data to be included in the analyses in this study, the following criteria must have been met:

- The participant was a native Spanish speaker;
- The participant was placed in English 1 under the University of Puebla criteria;
- The participant reported no uncorrected vision or hearing impairment;
- The participant completed all tasks in one of the two experimental sessions;
- The participant scored 70% on the vocabulary screening test.

Out of the 94 subjects who volunteered to participate and were present, 83 met the criteria for inclusion.
Table 3.1

*Mean Age and Years of Formal Study of English*

<table>
<thead>
<tr>
<th>n</th>
<th>Age</th>
<th>Range</th>
<th>Years of formal study of English</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>83</td>
<td>19.05</td>
<td>17-30 years</td>
<td>2.39</td>
<td>0-4 years</td>
</tr>
</tbody>
</table>

**L1 English/L2 Learners of Spanish**

The L2 learners of Spanish were recruited from 4 intact classes of Elementary Spanish II (SPN 1121) from Florida State University. This is the second course in a three-course sequence that undergraduate students take to complete the foreign language requirement. Elementary Spanish II is a hybrid course; therefore, participants only meet three days a week for 50 minutes per day. In a hybrid course, a portion of work for the class is done online. Class time is devoted mainly to meaning-based, interactive activities that require the use of targeted vocabulary and grammatical structures studied in the on-line materials.

Only students who completed the Elementary Spanish I course (SPN 1120), or equivalent, with a grade of C- or higher or students who take the FSU placement test and score 13-23 points (scores range from 0 to 70) are allowed to enrolled in this class. Therefore, students enrolled in this class are considered beginning level Spanish learners. Participants from this level were chosen for three reasons: (1) these participants provide an appropriate context for the testing to explore processing strategies in early second language acquisition, (2) learners did not receive formal, explicit instruction on the passive voice by the time of testing because passive voice is not the focus of any lesson in the Elementary Spanish 1 curriculum, and (3) learners had been exposed to the second language for 2.31 years by the time of testing. All participants were provided with a Language History Questionnaire that asked participants to describe their experience learning Spanish (see Appendix B for the questionnaire). Based on data from the language history questionnaire, it was determined that none of these learners lived or studied in a Spanish speaking country at the time of data collection, and none was a native or heritage speaker of Spanish. Table 3.2 presents the average age and years of formal study of Spanish for the group. In order for participant’s data to be included in the analyses in this study, the following criteria must have been met:
The participant was a native English speaker;
The participant was placed in elementary Spanish II under FSU criteria;
The participant reported no uncorrected vision or hearing impairment;
The participant completed all tasks in one of the two experimental sessions;
The participant scored 70% on the vocabulary test.

Out of the 88 subjects who volunteered to participate and were present in the experiment, 84 met the criteria for inclusion.

Table 3.2

<table>
<thead>
<tr>
<th>Mean Age and Years of Formal Study of Spanish</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n )</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>84</td>
</tr>
</tbody>
</table>

Out of the 182 subjects who volunteered to participate, only 167 met all of the criteria for inclusion and their data was submitted for analysis. The total number of participants was 167: 83 L2 learners of English and 84 L2 learners of Spanish.

Comparison between L2 English and L2 Spanish Learners

Comparability between L2 English and L2 Spanish learners cannot be determined via standardized test. However, the learners were comparable in terms of the average years of formal study of the second language (see Table 3.3). The results of an independent t-test revealed that there was no difference in the years of formal study of the L2 between the groups, \( t(165) = 4.30, p < .05 \). The groups were also comparable in terms of their age, \( t(165) = 3.27, p < .05 \).

Table 3.3

<table>
<thead>
<tr>
<th>Mean Age and Years of Formal Study of the L2 by Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{Group} )</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>L2 English</td>
</tr>
<tr>
<td>L2 Spanish</td>
</tr>
</tbody>
</table>
Materials

The materials used in this study included the following: participants’ background and consent material, vocabulary review materials, and experimental materials. The following section provides detailed descriptions of the participants’ background and consent material, and the vocabulary review materials. An overview of the experimental materials is presented at the end of the materials section. However, the specifics about the stimuli for each experiment are presented in Chapters 4 and 5.

Consent Form

The consent form notified the participants that the study was designed to investigate the strategies used to process English/Spanish sentences by L2 learners. There were no specific details provided about processing strategies or the use of passive voice in English or Spanish. The form explained the procedure of the experiment, and it provided a brief descriptions of the materials used in the two different experiments in English and Spanish. The consent form mentioned that learners would benefit from their participation in the study by practicing their linguistic abilities in the second language. It was also mentioned that the field of second language acquisition would benefit from their participation by providing researchers with data on how learners process a second language. The participants were assured that all the data collected during the experiment would be kept confidential and would not be used in any manner other than for the purposes of the study. At the end of the form, participants were asked to sign if they were willing to continue participating. The consent forms are provided in Appendix A.

Language History Questionnaire

The questionnaire was designed to obtain information about the participants’ native language and their history of studying English/Spanish. This information was used to exclude those participants whose native language was not English/Spanish, those who stated that they had a hearing or visual impairment, and heritage speakers of the experimental languages. The questionnaires in English and Spanish are provided in Appendix B.

The questionnaire included a self-rating scale of participants’ second language skills (reading, writing, speaking and listening comprehension), as well as comfort of expression in the second language. The ratings are an additional proficiency measure. The ratings were done on a
scale from 1 “least proficient” to 10 “most proficient”. Tables 3.4 and 3.5 show the results from the background questionnaire. Participants in the L2 English groups had consistently high ratings overall even though both groups have a comparable amount of exposure to the second language. However, the results of an independent t-test revealed that there was no significant difference in the self-ratings between the groups, $t(165) = 32.43, p < .001$.

Table 3.4

Mean (SD) Self-Ratings on Reading, Writing, Speaking, Listening and Comfort of Expression in L2 Language. Scale Was from 1 (Low Ability) to 10 (High Ability)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Reading</th>
<th>Writing</th>
<th>Speaking</th>
<th>Listening</th>
<th>Comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 English</td>
<td>83</td>
<td>6.11 (2.1)</td>
<td>5.96 (1.8)</td>
<td>5.54 (2.2)</td>
<td>5.97 (2.2)</td>
<td>6.42 (2.2)</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td>84</td>
<td>4.67 (1.9)</td>
<td>4.25 (1.8)</td>
<td>3.63 (1.7)</td>
<td>4.19 (1.9)</td>
<td>3.30 (1.6)</td>
</tr>
</tbody>
</table>

Table 3.5

Overall Mean of Self-Rating Ratings by Language Group

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 English</td>
<td>83</td>
<td>6.00</td>
<td>.29</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td>84</td>
<td>4.01</td>
<td>.48</td>
</tr>
</tbody>
</table>

Bernaus et al. (2004) found that cultural background and affective factors interacted with the language studied to influence self-ratings of language proficiency. Based on these findings, it is possible to say that the perception of L2 abilities from the L2 English group and their ratings might have been influenced by the learner’s perception of the L2 global status, as well as their instrumental motivation. Because English is a global language (Crystal, 1997), it is not surprising that Mexican learners of English, who possess a positive attitude towards English and a very high instrumental motivation, rated their abilities higher than their TOEFL scores indicated. Whereas self-ratings like those in the language history questionnaire provide a skewed picture of proficiency, they may provide additional information to understand any differences in sentences processing patterns.
**Vocabulary Review Materials**

The vocabulary review material included the following: vocabulary hand-out, vocabulary review sessions, and a vocabulary screening test.

**Vocabulary hand-out.** In order to ensure that participants were familiar with the vocabulary items used in the experimental tasks, a list of 20 verbs, and 44 nouns in English with Spanish equivalents was compiled and given to the participants as support material for the vocabulary review sessions. The vocabulary hand-out is provided in Appendix C.

**Vocabulary review sessions.** There were three 10-minute vocabulary review sessions within a period of a week. There was one review session per class period. During the first two sessions, participants were presented with the vocabulary items from the hand out. Half of the vocabulary items were presented in the first session and the other half in the second session. The emphasis of the review was on the vocabulary pronunciation given that the experiments test learners’ listening comprehension. Each of the first two review sessions consisted of a PowerPoint slide presentation where each word was presented in the second language along with an image representing its meaning. All the images used were simple black and white line drawings. A couple of items from the review session are presented in Example 3.1.

Example 3.1

**Example of items in review session**

**Instructions for L1 Spanish:** Escucha las palabras que va a presentar tu instructor(a). Repítelas después de él/ella.

**Instructions for L1 English:** Listen to the words your instructor will present. Repeat the words after him/her.

1. *Niño ‘boy’*
2. *Ratón* ‘mouse’

During the vocabulary presentations, all instructions were provided in the first language (Spanish for L1 Spanish, and English for L1 English). After the vocabulary presentation, learners engaged in meaning based activities that allowed them to practice the vocabulary reviewed that day. An example of a meaning based activity is provided in Example 3.2. Samples of the PowerPoint presentations for the review sessions are provided in Appendix D.

Example 3.2

*Example of meaning based activity*

**Instructions for L1 Spanish:** ¿Con quién hablas? Escucha las situaciones que va a leer tu instructor(a). Decide con quién tienes que hablar. Escribe el número delante de la palabra.

**Instructions for L1 English:** Who do you talk to? After each situation read by the instructor, decide who would be the best person to talk to and write the number of the situation next to the corresponding word.

1. *Cuando tienes problemas en tu trabajo, ¿con quién hablas?* When you have problems at work, who do you talk to?
2. **Cuando tienes problemas en la escuela, ¿con quién hablas?** When you have problems at school, who do you talk to?

<table>
<thead>
<tr>
<th>Instrucciones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paso 2: ¿con quién hablas? Escucha las situaciones que va a leer tu instructor(a). Decide con quién tienes que hablar. Escribir el número delante de la palabra.</td>
</tr>
<tr>
<td>When...</td>
</tr>
<tr>
<td>I talk to a:</td>
</tr>
<tr>
<td>___ painter</td>
</tr>
<tr>
<td>___ lawyer</td>
</tr>
<tr>
<td>___ doctor</td>
</tr>
<tr>
<td>___ mother</td>
</tr>
<tr>
<td>___ teacher</td>
</tr>
<tr>
<td>___ worker</td>
</tr>
<tr>
<td>___ driver</td>
</tr>
<tr>
<td>___ boss</td>
</tr>
<tr>
<td>___ nurse</td>
</tr>
<tr>
<td>___ uncle</td>
</tr>
<tr>
<td>___ niece</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2: who do you talk to? After each situation read by the instructor, decide who would be the best person to talk to and write the number of the situation next to the corresponding word.</td>
</tr>
<tr>
<td>Cuando... hablo con:</td>
</tr>
<tr>
<td>___ el pintor – la pintora</td>
</tr>
<tr>
<td>___ el abogado</td>
</tr>
<tr>
<td>___ el doctor</td>
</tr>
<tr>
<td>___ la madre</td>
</tr>
<tr>
<td>___ el profesor</td>
</tr>
<tr>
<td>___ el trabajador</td>
</tr>
<tr>
<td>___ el chofer</td>
</tr>
<tr>
<td>___ el jefe – la jefa</td>
</tr>
<tr>
<td>___ la enfermera</td>
</tr>
<tr>
<td>___ el tío</td>
</tr>
<tr>
<td>___ la sobrina</td>
</tr>
</tbody>
</table>

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The third review session consisted of two meaningful activities to practice the vocabulary. Vocabulary presentations were not part of the review session. A couple of items from each of the meaningful activities used in the review session are presented in Examples 3.3 and 3.4.

**Example 3.3**

*Example of meaning based activities used in review session*

**Instructions for L1 Spanish:** Escucha las actividades que va a mencionar tu instructor(a) y decide si tú haces esas actividades. Para ello marcar la columna que mejor exprese tu respuesta.

**Instructions for L1 English:** Listen to the following activities and decide whether you, yourself, do each activity by checking the appropriate column.

1) *Cargo a mis hermanos o sobrinos pequeños.* I carry my baby brothers or baby nephews.
2) *Empujo a la gente en el supermercado.* I push people at the supermarket.

---

<table>
<thead>
<tr>
<th>YES, I DO THAT.</th>
<th>NO, I DO NOT DO THAT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>SI LO HAGO</th>
<th>NO LO HAGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
</tbody>
</table>
Example 3.4

*Example of meaning based activities used in review session*

**Instructions for L1 Spanish:** Escucha las palabras que tu instructor(a) va a decir y escribe las en la categoría a la que pertenecen (animal/persona)

**Instructions for L1 English:** Listen to the words your instructor will read and decide to which category each word belongs (animal/person).

1) *Sobrina* ‘nice’
2) *Pato* ‘duck’

**Vocabulary Screening Test.** An on-line screening test was designed to ensure that the participants had a minimum knowledge of the vocabulary used in the experiment. The inclusion of the vocabulary screening test served as an additional measure to ensure that the results were not due to the differences in lexical knowledge among participant. The screening test consisted of 25 vocabulary items read to the students by the instructor. Participants had to listen to each item twice, and choose one of the three pictures (A, B, C) that corresponded to the word they heard. The pictures were presented on a timed PowerPoint slide presentation. Students had 8 seconds per item to respond. Responses were recorded on an answer sheet. A couple of items from the vocabulary screening test are presented in Example 3.5. The vocabulary screening test in English and Spanish is provided in Appendix E.

Example 3.5

*Items from the vocabulary screening test*

**Instructions for L1 Spanish:** Escucha las palabras que va a decir tu instructor(a). Después, escoge la foto (A, B o C) que mejor representa la palabra. Encierra tu respuesta en la hoja de respuestas.

**Instructions for L1 English:** Listen to the following words. Then, select the picture (A, B or C) that best represents the word that you heard. Write your answers in the answer sheet.
1. *oler* “to smell”

2. *pájaro* “bird”

All participants completed the vocabulary screening test during the next class period following the vocabulary review sessions. Only participants that scored 70% and above were included in the analysis. Only 4 participants were excluded. Table 3.6 presents the results from this measure by group. The results of an independent samples t-test revealed that there was no difference in the screening test scores between the groups, $t(165) = 3.60$, $p = .004$.

Table 3.6

<table>
<thead>
<tr>
<th>Group</th>
<th>$n$</th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 English</td>
<td>83</td>
<td>92.66</td>
<td>8.14</td>
<td>72-100</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td>84</td>
<td>88.19</td>
<td>7.90</td>
<td>72-100</td>
</tr>
</tbody>
</table>
Overview of the Experimental Materials

The total stimuli for the study consisted of 130 sentences in Spanish and 130 sentences in English split across two tasks: the picture-sentence verification task, and the sentence interpretation task. The picture-sentence verification task consisted of 60 sentences in Spanish and 60 sentences in English (20 active sentences, 20 passive sentences, and 20 fillers per language). Four target sentences were eliminated from the picture-sentence verification task due to semantic implausibility. That is, sentences that paired nouns with actions that the noun could not perform were eliminated such as animals pulling or calling others. Therefore, there were 18 active sentences, 18 passive sentences, and 20 filler sentences in the picture-sentence verification task in each language. The sentence interpretation task consisted of 70 sentences in Spanish and 70 sentences in English (5 sentences per each of the 9 different conditions, and 25 fillers per language). Nine target sentences were eliminated from the stimuli due to semantic implausibility. Therefore, there were 4 sentences per condition (36 total) and 25 fillers in the sentence interpretation task. The experimental materials of the study included sentences in English and sentences in Spanish, and pictures.

All sentences shared the following commonalities: (1) the experimental sentences contained two animated nouns and one transitive verb (action verb), (2) animated nouns consisted of people and animals, (3) the two nouns in each sentence were either two animals or two people; i.e., none of the experimental sentences combined one animal noun with one person noun, (4) the verbs were kept as simple as possible; therefore, all English verbs were monosyllabic, and none of the Spanish verbs were longer than 3 syllables. 60% of the Spanish verbs were two syllables long. (5) All verbs had regular past participle forms (–ed in English and –ado, –ido in Spanish), (6) the same nouns and verbs were used in both experiments; however, each noun and verb was used a maximum of 5 times on the 208 experimental sentences. (7) The nouns and verbs used were taken from two sources: (a) previous experiments (Reyes & Hernandez, 2006; Reyes, 2003, and Marinis, 2007), and (b) the participants’ textbooks. Some of the vocabulary used in previous experiments was not part of the learners’ textbooks. The list of nouns and verbs used for the stimuli can be found in Appendix C.

The pictures used in the study had the following characteristics: (1) all picture materials were black and white line drawings, (2) picture material depicted two entities only (i.e. pictures did not include any background details). A couple examples of the picture material used in both experiments are presented in Example 3.6. (3) All picture materials received a plausibility rating of less than 2 in a picture norming questionnaire in a scale from 1 to 5; 1 being “very clear connection between
picture and meaning”, 3 being “somewhat connected”, and 5 being “no connection between picture and meaning”.

Example 3.6

*Picture material used in Experiment 1 and Experiment 2.*

*Picture Norming Test*

The sentence-picture meaning relationship was determined based on the plausibility ratings obtained from 10 English native speakers and 10 Spanish native speakers. Participants rated how well a picture represented the meaning of sentence in a scale from 1 to 5; 1 being “very clear connection between picture and meaning”, 3 being “somewhat connected”, and 5 being “no connection between picture and meaning”. Picture materials with rating of more than 2 points were replaced. The average ratings for pictures used in the experiment are presented in Table 3.7. There was no difference in the ratings of English and Spanish native speakers, $t(19) = 4.47, p < .001$.

Table 3.7

*Mean Rating on Picture Norming Test*

<table>
<thead>
<tr>
<th>$n$</th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>1.45</td>
<td>.27</td>
<td>1.00 - 2.00</td>
</tr>
</tbody>
</table>
Procedure

The general procedure in all experiments was to present sentences in Spanish and in English accompanied by pictures on a computer screen. Each subject participated in two individual sessions of 50 minutes each, receiving at each session sentences in only one language. Language of presentation was counterbalanced across sessions and across participants; half the participants were tested in Spanish first and half in English first. In each session, participants completed Experiment 1 and Experiment 2 in one of the two languages tested. The order of presentation of the experiments was counterbalanced as well; half the participants performed Experiment 1 first and the other half performed Experiment 2 first. In order to counterbalance language and experiment order, four different presentation lists with 2 versions each were created: versions A and B. An overview of the experimental lists is presented in Figure 3.1

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 1</th>
<th>Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIST 1</strong></td>
<td><strong>LIST 2</strong></td>
<td><strong>LIST 3</strong></td>
<td><strong>LIST 4</strong></td>
</tr>
<tr>
<td>A L1</td>
<td>B L2</td>
<td>A L1</td>
<td>B L2</td>
</tr>
<tr>
<td>Experiment 1 picture-sentence verification task</td>
<td>Experiment 2 sentence interpretation task</td>
<td>Experiment 1 picture-sentence verification task</td>
<td>Experiment 2 sentence interpretation task</td>
</tr>
<tr>
<td>Experiment 2 sentence interpretation task</td>
<td>Experiment 1 picture-sentence verification task</td>
<td>Experiment 2 sentence interpretation task</td>
<td>Experiment 1 picture-sentence verification task</td>
</tr>
</tbody>
</table>

*Figure 3.1. Overview experimental lists.*

There were two sets of trials within each experiment: practice, and experimental; therefore, each list consisted of four sets. The first and third sets in each list corresponded to the practice trials for the experimental task. All participants were given a practice set of six sentences per experiment.
For the first two sets, participants completed one of the two experiments (sentence interpretation task or picture-sentence verification task with self-paced listening). For the remaining two sets, participants completed the other experiment. Participants received instructions prior to each set of trials. All instructions were provided in the participants’ native language.

Participants were tested individually in the computer laboratories at BUAP and FSU. After signing the consent form and the background questionnaire, they received general information about the study, and they were randomly assigned to one of the four experimental lists. Participants completed Version A of their assigned lists in Session 1 and Version B in Session 2. Participants were instructed in their native language to perform different processing tasks. Experiment 1 was a picture-sentence verification task with self-paced listening. Participants listened to sentences in a segment-by-segment fashion by pressing a button while the picture remained on the computer screen. Participants were asked to judge whether the critical sentences matched the pictures presented. Experiment 2 consisted of a sentence interpretation tasks. Participants were instructed to listen carefully to each sentence and to decide as quickly as possible which of the two nouns was the actor in the sentence. Before each sentence was presented, the two nouns contained in the sentence were shown on the screen, side by side, counterbalanced with sentence order. Once participants decided which of the two nouns performed the action in the sentence, they had to press the button that corresponded to the side of the screen where the noun was pictured.

All stimuli used in the study were counterbalanced as well; thus, none of the participants encountered the same version of the experimental sentences more than once. An account of how the stimuli were counterbalanced across the four presentation lists is provided in Chapters 4 and 5.

The random presentation of all stimuli and the tracking of participants’ responses were conducted using SuperLab experiment building software from Cedrus. Experiment 1 and Experiment 2 used reaction time as one of the dependent measures which were measured from the onset of stimuli presentation. All data from the dependent measures were submitted to factorial analysis of variance (ANOVA), and was analyzed with the Statistical Package for the Social Sciences (SPSS).
CHAPTER FOUR

EXPERIMENT 1: PICTURE-SENTENCE VERIFICATION TASK

This chapter describes one of the experiments used in the study investigating the research questions and hypotheses presented in Chapter 2. The following sections present the research design, participants, materials, procedure, and data analyses pertaining to Experiment 1. The results of this experiment are presented and discussed at the end of the chapter.

Research Design

Experiment 1 consisted of a picture-sentence verification task with self-paced listening designed to test whether L2 learners of English and L2 learners of Spanish use local processing strategies (i.e. first noun strategy), or whether they utilize L1 morphosyntactic strategies to initially assign agency. An overview of the research design for Experiment 1 is presented in Figure 4.1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Sentence Type</th>
<th>Picture-matching Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Active</td>
<td>Match</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mismatch</td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td>Match</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mismatch</td>
</tr>
<tr>
<td>L2</td>
<td>Active</td>
<td>Match</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mismatch</td>
</tr>
<tr>
<td></td>
<td>Passive</td>
<td>Match</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mismatch</td>
</tr>
</tbody>
</table>

Dependent Variables

- Off-line accuracy measure of comprehension
- Reaction times on target regions

*Figure 4.1. Research design Experiment 1.*
In this experiment there was one between-subjects variable: group (L1, L2), and two within-subjects variables: sentence type (active, passive), and picture condition (match, mismatch). Group was operationalized by including beginning L2 learners of English (L1 Spanish), beginning L2 learners of Spanish (L1 English), native speakers of English, and native speakers of Spanish. Sentence type was used to manipulate the agents’ syntactic position in a sentence. Therefore, participants received active sentences (pre-verbal agent), and passive sentences (post-verbal agent). The picture condition was operationalized with pictures that accurately reflected the action expressed by the sentence (match), and pictures that showed the event with the agent and patient reversed (mismatch). Examples of these conditions are provided in the Materials section.

The dependent variables included an off-line accuracy measure of comprehension, and reaction times (in milliseconds) for selected sentence regions in the self-paced listening task with picture matching. Greater accuracy for actives versus passives in this task would indicate the use of the first noun strategy. Moreover, active and passive sentences contained morphological cues for their correct interpretation in the verb region. These constructions also have other lexical cues for their interpretation in the post-verbal region. Reaction times in these two regions were analyzed in this experiment. The region immediately following the target regions was also analyzed to check for spillover effects. Longer reaction times in the target region may indicate that learners experienced difficulty integrating morphological information during sentence processing. Because passives are initially cognitively more costly to process, longer reaction times in the verb region would be expected if learners attended to verbal morphology. The target regions are regions 4, and 5, as presented in Example 4.1. Region 6 is the post-target region.

Example 4.1

*Target regions in active and passive sentences*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>I believe</td>
<td>that</td>
<td>the lawyer</td>
<td><em>is calling</em></td>
<td>the father</td>
<td>in the office</td>
<td>‘Beep’ sound</td>
</tr>
<tr>
<td></td>
<td>Creo</td>
<td>que</td>
<td><em>el abogado</em></td>
<td><em>está llamando</em></td>
<td><em>al padre</em></td>
<td><em>en la oficina</em></td>
<td>to mark the end of the sentence</td>
</tr>
<tr>
<td>b.</td>
<td>I believe</td>
<td>that</td>
<td>the father</td>
<td><em>is calling</em></td>
<td>the lawyer</td>
<td>in the office</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creo</td>
<td><em>que</em></td>
<td><em>el padre</em></td>
<td><em>está llamando</em></td>
<td><em>al abogado</em></td>
<td><em>en la oficina</em></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>I believe</td>
<td>that</td>
<td>the father</td>
<td><em>is called</em></td>
<td>by the lawyer</td>
<td>in the office</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creo</td>
<td><em>que</em></td>
<td><em>el padre</em></td>
<td><em>es llamado</em></td>
<td><em>por el abogado</em></td>
<td><em>en la oficina</em></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>I believe</td>
<td>that</td>
<td>the lawyer</td>
<td><em>is called</em></td>
<td>by the father</td>
<td>in the office</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creo</td>
<td><em>que</em></td>
<td><em>el abogado</em></td>
<td><em>es llamado</em></td>
<td><em>por el padre</em></td>
<td><em>en la oficina</em></td>
<td></td>
</tr>
</tbody>
</table>
Participants

The participants included 83 beginning L2 learners of English from University of Puebla, and 84 beginning L2 learners of Spanish from Florida State University. Participants ranged in age from 17-30 years old.

Material

The total stimuli for the verification task consisted of 18 active sentences, 18 passive sentences, and 20 sentences unrelated to grammatical voice in each language (Appendix F).

Stimuli. The target sentences consisted of two noun phrases (NP1 and NP2) and a transitive verb embedded in a subordinate clause, as in Example 4.2.

Example 4.2

Sentences used in Experiment 1

a. I think that the teacher is greeting the father in the school

\[ NP1 \quad - \quad V \quad - \quad NP2 \]

b. Pienso que el profesor está saludando al padre en la escuela

\[ NP1 \quad - \quad V \quad - \quad NP2 \]

c. I think that the teacher is greeted by the father in the school

\[ NP1 \quad - \quad V \quad - \quad NP2 \]

d. Pienso que el profesor es saludado por el padre en la escuela

\[ NP1 \quad - \quad V \quad - \quad NP2 \]

Each noun phrase consisted of the following: (a) a definite article, and (b) an animated singular noun. Half of the animated nouns in the noun phrases were animals and the other half were people. Each sentence had either two noun phrases with animals or two noun phrases with people. In other words, none of the sentences combined animals and people. In this experiment, semantic and grammatical cues such as animacy and gender agreement were eliminated to isolate the two cues that most distinguish English from Spanish: word order and verbal morphology. However, the accusative object marker a in Spanish was included to avoid the use of ungrammatical sentences. To summarize, the stimuli had the following characteristics:
1) None of the experimental sentences included inanimate nouns.
2) All sentences had animated nouns of the same gender.

The sentences were recorded by two female and two male native speakers of English/Spanish at a normal speaking rate in the phonetics lab at Florida State University, and were subsequently processed and analyzed using Sound Forge Pro 9 and the phonetics program Praat. The purpose was to have a uniform decibel level in all stimuli and to eliminate all background noise from the original recording.

**Verbal Morphology.** The semantic agent’s position was manipulated to test the first noun strategy. Therefore, the stimuli in English and Spanish consisted of active sentences, which have preverbal agents, and passive sentences, which have post verbal agents. The use of actives and passives allowed the manipulation of the agent’s position in English and Spanish without exposing learners to ambiguous and ungrammatical sentences. Half of the experimental sentences were active sentences and the other half were passive. Target sentences are presented in Appendix F.

Active and passive sentences have morphological cues for their correct interpretation in the verbal phrase. In both languages, active sentences (present progressive) are formed by the verb to be ‘estar’ plus a transitive verb and the gerund suffix (–ing in English, and –ando, –iendo in Spanish). Passive sentences in English and Spanish are formed with the verb to be ‘ser’ plus a transitive verb in the past participle (regular forms in English have the –ed suffix, and the –ado, –ido suffixes in Spanish). All passive sentences had verbs with regular participle verb morphology in English and Spanish, and they were full passive sentences. Thus, they had another passive marker in the prepositional phrase: by in English and por in Spanish. The morphological cues were discussed in Chapter 2 and are presented in Example 4.3.

**Example 4.3**

**Actives and passives verbal morphology**

a. The boys are **greeting**<sub>active marker</sub> the girl.
   ‘Los chicos están **saludando**<sub>active marker</sub> a la chica’

b. The girl is **pushed**<sub>passive marker</sub> **by**<sub>passive marker</sub> the boys.
   ‘La chica es **empujada**<sub>passive marker</sub> por **passive marker** los chicos’
The stimuli consisted of *semantically reversible* active and passive sentences. According to Turner and Rommetveit (1967), a semantically reversible sentence is one in which the agent and the patient can be switched, and the resulting sentence is still semantically plausible. In a semantically non-reversible sentence, the agent and patient are not interchangeable because of the nouns’ animacy or the event’s real-life implausibility. An example of semantically reversible and nonreversible sentences is presented in Example 4.4 (taken from Slobin, 1966).

Example 4.4

*Example of semantically (non)reversible sentence*

Reversible Active: The boy chased the girl.
Non-Reversible Active: The boy ate the bagel.
Reversible Passive: The girl was chased by the boy.
Non-Reversible Passive: The bagel was eaten by the boy.

The reversible active and passive sentences used in this experiment are exemplified in Example 4.5.

Example 4.5

*Reversible active and reversible full passive sentences*

a. I know that the worker is **carrying** the painter in the street. (Active sentence)

   *Sé que el trabajador está cargando al pintor en la calle.*

b. I know that the worker is **carried by** the painter in the street. (Passive sentence)

   *Sé que el trabajador es cargado por el pintor en la calle.*

*Picture material.* The picture condition was manipulated in order to make sure participants were doing the task. Therefore, in half of the sentences, the pictures matched the event of the sentence and in the other half they did not match. The mismatch was created by showing the event in the picture with the agent and patient reversed, relative to what the sentence indicated. Mismatch between pictures and sentences causes lower accuracy and slower reaction times independent of other variables (Marinis, 2007). Therefore, this condition was used as a comprehension measure only. An example of the matching condition is presented in Figure 4.2
**Experimental conditions.** The manipulation of the verb morphology and the picture material resulted in four experimental conditions per language. Four different experimental sets of sentences were created per language. Each set had one sentence of each condition (A, B, C, or D). Therefore, each participant encountered 9 sentences of each condition. Figure 4.3 presents these four conditions with examples of the experimental sentences in each condition. Target sentences can be found in Appendix F.

<table>
<thead>
<tr>
<th>Picture</th>
<th>Sentence Condition</th>
<th>Sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Picture" /></td>
<td>Active-matching</td>
<td>I notice that the girl is scratching the nurse in the house. (\text{Noto que la niña está rasguñando a la enfermera en la casa.})</td>
</tr>
<tr>
<td><img src="image2.png" alt="Picture" /></td>
<td>Active –non matching</td>
<td>I notice that the nurse is scratching the girl in the house. (\text{Noto que la enfermera está rasguñando a la niña en la casa.})</td>
</tr>
<tr>
<td><img src="image3.png" alt="Picture" /></td>
<td>Passive-matching</td>
<td>I notice that the nurse is scratched by the girl in the house. (\text{Noto que la enfermera es rasguñada por la niña en la casa.})</td>
</tr>
<tr>
<td><img src="image4.png" alt="Picture" /></td>
<td>Passive –non matching</td>
<td>I notice that the girl is scratched by the nurse in the house. (\text{Noto que la niña es rasguñada por la enfermera en la casa.})</td>
</tr>
</tbody>
</table>

*Figure 4.2. Example of picture material conditions.*

*Figure 4.3. Sentences in picture-sentence verification task.*
**Task**

Experiment 1 used an online *picture-verification* task with *self-paced listening* (Ferreira et al., 1996). The motivation behind using a self-paced listening component in the task was to reduce the processing load to explore whether beginning adult L2 learners process morphological cues. Therefore, the experimental sentences in all four conditions were divided into segments or regions as indicated in Figure 4.4. The last region of the sentence was a ‘beep’ marking the end of the sentence.

<table>
<thead>
<tr>
<th>Picture</th>
<th>Condition</th>
<th>Sentence Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>I believe <em>Creo</em> that <em>que</em> the lawyer <em>el abogado</em> is calling <em>está llamando</em> the father <em>al padre</em> in the office <em>en la oficina</em></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>I believe <em>Creo</em> that <em>que</em> the father <em>el padre</em> is calling <em>está llamando</em> the lawyer <em>al abogado</em> in the office <em>en la oficina</em></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>I believe <em>Creo</em> that <em>que</em> the father <em>el padre</em> is called <em>es llamado</em> by the lawyer <em>por el abogado</em> in the office <em>en la oficina</em></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>I believe <em>Creo</em> that <em>que</em> the lawyer <em>el abogado</em> is called <em>es llamado</em> by the father <em>por el padre</em> in the office <em>en la oficina</em></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 4.4.* Target and post-target regions by condition.

The reaction times for the online verification task were recorded using a self-paced listening procedure (Marinis, 2007). In this procedure, participants heard sentences segment-by-segment fashion by pressing a button while a picture remained on the computer screen. The rationale underlying the self-paced procedure is that increased RTs to a particular segment suggest a processing difficulty at that point in the sentence. In this experiment, L2 learners had to process the morphological cues to successfully comprehend passive sentences. The morphological cues were always in the fourth segment. Therefore, the first critical segment in this task was the fourth region. The fifth region provided additional cues for the interpretation of passives sentences; the preposition *by/por*. Therefore, this is the second critical segment in this experiment. Passive morphology is cognitively more costly to process. Thus, longer reading times in target regions would indicate that participants are unable to integrate morphological information during sentence processing. The sixth region was analyzed for spillover effects, and longer reaction times in this region would also indicate that L2 learners attend to the cues within the verb phrase.
The end of each sentence was marked by a ‘beep’ sound. At the end of each sentence participants were asked to judge whether the critical sentences matched the pictures. The question “does the sentence match the picture? / ¿la oración corresponde al dibujo?” appeared on a separate screen after each sentence, and participants responded either “yes” or “no”. The purpose of using picture judgments was twofolded. First, it provided information on the processing patterns for agent assignment during L2 sentence processing. To explain, higher accuracy for actives (preverbal agents) versus passives (post verbal agents) in the matching condition suggested that L2 learners are using a first noun strategy to assign agency. Second, the picture judgments in the mismatch condition were used to ensure that learners comprehended the stimuli. The correct answer for half of the items was “yes”, and the correct answer for the other half was “no”, and participants did not receive feedback as to whether or not they answered the comprehension question accurately.

Procedure
Participants were tested individually. After signing a consent form, and answering the language history questionnaire, they received general information about the study and each participant was randomly assigned to one of the four experimental lists presented in Chapter 3. There were two sets of trials: practice and experimental. In the experimental trial, a picture depicting two characters interacting was shown on a computer screen for 2500 ms. Subsequently, participants listened to a sentence in a segment-by-segment fashion by pressing a button while the picture remained on the computer screen. Participants were told that they had to press the button as soon as they were ready to listen to the next segment. The end of each sentence was indicated by a beep sound. Participants were also instructed to decide whether the sentence they heard matched the picture in the screen by pressing the “yes” or “no” buttons on a button box. L2 learners were given a practice set with 6 practice sentences (3 active sentences and 3 passive sentences) during the experiment in order to familiarize with the task. Superlab was used to present the stimuli and to record reaction times from the onset of each segment until the next time the button was pressed to start the next segment of the sentence.

Data Analysis
Participants’ data were included in the accuracy analyses if they demonstrated accuracy greater than 70% in their first language. This affected 9.3% of the data. For the RT analysis, only
data that fall within the window of 200 and 2000 ms. was included. This affected and additional 10.1% of the data. Moreover, if 75% or less of a participant’s data remained, that participant was excluded from the analysis; thus, 8 participants were eliminated, for a total number of 159 participants.

The data was first analyzed for accuracy in the picture judgments in all four experimental conditions. Mean accuracy for each participant was calculated based on sentence type and matching condition. The participants’ mean accuracy for each language was submitted to a 2 × 2 × 2 ANOVA with Group (L1, L2) as the between subject variable, and Sentence Type (active, passive) and Matching (match, mismatch) as the within-subjects variables. An analysis of simple main effects with a Bonferroni adjustment was conducted to explore significant interactions.

The data was then analyzed for reaction times to the target regions and the region immediately following them. Inaccurate responses were eliminated prior to the RTs analysis. Mean reading times for each participant were calculated based on sentence type and matching condition. The participants’ mean reaction times for each language were submitted to a 2 × 2 × 2 ANOVA with Group (L1, L2) as the between subject variable, and Sentence Type (active, passive) and Matching (match, mismatch) as the within-subjects variables. An analysis of simple main effects with a Bonferroni adjustment was conducted to explore significant interactions. Longer reaction times in the verb region suggest that participants experienced difficulty to integrate morphological information during sentence processing.

Of particular interest for this dissertation are the main effects of sentence type, which indicates that actives and passives are processed differently. Also of interest are the significant interactions between group and sentence type, which indicate that one group behaves differently than the other with respect to sentence type. Main effects of group and matching are also reported when significant, as are significant interactions between group and matching. However, these findings are not central to the research questions on this dissertation. To explain, a main effect of group would indicate that native speakers are more accurate/faster than the L2 learners. The main effect of matching would indicate that participants were more accurate/faster to sentences that match the sentence than to sentences that did not match the sentence. A significant interaction between group and matching would indicate that L2 learners were more accurate/faster in the matching condition than in the mismatch condition, and that native speakers performed the same in both conditions.
Results

This section presents the analysis of accuracy in the picture judgments and the reaction times for the picture-sentence verification task with self-paced listening. The accuracy results are presented by language and the reaction times are presented by language and sentence region.

Accuracy Analyses: English data

Table 4.1 provides an overview of the mean accuracy for English native speakers and L2 learners of English.

<table>
<thead>
<tr>
<th></th>
<th>English NS</th>
<th>English L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Active-match</td>
<td>92.22</td>
<td>11.29</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>95.42</td>
<td>9.10</td>
</tr>
<tr>
<td>Passive-match</td>
<td>92.44</td>
<td>8.72</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>96.58</td>
<td>7.58</td>
</tr>
</tbody>
</table>

The ANOVA revealed a main effect for group, \( F(1, 133) = 12.79, p < .001, \eta^2_{\text{partial}} = .630 \), sentence type, \( F(1, 133) = 42.47, p < .001, \eta^2_{\text{partial}} = .242 \), and matching, \( F(1, 133) = 15.96, p < .001, \eta^2_{\text{partial}} = .107 \). The main effect of sentence type revealed higher accuracy in actives than in passives. There was also a significant interaction between group and sentence type, \( F(1, 133) = 47.56, p < .001, \eta^2_{\text{partial}} = .263 \), and a significant interaction between group and matching, \( F(1, 133) = 42.04, p < .001, \eta^2_{\text{partial}} = .240 \). Pairwise comparisons with a Bonferroni adjustment for the group × sentence type interaction revealed that English native speakers had the same accuracy rate for both sentence types \( p = .797 \). L2 learners of English had a higher accuracy rate in active sentences than in passives \( p < .001 \) (see figure 4.5).
Accuracy Analyses: Spanish data

Table 4.2 provides an overview of the accuracy mean percentage of the Spanish native speakers and the L2 learners of Spanish in the picture-verification task in all condition.

Table 4.2

Descriptive Statistics in Percentages) for Accuracy by Group

<table>
<thead>
<tr>
<th></th>
<th>Spanish NS</th>
<th>Spanish L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Active-match</td>
<td>93.72</td>
<td>8.97</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>93.50</td>
<td>10.90</td>
</tr>
<tr>
<td>Passive-match</td>
<td>88.08</td>
<td>12.07</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>92.75</td>
<td>9.64</td>
</tr>
</tbody>
</table>

The ANOVA revealed a main effect for group, $F(1, 127) = 368.41, p < .001, \eta^2_{\text{partial}} = .744$, sentence type, $F(1, 127) = 63.93, p < .001, \eta^2_{\text{partial}} = .335$, and matching, $F(1, 127) = 42.41, p < .001, \eta^2_{\text{partial}} = .250$. The main effect of sentence type revealed higher accuracy in actives than in passives. There was also a significant interaction between group and sentence type, $F(1, 127) = 42.08,
$p < .001$, $\eta^2_{\text{partial}} = .249$, a significant interaction between group and matching, $F(1, 127) = 61.15$, $p < .001$, $\eta^2_{\text{partial}} = .325$, and a significant interaction between group, sentence type and matching, $F(1, 127) = 8.30$, $p = .005$, $\eta^2_{\text{partial}} = .061$. Pairwise comparisons with a Bonferroni adjustment for the group $\times$ sentence type interaction revealed that Spanish native speakers had the same accuracy rate for both sentence types ($p = .297$). L2 learners of Spanish had a higher accuracy rate in active sentences than in passives ($p < .001$) (see figure 4.6).

![Figure 4.6. Spanish native speakers and L2 Spanish learners’ accuracy (in percentages).](image)

To summarize, the ANOVA revealed that English native speakers and Spanish native speakers had the same accuracy rate for both sentence types ($ps > .10$). Beginning L2 learners of both languages had a higher accuracy rate in active sentences than in passives ($ps < .001$)

**Reaction Times Analyses: English data**

Table 4.3 provides an overview of the mean reaction times for English native speakers and L2 learners of English in the two target regions: 4th region of the sentence, where the verb is located, and the 5th region, where additional cues for interpretation are located. The reaction times in region 6, the spillover region, are also presented in Table 4.3.
Table 4.3

Descriptive Statistics (In Reaction Times) for Regions 4, 5 and 6 by Group

<table>
<thead>
<tr>
<th>Region 4</th>
<th>English NS</th>
<th>English L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Active-match</td>
<td>571</td>
<td>362</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>480</td>
<td>275</td>
</tr>
<tr>
<td>Passive-match</td>
<td>502</td>
<td>350</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>510</td>
<td>343</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region 5</th>
<th>English NS</th>
<th>English L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Active-match</td>
<td>524</td>
<td>287</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>546</td>
<td>306</td>
</tr>
<tr>
<td>Passive-match</td>
<td>575</td>
<td>300</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>591</td>
<td>365</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region 6</th>
<th>English NS</th>
<th>English L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Active-match</td>
<td>696</td>
<td>225</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>626</td>
<td>237</td>
</tr>
<tr>
<td>Passive-match</td>
<td>663</td>
<td>222</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>689</td>
<td>240</td>
</tr>
</tbody>
</table>

At the 4th region, the ANOVA revealed a main effect for group, $F(1, 156) = 42.45, p < .001$, $\eta^2_{\text{partial}} = .214$. There were no main effects for sentence type or matching condition ($ps > .10$). The analysis also revealed a significant interaction between group, sentence type, and matching, $F(1, 156) = 9.61, p = .002, \eta^2_{\text{partial}} = .058$. Pairwise comparisons in the matching condition revealed that L2 learners of English had significantly slower reaction times in passive sentences.
compared to active sentences \((p = .001)\). However, English native speaker demonstrated no significant difference between active sentences and passive sentences \((p = .211)\) (see Figure 4.7).

At the 5th region, the ANOVA revealed a main effect for group, \(F(1, 156) = 32.64, p < .001, \eta^2_{\text{partial}} = .173\), sentence type, \(F(1, 156) = 16.19, p < .001, \eta^2_{\text{partial}} = .094\), and matching, \(F(1, 156) = 14.95, p < .001, \eta^2_{\text{partial}} = .087\). The main effect of sentence type indicated that actives were processed faster than passives. The analysis also revealed a significant interaction between group and sentence type, \(F(1, 156) = 7.74, p = .006, \eta^2_{\text{partial}} = .047\), and group and matching, \(F(1, 156) = 11.04, p = .001, \eta^2_{\text{partial}} = .066\). Pairwise comparisons for the group and sentence type interaction revealed that L2 learners of English had significantly slower reaction times in passive sentences compared to active sentences \((p < .001)\). However, English native speaker demonstrated no significant difference between active sentences and passive sentences \((p = .378)\) (see Figure 4.7).

At the 6th region, the ANOVA revealed a main effect for group, \(F(1, 156) = 18.24, p < .001, \eta^2_{\text{partial}} = .112\), which indicated that L2 learners of English had slower reaction times compared to English native speakers. There were no main effects for sentence type or matching condition \((ps > .10)\). There were no significant interactions between group, sentence type, or matching \((ps > .06)\) (see Figure 4.7).

Figure 4.7. RTs at 4th, 5th & 6th regions by English native speakers and L2 English learners.
Summarizing the results of the English data for regions 4, 5, and 6, the ANOVA revealed that native speakers of English did not have significant differences in the reaction times between active sentences compared to passive sentences ($ps > .30$) in any of the regions. L2 learners of English, however, had significantly slower reaction times in passive sentences compared to active sentences in both target regions ($ps < .002$). The slower reaction times in passives in the target regions did not spill over to the sixth region; that is, there was no difference in the processing of passives versus actives in the sixth region ($p = .668$).

**Reaction Times Analyses: Spanish data**

Table 4.4 provides an overview of the mean reaction times for Spanish native speakers and L2 learners of Spanish in the two target regions: 4th region of the sentence, where the verb is located, and the 5th region, where additional cues for interpretation are located. The reaction times in region 6, the spillover region, are also presented in Table 4.4.

Table 4.4

*Descriptive Statistics (in Reaction Times) for Regions 4, 5, and 6, by Group*

<table>
<thead>
<tr>
<th>Region 4</th>
<th>Spanish NS</th>
<th>Spanish L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Active-match</td>
<td>589</td>
<td>289</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>643</td>
<td>316</td>
</tr>
<tr>
<td>Passive-match</td>
<td>629</td>
<td>384</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>576</td>
<td>356</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region 5</th>
<th>Spanish NS</th>
<th>Spanish L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Active-match</td>
<td>527</td>
<td>274</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>562</td>
<td>332</td>
</tr>
<tr>
<td>Passive-match</td>
<td>559</td>
<td>294</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>657</td>
<td>564</td>
</tr>
</tbody>
</table>
Table 4.4
Descriptive Statistics (in Reaction Times) for Regions 4, 5, and 6, by Group (continued)

<table>
<thead>
<tr>
<th>Region 6</th>
<th>Spanish NS</th>
<th>Spanish L2 learners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Active-match</td>
<td>757</td>
<td>256</td>
</tr>
<tr>
<td>Active-mismatch</td>
<td>685</td>
<td>246</td>
</tr>
<tr>
<td>Passive-match</td>
<td>681</td>
<td>218</td>
</tr>
<tr>
<td>Passive-mismatch</td>
<td>685</td>
<td>255</td>
</tr>
</tbody>
</table>

At the 4th region, the ANOVA revealed a main effect for group, $F(1, 130) = 11.50, p = .001, \eta^2_{\text{partial}} = .081$, which indicates that L2 learners of Spanish had slower reaction times compared to Spanish native speakers. There were no other main effects or significant interactions ($ps > .80$) (see Figure 4.8).

At the 5th region, the ANOVA revealed a main effect for group, $F(1, 130) = 5.93, p = .016, \eta^2_{\text{partial}} = .044$, and sentence type, $F(1, 130) = 7.138, p = .009, \eta^2_{\text{partial}} = .052$, which indicated that L2 learners of Spanish processed passives slower than actives. There were no other main effects or significant interactions ($ps > .80$) (see Figure 4.8).

At the 6th region, the ANOVA revealed no main effects for group, sentence type or matching. There were no significant interactions either ($ps > .70$) (see Figure 4.8).
Summary of Results

The analysis of participants’ accuracy to investigate local processing and the use of the first noun strategy revealed the following:

1. Native speakers of English and Spanish had high accuracy rates in the picture-matching verification task regardless of sentence type.
2. Beginning learners of English had higher accuracy rates for active sentences (preverbal agents) than for passives sentences (post verbal agents).
3. Beginning learners of Spanish had higher accuracy rates for active sentences (preverbal agents) than for passives sentences (post verbal agents) as well.

The analysis of reaction times to investigate processing of overt morphology revealed the following:

1. Native speakers of English and native speakers of Spanish demonstrated no difference in the processing of active versus passive sentences in any of the three sentence regions.
2. L2 learners of Spanish took longer to process passives than actives in the fifth region.
3. L2 learners of English took longer to process passives than actives in the fourth and fifth regions.

Figure 4.8. RTs at 4th, 5th & 6th Regions by Spanish Native Speakers and L2 Spanish Learners.
Discussion of Results

The purpose of this experiment was to investigate whether L2 learners of English and L2 learners of Spanish use local strategies (i.e., first noun strategy) or whether they utilize L1 morphosyntactic strategies to initially assign agency. The hypotheses that motivated this study were based on the premise that comprehension for learners is effortful at the beginning stages of acquisition (VanPatten, 1996, 2004, 2007). Also, previous research on sentence interpretation (VanPatten, 1984; VanPatten & Cadierno, 1993; VanPatten & Oikkennon, 1996; VanPatten & Sanz; 1995; VanPatten & Wong, 2004; Jackson, 2007, 2008), and on processing of passives (Rohde & Gibson, 2003; Dabrowska & Street, 2006; Ferreira, 2003; Stromswold, 2004) motivated the following hypotheses:

1. Sentence type will not affect English/Spanish native speakers’ agent assignment.
2. English/Spanish native speakers’ will process actives and passives efficiently; therefore, sentence type will not affect their reaction times in any of the target or post-target regions, and they will have high accuracy in actives and passives.
3. Sentence type will affect L2 learners’ agent assignment.
4. L2 learners (English and Spanish) will process passives as actives; therefore, sentence type will not affect reaction times in any of the target or post-target regions, but they will have lower accuracy rates in passives compared to actives.

The first hypothesis (i.e., sentence type not affecting native speakers’ agency assignment) was supported by the results. English native speakers and Spanish native speakers had high accuracy rates in the picture-matching verification task regardless of sentence type. These results are consistent with the notion that native speakers, who have well formed linguistic systems, derive meaning from morphosyntactic and semantic information. In other words, native speakers process L1 sentences at the syntactic level (Clahsen & Felser, 2006).

The prediction that sentence type would not affect native speakers’ reaction times (Hypothesis two) was confirmed. Neither native speakers of English nor native speakers of Spanish had differential reaction times between actives and passives in the target or post-target regions. These results indicate that native speakers processed actives and passives similarly. These results are consistent with previous research on adult processing of passives that found no difference in the
processing of actives versus passives in sentences containing full passives and plausible actions (Dabrowska & Street, 2006; Ferreira, 2003; Rohde & Gibson, 2003). As mentioned in the Material section, the fourth region in passives contains morphological cues and the fifth region contains lexical cues. The findings of this experiment suggest that native speakers integrated semantic and morphosyntactic information during sentence processing regardless of sentence type, which is consistent with previous research on adult process of passive verbal morphology (Stromswold, 2004).

As predicted by the third hypothesis, sentence type affected L2 learners’ agent assignment. As noted at the beginning of this chapter, it was predicted that L2 learners’ accuracy for passives would be affected if learners used the first noun strategy. In this experiment, both groups of beginning learners had higher accuracy rates in active sentences compared to passive sentences in the picture judgments. These results suggest that L2 learners of English and Spanish interpreted the first noun of passives as agents even though passive constructions had verbal morphology to correctly establish the agent – patient relationship. Thus, these results provide support to the input processing claim that L2 learners default to local and lexical-semantic strategies to process L2 sentences, and they are consistent with previous input processing studies that tested L2 learners (L1 English) of different languages (VanPatten, 1984; VanPatten & Houston, 1998; VanPatten & Sanz, 1995; VanPatten & Wong, 2004, Jackson, 2007, 2008).

The hypothesis that sentence type should not have an effect on learners’ reaction times in the target and post-target regions was partially supported by the results. To explain, longer reaction times in this task were hypothesized to indicate the participant’s difficulty to integrate morphological information during sentence processing. Because passives are initially cognitively more costly to process, longer reaction times in passives would be expected in target regions if learners attend to verbal morphology. It was hypothesized that L2 learners would not process verbal morphology. Therefore, differential reaction times between actives and passives were not expected in the target or post-target regions. In this experiment, L2 learners of Spanish processed actives and passives similarly at the verb region; however, they took longer to process passives than actives in the fifth region. Moreover, L2 learners of English took longer to process passives than actives in the fourth and fifth regions.

At first glance, the results from the fourth sentence segment, where the verb is located, suggest that L2 learners may have used L1 morphosyntactic strategies to process the L2. To explain,
longer reaction times to passives by L2 learners of English (L1 Spanish) could indicate that they attended to verbal morphology to process L2 sentences just like in their first language. However, the lower accuracy for passives suggests that even if L2 learners are attempting to process verbal morphology, they experienced processing difficulties and could not successfully integrate the morphosyntactic information in order to make accurate agent assignments. As mentioned at the beginning of the chapter, longer reaction times by beginning learners are taken here as an indication of the heavy processing load associated with the processing of morphosyntactic information. A possible explanation of these results is that learners may attempt to transfer L1 morphosyntactic strategies from their L1 at the beginning stages of acquisition as proposed by the competition model; however, the processing cost associated with morphosyntactic parsing forces learners to initially process sentences locally and at a purely lexical level, as proposed by input processing.

It was also predicted by the fourth hypothesis that sentence type would not affect learners’ reaction times at the fifth region where the prepositional phrase is located. This was not supported by the results. Differential reaction times between actives and passives were not expected in this region. It was hypothesized that L2 learners would utilize a first-noun strategy; thus, they would be more likely to attend to preverbal cues than post verbal ones. However, both groups of L2 learners took longer to process passives than actives at the preposition phrase within the verb phrase. One explanation is that L2 learners attended to the additional passive marker for meaning. As mentioned earlier, passives have grammatical markers at the verb region to encode grammatical voice. Passives have an additional passive marker at the post verbal region that also encodes passive voice, but this marker encodes voice information lexically. Thus, because the same information is expressed by the lexical marker, the grammatical marker is redundant. VanPatten explains that learners will process lexical markers, which have high communicative value, before redundant grammatical markers. This is known as the Lexical Preference Principle. This principle may be a possible explanation for the slower reaction times in the fifth region in passives by both groups of L2 learners. That is, learners’ reaction times in the fifth region are slower for passives because the lexical marker is more meaningful to learners than the grammatical forms in the verbal region. The higher reaction times in this region may indicate that L2 learners made an initial assignment of the agent theta role to the first noun in the sentence. Because they did not integrate the passive information encoded in the grammatical forms, they were expecting an active sentence. Once they encountered the passive lexical marker by/por, they had to re-analyze and re-assign the agent theta role. Marinis (2007)
suggests that these two processes may cause elevated reaction times during sentence interpretation. Another possibility is that L2 learners of Spanish demonstrated differential reaction times in region 5 due to a spillover effect. That is, L2 learners of Spanish might have also processed actives and passives differently in region 4; however, the time it took them to process the verb region was delayed and it was registered until the next region. If this is the case, the results would suggest that these learners attempted to use verbal morphology to process the L2 even when reliance on inflectional morphology is not a strong morphosyntactic strategy utilized in English. It seems, then, that L2 learners may not be necessarily transferring the strongest cues from their L1 to process the L2, but instead their language processor is attempting to use different strategies to parse the L2. In this sense, it seems that L2 parsing is not affected by the L1. Instead, L2 processing seems to be mediated by processing cost. The effects of processing cost on L2 sentence processing are discussed in Chapter 6.

It is important to mention that the 5th sentence region comprised the post verbal noun phrase with a definite article and a noun in active sentences. In passives sentences, this region consisted of the post verbal prepositional phrase with a preposition, a definite article, and a noun. This difference in length can be argued to have caused the increased reaction times in passives compared to actives in the L2 groups; however, the length of the 5th sentence region did not have an effect in native speakers’ reaction times, discarding the possibility that the way the region was constructed created an artificial increase in reaction times.

Differential reaction times between actives and passives were not expected in the sixth region because spillover effects were hypothesized. Although no differences were found between the processing times of actives compared to passives in the sixth region, this pattern does not seem to be caused by spillover effects. To explain, differential times in region 5 were not expected as explained above. Instead, the results indicate that L2 learners from both groups may have attended to the lexical marker in the passives sentences resulting in differential times in the fifth region. Based on the results from the fifth region, it is not possible to claim spillover effects in the sixth region. A possible explanation for L2 learners not showing differential times in the sixth region could be that the sixth region does not comprise relevant cues for agency assignment. Also, it could be that, because the sixth region is the second last region of the sentence, L2 learners had already assigned or reassigned semantic roles at that point.
Although, it seems that learners processed the passive lexical marker in the fifth region, their low accuracy with passives still indicates that they defaulted to local processing by using the first noun strategy. These results suggest that learners rely more on the first noun than on semantic cues such as the passive lexical marker in the prepositional phrase. An explanation for this preference is addressed in VanPatten’s Sentence Location Principle. The principle argues that it is cognitively less costly to process items in the initial position of the sentence before those in the final position and those in the medial position. This processing strategy may explain why learners relied more on the first noun than on the post verbal passive marker. It may also explained why learners slowed down when processing the *by*/*por* lexical markers located at the second last region of the sentence.

Overall, the results of Experiment 1 suggest that, although L2 learners may have attempted to transfer L1 morphosyntactic strategies, they could not use them to parse the L2 at the syntactic level. Instead, they processed the L2 locally using the first noun strategy. Previous sentence processing studies have confirmed that L2 learners are guided by local and lexical–semantic information during L2 sentence processing as proposed by input processing (Clahsen and Felser, 2006; Gass, 1987; Harrington, 1987; Fernandez, 2003; Felser et al., 2003; Papadopoulou and Clahsen, 2003). Clahsen and Felser (2006) have propose that, even at *advance* levels, L2 learners rely on lexical, semantic, and pragmatic information, but they do not rely on syntactic information, as native speakers. The authors suggest that full parsing in L2 learners might fail for one of two reasons: (a) a deficit in the language representations, or (b) a deficit in the parsing and processing mechanisms. They ascribe to the first option arguing that the L2 grammar, which feeds the parser, is incomplete causing full parsing to fail. That is, they proposed that adult L2 language representations do not contain the same detailed syntactic information that native speakers’ representations have. Considering that advanced L2 learners have a deficit in grammatical representations, it is possible that beginning L2 learners are unable to integrate information encoded in verbal morphology because the language processor is not being guided by L2 representations. In other words, it is possible that beginning learners do not have the “robust” representations of morphological verb inflections that feed the processor (VanPatten et al., 2012), even when the language processor seems to allocate cognitive resources to interpret verbal morphology. However, more research is needed to support the hypothesis that the problem with morphosyntactic processing is a representational problem.

This chapter presented the first experiment of this study. Experiment 1 consisted of a picture-sentence verification task with self-paced listening designed to test whether L2 learners of English
and L2 learners of Spanish utilize L1 morphological strategies to initially assign agency. The results of this experiment suggest that L2 learners default to local processing and they use a first noun strategy to process L2 sentences at the beginning stages of acquisition. The next chapter presents the second experiment of the study. Because research with the competition model has provided abundant evidence that supports L1 transfer, Experiment 2 follows the competition model paradigm to explore the possibility of L1 transfer of morphosyntactic strategies at the beginning stages of acquisition.
CHAPTER FIVE
EXPRESSMENT 2: SENTENCE INTERPRETATION TASK

This chapter describes the second experiment used in the study investigating the research questions and hypotheses presented in Chapter 2. The following sections present the research design, participants, materials, procedure, and data analyses pertaining to Experiment 2. The last section of this chapter presents the results and the discussion of the results.

Research Design

Experiment 2 consisted of a sentence interpretation task with agent assignment, which followed the competition model methodology. The aim of Experiment 2 was to investigate whether L2 learners of Spanish (L1 English) and L2 learners of English (L1 Spanish) transfer and use L1 morphosyntactic strategies to process the L2. Figure 5.1 presents an overview of the research design.

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Word Order</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Noun-Verb-Noun (NVN)</td>
<td>verb form is ambiguous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with first noun</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with second noun</td>
</tr>
<tr>
<td>L1</td>
<td>Verb-Noun-Noun (VNN)</td>
<td>verb form is ambiguous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with first noun</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with second noun</td>
</tr>
<tr>
<td></td>
<td>Noun-Noun-Verb (NNV)</td>
<td>verb form is ambiguous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with first noun</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with second noun</td>
</tr>
<tr>
<td></td>
<td>Noun-Verb-Noun (NVN)</td>
<td>verb form is ambiguous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with first noun</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with second noun</td>
</tr>
<tr>
<td>L2</td>
<td>Verb-Noun-Noun (VNN)</td>
<td>verb form is ambiguous</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with first noun</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with second noun</td>
</tr>
<tr>
<td></td>
<td>Noun-Noun-Verb (NNV)</td>
<td>verb form is ambiguous</td>
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<td></td>
<td></td>
<td>agreement with first noun</td>
</tr>
<tr>
<td></td>
<td></td>
<td>agreement with second noun</td>
</tr>
</tbody>
</table>

Dependent Variables
Percentage of first noun choice
Reaction times for agency assignment

Figure 5.1 Overview of the research design
In this experiment there was one between-subjects variable: group (L1, L2), and two within-subjects variables: word order and subject-verb agreement. Group was operationalized by including beginning L2 learners of English with Spanish as their first language and beginning L2 learners of Spanish with English as their first language. Word order was manipulated by providing participants with three types of sentences: canonical sentences with noun-verb-noun (NVN) word order, and non-canonical sentences with verb-noun-noun (VNN) and noun-noun-verb (NNV) word orders. Subject-verb agreement was operationalized with 3 different agreement conditions. In the first condition, the verb had an ambiguous form. In the second condition, the verb agreed with the first noun in the sentence. Lastly, the verb agreed with the second noun in the third condition. Examples of stimuli in all conditions can be found in the Materials section of this chapter.

The dependent variables included percentage of first noun choice, and reaction times for agency assignment in the sentence interpretation task. In this task, percentages closer to 100 indicate a first noun preference, and percentages closer to 0 indicate a second noun preference. The rational underlying the task is that the participants’ choice of noun and the reaction times to agent assignment reflect which cues are more salient to learners. If transfer of L1 strategies takes place, L2 learners should demonstrate processing patterns similar to their L1 patterns. That is, learners of English (L1 Spanish) would rely more on agreement, and learners of Spanish (L1 English) would rely more on word order. If lexical-semantic and local processing takes place at the beginning stages of acquisition, it is expected that both groups of L2 learners: (a) would rely more on word order than agreement cues, and (b) would use a first noun strategy as reflected in higher percentages of first noun choice in all conditions.

**Participants**

Participants included 83 beginning L2 learners of English at University of Puebla, and 84 beginning L2 language learners of Spanish at Florida State University. Participants ranged in age from 17-30 years old. Their participation was voluntary.

**Materials**

The total stimuli for the sentence interpretation task consisted of 4 sentences per each of the nine conditions, and 25 fillers in each language. The stimuli are described in the sections below.
Stimuli

In accordance with previous CM research, the stimulus for the sentence interpretation task in this experiment was manipulated based on two relevant cues for agency assignment in English and Spanish as follows:

1. Experimental sentences had one of the following word orders:
   a. noun-verb-noun (NVN)
   b. verb-noun-noun (VNN)
   c. noun-noun-verb (NNV)

2. The subject-verb agreement morphology of the stimuli had three different conditions:
   a. the verb form was ambiguous (Ambg)
   b. the verb agreed with the first noun in the sentence (1N)
   c. the verb agreed with the second noun (2N)

From the combination of these two variables and their corresponding three possibilities, nine different types of experimental sentences were created, most of which were ungrammatical. Four sentences were generated for each type of sentence, resulting in a total of 36 target sentences in English and 36 target sentences in Spanish. It is important to mention that most of the resulting sentences are ungrammatical, which is standard in CM studies. Table 5.1 presents examples of the experimental sentences used in the sentence interpretation task.

Table 5.1
Example of Experimental Sentences in Sentence Interpretation Task

<table>
<thead>
<tr>
<th>Sentence type</th>
<th>English</th>
<th>Spanish</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN, Ag0</td>
<td>The donkey is kicking the horse</td>
<td><em>El burro está pateando el caballo</em></td>
</tr>
<tr>
<td>NVN, Ag1</td>
<td>The son is hugging the parents</td>
<td><em>El hijo está abrazando los padres</em></td>
</tr>
<tr>
<td>NVN, Ag2</td>
<td>The uncle are carrying the drivers</td>
<td><em>El tío están cargando los choferes</em></td>
</tr>
<tr>
<td>VNN, Ag0</td>
<td>Is pulling the painter the teacher</td>
<td><em>Está jalando el pintor el profesor</em></td>
</tr>
<tr>
<td>VNN, Ag1</td>
<td>Is kicking the deer the donkeys</td>
<td><em>Está pateando el venado los burros</em></td>
</tr>
<tr>
<td>VNN, Ag2</td>
<td>Are watching the cat the monkeys</td>
<td><em>Están observando el gato los monos</em></td>
</tr>
<tr>
<td>NNV, Ag0</td>
<td>The cat the panda is watching</td>
<td><em>El gato el panda está observando</em></td>
</tr>
<tr>
<td>NNV, Ag1</td>
<td>The girl the aunts is pushing</td>
<td><em>La niña las tías está empujando</em></td>
</tr>
<tr>
<td>NNV, Ag2</td>
<td>The men the parents are greeting</td>
<td><em>El hombre los padres están saludando</em></td>
</tr>
</tbody>
</table>
**Characteristics of the noun phrases.** Each experimental sentence consisted of two noun phrases (NP1 and NP2) and a transitive verb (action verb) as shown in Example 5.1.

Example 5.1

*Sentence interpretation stimuli*

a. **The teachers** are greeting the **boy**.

\[ NP1 \quad - \quad V \quad - \quad NP2 \]

b. **Los profesores** están saludando el **niño**.

\[ NP1 \quad - \quad V \quad - \quad NP2 \]

Each noun phrase consisted of the following elements: (a) a definite article, and (b) an animated noun. The two elements of the noun phrases were in either singular or plural from depending on the agreement type of the sentence in which they appeared. Half of the animated nouns in the noun phrases were animals and half were people. Each experimental sentence had either two noun phrases with animals or two noun phrases with people (i.e., none of the experimental sentences combined animals and people to ensure semantic plausibility).

As mentioned in previous chapters, the cues that distinguish English and Spanish the most are *word order* and *subject-verb agreement*. Therefore, Experiment 2 was designed to isolate these two cues by eliminating other semantic and grammatical cues such as animacy, gender agreement, and the accusative object marker “a” in Spanish. For this reason, the stimuli had the following characteristics:

1. None of the experimental sentences included inanimate nouns.
2. The noun phrases in each experimental sentence had two animals or two people of the same gender; i.e., none of the experimental sentences combined one masculine noun with one feminine noun and vice versa.
3. The accusative object marker “a” was eliminated from all the Spanish stimuli.

**Verb morphology.** The experimental sentences contained a transitive verb preceded by the auxiliary verb *to be* and the progressive morpheme ‘-*ing*’ as in Example 5.2. Most of the previous studies of sentence interpretation within the CM paradigm have used the present progressive form of the verb in all stimuli. Therefore, the stimuli in Experiment 2 also used the present progressive.
Example 5.2

*Experimental sentences using the progressive morpheme by word order*

- NVN: The cow **is chasing** the horses
- VNN: **Is kicking** the deer the donkeys
- NNV: The men the parents **are greeting**

**Task**

The sentence interpretation task consisted of stimuli containing syntactic, semantic and morphological information that prompted competing or converging interpretations. The rational underlying the task is that the participants’ choice of noun reflects which cues are more salient to them. In this task, the stimuli were presented auditorily along with the pictures of each of the nouns in the sentences. The images were shown on a computer screen. The two nouns in the image were side by side as presented in Example 5.3. The nouns were counterbalanced with sentence order; therefore, the first noun of half of the sentences appeared to the right of the screen and the other half appeared to the left.

Example 5.3

*Stimulus in sentence interpretation task*

Sentence: Is calling the lawyer the drivers ‘*Está llamando el abogado los choferes*’

In the sentence interpretation task, participants had to decide which of the two nouns performed the action in a sentence. For that, participants were prompted with the following question: who did the action?/¿quién realizó la acción? The prompts appeared on a separate screen after each experimental item was presented. The pictures of the two nouns mentioned in the experimental sentence appeared as well. An example is presented in Example 5.4.
Example 5.4

Prompt in sentence interpretation task.

Sentence: The mother is stopping the girls ‘La madre está parando las niñas’

A pilot study suggested that the task led to unexpectedly short reaction times. It was likely that the participants were anticipating the prompt before it was presented due to the repetitive nature of the task. Therefore, a secondary task with fillers was designed to prevent the participants from interpreting sentences based on their expectation of the prompt (e.g., prematurely assigning agency before listening to the complete sentence). The secondary task was implemented with filler sentences, which had the same format of target sentences, with a modified prompt. This alternative task asked participants to decide whether a written sentence was similar to what they heard. The secondary prompt was the following: is the following similar to what you just heard? / ¿es la oración de abajo similar a lo que acabas de escuchar? The prompt appeared on a separate screen after the fillers were presented. Participants responded either “yes” or “no” on a button box. The responses to the secondary task were not considered in the statistical analysis. An example of the filler questions is presented in 5.5.
Example 5.5

*Example of the filler question in sentence interpretation task.*

**English sentence:** The lawyer is calling the patient.

**Spanish sentence:** *El abogado está llamando el paciente.*

The list of target sentences is provided in Appendix F. All the experimental sentences were recorded by native speakers of English and native speakers of Spanish (one female and one male per language) at a normal speaking rate in the phonetics lab at Florida State University. The auditory stimuli were processed and analyzed using Sound Forge Pro 9 and phonetics program Praat. The purpose was to have a uniform decibel level in all stimuli and to eliminate all background noise from the original recording. All stimuli were presented with the SuperLab experiment building software from Cedrus. The order of presentation was randomized, so participants did not see the English and Spanish sentences in the same order. The tracking of participants’ performance was also conducted using SuperLab experiment building software from Cedrus.

**Procedure**

Participants were tested individually. In the experimental trial, pictures of the nouns in a sentence were shown on a computer screen, side by side for 2500 ms. Then, participants were presented with the target sentences auditorily while the picture remained on the computer screen. Participants were instructed to listen carefully to each sentence. In the instructions, they were told that after each sentence, one of two types of questions was going to appear automatically on the screen and that for one type of question, they had to decide who performed the action in the sentence they heard. For the other type of question, they were told that they had to decide whether the
sentence they heard was similar to the sentence on the screen. After reading the instructions and given the opportunity to ask questions, they completed a practice set (with 3 items per question type), and the experimental trial. The experiment lasted no more than 40 minutes for any participant.

**Data Analysis**

Participants’ data were included in the analyses only if they demonstrated vocabulary accuracy greater than 70% as measured by the vocabulary screening test. Outlier analyses were performed for the reaction time data using the statistical program SPSS. Responses were excluded if they were ± 2 standard deviations from a participants’ mean or outside the cut-off of 200 to 7000 milliseconds (ms.). This affected 3.8% of the data. In addition, items with no response were eliminated. This affected 1% of the data. This affected 11 L2 learners of English and 4 L2 learners of Spanish. Therefore, the final participant pool consisted of 83 beginning L2 learners of English, and 84 beginning L2 learners of Spanish.

The dependent measures were the percentage of first noun choice and reaction times for agent assignment in the sentence interpretation task. Following the procedure used by Reyes and Hernandez (2006), accuracy to the agency question or percentage of correct responses were not calculated. This is due to the fact that there is no right or wrong answers to the experimental sentences because most of them are ungrammatical. Instead, results are presented in terms of the percentage of stimuli in which the participants chose the first noun as the agent of the sentence, and in terms of the reaction times for agency assignment. Following the scoring method used in Reyes and Hernandez (2006), a score of 1 was awarded when participants designated the first noun as the agent of the sentence, and a score of 0 when the second noun was chosen as the agent of the sentence. As a result, participants had scores from 0 to 100 percent. Scores closer to 0 percent were interpreted as participants choosing the second noun more often, and scores closer to 100 percent were taken as participants choosing the first noun more often. Reaction times for agency assignment were measured from the onset of the question’s presentation.

For the statistical analyses, means for first noun choice and reaction times were calculated for each participant for each word order and agreement condition. Three different analyses were performed with the data. The first analysis examined native speakers’ first noun choice and reaction times for agent assignment individually in order to confirm whether they used the processing strategies of their first language during sentence processing. For this analysis, the data of each group
of native speakers were submitted to a 3 × 3 ANOVA with word order (NVN, VNN, NNV), and subject-verb agreement (agreement with first noun, agreement with second noun, ambiguous verb form) as within-subject variables. Next, the same analysis was performed with each group of L2 learners in order to test the agreement and word order reliance of these participants. A third analysis was performed to compare each group of L2 learners with the corresponding group of native speakers in order to explore the difference in agent assignment patterns. For that, the percentage of first noun choice data and the reaction times for agent assignment were submitted to two separate 2 × 3 × 3 ANOVAs with Group (L1 Spanish/English and L2 Spanish/English) as a between-subject variable, and word order (NVN, VNN, NNV) and subject-verb agreement (agreement with first noun, agreement with second noun, ambiguous verb form) as within-subject variables. An analysis of simple main effects with a Bonferroni adjustment was conducted to explore significant interactions in all three analyses.

Relevant to the first two analyses, which examine the two groups of native speakers and the two groups of L2 learners separately, are the main effects for word order and agreement along with their effect size ($\eta^2_p$), which indicate the cue validity for sentence interpretation. Also of importance are the significant interactions between word order and agreement because they shed light on the cue dominance patterns. To explain, high percentages of first noun choice with NVN sentences, in all three agreement conditions, indicate that participants rely on word order to interpret sentences. The reliance in word order is confirmed if participants process NVN sentences faster than VNN or NNV, regardless of agreement conditions. Alternatively, high percentages of first noun choice with sentences where the verb agrees with the first noun and low percentages with sentences where the verb agrees with the second noun (regardless of word order), indicate that participants rely on agreement. The reliance on agreement is confirmed if participants process sentences with clear agreement cues (i.e., when the verb agrees with one of the two nouns) faster than sentences with ambiguous agreement.
Results

This section presents the analysis of first noun choice and the analysis of reaction times to agent assignment in the sentence interpretation task. The results of both dependent measures are presented by language and group.

Percentage of First Noun Choice: English Data

Table 5.2 provides an overview of the L1 and L2 English speakers’ mean percentage of first noun choice in all conditions.

<table>
<thead>
<tr>
<th></th>
<th>NVN</th>
<th>VNN</th>
<th>NNV</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMBG</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>L1 English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>96.8</td>
<td>13.5</td>
<td>11.9</td>
</tr>
<tr>
<td>1N</td>
<td>99.2</td>
<td>5.2</td>
<td>38.6</td>
</tr>
<tr>
<td>2N</td>
<td>58.7</td>
<td>43.3</td>
<td>3.8</td>
</tr>
<tr>
<td>L2 English</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>93.9</td>
<td>15.8</td>
<td>64.3</td>
</tr>
<tr>
<td>1N</td>
<td>86.9</td>
<td>21.8</td>
<td>81.1</td>
</tr>
<tr>
<td>2N</td>
<td>77.0</td>
<td>29.1</td>
<td>49.4</td>
</tr>
</tbody>
</table>

Note. NVN = noun verb noun, VNN = verb noun noun, NNV = noun noun verb, AMBG = ambiguous agreement, 1N = agreement with the first noun, and 2N = agreement with the second noun.

The results of the ANOVAs for L1 English and L2 English are summarized in Tables 5.3 and 5.4, respectively. The complete analysis is presented in Table 5.5. The complete analysis is particularly useful to evaluate the interactions involving Group (L1 vs. L2 English).
Table 5.3

**ANOVA for L1 English First Noun Choice**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>33.05</td>
<td>282.60</td>
<td>&lt;.001</td>
<td>.78</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>9.66</td>
<td>68.47</td>
<td>&lt;.001</td>
<td>.46</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>.73</td>
<td>20.57</td>
<td>&lt;.001</td>
<td>.20</td>
</tr>
<tr>
<td>Error</td>
<td>324</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.4

**ANOVA for L2 English First Noun Choice**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>6.87</td>
<td>70.33</td>
<td>&lt;.001</td>
<td>.47</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>3.17</td>
<td>34.68</td>
<td>&lt;.001</td>
<td>.30</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>.39</td>
<td>6.57</td>
<td>&lt;.001</td>
<td>.08</td>
</tr>
<tr>
<td>Error</td>
<td>324</td>
<td>.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.5

**ANOVA for L1 and L2 English First Noun Choice**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group (G)</td>
<td>1</td>
<td>23.35</td>
<td>210.09</td>
<td>&lt;.001</td>
<td>.57</td>
</tr>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>6.50</td>
<td>60.59</td>
<td>&lt;.001</td>
<td>.27</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>11.82</td>
<td>101.63</td>
<td>&lt;.001</td>
<td>.39</td>
</tr>
<tr>
<td>G × WO</td>
<td>2</td>
<td>6.50</td>
<td>60.59</td>
<td>&lt;.001</td>
<td>.27</td>
</tr>
<tr>
<td>G × AG</td>
<td>2</td>
<td>1.02</td>
<td>8.75</td>
<td>&lt;.001</td>
<td>.05</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>.81</td>
<td>17.15</td>
<td>&lt;.001</td>
<td>.10</td>
</tr>
<tr>
<td>G × WO × AG</td>
<td>4</td>
<td>.31</td>
<td>6.48</td>
<td>&lt;.001</td>
<td>.04</td>
</tr>
<tr>
<td>Error</td>
<td>648</td>
<td>.05</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Word Order**

There was a main effect for word order for both L1 and L2 English speakers. For L1 English, the first noun was chosen as the agent 43% of time, with the highest percentage in NVN sentences (85%) followed by NNV (25%), and finally VNN (18%). Native English speakers demonstrate a strong tendency to select the first noun as agent in NVN sentences and the second noun in VNN and NNV. These findings are consistent with L1 English data from a number of competition model experiments (Bates & MacWhinney, 1989; McDonald, 1986, 1987; Kilborn & Cooreman; 1987). The strong second noun choice as agent may reflect the inclination to assign the agent to the argument immediately preceding the verb in NNV sentences and to assign the object/patient role to the argument immediately following the verb in VNN sentences due to a rigid SVO word order in English. The effect for word order accounted for 78% of the variance in the L1 English data, reflecting a powerful effect for this variable.

For L2 English, the first noun was selected as the agent 68% of the time, with the highest percentage in NVN (86%), followed by VNN (65%) and NNV (53%). Unlike the L1 English group, the L2 learners did not demonstrate a strong second noun strategy in NNV and VNN sentences. Even so, word order accounted for 47% of the variance in the L2 English data.

The complete ANOVA revealed a significant interaction between group and word order, as displayed in Figure 5.2. This interaction is due to the fact that in the non-canonical word orders (i.e., VNN and NNV), the L2 English learners demonstrated a significantly higher percentage of first noun choice than the L1 English speakers \((p < .001)\).

![Figure 5.2. Group and word order interaction for L1 and L2 English 1st noun choice.](image)
**Agreement**

The main effect of agreement was significant for both groups of English speakers. For L1 English, agreement accounted for 46% of the variance in the data, and the first noun was chosen as the agent most often when the verb agreed with the first noun (63%), compared to sentences with ambiguous agreement (42%) or with agreement with the second noun (23%).

Agreement accounted for 30% of the variance among L2 English learners. First noun choice was highest when the verb agreed with the first noun (78%), followed by ambiguous agreement (71%), and agreement with the second noun (56%).

The different percentages of first noun choice between L1 English and L2 English are reflected in the significant interaction between group and agreement, which is displayed in Figure 5.3. Regardless of the Agreement condition (with the first noun, the second noun, or both), L2 English learners demonstrated a significantly higher percentage of first noun choice than the L1 English group ($p < .001$).

![Figure 5.3. Group and agreement interaction for L1 and L2 English 1st noun choice.](image)

**Figure 5.3.** Group and agreement interaction for L1 and L2 English 1st noun choice.

Given the strength of the main effects for the independent variables, the rank order of the cues for L1 English and L2 English are as follows:

- **L1 English:** WORD ORDER > AGREEMENT
- **L2 English:** WORD ORDER > AGREEMENT

However, it is also important to examine the interactions between word order and agreement to gain an idea of how the cues are used together.
**Interactions of Word Order and Agreement**

*L1 English.* There was a significant word order and agreement interaction, $F(4, 324) = 20.57, p < .001, \eta^2_{\text{partial}} = .20$ (see Figure 5.4).

![Figure 5.4. Word order and agreement interaction for L1 English 1st noun choice.](image)

**Summaries of the pairwise comparisons for the word order and agreement interaction with the L1 English group are presented next. Pairwise comparisons between word order conditions for the English L1 groups (see Table 5.6) indicate that English native speakers had the highest percentage of first noun choice with NVN sentences, regardless of agreement conditions.**

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN &gt; VNN</td>
<td>NVN &gt; NNV</td>
<td>78.2***</td>
<td>3.3</td>
</tr>
<tr>
<td>NVN &gt; VNN</td>
<td>NNV ≈ VNN</td>
<td>6.7</td>
<td>3.4</td>
</tr>
<tr>
<td>NVN &gt; VNN</td>
<td>NVN &gt; VNN</td>
<td>60.6***</td>
<td>4.7</td>
</tr>
<tr>
<td>1N</td>
<td>NVN &gt; NNV</td>
<td>48.7***</td>
<td>4.7</td>
</tr>
<tr>
<td>1N</td>
<td>NNV &gt; VNN</td>
<td>11.9**</td>
<td>3.7</td>
</tr>
</tbody>
</table>
Table 5.6

*Comparisons between Word Order Conditions for English Native Speakers (continued)*

<table>
<thead>
<tr>
<th>2N</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN &gt; VNN</td>
<td>54.9***</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>NVN &gt; NNV</td>
<td>51.8***</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>NNV ≈ VNN</td>
<td>3.2</td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

A summary of the comparisons between agreement conditions is presented in Table 5.7. These results show that English native speakers had the highest percentage of first noun choice with sentences where the verb agreed with the first noun and the lowest percentage with sentences where the verb agreed with the second noun, in all three word order conditions.

Table 5.7

*Comparisons between Agreement Conditions for English Native Speakers*

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>1N &gt; 2N</td>
<td>40.4***</td>
<td>4.8</td>
</tr>
<tr>
<td></td>
<td>1N ≈ Ambg</td>
<td>2.4*</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>37.9***</td>
<td>5.1</td>
</tr>
<tr>
<td>VNN</td>
<td>1N &gt; Ambg</td>
<td>26.7***</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>8.1***</td>
<td>2.0</td>
</tr>
<tr>
<td>NNV</td>
<td>1N &gt; 2N</td>
<td>43.6***</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>1N &gt; Ambg</td>
<td>31.9***</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>11.7**</td>
<td>3.2</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001
**L2 English.** There was a significant word order and agreement interaction, $F(4, 324) = 6.57$, $p < .001$, $\eta^2_{\text{partial}} = .08$ (see Figure 5.5).

![Figure 5.5. Word order and agreement interaction for L2 English 1st noun choice.](image)

Pairwise comparisons between word order conditions for the L2 English group are summarized in Table 5.8. These results show that, when the verb form was ambiguous and when the verb agreed with the second noun, L2 learners of English had the highest percentage of first noun choice with NVN sentences. When the verb agreed with the first noun, L2 learners of English had the highest percentage of first noun choice with NVN and VNN sentences.

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN ≈ VNN</td>
<td>NVN &gt; VNN</td>
<td>29.6***</td>
<td>3.6</td>
</tr>
<tr>
<td>1N</td>
<td>NVN &gt; NNV</td>
<td>40.3***</td>
<td>4.0</td>
</tr>
<tr>
<td>2N</td>
<td>NVN &gt; NNV</td>
<td>10.8*</td>
<td>4.4</td>
</tr>
<tr>
<td>VNN &gt; NNV</td>
<td>NVN ≈ VNN</td>
<td>5.8</td>
<td>3.9</td>
</tr>
<tr>
<td>1N</td>
<td>NVN &gt; NNV</td>
<td>21.7***</td>
<td>4.2</td>
</tr>
<tr>
<td>2N</td>
<td>NVN &gt; NNV</td>
<td>16.0**</td>
<td>4.1</td>
</tr>
<tr>
<td>NVN ≈ NNV</td>
<td>NVN &gt; VNN</td>
<td>27.6***</td>
<td>4.1</td>
</tr>
<tr>
<td>2N</td>
<td>NVN ≈ NNV</td>
<td>37.0***</td>
<td>4.8</td>
</tr>
<tr>
<td>2N</td>
<td>VNN ≈ NNV</td>
<td>9.3</td>
<td>4.7</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$, *** $p < .001$
A summary of the comparisons between agreement conditions for the L2 English group are presented in Table 5.9. These results indicate that, for the canonical word order sentences, L2 learners of English had the highest percentage of first noun choice in sentences with ambiguous agreement and the lowest percentage in sentences where the verb agrees with the second noun. In the non-canonical sentences (i.e., VNN and NNV), L2 learners of English had the highest percentage of first noun choice in sentences where the verb agreed with the first noun and the lowest percentage when the verb agreed with the second noun.

Table 5.9
Comparisons between Agreement Conditions for L2 English Learners

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>1N &gt; 2N</td>
<td>9.9*</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 1N</td>
<td>7.0*</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>16.9***</td>
<td>3.8</td>
</tr>
<tr>
<td></td>
<td>1N &gt; 2N</td>
<td>31.7***</td>
<td>4.7</td>
</tr>
<tr>
<td>VNN</td>
<td>1N &gt; Ambg</td>
<td>16.8***</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>14.9***</td>
<td>4.2</td>
</tr>
<tr>
<td>NNV</td>
<td>1N &gt; Ambg</td>
<td>11.6*</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>13.5*</td>
<td>4.5</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

L1/L2 English. There was a significant group, word order and agreement interaction, $F(4, 648) = 6.48, p < .001, \eta^2_{partial} = .04$ (see Figure 5.6).
Pairwise comparisons for the three way interaction revealed that, for NVN word order sentences, there was no significant difference between L1 and L2 English groups in sentences with ambiguous agreement, $F(1, 162) = 1.54, p = .217, \eta^2_{\text{partial}} = .01$. The L1 English group had a significantly higher percentage of first noun choice in sentences where the verb agreed with the first noun compared to the L2 English group, $F(1, 162) = 24.71, p < .001, \eta^2_{\text{partial}} = .13$. The L2 English group had a significantly higher percentage of first noun choice in sentences where the verb agreed with the second noun compared to the L1 English group, $F(1, 162) = 10.07, p = .002, \eta^2_{\text{partial}} = .06$.

For VNN sentences, the L2 English group had a significantly higher percentage of first noun choice than the L1 English group in all sentences, regardless of agreement condition: ambiguous agreement, $F(1, 162) = 205.38, p < .001, \eta^2_{\text{partial}} = .56$, agreement with the first noun, $F(1, 162) = 56.68, p < .001, \eta^2_{\text{partial}} = .26$, agreement with the second noun, $F(1, 162) = 142.87, p < .001, \eta^2_{\text{partial}} = .47$.

The same results were obtained for NNV sentences. That is, the L2 English group had a significantly higher percentage of first noun choice compared to the L1 English group in all sentences, regardless of agreement condition: ambiguous agreement, $F(1, 162) = 56.89, p < .001, \eta^2_{\text{partial}} = .26$, agreement with the first noun, $F(1, 162) = 6.14, p = .014, \eta^2_{\text{partial}} = .04$, agreement with the second noun, $F(1, 162) = 50.90, p < .001, \eta^2_{\text{partial}} = .24$. Table 5.10 presents the summary of the pairwise comparison for the three way interaction. Overall, the ANOVA revealed that beginning L2 learners of English had higher percentages of first noun choice than English native speakers in the two non-canonical word order conditions, regardless of agreement. With canonical NVN sentences, English native speakers had higher percentages than L2 learners in sentences where the verb agreed with the
first noun, and the L2 learners had higher percentages compared to L1 English in sentences where the verb agreed with the second noun.

Table 5.10

*Summary of Pairwise Comparisons for L1/L2 English*

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Agreement</th>
<th>Percentage of First Noun Choice</th>
<th>$F$</th>
<th>$\eta_{p}^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>AMBG</td>
<td>L2 ENG $\approx$ L1 ENG</td>
<td>1.54</td>
<td>.01</td>
</tr>
<tr>
<td>1N</td>
<td></td>
<td>L1 ENG $&gt;$ L2 ENG</td>
<td>24.71</td>
<td>.13</td>
</tr>
<tr>
<td>2N</td>
<td></td>
<td>L2 ENG $&gt;$ L1 ENG</td>
<td>10.07</td>
<td>.06</td>
</tr>
<tr>
<td>VNN</td>
<td>AMBG</td>
<td>L2 ENG $&gt;$ L1 ENG</td>
<td>205.38</td>
<td>.56</td>
</tr>
<tr>
<td>1N</td>
<td></td>
<td>L2 ENG $&gt;$ L1 ENG</td>
<td>56.68</td>
<td>.26</td>
</tr>
<tr>
<td>2N</td>
<td></td>
<td>L2 ENG $&gt;$ L1 ENG</td>
<td>142.87</td>
<td>.47</td>
</tr>
<tr>
<td>NNV</td>
<td>AMBG</td>
<td>L2 ENG $&gt;$ L1 ENG</td>
<td>56.89</td>
<td>.26</td>
</tr>
<tr>
<td>1N</td>
<td></td>
<td>L2 ENG $&gt;$ L1 ENG</td>
<td>6.14</td>
<td>.04</td>
</tr>
<tr>
<td>2N</td>
<td></td>
<td>L2 ENG $&gt;$ L1 ENG</td>
<td>50.90</td>
<td>.24</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$, *** $p < .001$

**Percentage of First Noun Choice: Spanish Data**

Table 5.11 provides an overview of the L1 and L2 Spanish speakers’ mean percentage of first noun choice in all conditions.

Table 5.11

*Descriptive statistics (in percentage) for L1 and L2 Spanish speakers’ first noun choice*

<table>
<thead>
<tr>
<th></th>
<th>NVN</th>
<th>VNN</th>
<th>NNV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>AMBG</td>
<td>76.3</td>
<td>34.6</td>
<td>71.8</td>
</tr>
<tr>
<td>1N</td>
<td>88.5</td>
<td>18.9</td>
<td>92.0</td>
</tr>
<tr>
<td>2N</td>
<td>23.8</td>
<td>32.5</td>
<td>22.3</td>
</tr>
</tbody>
</table>
Table 5.11

Descriptive statistics (in percentage) for L1 and L2 Spanish speakers’ first noun choice (continued)

<table>
<thead>
<tr>
<th></th>
<th>NVN</th>
<th>VNN</th>
<th>NNV</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMBG</td>
<td>86.6</td>
<td>67.4</td>
<td>69.9</td>
</tr>
<tr>
<td>1N</td>
<td>91.5</td>
<td>73.7</td>
<td>65.4</td>
</tr>
<tr>
<td>2N</td>
<td>69.7</td>
<td>50.1</td>
<td>31.1</td>
</tr>
</tbody>
</table>

The results of the ANOVAs for L1 Spanish and L2 Spanish are summarized in Tables 5.12 and 5.13, respectively. The complete analysis is presented in Table 5.14. The complete analysis is particularly useful to evaluate the interactions involving Group (L1 vs. L2 Spanish).

Table 5.12
ANOVA for L1 Spanish First Noun Choice

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>η²p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>1.26</td>
<td>18.41</td>
<td>&lt;.001</td>
<td>.21</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>23.39</td>
<td>193.80</td>
<td>&lt;.001</td>
<td>.74</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>.42</td>
<td>9.30</td>
<td>&lt;.001</td>
<td>.12</td>
</tr>
<tr>
<td>Error</td>
<td>280</td>
<td>.45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.13
ANOVA for L2 Spanish First Noun Choice

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>η²p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>4.69</td>
<td>49.97</td>
<td>&lt;.001</td>
<td>.38</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>5.29</td>
<td>46.96</td>
<td>&lt;.001</td>
<td>.37</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>.32</td>
<td>6.23</td>
<td>&lt;.001</td>
<td>.07</td>
</tr>
<tr>
<td>Error</td>
<td>320</td>
<td>.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5.14

ANOVA for L1 and L2 Spanish First Noun Choice

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>η²_p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group (G)</td>
<td>1</td>
<td>2.90</td>
<td>16.26</td>
<td>&lt;.001</td>
<td>.10</td>
</tr>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>4.72</td>
<td>57.67</td>
<td>&lt;.001</td>
<td>.28</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>25.63</td>
<td>220.21</td>
<td>&lt;.001</td>
<td>.60</td>
</tr>
<tr>
<td>G × WO</td>
<td>2</td>
<td>.10</td>
<td>12.16</td>
<td>&lt;.001</td>
<td>.08</td>
</tr>
<tr>
<td>G × AG</td>
<td>2</td>
<td>4.24</td>
<td>36.44</td>
<td>&lt;.001</td>
<td>.20</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>.47</td>
<td>.96</td>
<td>=.431</td>
<td>.06</td>
</tr>
<tr>
<td>G × WO × AG</td>
<td>4</td>
<td>.70</td>
<td>14.43</td>
<td>&lt;.001</td>
<td>.09</td>
</tr>
<tr>
<td>Error</td>
<td>600</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Word Order**

There was a main effect for word order for both L1 and L2 Spanish speakers. For L1 Spanish, the first noun was chosen as the agent 58% of time, with the highest percentage in NVN sentences (63%) and VNN (62%). The lowest percentage was in NNV (49%). The effect for word order accounted for 21% of the variance in the L1 Spanish data, reflecting a small effect for this variable.

For L2 Spanish, the first noun was selected as the agent 68% of the time, with the highest percentage in NVN (83%), followed by VNN (64%) and NNV (56%). Word order accounted for 39% of the variance in the L2 Spanish data, reflecting a large effect size for this variable.

The complete ANOVA revealed a significant interaction between group and word order, as displayed in Figure 5.7. This interaction is due to the fact that in the canonical word order (i.e., NVN), the L2 Spanish learners demonstrated a significantly higher percentage of first noun choice than the L1 Spanish speakers (p < .001).
Figure 5.7. Group and word order interaction for L1 and L2 Spanish 1st noun choice.

Agreement

The main effect of agreement was significant for both groups of Spanish speakers. For L1 Spanish, agreement accounted for 75% of the variance in the data, and the first noun was chosen as the agent most often when the verb agreed with the first noun (87%), compared to sentences with ambiguous agreement (65%) or with agreement with the second noun (22%). These findings indicate that native Spanish speakers select the noun that agrees with the verb as agent of the experimental sentences. These results are consistent with L1 Spanish data from a number of competition model experiments (Kilborn, 1989; Wulfeck et al., 1986; Hernandez et al., 1994; Hernandez et al., 2000; Reyes & Hernandez, 2006).

Agreement accounted for 37% of the variance among L2 Spanish learners. First noun choice was highest when the verb agreed with the first noun (77%), followed by ambiguous agreement (75%), and agreement with the second noun (50%).

The different percentage of first noun choice between L1 Spanish and L2 Spanish is reflected in the significant interaction between group and agreement, which is displayed in Figure 5.8. L2 Spanish learners demonstrated a significantly higher percentage of first noun choice in sentences where the verb agreed with the second noun and sentences with ambiguous agreement ($ps < .005$).
Figure 5.8. Group and agreement interaction for L1 and L2 Spanish 1\textsuperscript{st} noun choice.

Given the strength of the main effects for the independent variables, the rank order of the cues for L1 Spanish and L2 Spanish are as follows:

L1 Spanish: AGREEMENT > WORD ORDER
L2 Spanish: WORD ORDER > AGREEMENT

Interactions of Word Order and Agreement

L1 Spanish. There was a significant word order and agreement interaction, $F(4, 280) = 9.30$, $p < .001$, $\eta^2_{\text{partial}} = .12$ (see Figure 5.9).

Figure 5.9. Word order and agreement interaction for L1 Spanish 1\textsuperscript{st} noun choice.
Pairwise comparisons for the word order and agreement interaction are presented in the following tables. The comparisons between word order conditions (see Table 5.15) reveal that there was no significant difference in the percentage of first noun choice among word order conditions in sentences where the verb agreed with one of the two nouns. In sentences with ambiguous agreement, Spanish native speakers had the highest percentage of first noun choice in NVN and VNN sentences.

Table 5.15

*Comparisons between Word Order Conditions for Spanish Native Speakers*

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN ≈ VNN</td>
<td>NVN &gt; NNV</td>
<td>29.9***</td>
<td>4.6</td>
</tr>
<tr>
<td>Ambg</td>
<td>NVN ≈ NNV</td>
<td>-3.5</td>
<td>3.0</td>
</tr>
<tr>
<td>VNN &gt; NNV</td>
<td>NVN ≈ NNV</td>
<td>7.3</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>NNV ≈ VNN</td>
<td>10.8</td>
<td>3.6</td>
</tr>
<tr>
<td>1N</td>
<td>NVN ≈ NNV</td>
<td>1.5</td>
<td>3.2</td>
</tr>
<tr>
<td>2N</td>
<td>NVN ≈ NNV</td>
<td>3.9</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>VNN ≈ NNV</td>
<td>2.3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

* *p < .05, **p < .01, ***p < .001

Pairwise comparisons between agreement conditions for the L1 Spanish group (see Table 5.16) show that Spanish native speakers had the highest percentage of first noun choice in sentences where the verb agreed with the first noun and the lowest percentage in sentences where the verb agreed with the second noun, in all three word order conditions.
Table 5.16
Comparisons between Agreement Conditions for Spanish Native Speakers

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>1N &gt; 2N</td>
<td>64.7***</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>1N &gt; Ambg</td>
<td>12.2*</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>52.5***</td>
<td>4.6</td>
</tr>
<tr>
<td>VNN</td>
<td>1N &gt; 2N</td>
<td>69.7***</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>1N &gt; Ambg</td>
<td>20.2***</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>49.5***</td>
<td>3.8</td>
</tr>
<tr>
<td>NNV</td>
<td>1N &gt; 2N</td>
<td>61.3***</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>1N &gt; Ambg</td>
<td>34.9***</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>26.4***</td>
<td>4.3</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$, *** $p < .001$

To summarize the results of this interaction, the analysis revealed that Spanish native speakers had the highest percentage of first noun choice with sentences where the verb agreed with the first noun and the lowest percentage with sentences where the verb agreed with the second noun, regardless of word order condition. Also, the results revealed no difference in the percentage of first noun choice among word order conditions when there were clear agreement cues.

**L2 Spanish.** There was a significant word order and agreement interaction, $F(4, 320) = 6.23$, $p < .001$, $\eta^2_{partial} = .07$ (see Figure 5.10).

![Figure 5.10. Word order and agreement interaction for L2 Spanish 1st noun choice.](image)
These results of the pairwise comparisons between word order conditions indicate that L2 learners of Spanish had the highest percentage of first noun choice with NVN sentences, regardless of agreement condition. Table 5.17 presents a summary of these results.

Table 5.17
Comparisons between Word Order Conditions for L2 Spanish Learners

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambg</td>
<td>NVN &gt; VNN</td>
<td>19.2***</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>NVN &gt; NNV</td>
<td>16.7***</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>NNV ≈ VNN</td>
<td>2.6</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
<td>NVN &gt; VNN</td>
<td>17.8***</td>
<td>3.3</td>
</tr>
<tr>
<td>1N</td>
<td>NVN &gt; NNV</td>
<td>26.0***</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>VNN ≈ NNV</td>
<td>8.2</td>
<td>4.3</td>
</tr>
<tr>
<td>2N</td>
<td>NVN &gt; VNN</td>
<td>19.5***</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>NVN &gt; NNV</td>
<td>38.6***</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>VNN &gt; NNV</td>
<td>19.0***</td>
<td>4.2</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

Pairwise comparisons between agreement conditions for the L2 Spanish group show that L2 learners of Spanish had the highest percentage of first noun choice in sentences where the verb agreed with the first noun and the lowest percentage in sentences where the verb agreed with the second noun, regardless of word order condition. There was no difference between sentences where the verb agreed with the first noun and sentences with ambiguous agreement. Table 5.18 presents a summary of these pairwise comparisons.
Table 5.18
Comparisons between Agreement Conditions for L2 Spanish Learners

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Percentage of First Noun Choice</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>1N &gt; 2N</td>
<td>21.8***</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>Ambg ≈ 1N</td>
<td>-4.8</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>17.0***</td>
<td>4.2</td>
</tr>
<tr>
<td>NVN</td>
<td>1N &gt; 2N</td>
<td>23.6***</td>
<td>4.3</td>
</tr>
<tr>
<td>VNN</td>
<td>Ambg ≈ 1N</td>
<td>-6.3</td>
<td>4.1</td>
</tr>
<tr>
<td>VNN</td>
<td>Ambg &gt; 2N</td>
<td>17.3***</td>
<td>3.7</td>
</tr>
<tr>
<td>VNN</td>
<td>1N &gt; 2N</td>
<td>34.4***</td>
<td>5.4</td>
</tr>
<tr>
<td>NNV</td>
<td>Ambg ≈ 1N</td>
<td>4.5</td>
<td>4.2</td>
</tr>
<tr>
<td>NNV</td>
<td>Ambg &gt; 2N</td>
<td>38.9***</td>
<td>4.9</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

L1/L2 Spanish. There was a significant group, word order and agreement interaction, $F(4, 600) = 14.43, p < .001, \eta^2_{partial} = .09$ (see Figure 5.11).

Figure 5.11. Group, word order and agreement interaction for L1/L2 Spanish 1st noun choice.
Pairwise comparisons for the three way interaction revealed that for NVN word order sentences, the L2 Spanish group had a significantly higher percentage of first noun choice in sentences with ambiguous agreement compared to the L1 Spanish group, $F(1, 150) = 5.40, p = .021, \eta^2_{\text{partial}} = .04$. The L2 Spanish group also had a significantly higher percentage of first noun choice in sentences where the verb agreed with the second noun compared to the L1 Spanish group, $F(1, 150) = 73.99, p < .001, \eta^2_{\text{partial}} = .33$. In this word order condition, the percentage of first noun choice was no significantly different between L1 and L2 Spanish groups with sentences where the verb agreed with the first noun, $F(1, 150) = 1.12, p = .291, \eta^2_{\text{partial}} = .01$. For VNN sentences, the L1 Spanish group had a significantly higher percentage of first noun choice with sentences where the verb agreed with the first noun compared to the L2 Spanish group, $F(1, 150) = 19.70, p < .001, \eta^2_{\text{partial}} = .12$. The L2 learners of Spanish had a significantly higher percentage of first noun choice with sentences where the verb agreed with the second noun compared to the L1 Spanish group, $F(1, 150) = 34.21, p < .001, \eta^2_{\text{partial}} = .19$. The percentage of first noun choice was no significantly different between the L1 and L2 Spanish groups in sentences with ambiguous agreement, $F(1, 150) = 0.82, p = .366, \eta^2_{\text{partial}} = .01$. For NNV sentences, L2 learners of Spanish had a significantly higher percentage of first noun choice with sentences where the verb agreed with the second noun compared to the L1 Spanish group, $F(1, 150) = 4.34, p = .039, \eta^2_{\text{partial}} = .03$. They also had a significantly higher percentage of first noun choice with sentences with ambiguous agreement compared to the L1 Spanish group, $F(1, 150) = 18.87, p < .001, \eta^2_{\text{partial}} = .11$. The L1 Spanish group had a significantly higher percentage of first noun choice with sentences where the verb agreed with the first noun compared to the L2 Spanish group, $F(1, 150) = 9.73, p = .002, \eta^2_{\text{partial}} = .06$. Table 5.19 presents the summary of the pairwise comparisons for the three way interaction. Overall, these results reveal that the Spanish learners had higher percentages of first noun choice with sentences where the verb agreed with the second noun, regardless of word order condition.
Table 5.19

Summary of Pairwise Comparisons for L1/L2 Spanish

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Agreement</th>
<th>Percentage of First Noun Choice</th>
<th>( F )</th>
<th>( \eta_p^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>AMBG</td>
<td>L2 SP &gt; L1 SP</td>
<td>5.40*</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>1N</td>
<td>L2 SP ( \approx ) L1 SP</td>
<td>1.12</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>2N</td>
<td>L2 SP &gt; L1 SP</td>
<td>73.99***</td>
<td>.33</td>
</tr>
<tr>
<td>VNN</td>
<td>AMBG</td>
<td>L2 SP ( \approx ) L1 SP</td>
<td>0.82</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>1N</td>
<td>L1 SP &gt; L2 SP</td>
<td>19.70***</td>
<td>.12</td>
</tr>
<tr>
<td></td>
<td>2N</td>
<td>L2 SP &gt; L1 SP</td>
<td>34.21***</td>
<td>.19</td>
</tr>
<tr>
<td>NNV</td>
<td>AMBG</td>
<td>L2 SP &gt; L1 SP</td>
<td>18.87***</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>1N</td>
<td>L1 SP &gt; L2 SP</td>
<td>9.73**</td>
<td>.06</td>
</tr>
<tr>
<td></td>
<td>2N</td>
<td>L2 SP &gt; L1 SP</td>
<td>4.34*</td>
<td>.03</td>
</tr>
</tbody>
</table>

* \( p < .05 \), ** \( p < .01 \), *** \( p < .001 \)

Reaction Times Analysis: English Data

Table 5.20 provides an overview of the L1 and L2 English speakers’ mean reaction times for agency assignment in all conditions.

Table 5.20

Descriptive statistics (in milliseconds) for L1 and L2 English speakers’ RTs

<table>
<thead>
<tr>
<th>L1 English</th>
<th>L2 English</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>VNN</td>
</tr>
<tr>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>SD</td>
<td>SD</td>
</tr>
<tr>
<td>AMBG</td>
<td>1673</td>
</tr>
<tr>
<td></td>
<td>806</td>
</tr>
<tr>
<td>1N</td>
<td>1224</td>
</tr>
<tr>
<td></td>
<td>542</td>
</tr>
<tr>
<td>2N</td>
<td>2037</td>
</tr>
<tr>
<td></td>
<td>1144</td>
</tr>
<tr>
<td>AMBG</td>
<td>2256</td>
</tr>
<tr>
<td></td>
<td>945</td>
</tr>
<tr>
<td>1N</td>
<td>2088</td>
</tr>
<tr>
<td></td>
<td>899</td>
</tr>
<tr>
<td>2N</td>
<td>2530</td>
</tr>
<tr>
<td></td>
<td>1050</td>
</tr>
</tbody>
</table>
The results of the ANOVAs with the reaction times for L1 English and L2 English are summarized in Tables 5.21 and 5.22, respectively. The complete analysis is presented in Table 5.23.

Table 5.21
ANOVA for L1 English Reaction Times

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>45249218</td>
<td>52.45</td>
<td>&lt;.001</td>
<td>.39</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>6028868</td>
<td>7.50</td>
<td>=.001</td>
<td>.08</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>10013263</td>
<td>14.07</td>
<td>&lt;.001</td>
<td>.15</td>
</tr>
<tr>
<td>Error</td>
<td>324</td>
<td>711469</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.22
ANOVA for L2 English Reaction Times

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>40399700</td>
<td>45.22</td>
<td>&lt;.001</td>
<td>.36</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>11019891</td>
<td>16.20</td>
<td>&lt;.001</td>
<td>.17</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>3755811</td>
<td>5.39</td>
<td>&lt;.001</td>
<td>.06</td>
</tr>
<tr>
<td>Error</td>
<td>324</td>
<td>697299</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.23
ANOVA for L1 and L2 English Reaction Times

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group (G)</td>
<td>1</td>
<td>212481870</td>
<td>53.50</td>
<td>&lt;.001</td>
<td>.25</td>
</tr>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>80311113</td>
<td>91.50</td>
<td>&lt;.001</td>
<td>.36</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>16180197</td>
<td>21.80</td>
<td>&lt;.001</td>
<td>.12</td>
</tr>
<tr>
<td>G × WO</td>
<td>2</td>
<td>5337805</td>
<td>6.08</td>
<td>.003</td>
<td>.04</td>
</tr>
<tr>
<td>G × AG</td>
<td>2</td>
<td>868562</td>
<td>1.17</td>
<td>.312</td>
<td>.07</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>11079185</td>
<td>15.73</td>
<td>&lt;.001</td>
<td>.09</td>
</tr>
<tr>
<td>G × WO × AG</td>
<td>4</td>
<td>2689889</td>
<td>3.82</td>
<td>.004</td>
<td>.02</td>
</tr>
<tr>
<td>Error</td>
<td>648</td>
<td>704384</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Word Order**

The ANOVA revealed a main effect for word order for both L1 and L2 English speakers. English native speakers processed NVN sentences the fastest (1644 ms.) followed by VNN (1815 ms.) and NNV (2458 ms.) sentences. The effect for word order accounted for 39% of the variance in the L1 English data, reflecting a large effect size for this variable.

L2 learners of English demonstrated a similar processing pattern. That is, they processed NVN sentences the fastest (2291 ms.) followed by VNN (2814 ms.) and NNV (3088 ms.) sentences. The effect for word order accounted for 36% of the variance in the L1 English data, which is medium effect for this variable.

The complete ANOVA revealed a significant interaction between group and word order. This interaction is displayed in Figure 5.12. The English native speakers processed all sentences faster than the L2 learners, regardless of word order condition ($p_s < .001$).

![Figure 5.12. Group and word order interaction for L1 and L2 English reaction times.](image)

**Agreement**

The main effect of agreement was significant for both groups of English speakers. L1 English speakers processed sentences where the verb agreed with the first noun the fastest (1851 ms.) followed by sentences where the verb agreed with the second noun (1971 ms.) and sentences with ambiguous agreement (2149 ms.). However, agreement accounted for only 8% of the variance in the data.
Agreement accounted for 17% of the variance among L2 English learners. They also processed sentences where the verb agreed with the first noun the fastest (2515 ms.) followed by sentences where the verb agreed with the second noun (2741 ms.) and sentences with ambiguous agreement (2938 ms.). The complete ANOVA reveled a non-significant interaction (see Figure 5.13) between group and agreement between the L1 and L2 English groups ($p = .312$).

![Figure 5.13. Non-significant group and word order interaction for L1 and L2 English.](image)

The rank order of the cues for L1 English and L2 English (based on the strength of the main effects for the independent variables) are the following:

- **L1 English**: WORD ORDER > AGREEMENT
- **L2 English**: WORD ORDER > AGREEMENT

**Interactions of Word Order and Agreement**

**L1 English.** There was a significant word order and agreement interaction, $F(4, 324) = 14.07, p < .001, \eta^2_{partial} = .15$ (see Figure 5.14).
Pairwise comparisons between word order conditions for the English L1 groups are presented in Table 5.24. These comparisons indicate that English native speakers processed canonical NVN sentences faster than non-canonical VNN and NNV sentences, when the verb agreed with the first noun and when the verb form was ambiguous. VNN sentences were processed faster than NVN and NNV when the verb agreed with the second noun.

Table 5.24  
Comparisons between Word Order Conditions for English Native Speakers

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Reaction Times for Agency Assignment</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN &lt; VNN</td>
<td>NVN &lt; VNN</td>
<td>-413*</td>
<td>140</td>
</tr>
<tr>
<td>NVN &lt; NNV</td>
<td>NVN &lt; NNV</td>
<td>-1015***</td>
<td>163</td>
</tr>
<tr>
<td>VNN &lt; NNV</td>
<td>VNN &lt; NNV</td>
<td>-602***</td>
<td>132</td>
</tr>
<tr>
<td>VNN &lt; VNN</td>
<td>VNN &lt; VNN</td>
<td>-681***</td>
<td>112</td>
</tr>
<tr>
<td>NVN ≈ NNV</td>
<td>NVN ≈ NNV</td>
<td>-225</td>
<td>136</td>
</tr>
<tr>
<td>VNN &lt; NVN</td>
<td>VNN &lt; NVN</td>
<td>-582***</td>
<td>129</td>
</tr>
<tr>
<td>VNN &lt; NVN</td>
<td>VNN &lt; NVN</td>
<td>-807***</td>
<td>140</td>
</tr>
</tbody>
</table>

*p < .05, ** p < .01, *** p < .001
The comparisons between agreement conditions show that English native speakers processed sentences where the verb agreed with the first noun faster than sentences where the verb agreed with the second noun, but only in canonical sentences. When the verb agreed with the second noun, English native speakers processed non-canonical sentences faster. A summary of the pairwise comparisons is presented in Table 5.25.

Table 5.25
Comparisons between Agreement Conditions for English Native Speakers

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Reaction Times for Agency Assignment</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1N &lt; 2N</td>
<td>-813***</td>
<td>122</td>
</tr>
<tr>
<td>NVN</td>
<td>1N &lt; Ambg</td>
<td>-449***</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Ambg &lt; 2N</td>
<td>-363*</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>2N &lt; 1N</td>
<td>-450**</td>
<td>117</td>
</tr>
<tr>
<td>VNN</td>
<td>2N &lt; Ambg</td>
<td>-632***</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Ambg = 2N</td>
<td>182</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>1N = 2N</td>
<td>163</td>
<td>139</td>
</tr>
<tr>
<td>NNV</td>
<td>1N = Ambg</td>
<td>-264</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td>2N &lt; Ambg</td>
<td>-427*</td>
<td>155</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

**L2 English.** There was a significant word order and agreement interaction, $F(4, 324) = 5.40, p < .001, \eta^2_{\text{partial}} = .06$ (see Figure 5.15).

Figure 5.15. Word order and agreement interaction for L2 English reaction times.
Pairwise comparisons between word order conditions for the L2 English group are presented in Table 5.26. Overall, these comparisons show that the fastest reaction times for agency assignment occurred with NVN when the verb agreed with the first noun and when the verb had ambiguous agreement.

Table 5.26

Comparisons between Word Order Conditions for L2 English Learners

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Reaction Times for Agency Assignment</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN &lt; VNN</td>
<td>-960***</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Ambg</td>
<td>NVN &lt; NNV</td>
<td>-1087***</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>VNN ≈ NNV</td>
<td>-127</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>NVN &lt; VNN</td>
<td>-462**</td>
<td>133</td>
</tr>
<tr>
<td>1N</td>
<td>NVN &lt; NNV</td>
<td>-820***</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td>VNN &lt; NNV</td>
<td>-358*</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>NVN ≈ VNN</td>
<td>-148</td>
<td>132</td>
</tr>
<tr>
<td>2N</td>
<td>NVN &lt; NNV</td>
<td>-486**</td>
<td>153</td>
</tr>
<tr>
<td></td>
<td>VNN ≈ NNV</td>
<td>-338</td>
<td>161</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

A summary of the comparisons between agreement conditions for the L2 English group are presented in Table 5.27. These results indicate that L2 learners of English processed sentences with clear agreement cues faster than sentences with ambiguous agreement only in VNN word order sentences. For the canonical word order, L2 learners of English processed sentences where the verb agreed with the first noun and sentences with ambiguous agreement faster than sentences where the verb agreed with the second noun.
Table 5.27

Comparisons between Agreement Conditions for L2 English Learners

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Reaction Times for Agency Assignment</th>
<th>Mean Difference</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>Ambg ≈ 1N</td>
<td>168</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>Ambg ≈ 2N</td>
<td>-275</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>1N &lt; 2N</td>
<td>443**</td>
<td>116</td>
</tr>
<tr>
<td>VNN</td>
<td>Ambg &gt; 1N</td>
<td>665***</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td>Ambg &gt; 2N</td>
<td>537***</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td>1N ≈ 2N</td>
<td>-128</td>
<td>124</td>
</tr>
<tr>
<td>NNV</td>
<td>Ambg &gt; 1N</td>
<td>435*</td>
<td>133</td>
</tr>
<tr>
<td></td>
<td>Ambg ≈ 2N</td>
<td>326</td>
<td>162</td>
</tr>
<tr>
<td></td>
<td>1N ≈ 2N</td>
<td>-108</td>
<td>136</td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01, *** p < .001

L1/L2 English. There was a significant group, word order and agreement interaction, \(F(4, 648) = 6.48, p < .001, \eta^2_{\text{partial}} = .04\) (see Figure 5.16).

![Figure 5.16](image)

Figure 5.16. Group, word order and agreement interaction for L1/L2 English reaction times.
Pairwise comparisons for the group, word order, and agreement interaction revealed that L2 learners of English took longer to assign agency compared to the English native speakers in all conditions (ps < .01). Table 5.28 presents these results for each experimental condition.

Table 5.28

**Summary of Pairwise Comparisons for L1/L2 English**

<table>
<thead>
<tr>
<th>Word Order</th>
<th>Agreement</th>
<th>Reaction Times for Agency Assignment</th>
<th>F</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVN</td>
<td>AMBG</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>18.018***</td>
<td>.100</td>
</tr>
<tr>
<td></td>
<td>1N</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>55.537***</td>
<td>.255</td>
</tr>
<tr>
<td></td>
<td>2N</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>8.290**</td>
<td>.049</td>
</tr>
<tr>
<td>VNN</td>
<td>AMBG</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>46.932***</td>
<td>.225</td>
</tr>
<tr>
<td></td>
<td>1N</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>14.857***</td>
<td>.084</td>
</tr>
<tr>
<td></td>
<td>2N</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>66.095***</td>
<td>.290</td>
</tr>
<tr>
<td>NNV</td>
<td>AMBG</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>12.082**</td>
<td>.069</td>
</tr>
<tr>
<td></td>
<td>1N</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>7.412**</td>
<td>.044</td>
</tr>
<tr>
<td></td>
<td>2N</td>
<td>L1 ENG &lt; L2 ENG</td>
<td>14.908***</td>
<td>.084</td>
</tr>
</tbody>
</table>

**Reaction Times Analysis: Spanish Data**

Table 5.29 provides an overview of the L1 and L2 Spanish speakers’ mean reaction times for agency assignment in all conditions.

Table 5.29

**Descriptive statistics (in milliseconds) for L1 and L2 Spanish speakers’ RTs**

<table>
<thead>
<tr>
<th></th>
<th>L1 Spanish</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NVN</td>
<td>VNN</td>
<td>NNV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>AMBG</td>
<td>2384</td>
<td>1273</td>
<td>2686</td>
<td>1089</td>
<td>2761</td>
<td>1157</td>
</tr>
<tr>
<td>1N</td>
<td>2031</td>
<td>987</td>
<td>1995</td>
<td>975</td>
<td>2120</td>
<td>984</td>
</tr>
<tr>
<td>2N</td>
<td>1802</td>
<td>930</td>
<td>2199</td>
<td>1138</td>
<td>2235</td>
<td>1102</td>
</tr>
</tbody>
</table>
Table 5.29
*Descriptive statistics (in milliseconds) for L1 and L2 Spanish speakers’ RTs (continued)*

<table>
<thead>
<tr>
<th></th>
<th>NVN</th>
<th>VNN</th>
<th>NNV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>AMBG</td>
<td>2019</td>
<td>1070</td>
<td>2702</td>
</tr>
<tr>
<td>1N</td>
<td>1670</td>
<td>781</td>
<td>2384</td>
</tr>
<tr>
<td>2N</td>
<td>1673</td>
<td>886</td>
<td>2177</td>
</tr>
</tbody>
</table>

The results of the ANOVAs with reaction times to agency assignment for L1 Spanish and L2 Spanish are summarized in Tables 5.30 and 5.31. The complete analysis is presented in Table 5.32. The complete analysis is particularly useful to evaluate the interactions involving Group (L1 vs. L2 Spanish).

Table 5.30
*ANOVA for L1 Spanish Reaction Times*

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>5132272</td>
<td>8.34</td>
<td>&lt;.001</td>
<td>.11</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>21255164</td>
<td>17.96</td>
<td>&lt;.001</td>
<td>.20</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>1042521</td>
<td>1.59</td>
<td>=.178</td>
<td>.02</td>
</tr>
<tr>
<td>Error</td>
<td>280</td>
<td>656458</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.31
*ANOVA for L2 Spanish Reaction Times*

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>29558006</td>
<td>32.86</td>
<td>&lt;.001</td>
<td>.29</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>16417334</td>
<td>21.07</td>
<td>&lt;.001</td>
<td>.21</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>1215560</td>
<td>1.88</td>
<td>=.113</td>
<td>.02</td>
</tr>
<tr>
<td>Error</td>
<td>320</td>
<td>646026</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5.32

ANOVA for L1 and L2 Spanish Reaction Times

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>η²p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group (G)</td>
<td>1</td>
<td>1132858</td>
<td>0.26</td>
<td>=.609</td>
<td>.00</td>
</tr>
<tr>
<td>Word Order (WO)</td>
<td>2</td>
<td>28095798</td>
<td>36.64</td>
<td>&lt;.001</td>
<td>.20</td>
</tr>
<tr>
<td>Agreement (AG)</td>
<td>2</td>
<td>37610853</td>
<td>38.86</td>
<td>&lt;.001</td>
<td>.21</td>
</tr>
<tr>
<td>G × WO</td>
<td>2</td>
<td>4987523</td>
<td>6.50</td>
<td>=.002</td>
<td>.04</td>
</tr>
<tr>
<td>G × AG</td>
<td>2</td>
<td>379923</td>
<td>0.39</td>
<td>=.676</td>
<td>.00</td>
</tr>
<tr>
<td>WO × AG</td>
<td>4</td>
<td>1085767</td>
<td>1.67</td>
<td>=.156</td>
<td>.01</td>
</tr>
<tr>
<td>G × WO × AG</td>
<td>4</td>
<td>1160931</td>
<td>1.78</td>
<td>=.130</td>
<td>.01</td>
</tr>
<tr>
<td>Error</td>
<td>600</td>
<td>650894</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Word Order**

There was a main effect for word order for both L1 and L2 Spanish speakers. To explain, Spanish native speakers processed NVN sentences the fastest (2072 ms.) followed by VNN (2293 ms.) and NNV (2372 ms.). The effect for word order accounted for 11% of the variance in the L1 Spanish data, which represents a small effect for this variable.

For L2 Spanish, word order accounted for 29% of the variance in the L2 Spanish data, reflecting a medium effect for this variable. L2 learners of Spanish processed NVN sentences the fastest (1787 ms.) followed by NNV (2356 ms.) and VNN (2421 ms.).

The complete ANOVA revealed a significant interaction between group and word order, as displayed in Figure 5.17. This interaction is due to the fact that in the canonical word order (i.e., NVN), the L2 Spanish learners processed sentences significantly faster than the L1 Spanish speakers (p = .022).
Agreement

There was a significant main effect of agreement for both groups of Spanish speakers. For L1 Spanish, agreement accounted for 20% of the variance in the data, and these speakers processed sentences where the verb agreed with the first noun (2049 ms.) and with the second noun (2079 ms.) faster than sentences with ambiguous agreement (2610 ms.).

Agreement accounted for 21% of the variance among L2 Spanish learners. These L2 learners also processed sentences where the verb agreed with the first noun (2039 ms.) and with the second noun (2037 ms.) faster than sentences with ambiguous agreement (2488 ms.).

The complete ANOVA revealed a non-significant interaction (see Figure 5.18) between group and agreement in the Spanish groups ($p = .676$).

Based on the strength of the main effects for the independent variables, the rank order of the cues for L1 Spanish and L2 Spanish are as follows:

- L1 Spanish: AGREEMENT > WORD ORDER
- L2 Spanish: WORD ORDER > AGREEMENT
Interactions of Word Order and Agreement

There results revealed that the word order and agreement interaction in the L1, L2, and L1/L2 groups were non-significant: **L1 Spanish.** $F(4, 280) = 1.60, p = .178, \eta^2_{\text{partial}} = .02$, **L2 Spanish.** $F(4, 320) = 1.88, p = .113, \eta^2_{\text{partial}} = .02$, **L1/L2 Spanish.** $F(4, 600) = 1.78, p = .130, \eta^2_{\text{partial}} = .01$. There was a significant interaction between group and word order, $F(2, 300) = 6.50, p = .002, \eta^2_{\text{partial}} = .042$ (see Figure 5.19).

---

**Figure 5.18.** Non-significant group and word order interaction for L1 and L2 Spanish.

**Figure 5.19.** Group and word order interaction for L1/L2 Spanish reaction times.
Pairwise comparisons for the group and word order interaction revealed that the L2 Spanish group was faster than L1 Spanish group in assigning the agent of NVN sentences, \( F(1, 150) = 5.34, p = .022, \eta^2_{\text{partial}} = .034 \). The analysis also revealed that L2 learners of Spanish had significantly faster reaction times with NVN sentences than with VNN \( (p < .001) \) and NNV sentences \( (p < .001) \). There was no difference in the reaction times between VNN and NNV sentences in this group \( (p = 1.000) \).

**Summary of Results**

**The Rank Order of Variables**

**Percentage of First Noun Choice:**

- L1 English: \text{WORD ORDER} (78%) > \text{AGREEMENT} (46%)
- L1 Spanish: \text{AGREEMENT} (74%) > \text{WORD ORDER} (21%)
- L2 English: \text{WORD ORDER} (47%) > \text{AGREEMENT} (30%)
- L2 Spanish: \text{WORD ORDER} (38%) > \text{AGREEMENT} (37%)

**Reaction Times Analysis:**

- L1 English: \text{WORD ORDER} (39%) > \text{AGREEMENT} (8%)
- L1 Spanish: \text{AGREEMENT} (20%) > \text{WORD ORDER} (11%)
- L2 English: \text{WORD ORDER} (36%) > \text{AGREEMENT} (17%)
- L2 Spanish: \text{WORD ORDER} (29%) > \text{AGREEMENT} (21%)

**Significant Interactions**

**Native Speakers**

The analysis of native speakers’ first noun choice and reaction times to confirm cue dominance patterns revealed the following:

1. For the English native speakers, the highest percentage of first noun choice occurred with canonical NVN sentences, and the lowest with non-canonical VNN and NNV sentences, regardless of agreement condition. Concerning agreement, the highest percentage of first noun choice for English native speakers occurred with sentences where the verb agreed with the first noun and the lowest percentage occurred with sentences where the verb agreed with the second noun, regardless of word order condition.
2. English native speakers processed canonical sentences faster than non-canonical sentences when the verb agreed with the first noun and when the verb had an ambiguous form. Non-canonical sentences were processed faster when the verb agreed with the second noun. Also, the reaction times analysis revealed that English native speakers did not process sentences with clear agreement cues faster than sentences with ambiguous verbal agreement, in any word order condition.

3. For Spanish native speakers, the highest percentage of first noun choice occurred with sentences where the verb agreed with the first noun and the lowest percentage occurred with sentences where the verb agreed with the second noun, regardless of word order condition. In other words, Spanish native speakers tended to choose the first noun as agent only when the verb agreed with it.

4. Spanish native speakers processed sentences with clear agreement cues faster than those with ambiguous agreement. The analysis also revealed that Spanish native speakers assigned agency faster with canonical NVN sentences than with non-canonical VNN or NNV.

Second Language Learners

The analysis of L2 learners’ first noun choice and reaction times to investigate L1 transfer of morphosyntactic cues revealed the following:

1. The ANOVA for the L2 English group revealed that, the highest percentage of first noun choice occurred with NVN for that group, regardless of agreement condition. Concerning agreement, the highest percentage of first noun choice for the L2 learners of English occurred with sentences where the verb agreed with the first noun and the lowest percentage occurred when the verb agreed with the second noun, but only in the non-canonical word order sentences. In the canonical sentences, clear agreement cues did not affect learners’ choice of agent.

2. The ANOVA for the L2 English group revealed that (a) L2 learners of English assigned agency the fastest with NVN when the verb agreed with the first noun and when the verb had ambiguous agreement, and (b) L2 learners of English processed sentences with clear agreement cues faster than sentences with ambiguous agreement in the non-canonical word order only. For the canonical word order, L2 learners of English processed
sentences where the verb agreed with the first noun and sentences with ambiguous agreement faster than sentences where the verb agreed with the second noun.

3. The ANOVA for the L2 Spanish group revealed that (a) the highest percentage of first noun choice, for that group, occurred with NVN sentences, in all three agreement conditions, and (b) the highest percentage of first noun choice occurred with sentences where the verb agreed with the first noun and the lowest percentage occurred with sentences where the verb agreed with the second noun, in all three word order conditions.

4. L2 learners of Spanish processed canonical sentences faster than non-canonical sentences, and they processed sentences with clear agreement cues faster than sentences with ambiguous agreement, regardless of word order.

Complete Analysis (L1/L2 English & Spanish)

1. L2 learners of English had higher percentages of first noun choice compared to English native speakers with the two non-canonical word order conditions, regardless of agreement. With canonical NVN sentences, English native speakers had higher percentages compared to L2 learners in sentences where the verb agreed with the first noun.

2. Reaction times by L2 learners of English were significantly slower than the English native speakers’ reaction times in all conditions.

3. L2 learners of Spanish had higher percentages of first noun choice than the Spanish native speakers had in sentences where the verb agreed with the second noun, regardless of word order condition.

4. The L2 Spanish group assigned agency faster in NVN sentences than the L1 Spanish group. In all other conditions, L2 learners of Spanish processed sentences as fast as Spanish native speakers.
Discussion of Results

The purpose of Experiment 2 was to investigate whether L2 learners of English and L2 learners of Spanish initially transfer and use L1 morphosyntactic strategies to process the L2. The hypotheses that motivated this study were based on the results of previous competition model studies on cue dominance by native speakers and studies that do not support L1 transfer (Bates et al., 1982; MacWhinney & Bates, 1978; MacWhinney et al., 1984; Kilborn, 1989; Hernandez et al., 1994; Hernandez et al., 2000; Wulfeck et al., 1986; Gass, 1989; Harrington, 1987; Ito, 1990; Devescovi et al., 1998; Reyes, 2003; Reyes & Hernandez, 2006). The hypotheses for Experiment 2 were the following:

Native Speakers

- English native speakers will rely more on word order than on agreement cues for agent assignment.
- Spanish native speakers will rely more on agreement cues than on word order for agent assignment.

Second Language Learners

- L2 learners will have a high percentage of first noun choice in all conditions because they will use a first noun strategy.
- L2 learners of English will rely on word order for agent assignment.
- L2 learners of English will not utilize agreement cues for agent assignment.
- L2 learners of Spanish will also rely on word order for agent assignment.
- L2 learners of Spanish will not utilize agreement cues for agent assignment.

The hypotheses for the two groups of native speakers were supported by the results. English native speakers rely more on word order than on agreement as indicated by the variables’ effect size. In the percentage of first noun choice analysis, word order had a large effect size (i.e., word order accounted for 78% of the total variance) whereas agreement had a medium effect size (44%). This processing pattern was also found in the reaction times analysis. Word order accounted for 39% of the variance and agreement only accounted for 8% of the variance. The results from the pairwise comparisons for the significant interactions also confirmed that English native speakers rely more on
word order cues than on agreement cues. To explain, English native speakers had the highest percentage of first noun choice with canonical NVN sentences compared to the non-canonical sentences, and the canonical sentences were processed faster than the non-canonical sentences. This processing pattern suggests that English native speakers relied on word order for agent assignment. Also, English native speakers had a higher percentage of first noun choice in sentences with clear agreement cues compared to sentences with ambiguous verbal markers. This is consistent with reliance on agreement during language processing. However, reliance on agreement was not confirmed by the reaction times analysis. That is, sentences with clear agreement cues were not processed faster, which indicates that English native speakers rely more heavily on word order. Moreover, the reaction times analysis revealed that NVN sentences were processed the fastest when the verb agreed with the first noun and the slowest when the verb agreed with the second noun. This finding supports the use of word order for agent assignment by English native speakers. It also suggests that this group utilized a first noun strategy to process canonical sentences. To explain, reliance on the first noun sped up processing whereas reliance on the second noun slowed it down. These results are consistent with previous competition model studies on cue dominance that found that word order is the dominant cue for sentence interpretation by English native speakers (Bates & MacWhinney, 1981; Kilborn, 1989, 1994; Miao, 1981; Liu, 1996; McDonald, 1986, 1987a, 1987b; Kilborn & Cooreman, 1987).

For Spanish native speakers, the variables’ effect sizes indicated that Spanish native speakers rely more heavily on agreement cues than on word order cues. In the percentage of first noun analysis, agreement and word order accounted for 74% and 21% of the total variance, respectively. In the reaction times analysis these variables accounted for 20% and 11%. Reliance on agreement by L1 Spanish speakers was confirmed by the interactions’ results. For the L1 Spanish speakers, the highest percentage of first noun choice occurred with sentences where the verb agreed with the first noun and the lowest percentage of first noun choice occurred with sentences where the verb agreed with the second noun, regardless of word order condition. Also, Spanish native speakers processed sentences that had clear agreement cues faster than they processed sentences with ambiguous verb forms. These results are consistent with the use of agreement cues to assign agency. The reaction times analysis revealed that Spanish native speakers had some reliance on word order. They were faster assigning agency to NVN sentences than to VNN or NNV, which indicates word order use. However, variables’ effect size supports the hypothesis that Spanish native speakers rely more on
agreement than on word order. These results are consistent with previous competition model studies on cue dominance in Spanish that found that agreement is the dominant cue for sentence interpretation in this language (Kilborn, 1989; Wulfeck et al., 1986; Hernandez et al., 1994; Hernandez et al., 2000).

Only three of the hypotheses for L2 learners were supported by the results. Regarding Hypothesis 3, the results revealed that both groups of L2 learners had higher percentages of first noun choice compared to native speakers, particularly in the non-canonical sentences and in sentences where the verb agreed with the second noun. In fact, L2 learners chose the first noun as agent in almost 70% of the experimental sentences compared to the 50% average of native speakers. These results suggest that (a) L2 learners, regardless of their L1 background, defaulted to a preverbal strategy to assigned agency in all conditions, and (b) agreement conditions were not determinant factors in the use of this strategy. The use of a preverbal strategy is consistent with previous competition model studies that found that L2 learners and monolingual children had a strong preference for the preverbal agents and for word order cues to process L2 sentences at the beginning stages of acquisition (Reyes, 2003; Reyes & Hernandez, 2006).

Although the results suggest that beginning L2 learners used a preverbal strategy to initially processed L2 sentences, the results also revealed reliance on word order and agreement during L2 processing. Hypotheses 4 and 6 about reliance on word order by L2 learners were confirmed. The variables’ effect sizes in the two analyses (i.e., percentage of noun choice and reaction times) indicated that both groups of L2 learners rely more on word order than on agreement:

- L2 English: **WORD ORDER (47%, 36%) > AGREEMENT (30%, 17%)**
- L2 Spanish: **WORD ORDER (38%, 29%) > AGREEMENT (37%, 21%)**

Moreover, the processing pattern provided by the interactions confirmed that both groups of L2 learners relied more on word order to process the L2. To explain, both groups of L2 learners had higher percentages of first noun choice with NVN sentences compared to VNN and NNV, and they assigned agency faster to canonical NVN sentences than to non-canonical VNN and NNV sentences. Processing patterns favoring canonicity suggest reliance on word order. These results are consistent with the research discussed in Chapter 2 that found a strong preference for word order by L2 learners and monolingual children at the beginning stages of acquisition (Harrington, 1987; Ito, 1990; Gass, 1989; Reyes, 2003; Reyes & Hernandez, 2006).
Hypotheses 5 and 7 stating that neither group of L2 learners would utilize agreement cues were only partially supported by the results. L2 learners of English and Spanish demonstrated that they utilized agreement cues to a certain degree, which is not surprising given that English and Spanish have agreement features. However, the analyses (i.e., first noun choice and reaction times for agent assignment) did not reveal a consistent pattern indicating the use of agreement. The following results would demonstrate a steady pattern of agreement use: (a) participants should have a higher percentage of first noun choice in sentences where the verb agrees with the first noun compared to sentences where the verb agrees with the second noun, regardless of word order condition, and (b) participants should have faster reaction times in sentences with clear agreement cues (i.e., when the verb agrees with one of the two nouns) than in sentences with ambiguous agreement cues. Both groups of L2 learners had higher percentages of first noun choice in sentences where the verb agreed with the first noun compared to sentences where the verb agreed with the second noun, but only in certain conditions. For instance, L2 learners of English displayed agreement use as described in (a) and (b) only in the non-canonical sentences. In the canonical sentences, however, agreement cues neither affected their agency assignment nor sped up processing. Instead, L2 learners of English demonstrated reliance on word order to process canonical sentences as shown by (a) a high percentage of first noun choice in NVN sentences regardless of the clear agreement cues, and (b) faster reaction times in sentences where the verb agreed with the first noun than in sentences where the verb agreed with the second noun. The result in (b) suggests the use of word order to process L2 sentences, and it also indicates that this group utilized a first noun strategy to process canonical sentences. Although L2 learners of Spanish also demonstrated reliance on agreement in the percentage of first noun choice analysis, the reaction times analysis did not confirm this pattern. That is, L2 learners of Spanish were faster than the Spanish native speakers in assigning the agent in NVN sentences. This result suggests a strong reliance on word order by the L2 learners. Taken together, these results indicate that L2 learners have a strong preference for word order over agreement to process L2 sentences.

One finding that deserves attention is the fact that L2 learners of Spanish were faster than the L1 Spanish group in NVN sentences, and they process VNN and NNV as fast as the Spanish native speakers. Previous research on Spanish sentence processing found that Spanish native speakers suffer a cue cost effect (Reyes, 2003, Reyes and Hernandez, 2006). The cue cost effect refers to the slowdown in processing caused by the processing of morphosyntactic cues, which are cognitively
more costly to process. This effect may explain the Spanish native speakers’ slow reaction times. It may also explain the fact that L2 learners of English had significantly slower reaction times compared to L2 learners of Spanish. One explanation for this pattern is that L2 learners of English were slowing down because they were attempting to integrate morphosyntactic information. Thus, these results suggest that their language processor was attempting to transfer L1 morphosyntactic processing strategies to interpret the L2, which is consistent with competition model predictions and the L1 transfer component of input processing. Another possible explanation could be that L2 learners of English, who have strong underlying agreement features in their first language grammar, are showing signs of reorganization of verbal morphology representations in the L2. Reyes (2003) has suggested that reorganization of processing strategies is reflected in increased reaction times, as shown in these results. Lardiere (2008, 2009) has proposed, with the Feature Assembly Hypothesis (FAH), that corresponding features available anywhere in the L1 should be available for the purpose of reassembly in the L2. In terms of the FAH, the L2 learners of English may be already developing the knowledge to reassemble agreement features as required by the L2. It is possible that L2 learners of Spanish, who have weak agreement features in English, could take longer to reassemble agreement representations due to the rich inflectional morphology as required by Spanish (VanPatten et al. 2012). It is important to mention that the Feature Assembly Hypothesis assumes that L2 learners possess grammatical representations; however, it could also be the case that L2 learners do not have the agreement features represented in their interlanguage. Thus, the processing cost observed with the L2 English group might have been due to the fact that their language processor automatically searched the input for agreement cues as it does during L1 processing. This could indicate that the L1 may have some effects on L2 processing as proposed by work on syntactic processing (e.g., Dussias, 2001, 2003; Dussias and Sagarr, 2007; Frenck-Mestre, 1997, 2002, 2005; Jackson, 2011; Juffs; 2001).

To conclude, these results provide support to the processing patterns observed in Experiment 1. In the previous experiment, although the L2 learners’ parser attempted to use L1 morphosyntactic strategies, L2 learners defaulted to local and lexical-semantic strategies to process the L2. This seems to be the case in Experiment 2 as well. The findings here suggest that, regardless of the L1, L2 learners rely more heavily on word order to process the L2 at the beginning stages of acquisition because it is cognitively less demanding, as proposed by VanPatten (2004, 2007).
CHAPTER 6
GENERAL DISCUSSION AND CONCLUSION

In this chapter, I address the main research question of the study: do beginning L2 learners initially transfer L1 morphosyntactic strategies to process the L2, or do they default to a parsing strategy that minimizes processing difficulty? First, I briefly summarize the main findings across experiments. Second, I discuss how the findings relate to the main research question. Then, I present the implications of these results for models of second language acquisition. Next, I discuss the implication of this study on second language instruction. Finally, I present the limitations of the study, the directions for future research, and the conclusions.

Summary of Results

The research question that guided this dissertation is whether L2 learners are able to transfer and use L1 morphosyntactic strategies at the beginning stages of acquisition or whether second language processing mechanisms are driven initially by a universal parsing strategy, such as the preverbal positioning for agent identification. Processing strategies were examined with two tasks: a self-paced listening task with picture-matching and a sentence interpretation task with agent identification.

In the self-paced listening task, accuracy and reaction times for picture judgments were analyzed in order to test the use of the first noun strategy, which is considered a local processing strategy, at the beginning stages of acquisition. The results of the picture judgments revealed that beginning L2 learners, regardless of their first language, utilized a first-noun strategy to process sentences in the L2. In other words, beginning L2 learners consistently selected the first noun in the sentence as the agent, regardless of whether the sentence was active or passive. In the reaction times analysis, slower reaction times in passives compared to actives were not expected in the target region (i.e., the fourth region); however, L2 learners of English had slower reaction times in passive sentences in this region than in active sentences. Differential reactions times would be expected if learners attended to morphosyntactic information to process grammatical voice encoded in the verbal morphology. Therefore, it is possible that some transfer took place with the L2 English learners in that they attempted to utilize verbal morphology to process L2 passive sentences. The next region (region 5) was a spillover region; thus, differential reaction times were not expected either. In this fifth region, which comprises the extra lexical marker –by/por in passive sentences, both groups of
L2 learners had slower reaction times in passives than in actives. The slower reaction times in passives suggest that both groups of L2 learners utilized a lexical-semantic strategy. To explain, the results seem to suggest that L2 learners made an initial assignment of the agent theta role to the first noun in active and passive sentences. Because they used a first-noun strategy to process the experimental sentences and did not integrate the grammatical voice information encoded in the verbal morphology, they were expecting active sentences. Once they encountered the passive lexical marker –by/por in the passive sentences, they had to re-analyze and re-assign the agent theta role, as indicated by the elevated reaction times in passives only.

As mentioned in Chapter 4, it is possible that both groups of L2 learners attempted to process the verbal morphology in the fourth region. To explain, although L2 learners of Spanish did not demonstrate differential reaction times between actives and passives in the fourth region, these learners may have also attempted to process morphosyntactic information encoded in the verb, resulting in a spillover effect in the fifth region. In other words, it is possible that the processing pattern was delayed and did not appear until the fifth region. In order to explore this possibility more in depth, Region 6 was also analyzed. However, Region 6 did not show spillover effects, which may indicate that the strongest processing strategies or language cues in the L1 may have an effect in the way L2 learners process the L2. Thus, morphological cues affected the processing of the L2 English group, whereas word order influenced the processing of the L2 Spanish group.

To summarize the results of Experiment 1, the data showed that L2 learners’ accuracy in the picture judgments for passives was significantly lower compared to the accuracy for actives. It seems then that, although L2 learners may have attempted to transfer L1 strategies to process the L2, their language processor was not able to integrate the grammatical information provided by the inflectional morphology and correctly assign agency. Instead, they defaulted to a first noun strategy and to the use of lexical-semantic strategies to process the L2.

In the sentence interpretation task, noun selection and reaction times for agent assignment were analyzed to test for transfer of L1 morphosyntactic strategies. The native speakers’ data confirmed the patterns of cue reliance reported by previous competition model studies. That is, English native speakers relied more heavily on word order cues and Spanish native speakers relied on agreement cues to assign agency. Regarding L2 processing, both groups demonstrated a similar processing pattern. To explain, L2 learners had consistently high percentages of first noun choice across all agreement and word order conditions, regardless of their L1. These results suggest that
beginning L2 learners utilized a first noun strategy to assign agency in the L2. Moreover, both groups of L2 learners demonstrated a preference for word order cues to interpret L2 sentences. The significant interactions between the variables revealed that there were also instances of agreement reliance by both groups of L2 learners. This agreement-reliance pattern was inconsistent and could not be confirmed. Instead, the interactions revealed a steady pattern of preverbal agency assignment and a strong preference for word order over agreement. These results are consistent with previous competition model studies that found that L2 learners and monolingual children use a preverbal strategy and have a preference for word order cues at the beginning stages of acquisition (Devescovi & D’Amico, 2005; Reyes, 2003; Reyes & Hernandez, 2006).

An interesting finding in Experiment 2 was that L2 learners of English experienced a cue cost effect when processing sentences in the L1 and in the L2. Reyes (2003) and Reyes and Hernandez (2006) claim that the elevated reaction times observed with Spanish speakers are caused by a cue cost effect. These findings are discussed in the following sections.

**General Discussion**

The results of both experiments in the study lend support to the hypothesis that beginning L2 learners utilize a more universal parsing strategy (i.e., the first noun strategy) in determining the agent of a sentence. That is, the results indicate that the L2 learners in this study defaulted to the first noun strategy to process the L2 at the beginning stages of acquisition. There are three approaches to explain universal parsing. One can hypothesize that beginning L2 learners default to local and lexical-semantic parsing due to a processing problem, a representational problem, or a matching problem. The following discussion addresses the results of the study in terms of these three perspectives.

An explanation for universal parsing may lie in accounts of processing cost and capacity limitations. Under the processing problem view, comprehension and production of verbal morphology is effortful and cognitively demanding, particularly at the beginning stages of acquisition. The processing load of distributed cues such as agreement cues, which involve exchanges of information from one constituent to another, may contribute to a break-down in comprehension. McDonald (2006), for instance, explains that processing difficulties may prevent L2 learners from accessing and using the grammatical information encoded in the input. Specifically, McDonald claims that the lack of morphosyntactic processing by L2 learners is the result of “poorer
L2 memory capacity, lexical decoding, and/or processing speed” (p. 385). Based on the processing cost account, it is possible to argue that L2 learners default to universal parsing because it is cognitively less demanding. Agency assignment by means of a first noun strategy involves a much lower processing cost compared to agency assignment via morphosyntactic parsing. To explain, the first noun occupies a sentence-initial position. This is a prominent position for processing because the human mind stores initial-position items in working memory longer than items in final or middle position (VanPatten, 2004, 2007). Moreover, nouns are lexical items with inherent semantic information which facilitates the process of meaning decoding. More importantly, the first noun strategy allows beginning L2 learners to initially assign a syntactic structure to the L2 input without exceeding the capacity of their language processors, which enhances comprehension. In other words, the first noun strategy allows L2 learners to initially establish the agent-patient semantic relationship as they parse L2 sentences with minimum processing difficulty. Conversely, assignment of the argument structure through inflectional morphology has a higher processing cost. Morphological cues (e.g., subject-verb agreement) are harder to process than local cues (e.g., the first noun) because they are distributed across several sentence elements (Kail, 1989). According to Devescovi et al. (1998), agreement cues make greater demands on short term memory because they require additional cognitive operations to compare and cross-reference the elements held in memory. In terms of syntactic operations, agreement feature-checking involves movement, which requires a higher processing cost (Dowens et al. 2010). In Experiment 1 of this study, the higher reaction times by L2 learners of English on the fourth region of passive sentences may be an indication of a processing problem. It could be that these learners attempted to process the passive verbal morphology. However, due to the processing load of passives sentences, they experienced a break-down in comprehension that forced them to default to local and semantic parsing. In Experiment 2, these same participants had significantly slower processing times than the L2 Spanish group. In sentence processing research, elevated processing times are taken as evidence of a processing problem. It is possible that the L2 English learners were attempting to transfer L1 morphosyntactic strategies from Spanish; however, because of the processing cost of these strategies, they had to rely on less costly cues such as word order and the first noun. It is important to mention that, for some researchers, processing-cost views assume that the inconsistencies with inflectional morphology in the initial stages of acquisition are due to a processing problem rather than a deficit in the syntactic representations (McDonald, 2006).
For other researchers, the irregularities with inflectional morphology are due to a representational problem (Felser et al., 2003; Hawkins, 2001; Hawkins & Chan, 1997; Papadopoulou & Clahsen, 2003). Under the representational view, the L2 learners’ inability to process verbal morphology has been attributed to L2 learners relying on semantic cues and not on syntactic ones to interpret sentences. The proposal is that the L2 linguistic system initially contains lexical categories such as noun, verb, preposition, etc.; however, abstract features such as tense and agreement are not represented in the learners’ syntax, or at least not at the beginning stages of acquisition (Clahsen & Felser, 2006; VanPatten, Keating & Leeser, 2012). The results of this study could also be explained as the consequence of a defective L2 grammar. Under the deficit problem of L2 acquisition, the L2 learners in this study may have defaulted to local and lexical-semantic parsing initially because their L2 linguistic system lacks functional categories and fully specified feature values altogether (Clahsen, 1990; Eubank, 1996; Meisel, 1997; Vainikka & Young-Scholten, 1998). Specifically, it is possible that the beginning L2 learners’ defaulted to the first noun strategy because their parser was not being guided by L2 grammatical representations.

Other researchers argue that abstract morphosyntactic features are fully represented even at the beginning stages of L2 acquisition. For them, the problem with inflectional morphology is a mapping problem; that is, the difficulty lies in the correspondence between underlying representations and the surface form (Prévost & White, 2000; Lardiere, 2000, 2007). Thus, L2 learners start the process of language acquisition with fully represented abstract features of tense and agreement, but they need to acquire the feature’s surface morphological realization in the target language (e.g., the –ed morpheme for the past tense in English). Considering the mapping problem, it is possible that the L2 learners in this study defaulted to a first noun strategy and to lexical-semantic processing because they have not yet acquired the correspondence between the agreement feature and the overt morphological forms. This may explain that the L2 learners of English attempted to use agreement cues and integrate verbal morphology in this study, but were unable to do so, and instead defaulted to process the L2 locally by using a first noun strategy.
Implications for Models of L2 Acquisition

VanPatten (2004, 2007) proposed the first noun principle (FNP) within the input processing model of second language acquisition. This principle states that “learners tend to process the first noun or pronoun they encountered in a sentence as the subject” (VanPatten, 2004, p.122). VanPatten has also proposed that this first noun processing strategy could be a default strategy during the beginning stages of acquisition; that is, that L2 learners, regardless of their first language, may use this processing strategy to initially process the language. This dissertation examined the universality of the FNP by testing learners of English, who are native speakers of Spanish, and learners of Spanish, who are native speakers of English. The results of the experiments in the study lend support to the hypothesis that beginning L2 learners utilize a more universal parsing strategy (i.e., the first noun strategy) in determining the agent of a sentence. If additional research is conducted with languages that allow the OVS sequence (Basque, Dutch, German, etc.), the FNP could be stated as follows:

Universal Parsing Principle: beginning L2 learners, regardless of L1, process the first noun or pronoun as the subject/agent of L2 sentences.

This dissertation also examined L1 transfer at the beginning stages of acquisition. The results of this study did not provide support to the hypothesis that learners transfer the strongest L1 morphosyntactic cues to process the L2. Because transfer is an important construct in input processing and the competition model, I discuss the implication of the results for these two models of sentence interpretation next.

As discussed in Chapter 2, the model of input processing acknowledges the possibility that L2 learners could start acquisition with L1 transferred procedures based on the L1 transfer principle. This principle states that “learners begin acquisition with L1 parsing procedures” (VanPatten, 2007, p. 122). Based on the results of this dissertation, one could propose that if beginning L2 learners default to universal processing at the beginning stages of acquisition, the L1 transfer principle could be modified as follows:
**L1 Transfer Principle**: learners do not transfer L1 processing procedures at the beginning stages of acquisition; however, they may make use of L1 processing procedures at later stages of acquisition.

Regarding the competition model, L1 transfer is a core concept in the model and it is used to explain L2 acquisition (MacWhinney, 2005, 2008). MacWhinney (2008) claims that L2 learners start L2 acquisition transferring everything that can be transferred, including the strongest L1 morphosyntactic cues. The results of experiment 2, however, suggest that the cost of processing morphosyntactic cues, or the *cues cost effect* (Reyes & Hernandez, 2006), could affect L1 transfer. Recent accounts of the model have incorporated the *cue cost* construct as a factor that limits the application of L1 transfer and cue validity. MacWhinney (2005) explains that functional processes such as transfer and cue validity rely heavily on cognitive resources and they can be easily disrupted when learners are asked to process second language sentences online. Thus, L1 transfer may take place when adult subjects are given plenty of time to process the second language. The position taken here is that online methods are more accurate in portraying learners’ implicit knowledge of the language than offline methods (Leeser et al. 2011). It is important to emphasize that the results of this dissertation do not discount L1 transfer. It is possible that transfer takes place once processing cost or cue cost has lessened. That is, it could be that, once beginning L2 learners start acquiring the L2 representations and the L2 form-to-function mappings, they won’t depend on cognitively less costly processing strategies to process the second language, allowing them to transfer L1 structures.

**Implications for L2 Instruction**

The results suggest that beginning L2 learners do not process morphosyntactic information at the beginning stages of acquisition. Instead, they rely on strategies that minimize processing load. Based on these results, it seems that second language instruction needs to focus on how learners initially perceive the L2. That is, any L2 language pedagogical intervention needs to work on the process learners utilize to get linguistic data from the input they receive in the classroom. This study showed that L2 learners are less likely to attend to grammatical forms. Therefore, they may not benefit from explicit instruction that relies on grammatical explanations, rules, and the mechanical
production of forms. The results of this study support previous research that has found that L2 learners, particularly at the beginning stages of acquisition, benefit the most from pedagogical interventions such as processing instruction (PI). This type of intervention takes into consideration the non-optimal processing strategies L2 learners may utilize and trains them to overcome those strategies by pushing them to rely on morphosyntactic information in order to get meaning (Benati, 2001; Benati & Lee, 2008; Cadierno 1995; Cheng, 1995; Farley, 2001; Fernández, 2008; VanPatten & Cadierno, 1993; VanPatten & Fernández, 2004; VanPatten & Oikkenon, 1996; VanPatten & Sanz, 1995).

**Limitations of the Present Study and Directions for Future Research**

In general, the present study is limited by the comparability of the groups. This was a cross-linguistic investigation of L2 processing that included L2 learners of two different languages; therefore, the participants’ proficiency level could not be tested with a single proficiency test. Instead, L2 learners were compared based on the years of formal study of the L2. Although the groups of L2 learners were comparable in terms of years of exposure, self-paced ratings revealed a difference between the groups. The self-reported ratings revealed that L2 learners of English (L1 Spanish) rated themselves higher than the L2 learners of Spanish in all four language skills.

One way to overcome the limitation above would be to examine language learners from different L1 backgrounds who are learning the same target language. Therefore, one direction for further research would be to explore L2 processing strategies by L1 English and L1 Italian speakers learning Spanish as a second language at the basic level. It has been suggested that Italian speakers rely in verbal morphology to assign agency whereas English native speakers do not. Therefore, these L2 speakers could be given a proficiency test in Spanish to ensure the compatibility of proficiency across different L1s. If beginning L2 learners, regardless of L2, default to local and lexical-semantic processing, as suggested in this study, the results would find that both, the L1 English and L1 Italian, use a first noun strategy to assign agency to L2 Spanish sentences.

Another limitation of this study was that the two languages under investigation in this study are SVO languages. Considering this, it could be that beginning L2 learners had a strong preference for word order strategies to assign agency to the L2 sentences because this is a frequent word order in English and in Spanish, although Spanish allows for other word orders. Further research would test languages with OVS word order such as Basque, Dutch or German.
Conclusions

This dissertation investigated the processing strategies utilized by beginning L2 learners of English and Spanish. Based on the results of this study, the following conclusions can be made: (a) beginning second language learners use local and lexical-semantic strategies (e.g. first-noun strategy) to process L2 sentences, (b) local and lexical-semantic processing may be a universal processing strategy at the beginning stages of acquisition, (c) marked L1 processing strategies may have some influence on the processing of the L2, (d) processing cost may mediate transfer and use of L1 morphosyntactic strategies at the beginning stages of acquisition.

This study contributed to the understanding of the processes involved in L2 sentences processing at the beginning stages of acquisition, and it also contributed to the understanding of the role that the L1 has at the beginning stages of acquisition; however, due to the limitations of the study, further research is necessary to expand upon these preliminary findings concerning processing strategies by beginning L2 learners.
APPENDIX A

INFORMED CONSENT FORM

Informed Consent Form

The study on sentence processing in English and Spanish is part of research intended to provide information about the way students learn and process English and Spanish at the beginning stages of acquisition.

Participation in this experiment is anonymous. If you agree to participate, you will be asked to perform 2 different tasks in two sessions (approximately 50 minutes). The first task will be conducted on a computer. You will listen to a series of sentences in English and Spanish. You will be asked to match the sentences to pictures. This task will be conducted on a computer. You will hear the sentences using earphones. The computer will record the data; however, your information is confidential because your name won’t be used, and only the primary researchers will have access to these data. In addition, you will complete a task that checks your memory. Afterwards, you will complete a questionnaire asking about your past experience learning Spanish. You may decline to answer specific questions.

Your participation is totally voluntary, and you may stop participation at anytime. There is no expected risk during the session. However, you have the right to terminate the session at any time without any penalty.

Your performance and any information obtained will remain confidential, to the extent allowed by law. Your name won’t be used at any stage of the experiment. In order to analyze the data, a random participants’ number will be used. Only the primary researchers will have access to the codes and the data, and all data will be stored electronically on an external hard drive, which will be kept in a safe when not being analyzed. In accordance with standard procedure, all data will be destroyed by February 1, 2019.

You are encouraged to ask any questions that you might have about this study before, during and after your participation in the study. However, answers that could influence the results of the experiment will be deferred to the end of the experiment. You will also receive a debriefing form upon completion of the study, fully explaining the goals of the research.

There are benefits for participating in the research project. First, you will have the opportunity to practice your listening skills in the second language. This may increase your awareness of your second language abilities. Also, you will be providing second language acquisition researchers with valuable information about how individuals process a foreign language. This knowledge will assist researchers to improve second language learning methods.

If you have any questions about this research or your rights as a participant in this study or if you feel you have been placed at risk please contact Anel Brandl (abrandl@fsu.edu), or Dr. Michael Leeser (mleeser@fsu.edu), Florida State University, Dept. of Modern Languages and Linguistics. You can also contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at humansubjects@magnet.fsu.edu

I understand the above information and voluntarily consent to participate in this study of my own free will. I am 18 years of age or older and a student at Florida State University.

I understand that I am free to discontinue participation at any time without explanation. I understand that this form will not be used in conjunction with the results of the study so that my identity will be protected to the extent allowed by the law. I understand that I will receive a signed copy of this consent form.

____________________________________   ______________________
Signature               Date

FSU Human Subjects Committee approved on 12/9/09   VOID after 12/7/10   HSC# 2009.3557
RENEWED INFORMED CONSENT FORM

Informed Consent Form

The study on sentence processing in English and Spanish is part of research intended to provide information about the way students learn and process English and Spanish at the beginning stages of acquisition.

Participation in this experiment is anonymous. If you agree to participate, you will be asked to perform 2 different tasks in two sessions (approximately 50 minutes). The first task will be conducted on a computer. You will listen to a series of sentences in English and Spanish. You will be asked to match the sentences to pictures. This task will be conducted on a computer. You will hear the sentences using earphones. The computer will record the data; however, your information is confidential because your name won’t be used, and only the primary researchers will have access to these data. In addition, you will complete a task that checks your memory. Afterwards, you will complete a questionnaire asking about your past experience learning Spanish. You may decline to answer specific questions.

Your participation is totally voluntary, and you may stop participation at anytime. There is no expected risk during the session. However, you have the right to terminate the session at any time without any penalty.

Your performance and any information obtained will remain confidential, to the extent allowed by law. Your name won’t be use at any stage of the experiment. In order to analyze the data, a random participants’ number will be use. Only the primary researchers will have access to the codes and the data, and all data will be stored electronically on an external hard drive, which will be kept in a safe when not being analyzed. In accordance with standard procedure, all data will be destroyed by February 1, 2019.

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If you have any questions about this research or your rights as a participant in this study or if you feel you have been placed at risk please contact any of the following people: Mtro. Santiago Aguilar Márquez (santiam_25@hotmail.com), BUAP, Anel Brandl (abrandl@fsu.edu), or Dr. Michael Leeser (mleeser@fsu.edu), Florida State University, Dept. of Modern Languages and Linguistics. You can also contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at humansubjects@magnet.fsu.edu

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_____________________________________   ___________ _____________
Signature        Date

APPENDIX B

LANGUAGE HISTORY QUESTIONNAIRE – ENGLISH

<table>
<thead>
<tr>
<th>Subject # ____________</th>
<th>Date ____________</th>
</tr>
</thead>
</table>

Language History Questionnaire
This questionnaire is designed to give us a better understanding of your experience with other languages. We ask that you be as accurate and thorough as possible when answering the following questions.

General Background Questions:
1. Gender
   - Female
   - Male
2. Age: ______ years
3. Do you have any known visual or hearing problems (corrected or uncorrected)?
   - No
   - Yes [Please explain] __________________________________________
4. Native Country
   - United States
   - Other ___________________
     If other, at what age did you come to the US? _________________

Home Language:
5. What is your native language?
   - English
   - Other: ___________________
6. Language spoken at home:
   - English
   - Spanish
   - Other __________

Education:
7. Please indicate where you have studied Spanish.
   Please check all that apply and indicate length of study.

<table>
<thead>
<tr>
<th>High School</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>Less than a one semester</td>
</tr>
<tr>
<td>2 years</td>
<td>1-2 semesters</td>
</tr>
<tr>
<td>3 years</td>
<td>3-4 semesters</td>
</tr>
<tr>
<td>4 years</td>
<td>5-6 semesters</td>
</tr>
<tr>
<td></td>
<td>7-8 semesters</td>
</tr>
</tbody>
</table>
Rate your *Spanish Skills*:

8. Please rate your Spanish *reading* proficiency. (1 = not literate and 10 = very literate)

<table>
<thead>
<tr>
<th>not literate</th>
<th>very literate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

9. Please rate your Spanish *writing* proficiency. (1 = not literate and 10 = very literate)

<table>
<thead>
<tr>
<th>not literate</th>
<th>very literate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

10. Please rate your Spanish *speaking* ability. (1 = not fluent and 10 = very fluent)

<table>
<thead>
<tr>
<th>not fluent</th>
<th>very fluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

11. Please rate your Spanish speech *comprehension* ability. (1 = unable to understand conversation and 10 = perfectly able to understand)

<table>
<thead>
<tr>
<th>unable to understand</th>
<th>perfectly able to understand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

12. Rate how comfortable you feel expressing yourself in Spanish:

<table>
<thead>
<tr>
<th>Not comfortable at all</th>
<th>Very Comfortable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

13. Is there anything else that we should know about your language abilities? Other languages you may speak, etc. Please explain:

__________________________________________________________________________  
__________________________________________________________________________  
__________________________________________________________________________

**Thank you for participating!**
Cuestionario – Historial

Este cuestionario está diseñado para tener un mejor entendimiento sobre tu experiencia con las lenguas. Te pedimos que respondas a las preguntas con la verdad y con respuestas completas en la medida de lo posible.

**Preguntas Generales sobre tu origen:**

1. **Sexo**
   - [ ] Femenino
   - [ ] Masculino

2. **Edad: ______ años**

3. ¿Tienes algún tipo de discapacidad visual o problemas auditivos (corregidos o no corregidos)?
   - [ ] No
   - [ ] Sí [Explica por favor] ________________________________

4. **País de origen**
   - [ ] México
   - [ ] Otro ___________________

   Si eligiste otro, ¿a qué edad viniste a México? _________________

**Lengua Materna:**

5. ¿Cuál es tu lengua materna?
   - [ ] Español
   - [ ] Otra: ___________________

6. **Lengua que se habla en tu casa:**
   - [ ] Inglés
   - [ ] Español
   - [ ] Otra ____________

**Educación:**

7. **Indica en donde has estudiado inglés.**
   Por favor selecciona todas las opciones que se te aplican e indica el periodo de tiempo de estudio.

<table>
<thead>
<tr>
<th>Preparatoria</th>
<th>Universidad</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] 1 año</td>
<td>[ ] Menos de un semestre</td>
</tr>
<tr>
<td>[ ] 2 años</td>
<td>[ ] 1-2 semestres</td>
</tr>
<tr>
<td>[ ] 3 años</td>
<td>[ ] 3-4 semestres</td>
</tr>
<tr>
<td>[ ] 4 años</td>
<td>[ ] 5-6 semestres</td>
</tr>
<tr>
<td></td>
<td>[ ] 7-8 semestres</td>
</tr>
</tbody>
</table>
Evalúa tus habilidades del inglés:

8. Por favor evalúa tus habilidades de lectura en inglés. (1=no competente y 10= muy competente)
   no competente               muy competente
   \[\cdot 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10\]

9. Por favor evalúa tus habilidades de escritura en inglés. (1=no competente y 10= muy competente)
   no competente               muy competente
   \[\cdot 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10\]

10. Por favor evalúa tus habilidades para hablar en inglés. (1=no fluido y 10= muy fluido)
    no fluido                   muy fluido
    \[\cdot 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10\]

11. Por favor evalúa tus habilidades para comprender conversaciones en inglés. (1=incapaz de comprender y 10= perfectamente capaz de comprender)
    incapaz de comprender       perfectamente capaz de comprender
    \[\cdot 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10\]

12. Evalúa que tan cómodo te sientes expresándote en inglés:
    nada cómodo                 muy cómodo
    \[\cdot 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10\]

13. ¿Hay algo más que deberíamos saber sobre tus habilidades con las lenguas? Hablas algunas otras lenguas. Explica:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

¡GRACIAS POR PARTICIPAR!
# APPENDIX C

## VOCABULARY HAND-OUT

<table>
<thead>
<tr>
<th>Animals</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>fox</td>
<td>el zorro</td>
</tr>
<tr>
<td>dog</td>
<td>el perro</td>
</tr>
<tr>
<td>horse</td>
<td>el caballo</td>
</tr>
<tr>
<td>mouse</td>
<td>el ratón</td>
</tr>
<tr>
<td>wolf</td>
<td>el lobo</td>
</tr>
<tr>
<td>hen</td>
<td>la gallina</td>
</tr>
<tr>
<td>deer</td>
<td>el venado</td>
</tr>
<tr>
<td>bull</td>
<td>el toro</td>
</tr>
<tr>
<td>lion</td>
<td>el león</td>
</tr>
<tr>
<td>panda</td>
<td>la panda</td>
</tr>
<tr>
<td>bear</td>
<td>la osa / el oso</td>
</tr>
<tr>
<td>turtle</td>
<td>la tortuga</td>
</tr>
<tr>
<td>cat</td>
<td>el gato</td>
</tr>
<tr>
<td>bird</td>
<td>el pájaro</td>
</tr>
<tr>
<td>rabbit</td>
<td>el conejo / la coneja</td>
</tr>
<tr>
<td>pig</td>
<td>el cerdo</td>
</tr>
<tr>
<td>zebra</td>
<td>la cebra</td>
</tr>
<tr>
<td>tiger</td>
<td>el tigre</td>
</tr>
<tr>
<td>cow</td>
<td>la vaca</td>
</tr>
<tr>
<td>duck</td>
<td>el pato / la pata</td>
</tr>
<tr>
<td>monkey</td>
<td>el mono</td>
</tr>
<tr>
<td>donkey</td>
<td>el burro</td>
</tr>
</tbody>
</table>

### Verbs

- to kick: patear
- to scratch: rasguñar
- to kiss: besar
- to carry: cargar
- to call: llamar
- to watch: observar
- to bump: golpear
- to chase: perseguir
- to pull: jalar
- to stop: parar
- to bathe: bañar
- to scrub: tallar
- to smell: oler
- to attack: atacar
- to greet: saludar
- to splash: salpicar
- to wash: lavar
- to hug: abrazar
- to push: empujar
- to lick: lamer
APPENDIX D

VOCABULARY REVIEW SESSION SAMPLE

ENGLISH

¡Vocabulario Nuevo!

Instructions

Activity A:
• Step 1: Listen to the words your instructor will present. Repeat the words after him/her.

BAÑAR

TALLAR

ATACAR

OLER
Instructions

- Step 2: Listen to the descriptions that your instructor will read, and write the number of the description next to the matching word.

| _bañar   | _salpicar | _abrazar |
| _saludar | _lavar    | _empujar |
| _atacar  | _tallar   | _oler   |
Answers

• Step 2: Listen to the descriptions that your instructor will read, and write the number of the description next to the matching word.

  1. _ baño  2. _ saldar  3. _ atacar

  4. _ abrazar  5. _ lavar  6. _ saltar

  7. _ oler

¡Mas vocabulario nuevo!

Instrucciones

Activity B:

• Step 1: Listen to the words your instructor will present. Repeat the words after him/her.
**Instructions**

Step 1: who do you talk to? After each situation read by the instructor, decide who would be the local person to talk to and write the number of the situation next to the corresponding word.

- Cuando ... hablas con:
  1. el pintor – la pintora
  2. el abogado
  3. el doctor
  4. la madre
  5. el profesor
  6. el trabajador
  7. el chofer
  8. el jefe – la jefa
  9. la enfermera
  10. el tío
  11. la sobrina

**Answers**

Cuando ... hablas con:

- 1. el pintor – la pintora
- 2. el abogado
- 3. el doctor
- 4. la madre
- 5. el profesor
- 6. el trabajador
- 7. el chofer
- 8. el jefe – la jefa
- 9. la enfermera
- 10. el tío
- 11. la sobrina
VOCABULARY REVIEW SESSION SAMPLE

SPANISH

¡Vocabulario Nuevo!

Instrucciones

Actividad A:
- Paso 1: Escucha las palabras que va a presentar tu instructor(a). Repítelas después de él/ella.

FOX

DOG

HORSE

MOUSE
Instrucciones


- hen
- deer
- turtle
- rabbit
- bird
- fox
- donkey
- mouse
- horse
- wolf

¡Más vocabulario nuevo!

Respuestas

1. hen
2. deer
3. turtle
4. rabbit
5. bird
6. fox
7. donkey
8. mouse
9. horse
10. wolf

Instrucciones

Actividad B:

Paso 1: Escucha las palabras que va a presentar tu instructor(a). Repítelas después de él/ella.

TO KICK

TO SCRATCH
Instrucciones
* Pase 2: Escucha las palabras que va a leer tu instructor(a). Escribe la palabra delante de la mejor descripción a continuación. Usa la hoja de vocabulario.

1) ________: to make a mark on the skin using the finger nails.
2) ________: to use the foot to hit someone.
3) ________: to move something closer to you.
4) ________: to use the hands to lift something from the floor.
5) ________: to run after someone in order to catch him.
6) ________: to use the phone to talk to someone.

Respuestas
1) To scratch: to make a mark on the skin using the finger nails.
2) To kick: to use the foot to hit someone.
3) To pull: to move something closer to you.
4) To carry: to use the hands to lift someone from the floor.
5) To chase: to run after someone in order to catch him.
6) To call: to use the phone to talk to someone.

¡ESO ES TODO!
GRACIAS
APPENDIX E

VOCABULARY SCREENING TEST

ENGLISH

Script - Instructor
(Please read the following words to the students once. They have to choose the image that best represents the word. Also, they need to write their answers in the answers sheet. Thanks!)

| 1. llamar          | 14. perseguir                 |
| 2. el conejo       | 15. cargar                    |
| 3. tallar          | 16. los pájaros               |
| 4. abrazar         | 17. empujar                   |
| 5. rasguñar        | 18. la enfermera              |
| 6. observar        | 19. oler                      |
| 7. parar           | 20. empujar                   |
| 8. besar           | 21. el abogado                |
| 9. lavar           | 22. el pato                   |
| 10. bañar          | 23. patear                   |
| 11. atacar         | 24. el venado                 |
| 12. saludar        | 25. jalar                    |
| 13. salpicar       |                              |
Example of Visuals for Students

**Listen** to the following words.

Then, select the picture (A, B or C) that best represents the word that you heard.

Write your answers in the answer sheet.

Example: if you hear “abrazar”, put a circle around C on your answer sheet.

---

**¿ESTAS LISTO?**

---

1

A

B

C

---

2

A

B

C

---

3

A

B

C
**VOCABULARY SCREENING TEST**

**SPANISH**

**Palabras para el examen**

(Por favor lea las siguientes palabras solo una vez. Los estudiantes van a escoger la imagen que mejor represente la palabra y van a anotar su respuesta en la hoja de respuestas. ¡Gracias!)

<table>
<thead>
<tr>
<th>1. rabbit</th>
<th>14. to hug</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. to bump</td>
<td>15. to carry</td>
</tr>
<tr>
<td>3. to scrub</td>
<td>16. birds</td>
</tr>
<tr>
<td>4. to chase</td>
<td>17. to call</td>
</tr>
<tr>
<td>5. to scratch</td>
<td>18. nurse</td>
</tr>
<tr>
<td>6. to watch</td>
<td>19. to smell</td>
</tr>
<tr>
<td>7. to stop</td>
<td>20. to push</td>
</tr>
<tr>
<td>8. to kiss</td>
<td>21. lawyer</td>
</tr>
<tr>
<td>9. to wash</td>
<td>22. duck</td>
</tr>
<tr>
<td>10. to bathe</td>
<td>23. to kick</td>
</tr>
<tr>
<td>11. to attack</td>
<td>24. deer</td>
</tr>
<tr>
<td>12. to greet</td>
<td>25. to pull</td>
</tr>
<tr>
<td>13. to splash</td>
<td></td>
</tr>
</tbody>
</table>
Example of Visuals for Students

**Escucha** las palabras que va a decir tu instructor(a).

Después, **escoge la foto (A, B o C)** que mejor represente la palabra.

Encierra tu respuesta en la hoja de respuestas.

Ejemplo: si escuchas “to hug”, debes encerrar la opción C.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX F

TARGET SENTENCES

EXPERIMENT 1 – ENGLISH

**Active-Match**

It seems / that / the student / is kicking / the men / in the school
I notice / that / the girl / is scratching / the nurse / in the house
It seems / that / the nurse / is kissing / the patient / in the hospital
I know / that / the painter / is carrying / the worker / in the street
I believe / that / the lawyer / is calling / the father / in the office
It is clear / that / the mother / is licking / the niece / in the house
It is true / that / the son / is bumping / the doctor / in the hospital
It is a fact / that / the uncle / is chasing / the boy / in the street
I believe / that / the men / is pulling / the worker / in the street
It is clear / that / the boss / is stopping / the woman / in the office
It is certain / that / the girl / is bathing / the lady / in the house
I see / that / the woman / is scrubbing / the mother / in the house
It is true / that / the uncle / is smelling / the painter / in the street
I see / that / the driver / is attacking / the teacher / in the school
I think / that / the teacher / is greeting / the father / in the school
I notice / that / the patient / is splashing / the son / in the hospital
It is a fact / that / the lady / is washing / the niece / in the hospital
It is certain / that / the boy / is hugging / the lawyer / in the office
I think / that / the student / is pushing / the driver / in the school
I know / that / the boss / is watching / the doctor / in the hospital
I believe / that / the fox / is kicking / the dog / in the yard
It seems / that / the mouse / is scratching / the bird / in the yard
It is clear / that / the horse / is kissing / the cat / in the barn
It is true / that / the turtle / is carrying / the duck / in the yard
It is a fact / that / the dog / is calling / the deer / in the park
I notice / that / the cow / is licking / the deer / in the farm
I see / that / the bear / is bumping / the zebra / in the zoo
I think / that / the pig / is chasing / the rabbit / in the farm
I believe / that / the panda / is pulling / the lion / in the zoo (eliminated)
I know / that / the wolf / is stopping / the tiger / in the zoo
It is certain / that / the mouse / is bathing / the cat / in the yard
I see / that / the bear / is scrubbing / the zebra / in the zoo
It is a fact / that / the bull / is smelling / the pig / in the barn
I know / that / the hen / is attacking / the rabbit / in the farm
It seems / that / the bird / is greeting / the horse / in the farm
I think / that / the bull / is splashing / the tiger / in the park
It is clear / that / the fox / is washing / the panda / in the park
It is true / that / the turtle / is hugging / the cow / in the park
It is certain / that / the wolf / is pushing / the lion / in the zoo
I notice / that / the duck / is watching / the hen / in the barn

**Active-Mismatch**

It seems / that / the man / is kicking / the student / in the school
I notice / that / the nurse / is scratching / the girl / in the house
It seems / that / the patient / is kissing / the nurse / in the hospital
I know / that / the worker / is carrying / the painter / in the street
I believe / that / the father / is calling / the lawyer / in the office
It is clear / that / the niece / is licking / the mother / in the house
It is true / that / the doctor / is bumping / the son / in the hospital
It is a fact / that / the boy / is chasing / the uncle / in the street
I believe / that / the worker / is pulling / the men / in the street
It is clear / that / the woman / is stopping / the boss / in the office
It is certain / that / the lady / is bathing / the girl / in the house
I see / that / the mother / is scrubbing / the woman / in the house
It is true / that / the painter / is smelling / the uncle / in the street
I see / that / the teacher / is attacking / the driver / in the school
I think / that / the father / is greeting / the teacher / in the school
I notice / that / the son / is splashing / the patient / in the hospital
It is a fact / that / the niece / is washing / the lady / in the hospital
It is certain / that / the lawyer / is hugging / the boy / in the office
I think / that / the driver / is pushing / the student / in the school
I know / that / the doctor / is watching / the boss / in the hospital
I believe / that / the dog / is kicking / the fox / in the yard
It seems / that / the bird / is scratching / the mouse / in the yard
It is clear / that / the cat / is kissing / the horse / in the barn
It is true / that / the duck / is carrying / the turtle / in the yard
It is a fact / that / the deer / is calling / the dog / in the park
I notice / that / the deer / is licking / the cow / in the farm
I see / that / the zebra / is bumping / the bear / in the zoo
I think / that / the rabbit / is chasing / the pig / in the farm
I believe / that / the lion / is pulling / the panda / in the zoo
I know / that / the tiger / is stopping / the wolf / in the zoo
It is certain / that / the cat / is bathing / the mouse / in the yard
I see / that / the zebra / is scrubbing / the bear / in the zoo
It is a fact / that / the pig / is smelling / the bull / in the barn
I know / that / the rabbit / is attacking / the hen / in the farm
It seems / that / the horse / is greeting / the bird / in the farm
I think / that / the tiger / is splashing / the bull / in the park
It is clear / that / the panda / is washing / the fox / in the park
It is true / that / the cow / is hugging / the turtle / in the park
It is certain / that / the lion / is pushing / the wolf / in the zoo
I notice / that / the hen / is watching / the duck / in the barn

Passive-Match
It seems / that / the man / is kicked / by the student / in the school
I notice / that / the nurse / is scratched / by the girl / in the house
It seems / that / the patient / is kissed / by the nurse / in the hospital
I know / that / the worker / is carried / by the painter / in the street
I believe / that / the father / is called / by the lawyer / in the office
It is clear / that / the niece / is licked / by the mother / in the house
It is true / that / the doctor / is bumped / by the son / in the hospital
It is a fact / that / the boy / is chased / by the uncle / in the street
I believe / that / the worker / is pulled / by the men / in the street
It is clear / that / the woman / is stopped / by the boss / in the office
It is certain / that / the lady / is bathed / by the girl / in the house
I see / that / the mother / is scrubbed / by the woman / in the house
It is true / that / the painter / is smelled / by the uncle / in the street
I see / that / the teacher / is attacked / by the driver / in the school
I think / that / the father / is greeted / by the teacher / in the school
I notice / that / the son / is splashed / by the patient / in the hospital
It is a fact / that / the niece / is washed / by the lady / in the hospital
It is certain / that / the lawyer / is hugged / by the boy / in the office
I think / that / the driver / is pushed / by the student / in the school
I know / that / the doctor / is watched / by the boss / in the hospital
I believe / that / the dog / is kicked / by the fox / in the yard
It seems / that / the bird / is scratched / by the mouse / in the yard
It is clear / that / the cat / is kissed / by the horse / in the barn
It is true / that / the duck / is carried / by the turtle / in the yard
It is a fact / that / the deer / is called / by the dog / in the park
I notice / that / the deer / is licked / by the cow / in the farm
I see / that / the zebra / is bumped / by the bear / in the zoo
I think / that / the rabbit / is chased / by the pig / in the farm
I believe / that / the lion / is pulled / by the panda / in the zoo
I know / that / the tiger / is stopped / by the wolf / in the zoo
It is certain / that / the cat / is bathed / by the mouse / in the yard
I see / that / the zebra / is scrubbed / by the bear / in the zoo
It is a fact / that / the pig / is smelled / by the bull / in the barn
I know / that / the rabbit / is attacked / by the hen / in the farm
It seems / that / the horse / is greeted / by the bird / in the farm
I think / that / the tiger / is splashed / by the bull / in the park
It is clear / that / the panda / is washed / by the fox / in the park
It is true / that / the cow / is hugged / by the turtle / in the park
It is certain / that / the lion / is pushed / by the wolf / in the zoo
I notice / that / the hen / is watched / by the duck / in the barn

**Passive-Mismatch**
It seems / that / the student / is kicked / by the men / in the school
I notice / that / the girl / is scratched / by the nurse / in the house
It seems / that / the nurse / is kissed / by the patient / in the hospital
I know / that / the painter / is carried / by the worker / in the street
I believe / that / the lawyer / is called / by the father / in the office
It is clear / that / the mother / is licked / by the niece / in the house
It is true / that / the son / is bumped / by the doctor / in the hospital
It is a fact / that / the uncle / is chased / by the boy / in the street
I believe / that / the men / is pulled / by the worker / in the street
It is certain / that / the boss / is stopped / by the woman / in the office
It is true / that / the lady / is bathed / by the mother / in the house
I see / that / the woman / is scrubbed / by the mother / in the house
It is true / that / the uncle / is smelled / by the painter / in the street
I see / that / the driver / is attacked / by the teacher / in the school
I think / that / the teacher / is greeted / by the father / in the school
I notice / that / the patient / is splashed / by the son / in the hospital
It is a fact / that / the lady / is washed / by the niece / in the hospital
It is certain / that / the boy / is hugged / by the lawyer / in the office
I think / that / the student / is pushed / by the driver / in the school
I know / that / the boss / is watched / by the doctor / in the hospital
I believe / that / the fox / is kicked / by the dog / in the yard
It seems / that / the mouse / is scratched / by the bird / in the yard
It is clear / that / the horse / is kissed / by the cat / in the barn
It is true / that / the turtle / is carried / by the duck / in the yard
It is a fact / that / the dog / is called / by the deer / in the park
I notice / that / the cow / is licked / by the deer / in the farm
I see / that / the bear / is bumped / by the zebra / in the zoo
I think / that / the pig / is chased / by the rabbit / in the farm
I believe / that / the panda / is pulled / by the lion / in the zoo
I know / that / the wolf / is stopped / by the tiger / in the zoo
It is certain / that / the mouse / is bathed / by the cat / in the yard
I see / that / the bear / is scrubbed / by the zebra / in the zoo
It is a fact / that / the bull / is smelled / by the pig / in the barn
I know / that / the hen / is attacked / by the rabbit / in the farm
It seems / that / the bird / is greeted / by the horse / in the farm
I think / that / the bull / is splashed / by the tiger / in the park
It is clear / that / the fox / is washed / by the panda / in the park
It is true / that / the turtle / is hugged / by the cow / in the park
It is certain / that / the wolf / is pushed / by the lion / in the zoo
I notice / that / the duck / is watched / by the hen / in the barn
EXPERIMENT 1 – SPANISH

Active-Match

Parece / que / el estudiante / está pateando / al hombre / en la escuela

Noto / que / la niña / está rasguñando / a la enfermera / en la casa

Parece / que / la enfermera / está besando / a la paciente / en el hospital

Se / que / el pintor / está cargando / al trabajador / en la calle

Creo / que / el abogado / está llamando / al padre / en la oficina

Es claro / que / la madre / está lamiendo / a la sobrina / en la casa

Es verdad / que / el hijo / está lampeando / al doctor / en el hospital

Es un hecho / que / el tío / está persiguiendo / al niño / en la calle

Creo / que / el hombre / está jalando / al trabajador / en la calle

Es claro / que / la jefa / está parando / a la mujer / en la oficina

Es cierto / que / la niña / está bañando / a la señora / en la casa

Veo / que / la mujer / está tallando / a la madre / en la casa

Es verdad / que / el tío / está oliendo / al pintor / en la calle

Veo / que / el chofer / está atacando / al profesor / en la escuela

Pienso / que / el profesor / está saludando / al padre / en la escuela

Noto / que / el paciente / está salpicando / al hijo / en el hospital

Es un hecho / que / la señora / está lavando / a la sobrina / en el hospital

Es cierto / que / el niño / está abrazando / al abogado / en la oficina

Pienso / que / el estudiante / está empujando / al chofer / en la escuela

Se / que / la jefa / está observando / a la doctora / en el hospital

Creo / que / el zorro / está pateando / al perro / en el jardín

Parece / que / el ratón / está rasguñando / al pájaro / en el jardín

Es claro / que / el caballo / está besando / al gato / en el corral

Es verdad / que / la tortuga / está cargando / a la pata / en el jardín

Es un hecho / que / el perro / está llamando / al venado / en el parque

Noto / que / la vaca / está lamiendo / a la venada / en la granja

Veo / que / la osa / está golpeando / a la cebra / en el zoológico

Pienso / que / el cerdo / está persiguiendo / al conejo / en la granja

Creo / que / el panda / está jalando / al león / en el zoológico
Se / que / el lobo / está parando / al tigre / en el zoológico
Es cierto / que / el ratón / está bañando / al gato / en el jardín
Veo / que / la osa/ está tallando / a la cebra / en el zoológico
Es un hecho / que / el toro / está oliendo / al cerdo / en el corral
Se / que / la gallina / está atacando / a la coneja / en la granja
Parece / que / el pájaro / está salpicando / al tigre / en el parque
Es claro / que / el zorro / está lavando / al panda / en el parque
Es cierto / que / la tortuga / está abrazando / a la vaca / en el parque
Es cierto / que / el lobo / está empujando / al león / en el zoológico
Noto / que / la pata / está observando / a la gallina / en el corral

Active-Mismatch

Parece / que / el hombre / está pateando / al estudiante / en la escuela
Noto / que / la enfermera / está rasguñando / a la niña / en la casa
Parece / que / la paciente / está besando / a la enfermera / en el hospital
Se / que / el trabajador / está cargando / al pintor / en la calle
Creo / que / el padre / está llamando / al abogado / en la oficina
Es claro / que / la sobrina / está lamiendo / a la madre / en la casa
Es verdad / que / el doctor / está golpeando / al hijo / en el hospital
Es un hecho / que / el niño / está persiguiendo / al tío / en la calle
Creo / que / el trabajador / está jalando / al hombre / en la calle
Es claro / que / la mujer / está parando / a la jefa / en la oficina
Es cierto / que / la señora / está bañando / a la niña / en la casa
Veo / que / la madre / está tallando / a la mujer / en la casa
Es verdad / que / el pintor / está oliendo / al tío / en la calle
Veo / que / el profesor / está atacando / al chofer / en la escuela
Pienso / que / el padre / está saludando / al profesor / en la escuela
Noto / que / el hijo / está salpicando / al paciente / en el hospital
Es un hecho / que / la sobrina / está lavando / a la señora / en el hospital
Es cierto / que / el abogado / está abrazando / al niño / en la oficina
Pienso / que / el chofer / está empujando / al estudiante / en la escuela
Se / que / la doctora / está observando / a la jefa / en el hospital
Creo / que / el perro / está pateando / al zorro / en el jardín
 Parece / que / el pájaro / está rasguñando / al ratón / en el jardín
Es claro / que / el gato / está besando / al caballo / en el corral
Es verdad / que / la pata / está cargando / a la tortuga / en el jardín
Es un hecho / que / el venado / está llamando / al perro / en el parque
Noto / que / la venada / está lamiendo / a la vaca / en la granja
Veo / que / la cebra / está golpeando / a la osa / en el zoológico
Pienso / que / el conejo / está persiguiendo / al cerdo / en la granja
Creo / que / el león / está jalando / al panda / en el zoológico
Se / que / el tigre / está parando / al lobo / en el zoológico
Es cierto / que / el gato / está bañando / al ratón / en el jardín
Veo / que / la cebra / está tallando / a la osa / en el zoológico
Es un hecho / que / el cerdo / está oliendo / al toro / en el corral
Se / que / la coneja / está atacando / a la gallina / en la granja
Parece / que / el caballo / está saludando / al pájaro / en la granja
Pienso / que / el tigre / está salpicando / al toro / en el parque
Es claro / que / el panda / está lavando / al zorro / en el parque
Es cierto / que / la vaca / está abrazando / a la tortuga / en el parque
Es cierto / que / el león / está empujando / al lobo / en el zoológico
Noto / que / la gallina / está observando / a la pata / en el corral

**Passive-Match**

Parece / que / el hombre / es pateado / por el estudiante / en la escuela
Noto / que / la enfermera / es rasguñada / por la niña / en la casa
Parece / que / la paciente / es besada / por la enfermera / en el hospital
Se / que / el trabajador / es cargado / por el pintor / en la calle
Creo / que / el padre / es llamado / por el abogado / en la oficina
Es claro / que / la sobrina / es lamida / por la madre / en la casa
Es verdad / que / el doctor / es golpeado / por el hijo / en el hospital

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Es un hecho / que / el niño / es perseguido / por el tío / en la calle
Creo / que / el trabajador / es jalado / por el hombre / en la calle
Es claro / que / la mujer / es parada / por la jefa / en la oficina
Es cierto / que / la señora / es bañada / por la niña / en la casa
Veo / que / la madre / es tallada / por la mujer / en la casa
Es verdad / que / el pintor / es olido / por el tío / en la calle
Veo / que / el profesor / es atacado / por el chofer / en la escuela
Pienso / que / el padre / es saludado / por el profesor / en la escuela
Noto / que / el hijo / es salpicado / por el paciente / en el hospital
Es un hecho / que / la sobrina / es lavada / por la señora / en el hospital
Es cierto / que / el abogado / es abrazado / por el niño / en la oficina
Pienso / que / el chofer / es empujado / por el estudiante / en la escuela
Se / que / la doctora / es observada / por la jefa / en el hospital
Creo / que / el perro / es pateado / por el zorro / en el jardín
Parece / que / el pájaro / es rasguñado / por el ratón / en el jardín
Es claro / que / el gato / es besado / por el caballo / en el corral
Es verdad / que / la pata / es cargada / por la tortuga / en el jardín
Es un hecho / que / el venado / es llamado / por el perro / en el parque
Noto / que / la venada / es lamida / por la vaca / en la granja
Veo / que / la cebra / es golpeada / por la osa / en el zoológico
Pienso / que / el conejo / es perseguido / por el cerdo / en la granja
Creo / que / el león / es jalado / por el panda / en el zoológico
Se / que / el tigre / es parado / por el lobo / en el zoológico
Es cierto / que / el gato / es bañado / por el ratón / en el jardín
Veo / que / la cebra / es tallada / por la osa / en el zoológico
Es un hecho / que / el cerdo / es olido / por el toro / en el corral
Se / que / la coneja / es atacada / por la gallina / en la granja
Parece / que / el caballo / es saludado / por el pájaro / en la granja
Pienso / que / el tigre / es salpicado / por el toro / en el parque
Es claro / que / el panda / es lavado / por el zorro / en el parque
Es cierto / que / la vaca / es abrazada / por la tortuga / en el parque
Es cierto / que / el león / es empujado / por el lobo / en el zoológico
Noto / que / la gallina / es observada / a la pata / en el corral

**Passive-Mismatch**

Parece / que / el estudiante / es pateado / por el hombre / en la escuela
Noto / que / la niña / es rasguñada / por la enfermera / en la casa
Parece / que / la enfermera / es besada / por la paciente / en el hospital
Se / que / el pintor / es cargado / por el trabajador / en la calle
Creo / que / el abogado / es llamado / por el padre / en la oficina
Es claro / que / la madre / es lamida / por la sobrina / en la casa
Es verdad / que / el hijo / es golpeado / por el doctor / en el hospital
Es un hecho / que / el tío / es perseguido / por el niño / en la calle
Creo / que / el hombre / es jalado / por el trabajador / en la calle
Es claro / que / la jefa / es parada / por la mujer / en la oficina
Es cierto / que / la niña / es bañada / por la señora / en la casa
Veo / que / la mujer / es tallada / por la madre / en la casa
Es verdad / que / el tío / es olido / por el pintor / en la calle
Veo / que / el chofer / es atacado / por el profesor / en la escuela
Pienso / que / el profesor / es saludado / por el padre / en la escuela
Noto / que / el paciente / es salpicado / por el hijo / en el hospital
Es un hecho / que / la señora / es lavada / por la sobrina / en el hospital
Es cierto / que / el niño / es abrazado / por el abogado / en la oficina
Pienso / que / el estudiante / es empujado / por el chofer / en la escuela
Se / que / la jefa / es observada / por la doctora / en el hospital
Creo / que / el zorro / es pateado / por el perro / en el jardín
Parece / que / el ratón / es rasguñado / por el pájaro / en el jardín
Es claro / que / el caballo / es besado / por el gato / en el corral
Es verdad / que / la tortuga / es cargada / por la pata / en el jardín
Es un hecho / que / el perro / es llamado / por el venado / en el parque
Noto / que / la vaca / es lamida / por la venada / en la granja
Veo / que / la osa / es golpeada / por la cebra / en el zoológico

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Piensas que el cerdo es perseguido por el conejo en la granja
Creo que el panda es jalado por el león en el zoológico
Se que el lobo es parado por el tigre en el zoológico
Es cierto que el ratón es bañado por el gato en el jardín
Veo que la osa es tallada por la cebra en el zoológico
Es un hecho que el toro es olido por el cerdo en el corral
Se que la gallina es atacada por la coneja en la granja
Parece que el pájaro es saludado por el caballo en la granja
Piensas que el toro es salpicado por el tigre en el parque
Es claro que el zorro es lavado por el panda en el parque
Es cierto que la tortuga es abrazada por la vaca en el parque
Es cierto que el lobo es empujado por el león en el zoológico
Noto que la pata es observada por la gallina en el corral
EXPERIMENT 2 – ENGLISH

Sentence Type

NVN, Ag1  The son is hugging the parents
NVN, Ag1  The mother is stopping the girls
NVN, Ag1  The boss is attacking the painters
NVN, Ag1  The cat is watching the dogs
NVN, Ag1  The pig is smelling the bulls
NVN, Ag1  The lion is chasing the tigers
NVN, Ag0  The teacher is greeting the man
NVN, Ag0  The woman is kissing the nurse
NVN, Ag0  The lawyer is calling the patient
NVN, Ag0  The wolf is licking the bear
NVN, Ag0  The deer is splashing the rabbit
NVN, Ag0  The donkey is kicking the horse
NVN, Ag2  The uncle are carrying the drivers
NVN, Ag2  The aunt are pushing the students
NVN, Ag2  The boy are pulling the workers
NVN, Ag2  The fox are scratching the monkeys
NVN, Ag2  The mouse are bumping the pandas
NVN, Ag2  The duck are bathing the birds

Sentence Type

VNN, Ag1  Is greeting the man the sons
VNN, Ag1  Is kissing the woman the girls
VNN, Ag1  Is calling the lawyer the drivers
VNN, Ag1  Is licking the wolf the tigers
VNN, Ag1  Is splashing the horse the rabbits
VNN, Ag1  Is kicking the deer the donkeys
VNN, Ag0  Is carrying the uncle the student
VNN, Ag0  Is pushing the aunt the patient
VNN, Ag0  Is pulling the painter the teacher
VNN, Ag0  Is scratching the panda the fox
VNN, Ag0  Is bumping the mouse the dog
VNN, Ag0  Is bathing the bull the duck
VNN, Ag2  Are hugging the son the parents
VNN, Ag2  Are stopping the nurse the mothers
VNN, Ag2  Are attacking the boss the workers
VNN, Ag2  Are watching the cat the monkeys
VNN, Ag2  Are smelling the pig the birds
VNN, Ag2  Are chasing the lion the bears

Sentence Type
NNV, Ag1  The boss the students is carrying
NNV, Ag1  The girl the aunts is pushing
NNV, Ag1  The teacher the uncles is pulling
NNV, Ag1  The dog the wolves is scratching
NNV, Ag1  The monkey the mice is bumping
NNV, Ag1  The bird the tigers is bathing
NNV, Ag0  The boy the worker is hugging
NNV, Ag0  The painter the mother is stopping
NNV, Ag0  The driver the boy is attacking
NNV, Ag0  The cat the panda is watching
NNV, Ag0  The deer the pig is smelling
NNV, Ag0  The lion the bear is chasing
NNV, Ag2  The men the parents are greeting
NNV, Ag2  The patient the nurses are kissing
NNV, Ag2  The lawyer the women are calling
NNV, Ag2  The fox the ducks are licking
NNV, Ag2  The donkey the rabbits are splashing
NNV, Ag2  The bull the horses are kicking
EXPERIMENT 2 – SPANISH

Sentence Type

NVN, Ag1  El hijo está abrazando los padres
NVN, Ag1  La madre está parando las niñas
NVN, Ag1  El jefe está atacando los pintores
NVN, Ag1  El gato está observando los perros
NVN, Ag1  El cerdo está oliendo los toros
NVN, Ag1  El león está persiguiendo los tigres
NVN, Ag0  El profesor está saluando el hombre
NVN, Ag0  La mujer está besando la enfermera
NVN, Ag0  El abogado está llamando el paciente
NVN, Ag0  El lobo está lamendo el oso
NVN, Ag0  El venado está salpicando el conejo
NVN, Ag0  El burro está pateando el caballo
NVN, Ag2  El tío están cargando los choferes
NVN, Ag2  La tía están empujando las estudiantes
NVN, Ag2  El niño están jalando los trabajadores
NVN, Ag2  El zorro están rasguñando los monos
NVN, Ag2  El ratón están golpeando los pandas
NVN, Ag2  El pato están bañando los pájaros

Sentence Type

VNN, Ag1  Está saluando el hombre los hijos
VNN, Ag1  Está besando la mujer las niñas
VNN, Ag1  Está llamando el abogado los choferes
VNN, Ag1  Está lamendo el lobo los tigres
VNN, Ag1  Está salpicando el caballo los conejos
VNN, Ag1  Está pateando el venado los burros
VNN, Ag0  Está cargando el tío el estudiante
VNN, Ag0  Está empujando la tía el paciente
VNN, Ag0  Está jalando el pintor el profesor
VNN, Ag0  Está rasguñando el panda el zorro
VNN, Ag0  Está golpeando el ratón el perro
VNN, Ag0  Está bañando el toro el pato
VNN, Ag2  Están abrazando el hijo los padres
VNN, Ag2  Están parando la enfermera las madres
VNN, Ag2  Están atacando el jefe los trabajadores
VNN, Ag2  Están observando el gato los monos
VNN, Ag2  Están oliendo el cerdo los pájaros
VNN, Ag2  Están persiguiendo el león los osos

Sentence Type
NNV, Ag1  El jefe los estudiantes está cargando
NNV, Ag1  La niña las tías está empujando
NNV, Ag1  El profesor los tíos está jalando
NNV, Ag1  El perro los lobos está rasguñando
NNV, Ag1  El mono los ratones está golpeando
NNV, Ag1  El pájaro los tigres está bañando
NNV, Ag0  El niño el trabajador está abrazando
NNV, Ag0  La pintora la madre está parando
NNV, Ag0  El chofer el niño está atacando
NNV, Ag0  El gato el panda está observando
NNV, Ag0  El venado el cerdo está oliendo
NNV, Ag0  El león el oso está persiguiendo
NNV, Ag2  El hombre los padres están saludando
NNV, Ag2  La paciente las enfermeras están besando
NNV, Ag2  La abogada las mujeres están llamando
NNV, Ag2  El zorro los patos están lamiendo
NNV, Ag2  El burro los conejos están salpicando
NNV, Ag2  El toro los caballos están pateando
APPENDIX G

HUMAN SUBJECTS COMMITTEE APPROVAL LETTERS

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 12/9/2009

To: Michael Leeser [mleeser@fsu.edu]

Address: 302B Diffenbaugh Building. Tallahassee, FL 32306-1540
Dept.: MODERN LANGUAGES AND LINGUISTICS

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Processing Strategies in Early Second Language Acquisition: A Cross Linguistic Study

The application that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Expedited per 45 CFR § 46.110(7) and has been approved by an expedited review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 12/7/2010 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition,
federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The Assurance Number is IRB00000446.

Cc: William Cloonan, Chair [bcloonan@fsu.edu]
HSC No. 2009.3557
APPROVAL MEMORANDUM

Date: 3/30/2011

To: Michael Leeser [mleeser@fsu.edu]

Address: 302B Diffenbaugh Building. Tallahassee, FL 32306-1540
Dept.: MODERN LANGUAGES AND LINGUISTICS

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research
Processing Strategies in Early Second Language Acquisition: A Cross Linguistic Study

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The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If you submitted a proposed consent form with your application, the approved stamped consent form is attached to this approval notice. Only the stamped version of the consent form may be used in recruiting research subjects.

If the project has not been completed by 3/27/2012 you must request a renewal of approval for continuation of the project. As a courtesy, a renewal notice will be sent to you prior to your expiration date; however, it is your responsibility as the Principal Investigator to timely request renewal of your approval from the Committee.

You are advised that any change in protocol for this project must be reviewed and approved by the Committee prior to implementation of the proposed change in the protocol. A protocol change/amendment form is required to be submitted for approval by the Committee. In addition, federal regulations require that the Principal Investigator promptly report, in writing any unanticipated problems or adverse events involving risks to research subjects or others.

By copy of this memorandum, the Chair of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving
human subjects in the department, and should review protocols as often as needed to insure that
the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Human Research Protection. The
Assurance Number is IRB00000446.

Cc: William Cloonan, Chair [bcloonan@fsu.edu]
   HSC No. 2011.5796
REFERENCES


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BIOGRAPHICAL SKETCH

Anel Brandl was born in Puebla, Mexico. She attended the University of Puebla (Benemérita Universidad Autónoma de Puebla) where she completed her B.A. degree in Modern Languages Education and ESL. In 2003, she received a teaching assistantship from Gardner-Webb University to teach Spanish. Anel then attended the Florida State University (FSU) where she received her M.A. in Spanish and SLA in the Spring of 2006. She currently has a teaching position at FSU where she also serves as the Assistant Director of the Spanish Program. She will receive her Ph.D. in Spanish Applied Linguistics from the Florida State University in the spring of 2013. Her research interests include second language sentence processing and the acquisition of phonology by L2 learners.