THE ROLE OF CROSSLINGUISTIC INFLUENCE FROM L2 SPANISH, TYPE OF LINGUISTIC ITEM, AND APTITUDE IN THE LEARNING STAGES OF L3 PORTUGUESE FORMS: AN EXPLORATORY STUDY

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Luciane L. Maimone, M.S.

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THE ROLE OF CROSSLINGUISTIC INFLUENCE FROM L2 SPANISH, TYPE OF LINGUISTIC ITEM, AND APTITUDE IN THE LEARNING STAGES OF L3 PORTUGUESE FORMS: AN EXPLORATORY STUDY

Luciane L Maimone, M.S.

Co-Mentors: Ronald P. Leow, Ph.D.; Lourdes Ortega, Ph.D.

Abstract

This study investigates facilitative and non-facilitative crosslinguistic influence (CLI) from second language (L2) Spanish in third language (L3) Portuguese learning by native English speakers, testing some of the hypotheses of L3 acquisition models. To assess CLI effects on the intake and learning of Portuguese forms by novice Portuguese learners, the performance of L2 Spanish speakers was compared to that of non-Spanish speaking learners. The study also addresses the question of how CLI affects the intake and learning of lexical versus morphosyntactic items.

While this study does not pinpoint the exact mechanisms affected by CLI during input processing, it approaches CLI from a cognitive perspective, going beyond the simple verification of transfer and looking at prior knowledge as a cognitive factor in interaction with the analytical components of aptitude, operationalized as grammatical sensitivity and grammar inferencing. It also looks at how CLI affects different learning stages, following Leow's (2015a) model of the L2 learning process in ISLA. Participants underwent laboratory learning conditions and were assessed at three points in time. Results confirmed non-facilitative CLI from Spanish in the recognition and production of lexical items and irregular past participles, and positive CLI from Spanish in the recognition and production of regular past participles, partially supporting the Typological Proximity Model (TPM) (Rothman, 2010) and the Scalpel Model (Slabakova, 2016). Results also showed that CLI affected different learning stages similarly, and that differential performance on lexical versus morphosyntactic items was mediated by verb morphology and prior language knowledge. Aptitude
only correlated positively with overall accuracy and agreement in the production of regular verb forms, with no mitigating effects on negative CLI.
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CHAPTER ONE: Introduction

Statement of the Problem

Those who know of the similarities between Portuguese and Spanish may instantly think of the benefits a native speaker of one of these languages enjoy when learning the other. The facilitative effect of Spanish in nonnative Portuguese acquisition is widely recognized in the field of Portuguese as a Second or Foreign Language (PSL/PFL) (Almeida Filho, 1995b; Lipski, 2006; Carvalho et al., 2010). It is no surprise that, in the classroom, Spanish speakers learning Portuguese (SSLPs) rely heavily on their lexical and grammatical knowledge of Spanish, which gives them a boost in initial stages of Portuguese acquisition. Portuguese and Spanish are Romance languages that share a high degree of structural and lexical similarity to the point that the two languages are mutually intelligible despite the differences in pronunciation (Jensen, 1989; Carmolingo, 1997). For instance, Ulsh (1971) estimated that cognates between Spanish and Portuguese amount to 85% of their lexicon. However, it is also not uncommon for language practitioners to describe learning difficulties specific to this group and to report transfer from Spanish even in the production of more advanced Portuguese learners (Ferreira, 2009; Tarquino, 1977). Most importantly, this interference is believed to lead to errors that are not found in the interlanguage of learners with different language backgrounds at lower levels of proficiency, as reported by different authors (Almeida Filho, 1995a).

Spanish interference, or negative transfer, is described in several contrastive analysis studies. For example, Azevedo (1978) discussed resistance areas in pronunciation and verb morphology. Akerberg (1998, 2001a, 2001b) focused on problems related to the perception and pronunciation of vowels and consonants, and on the influence of Spanish orthography, while Grannier and Carvalho (2001) addressed what they called ‘critical points’ in Portuguese acquisition, referring to persistent and common errors in written production involving lexical choice,
morphosyntactic constructions, and syntactic-semantic interface features. The notion of persistent errors in the production of SSLPs is also widespread and often associated with the idea of fossilization, a premature cessation of language development (e.g. in Carmolinga, 1997, Camargo, 2009; Carvalho, 2002; Ferreira, 2009; Carvalho, Freire & Silva, 2010). However, most descriptions of learning difficulties in the literature are anecdotal and do not take into account context and amount of Portuguese exposure or order of acquisition and proficiency in Spanish. In fact, only a few experimental studies have been conducted to examine negative transfer from Spanish in Portuguese acquisition, such as Carvalho and Silva (2006), Koike and Gualda (2008) and Child (2014), and none of them have compared the language of SSLPs to that of learners without knowledge of Spanish. Moreover, no studies have shown evidence of fossilization for SSLPs at early or later stages of development. Therefore, to move us beyond the realm of speculation, much research is needed on the effects of Spanish knowledge in almost every aspect of nonnative Portuguese acquisition.

Understanding how Spanish affects the acquisition of nonnative Portuguese has pedagogical implications at the program and classroom levels, which are especially relevant given the rising numbers of Portuguese courses being offered at the American universities, where most learners have Spanish experience. Reflecting these trends, the PSL/PFL field has gradually seen the emergence of a subfield concerned with the acquisition of Portuguese by Spanish speakers. In Tesser (2004), a historical overview of the PSL/PFL in the United States shows that since the Portuguese language entered the university curriculum in the 20th century it has been linked to the study of Spanish. According to Carvalho (2013), the field of Portuguese for Spanish Speakers (PSS) started to consolidate in the 1970s and is now recognized as a field in its own right after growing considerably in the last two decades. The consolidation of the PSS field is attributed to the increasing number of Spanish speakers entering university programs (many of whom are Spanish
heritage speakers), with Spanish ranking as the second most spoken language in United States (U.S. Census Bureau, 2015). Other factors behind the growth of Portuguese programs include changes in academic language requirements, public support, and the Brazil’s new role in the global economy in the early 2000s (Carvalho, 2002; Carvalho et al., 2010; Wiedermann & Scaramucci, 2008; Milleret, 2012, 2014). Jensen (2004) observed that even at the outset of the 21st century it was rare to encounter Portuguese learners in American universities with no knowledge of Spanish. More recently, Valadares (2013) reported that 99% of students enrolled in introductory level Portuguese courses at the University of New Mexico spoke Spanish in 2008. Child (2013) conducted a similar survey at the University of Arizona and found that the language background of students enrolled in Portuguese courses could be limited to three groups: 13% of L1 Spanish speakers, 32% of L2 Spanish speakers, and 55% of Spanish heritage speakers. Bianconi (2012), in a study about the motivation of Portuguese learners and the profile of Portuguese instructors across the United States, showed how courses for SSLPs have multiplied in the past few years, complementing the findings of Carvalho et al. (2010). The PSS field grew also outside the United States, and has been especially prominent among the member countries of Mercosur (Barbiere-Durlo, 1998; Gil, 2002), including in Brazil (Nogueira, 2007; Scaramucci, 2013).

For almost three decades, instructors and scholars in the PSS field have been interested in understanding the interaction between Spanish and Portuguese and in rethinking pedagogical practices to optimize learning in PSS classes, although this interest has led to more awareness of SSLPs’ needs than to actual research on the effects of Spanish in Portuguese acquisition. Instrumental to the PSS field are Contrastive Analysis (CA) studies dating back to the 1950’s that described the contrasts and similarities between the languages. While many researchers are careful to point out that Portuguese and Spanish CA is not always predictive of learners’ errors (Lombello, 1983; Akerberg, 1998), CA studies have helped identify areas of difficulty in language instruction,
informing the choice of linguistic structures and vocabulary covered in PSS courses. Several publications in the 1980’s and 1990’s describe linguistic and affective characteristics of SSLPs, making curriculum and task design recommendations. In a review of articles on the topic, Carvalho et al. (2010) provide a summary of observations that characterize the language development of SSLPs as involving:

[1] a high proficiency in receptive skills from the early stages of instruction, [2] a rapid stabilization of structural errors due to speakers’ ability to communicate meaning at early stages of learning, [3] a faster learning process, and [4] a beneficial effect of metalinguistic awareness on the learning of the subtle differences between Portuguese and Spanish. (Carvalho et al., 2010, p. 71)

Also, since it was first established, the Symposium on Portuguese for Spanish Speakers has led to the publication of two monographies focused on PSS pedagogy (Simões, Carvalho, & Wiedemann, 2004, and Wiedemann & Scaramucci, 2008). Pedagogical recommendations have acknowledged the reality of SSLPs and their learning characteristics applied to different language domains, with a special concern in raising students’ awareness of crosslinguistic contrasts to avoid early fossilization. For instance, Simões and Kelm (1991) and Akerberg (2001a, 2001b, 2004) stated that phonological differences were one of the greatest challenges for SSLPs, partially because of similarities in spelling. They proposed that SSLPs should receive training in both perception and production of vowel contrasts. Akerberg (2013) affirmed that the development of receptive skills in SSLPs is much faster than the development of production skills and that students should have more opportunities for writing and speaking in the classroom. In the area of morphosyntax, some authors have stressed the need to dedicate more time to teaching aspeccual and modal differences (Azevedo, 1978; Brakel, 1980, van de Wiel, 1995; Barros, 2002; Vanderschueren, 2012; Ferreira, 2012), as well as nominal and verbal morphology (Chandler, 1958; Thogmartin & Courteau, 1985). Briones
and Perez (2002), Koike and Flanzer (2004), Araújo (2008), and Doerflinger (2013) recommended
that more emphasis be given to teaching pragmatics, arguing that the subtleties of the Portuguese
discourse seem to be hard to acquire. The importance of teaching the semantic and pragmatic uses
of cognates and false-cognates is mentioned in several publications (Schmitz, 1970; Lombello et al.,
1983; Carmolínga, 1997; Turazza, 1998; Galego, 2009). Along the same lines, Ferraro (2000) and
Silveira (2013) have suggested that SSLPs would benefit from learning chunks, formulaic
sentences, and idiomatic expressions, rather than focusing on grammar. Once again, however, few
of these recommendations are based on experimental data, and little is known if the learning
difficulties identified by PSS researchers are exclusive to SSLPs or how they compare to
Portuguese development in speakers with other language backgrounds.

PSS researchers and instructors in the United States have advocated for a specific
curriculum to meet the needs of SSLPs (Holton, 1954; Muller & Muller, 1968; Garrison, 1979;
Ferreira, 1995; Lombello, 1983; Patrocínio & Colín, 1990; Suárez, 1990; Carmolínga, 1997; Santos
Maia; 1998; Júdice, 2000; Grannier, 2002, 2004; Carvalho, 2002; Almeida Filho, 2004; Fialho,
2005; Alves da Silva, 2008; Rodea, 2008; Mohr, 2009; Carvalho et al., 2010; Scaramucci, 2013;
Valadares, 2013; Ramos, Carvalho, & Messias, 2013), resulting in a growing number of PSS
course offerings at the university level. The popularity of PSS courses in the United States
recognizes a linguistic reality that applies to an increasing number of students in response to very
concrete demands. It is also an administrative decision that helps preserve language programs of
less commonly taught languages, such as Portuguese. For instance, Carvalho (2013) maintained that
when Spanish speakers and non-Spanish speakers are put together in the same classroom,
everybody loses: Spanish speakers get bored and non-Spanish speakers lose self-confidence,
directly affecting student recruitment and retention. She also pointed out that experimental data is
scarce in the PSS literature and that greater methodological rigor is called for to advance research in this field.

The effects of prior language knowledge in language acquisition have been long studied in SLA and have gained popularity in the last two decades with a paradigm shift from prior knowledge as mere interference (or error) to prior knowledge as conscious and unconscious learning strategies. Within this new paradigm, Sharwood Smith and Kellerman (1986) coined the term crosslinguistic influence (CLI), referring to the broader range of linguistic phenomena that results from the bi-directional interaction of multiple language systems. The term has been adopted by researchers looking at different language combinations and exploring not only SLA, but third language acquisition (TLA). Studies in this area have shown evidence of CLI in different linguistic domains, such as morphosyntax (Klein, 1995; Judy, Guijarro-Fuentes, & Rothman, 2008; Rothman, 2010, 2011), lexical transfer (Jessner, 2003; de Bot, 2004; Singleton, 2012; Tremblay, 2006; Bardel & Lindqvist, 2007; Lindqvist, 2012; Ecke, 2014), conceptual transfer (Jarvis & Odlin, 2001, Wei, 2006), and phonology (Gut, 2010; Llama, Cardoso & Collins, 2010; Wrembel, 2010, 2012).

Typological proximity theories, a subfield of CLI research, focus on the interface of structurally similar languages and are especially relevant to the study of Portuguese and Spanish. The same applies to the role of psychotypology (Kellerman, 1977), that is learners’ perceived degree of similarity between the languages they speak and the target language, since both structural and perceived similarity between Portuguese and Spanish are well documented in the literature (Bachi, 1831; Brakel, 1980; Carmolínga, 1997; Jensen, 1989; Ferraro, 2000; Akerberg, 2002; Child, 2013). Both structural and perceived typological similarity have been shown to heighten or predict the source of CLI (Corder, 1992[1983]; Rothman & Amaro, 2010; Rothman, 2011; Ringbom, 1986; Slabakova & García-Mayo, 2016). In the context of TLA, Rothman (2010, 2011) challenged models such as the L2 status factor (Bardel & Falk, 2007; Falk & Bardel, 2011) by attributing a more
important role to language proximity than to order of acquisition. In his Typological Proximity Model (TPM), he also argued that CLI can manifest not only as facilitative effects (positive transfer), but also as non-facilitative effects (negative transfer), contradicting the claims of the Cumulative Enhancement Model (Flynn, Foley, & Vinnitskaya, 2004). The study of Spanish CLI in L3 Portuguese acquisition allows us to test both TPM predictions against other TLA models. So far, however, only a limited number of CLI studies have examined the Portuguese-Spanish language pair, and even fewer studies have looked at non-facilitative Spanish effects in L3 Portuguese. For instance, Rothman (2010) examined CLI from Spanish in the acquisition of Portuguese word order and relative clause attachment, and found negative effects from Spanish as L1 and L2. In an earlier study, Carvalho and Silva (2006) found negative transfer from Spanish in the acquisition of L3 Portuguese tense and mood, with more pronounced CLI from Spanish than from English. Similarly, Child’s (2014) results showed negative CLI from Spanish in L3 Portuguese mood distinction by L1, L2, and heritage speakers of Spanish. While these studies support TPM predictions in morphosyntax to some extent, no L3 studies have looked at the effects of Spanish CLI in initial state development of Portuguese lexicon and morphology. Also, while these findings support classroom observations regarding unwelcome effects from Spanish, they say nothing about how CLI from Spanish affects the development of Portuguese knowledge compared to influence of other languages. Only by comparing the acquisition of Portuguese by SSLPs to learners with no knowledge of Spanish can we begin to understand if these initial non-facilitative effects are negligible in the long run, or if they lead to development shortcomings such as early fossilization.

A more recent discussion concerning the role of typology in TLA is explored by Slabakova (2016) in her proposal of the Scalpel Model. For Slabakova, while the TPM predicts a wholesale primacy of typology in CLI, transfer effects are in fact localized, based on feature-by-feature similarities. According to the Scalpel Model, therefore, the overall structural or perceived proximity
between languages is not a deterministic variable for transfer, and neither is order of acquisition.

Slabakova’s analysis echoes SLA research interested in the role played by the inherent and contextual characteristics of linguistic item types in language acquisition, which shows that attention to form, input processing, and perceived difficulty are determined in part by differences in salience, frequency, complexity, redundancy, and form-meaning transparency (DeKeyser & Sokalski, 1996; Hulstijn & Graaff, 1994; de Graaff, 1997; Barcroft & VanPatten, 1997; Leow, Egi, Nuevo, & Tsai, 2003; Cerezo, 2010; Calderón, 2013). Looking at how Spanish CLI affects the learning of specific linguistic items may reveal complex interactions than those described in CA studies, with a less direct mapping between similarity and positive transfer and between contrasts and negative transfer. The Scalpel Model looks at prior knowledge as another discrete characteristic of item types, triggering CLI or not based on the degree of crosslinguistic overlap. In CLI research, however, few studies have investigated more than one linguistic item type at once to test these hypotheses. For instance, Cenoz (2001) found greater transfer of Spanish/English cognate words compared to functional words. Similarly, Lindqvist (2015) showed that lexical items from Swedish and English transferred in greater number to L3 French compared to grammatical items. A more localized interpretation of typological proximity is explored by Bezooijen and Gooskens (2007) and Dijkstra, Jaarsveld, and Brinke (1998), who investigated cognate effects in comprehension and processing speed respectively, and found that CLI positively correlated with higher degrees of local similarity. Tolentino and Tokowicz (2014) investigated crosslinguistic similarity between English and Swedish and found that the learning of demonstrative L2 Swedish markers was superior to the learning of definite markers under a text-enhancement condition. Studies looking at more than one linguistic item type in the context of Portuguese and Spanish are less frequent. For example, Carvalho and Silva (2006) investigated the performance of Spanish speakers on the production of the present subjunctive (convergent forms) and the future subjunctive (divergent forms) and found a
trend pointing to facilitative effects in the acquisition of the former and non-facilitative effects in the acquisition of the latter. Pinto and Carvalhosa (2013) identified more lexical words from Spanish in L3 Portuguese production than functional words. In generative research, Guijarro-Fuentes, Iverson, Judy, and Rothman (2008) found that knowledge of gender agreement and noun ellipsis (noun-drop) from Spanish were transferable to L3 Portuguese, although no differences in the acquisition of these two features were reported. Results from these studies suggest that CLI from Spanish manifests across various linguistic domains in the acquisition of Portuguese, but does not affect them equally. There is also evidence of both negative and positive effects, but little is known about which features from Spanish facilitate or hinder Portuguese acquisition. It is also not clear from research if CLI from Spanish is triggered by an overall perception of typological proximity or if it is conditioned by more structural and concrete similarities at the local level, as posed by the Scalpel Model.

As pointed out by Jarvis et al. (2013), CLI research has been primarily interested in the consequences of CLI rather on the cognitive processes through which it occurs, with a focus on verification and quantification of transfer. Studies approaching CLI from a cognitive perspective have been interested in conceptual transfer (Flecken, 2010; Bylund & Jarvis, 2011) and cognate effects (Dijkstra et al., 1998; Dijkstra et al., 1999; De Groot et al., 2002) or on the outcomes of bilingualism, such as metalinguistic awareness (Cummins, 1978; Galambos & Goldin-Meadow, 1990; Gibson & Hufeisen, 2006), cognitive and inhibitory control (Bialystok, 2005; Costa, Hernandez, & Sebastián-Gallés, 2008), and memory (Magiste, 1980). Very few have examined the interaction of prior knowledge and processing mechanisms, especially in the area of morphosyntax. Studies approaching CLI as a cognitive variable have found evidence of CLI effects in language processing and indications that prior knowledge interacts with other aspects of cognition, such as metalinguistic awareness (Elder & Manwaring, 2004; Bono, 2011; Brook & Kempe, 2013, Falk,
Lindqvist, & Bardel, 2015), working memory (Lin, 2009; Trude & Tokowicz, 2011; Jarvis et al., 2012), and aptitude (Tolentino & Tokowicz, 2014). The same focus on the consequences of CLI is observed in research on nonnative Portuguese, with most studies conducted within the CA and generative frameworks. CLI Portuguese studies looking at individual variables and input processing are scarce. Some exceptions are Trude and Tokowicz (2011), who found that negative CLI from English and Spanish in Portuguese pronunciation was inhibited by higher working memory capacity. Koike and Gualda (2008) looked at the effects of implicit and explicit instruction on attention to Portuguese possessive forms by L2 and heritage speakers of Spanish and found that not only did instruction mediate the noticing of these forms, but context of acquisition (sequential versus simultaneous bilingualism) affected amount of CLI differently for different linguistic items. While the importance of attention, noticing, and awareness for language learning has been recognized in the SLA literature (Schmidt, 1990; Leow, 2000, 2001; Rosa & Leow, 2004; Gilakjani & Ahmadi, 2011), the role of prior knowledge is usually not accounted for in these studies. However, how prior knowledge affects processing mechanisms seems particularly relevant to CLI research, given the findings from studies that explored speech perception (Kuhl, 2000a; Best & Strange, 1992; Werker, Yeung, and Yoshida, 2012) and orthography (Taft, 1985; Akamatsu, 1998, 2003; Schwartz, Kroll, & Diaz, 2007; Rafat, 2011, 2013; Bassetti, Escudero, & Hayes-Harb, 2015), which show that prior languages (and specially the L1) modulate input processing through selective attention and parsing mechanisms. Prior knowledge can also affect tense cue learning (Musumeci, 1989), intake of verb morphology (Benati, 2005), and the relative salience of items in spontaneous noticing (Park & Han, 2008).

Another aspect seldom addressed in CLI research is the role of aptitude and whether it mitigates negative transfer. Despite the recognized role of aptitude in second and first language acquisition (see Robinson, 2013; Skehan, 2015; and Kormos, 2013, for reviews), CLI studies have
focused more often on the effects of metalinguistic knowledge (Jessner, 2006; Gibson & Hufeisen, 2006; Bono, 2011; Onishi, 2013; Falk et al., 2015), which has also been shown by innumerous SLA studies to facilitate language development (Elder & Manwaring, 2004; Erlam, 2005; Roehr, 2007, 2008; Sanz, 2011; Gutierrez, 2012; Brooks & Kempe, 2013). However, aptitude as it was conceptualized by Carroll and Sapon (1959) and later in Robinson (2002b), is a multi-dimensional set of abilities that includes components such as phonetic discrimination, memory, and analytical reasoning. As suggested by Ranta (2002), upon closer scrutiny, analytical ability and metalinguistic awareness can be seen as overlapping concepts, even though their operationalization involves different measures. The analytical components of aptitude have indeed been shown to positively correlate to explicit learning (Granena, 2012, 2013, 2015). Although results for analytical ability as a predictor of language development have been mixed, there is enough evidence of this correlation to warrant further research (Robinson, 1996, 1997, 2002; Sheen, 2007; Bell, 2009; Kormos, 2013; Li, 2013; Trofimovich, Ammar, & Gatbonton, 2007; Tolentino & Tokowicz, 2014). Both metalinguistic awareness and aptitude are discussed in the PSL/PFL literature as beneficial to SSLPs in terms of overcoming negative transfer and raising awareness of crosslinguistic contrasts, which would lead to greater attention to form (e.g. Garrison, 1979; Lombello, 1983; Carvalho & Silva, 2006; Carvalho, Freire, & Silva, 2010). However, these observations have not been researched empirically. In initial states of L3 Portuguese acquisition, when learners may not have yet developed L3 metalinguistic knowledge, it might make more sense to look at learners’ cognitive abilities engaged in developing such knowledge, such as grammatical sensitivity (measured, for instance, by part IV of the MLAT) and grammar inferencing (measured by sub-components of the LLAMA).

In sum, there is still a lack of experimental evidence to support most widespread anecdotal observations regarding Spanish positive and negative CLI in the PSS field. Cognitive research in L2
and L3 Portuguese acquisition is still incipient, and little is known about how Spanish CLI affects Portuguese processing or how it interacts with other cognitive abilities and mechanisms. Also, although evidence from CLI seems to support the primacy of (psycho)typology proximity as a factor for transfer, more research is needed to understand if typology triggers transfer at the local or the holistic level. The importance of understanding the Portuguese and Spanish interface goes beyond curriculum and program considerations. It provides valuable information in understanding how languages are represented in the brain and are retrieved and activated for language use (Kellerman, 1977; Ringbom, 1986; Corder, 1992 [1983]). Therefore, findings from the study of typologically close languages have important theoretical implications for models of second and third language acquisition (Cenoz, Hufesein, & Jessner, 2001; Rothman, Giancaspro, & Halloran, 2014).

In this study, I investigate the effects of Spanish CLI in L3 Portuguese acquisition, looking at types of CLI (facilitative and non-facilitative) after immediate and delayed exposure to input. I compare the performance of non-Spanish speaking learners of Portuguese to that of SSLPs at similar levels of Portuguese proficiency to isolate the effects of Spanish CLI. By investigating learning stages in the initial states of Portuguese acquisition, I hope to tap into the initial intake of Portuguese forms operationalized as recognition scores in addition to subsequent production performance. While this study does not pinpoint the exact mechanisms affected by CLI during input processing, it approaches CLI from a cognitive perspective, going beyond the simple verification of transfer and looking at prior knowledge as a cognitive factor that interacts with other cognitive abilities. I also investigate how Spanish CLI affects the intake and controlled production of different types of morphosyntactic and lexical items hypothesized to trigger positive or negative transfer, looking at CLI at the local level. The interaction of prior knowledge and analytical components of aptitude (grammatical sensitivity and grammar inferencing) is also examined to
verify the role of aptitude in mitigating or enhancing Spanish CLI. In Chapter Two, the literature on CLI research, input processing, aptitude, and linguistic item type is reviewed. Chapter Three describes the methodology and research questions guiding this study. Chapter Four introduces the results and Chapter Five presents the discussion of results, limitations of the study, theoretical and pedagogical implications, and final conclusions.

**Operationalization of Constructs.**

**Language proficiency.**

Participants in the study were expected to be at initial-levels of Portuguese acquisition, that is low proficiency. Participants in the L2 Spanish group were expected to have an intermediate level of Spanish proficiency. Proficiency level was operationalized as the participants’ scores on the Portuguese C-test and Spanish C-test, respectively (Appendices B and C). Low proficiency in nonnative Portuguese was set as scores equal or lower than 50%, and intermediate proficiency in Spanish was set as 65%.

**Grammatical sensitivity.**

Grammatical sensitivity was operationalized as the raw scores on the Part IV (Words in Sentences) of the MLAT (Language Learning and Testing Foundation, 2009).

**Grammar inferencing.**

Grammar inferencing was operationalized as the raw scores on the LLAMA_F component of the LLAMA Aptitude Battery Test (Meara, 2005).

**Analytical ability.**

Analytical ability was operationalized as the combined average percentage score of grammatical sensitivity (measured by Part IV of the MLAT) and grammar inferencing (measured by LLAMA_F) scores.
Crosslinguistic influence (CLI).

CLI was operationalized as the differential performance between the No Spanish and the L2 Spanish groups on the different assessment tasks.

Learning stages.

Three different learning stages were assessed in this study, based on Leow's (2015a) model of the L2 learning process in ISLA. Learning Stage 2 (intake) was operationalized as the performance on the immediate recognition task (either the Lexical Decision Task for lexical items or the Multiple-Choice Recognition Assessment Task for past participles). Learning Stage 6 (output) was operationalized as the immediate Controlled Production Assessment Task (for both lexical and morphosyntactic linguistic items). A third learning stage, retention, was operationalized as performance on the delayed Controlled Production Assessment Task (for both lexical and morphosyntactic linguistic items). This later stage, although not defined in Leow’s model, represents more stable and internalized learned knowledge, which is assumed to reflect qualitative differences in processing that allowed linguistic information to be retained in long-term memory after one week of exposure.
CHAPTER TWO: Review of the Literature

Crosslinguistic Influence (CLI)

**CLI theory and research.**

The study of crosslinguistic phenomena, that is the interaction of two or more language systems in language acquisition, has a long tradition in second acquisition research and has been commonly studied under the label of *language transfer*. In the 1980s the term transfer acquired negative connotations in association with behaviorist theories. Sharwood Smith (1983) argued that the notion of *transfer* was conceptually limited in scope and restricted to “processes that lead to the incorporation of elements from one language into another” (Sharwood Smith & Kellerman, 1986, p. 1). Sharwood Smith, and later Sharwood Smith and Kellerman, proposed the adoption of *cross-linguistic influence* (CLI) as a less biased, broader, and theory-neutral concept that would comprise a variety of bidirectional language phenomena such as pidgining and relearning, accommodating the roles of the learners’ multiple languages. The term CLI has since become the preferred terminology in this area of research, although *transfer* and *interference* continue to be used interchangeably with CLI (Cenoz, Hufesein, & Jessner, 2001; Jarvis, 2013). Initially, CLI studies focused on the interaction of the learners’ L1 and L2, as those appearing in monographs by Kellerman and Sharwood Smith (1986) and Gass and Selinker (1992 [1986]). Although early studies can also be found in the context of third languages (e.g. Green, 1986; Ringbom, 1987; & Grosjean, 1997), it is only recently that more researchers have advocated for the importance of L3 research as pertinent to the reality of many language communities (Cenoz & Jessner, 2009; Ortega, 2014) and as offering valuable insights into debates concerning post-critical period ultimate attainment and UG accessibility (Leung, 2007; Cabrelli, Iverson, Judy, & Rothman, 2008; Cabrelli Amaro, Flynn, & Rothman, 2012; García-Mayo & Rothman, 2012). Despite the challenges pointed out by Cenoz (2013), there has been a rapid increase in interest in multilingual CLI research in the last two
decades (De Angelis & Dewaele, 2009, 2011), and recent CLI publications show a shift towards the study of multilingualism (e.g. Vicenzi & Lombardo, 2000; Cenoz et al., 2001; Cenoz, Hufeisen, & Jessner, 2003; Safont Jordà, 2005; De Angelis, 2007; Hufeisen & Aronin, 2009; De Angelis & Dewaele, 2011; Gabrys-Baker, 2012; and Cabrelli-Amaro, Flynn, & Rothman, 2012). Not only have several CLI studies drawn attention to the differences between second and third language acquisition (Kemp, 2009; Bono, 2011; Sanz, 2011; Cenoz, 2013a, 2013b; Hermas, 2014), but they have also provided evidence that third language acquisition may be affected by knowledge of any previously learned language (Dewaele, 2001; Pae & Morris, 2010; Bono, 2011; De Angelis & Dewaele, 2011; Bardel & Falk, 2007; 2012; Berkes & Flynn, 2012a, 2012b; Wrembel, 2015).

Early CLI research consisted mostly of structural descriptions and comparisons between languages (Lennon, 2008) and gained visibility with the publication of Language by Bloomfield (1933). Bloomfield’s book found great support in the context of formal language instruction, laying the theoretical groundwork for what became known as contrastive analysis (CA), a view of language learning often associated with the work of Robert Lado (1957). In CA, similarities between one’s L1 and the target language are believed to facilitate learning, and learning difficulties and errors are predicted on the basis of the languages’ dissimilarities. The predictive ambitions of CA were widely criticized, especially as psycholinguistic views of language learning (Coder, 1967, 1971, 1983; Nemser, 1971; Faerch & Kasper, 1986, 1987; Zobl, 1980; Meisel, 1980, 1997; Dulay & Burt, 1994; Jordens, 1997) gained popularity and the idea of interlanguage (Selinker, 1972, 1992; Tarone, 2014 and elsewhere) became more widely accepted, pointing to the existence of individual and developmental errors unrelated to the learners’ L1. Moving away from CA, psycholinguistic CLI research sought to incorporate the effects of other cognitive variables, such as the role of L2 proficiency (Odlin, 1989; Poulisse & Bongaerts, 1994; Hammarberg, 2001; Gallardo del Puerto, 2007; Lindqvist, 2009), length of residence (Stedje, 1977), cognitive control (Green, 1986),

The multilingual phenomenon, however, can be approached from different perspectives, e.g. educational, formal linguistic, neurolinguistics, sociocultural, or psycholinguistic, as observed by García-Mayo (2012), who also pointed out that the main difference between psycholinguistic and formal linguistic multilingual research has been the issue of modularity. While psycholinguistic approaches claim that the processes of language acquisition are not different from those involved in the learning of other cognitive skills, formal linguistics (or generativist) accounts argue that the language faculty is enabled by a language-specific and independent module (p. 131). Moreover, in the psycholinguistic strand the individual characteristics of learners and the learning environment play a major role. Consequently, CLI psycholinguistic studies often explore the interaction of prior knowledge and other cognitive factors, such as attention, intelligence, intentionality, depth of
processing, age, memory capacity, cognitive control, proficiency level, aptitude, and motivation. They are also interested in the effect of instruction and learners’ conscious and unconscious learning strategies. Within this approach, and relevant to the study of the Portuguese and Spanish interface, is research on typological proximity and on Kellerman’s notion of *psychotypology*, that is learners’ perceptions of structural and semantic similarity between languages. CLI studies in the generative strand, on the other hand, have focused to date on phonological and morphosyntactic transfer, seeking to identify the source or sources of transfer.

**Typological proximity and psychotypology.**

The implications of typological proximity, that is the structural similarities between languages, to second language acquisition had been discussed in early SLA research long before the principles of contrastive analysis (CA) gained popularity. Charles Fries (1945), for instance, affirmed that “(t)he most efficient materials are those that are based upon a scientific description of the language to be learned, carefully compared with a parallel description of the native language of the learner” (p. 9). In strong versions of the Contrastive Analysis Hypothesis (CAH) (Lado, 1957; Banathy, Trager, & Waddle, 1966) L2 features analogous to features in the L1 were seen as easily transferrable, facilitating learning (positive transfer). On the other hand, features that contrasted in both languages were predicted to transfer as errors (or interference) and hinder L2 development. In his criticism of the CAH, Wardhaugh (1970) dismissed the predictive power of the CAH, but acknowledged that typological proximity or distance was one of the many variables affecting second language development. In another revision of the CAH, Eckman (1977) introduced the notion of typological markedness, which he believed could be determined independently of any particular language and, if incorporated to the CAH, would help predict not only areas of difficulty in second language learning but also the relative level of difficulty.
In the generative strand (as discussed in the next section), the role of typological proximity has been examined in different models of L3 acquisition and is a central component of the TPM (Rothman, 2010, 2011), which claims that both typological proximity and psychotopology override the effects of order of acquisition and language status as conditioning factors for syntactic transfer. 

*From a psycholinguistic perspective,* Sharwood Smith and Kellerman (1986) differentiated between *transfer in communication* and *transfer in learning.* For them, communication transfer comprises production and reception procedures, which involve the activation of prior knowledge and are governed by communicative demands, in an approximation to Chomsky’s concept of performance. They defined *transfer in learning* as transfer with the purpose of learning, e.g. when learners use their L1 to make assumptions about the L2 input in order to maximize comprehension. In a further departure from formalist views of typological proximity, a more active role of the learner in CLI had already been proposed by Weinreich (1953), but became popularized as Kellerman’s notion of *psychotopology.* Kellerman (1977, 1979, 1983, 1995) called attention to the fact that behind the formal causes for language interference lie psychological processes whereby prior knowledge is carried over into new learning situations, regulating the transfer phenomenon (Kellerman, 1977, p. 63). Therefore, instead of maintaining that learning difficulties and facilitation are triggered only by the degree of formal correspondence between prior knowledge and the target language, Kellerman argued that the interaction between languages’ genetic typology and learners’ behaviors and psycholinguistic realities was more important. Under this view, transfer is seen as the process through which learners, consciously or unconsciously, incorporate features of prior language knowledge in the production of the target language. Kellerman referred to learners’ perceptions of language distance as *psychotopology.* These ideas are incorporated by Krashen (1983), who asserted that transfer from L1 into L2 only occurs when the L1 structures resemble structures in the next stage of the learner’s L2 development. In a parallel analysis, Anderson (1983) defined transfer as a
function of how learners perceive the structural relations within the L2 input but not in direct
relation with the L1. He proposed the Transfer to Somewhere Principle (TTS), which asserts that
CLI will occur ‘if and only if there already exists within the L2 input the potential for (mis-)
generalization’ (p. 178). A few years later, Faerch and Kasper (1987) proposed a broader account of
CLI phenomena, addressing the role of social-psychological factors. They discussed the role of
attention and automatization in relation to modes of activation in production, pinpointing two types
of transfer: automatic transfer (that of highly automatized declarative knowledge), and strategic
transfer (a sometimes conscious, planned strategy to overcome unavailable linguistic means). Three
main criteria were identified as favoring or disfavoring both types of language transfer and
rendering different degrees of transferability: linguistic criteria (e.g. typological differences,
universal developmental principles), psycholinguistic criteria (e.g. learner perception), and socio-
psychological criteria (e.g. social context, group solidarity). Faerch and Kasper (1987) were also
concerned with the notion of overgeneralization, previously discussed by Singh and Carroll (1979).
For them, overgeneralization is triggered by the perceived similarity across two languages, which
results in the oversight of linguistic forms in the input due to excessive confidence in transferring
conscious and unconscious language strategies.

Extensive research in typological proximity has been done by Ringbom (1978, 1986, 2002,
2007, 2008) in his study of L2/L3 English acquisition by speakers of Finish and Swedish. For
Ringbom, crosslinguistic similarity is an important variable in the use of cognitive and
metacognitive learning strategies, that is how the learner attempts to enhance the effectiveness of
learning (Ringbom, 2008, p. 104), and should be seen as an aid, not an obstacle. He found that CLI
effects resulting from crosslinguistic similarity tended to be more evident in early stages of
language acquisition and more prominent in the area of lexis. Moreover, while crosslinguistic
similarities significantly facilitate learning for comprehension, they may also “lull learners into
thinking that learning is easy and that they already know as much as they need of the TL,” with the result that less effort will be expended in learning (Ringbom, 2008, p. 108). Ringbom argued that crosslinguistic similarities result in both facilitative and non-facilitative CLI in both reception and production, and that the effects of perceived grammatical similarity can also be observed in unrelated languages at either functional, semantic, or formal aspects of language. More recently, Hammarberg (2009) looked at the role of crosslinguistic similarity in L3 acquisition, differentiating between three levels of comparison: phonological similarity, morphosyntactic similarity, and lexical similarity. She pointed out that despite the widespread idea of perceived similarity, language distance or closeness in L2 and L3 research has been judged mostly on the basis of genetic relatedness (p. 130). She suggested that in order to answer the question of how learners perceive and evaluate crosslinguistic similarity, a distinction must be made between perceived similarity in language reception and in language production. For her, linguistic items in reception interact with a series of extra-linguistic factors that facilitate comprehension. Therefore, learners can directly observe and contrast elements of the target language and their different background languages in reception, but such attention to form will depend on contextual factors and learners’ focus of interest. On the other hand, learners are much more dependent on their actual knowledge and intuitions of the target language in production. Hammarberg also claimed that in the first encounter learners have with the L3 they form conceptions of crosslinguistic similarity and formulate hypotheses that can be tested and revised over time upon continued exposure to the L3. Learners’ hypotheses affect both reception and production processes and, as they are revised, learners selectively employ them to avoid negative transfer or to bolster language learning.

Typological proximity may refer not only to the similarity of entire language systems and their genetic relatedness (c.f. Croft, 1990, 2004) but also to similarities of language specifics. As pointed out by De Angelis (2007, as cited in Falk & Bardel, 2010) two unrelated languages may be
“formally similar as to certain formal features or components” (p. 194). Moreover, language relatedness does not necessarily imply exact sameness in respect to specific structures but may also apply to relative degrees of formal or semantic overlap. The idea of a modulated item-to-item relatedness is captured by the Parasitic Model of Vocabulary Development (Hall, 2002; Hall & Ecke, 2003), which posits that word learning is driven by unconscious and automatic detection of similarities between new input and information already stored in the mental lexicon either as L1, L2, or L3 (Hall et al., 2009, p. 154). Points of connection between languages are said to be detected at three fundamental levels of lexical representation: form (lexeme), frame (grammar), and concept (meaning). The model predicts, therefore, that phonological and/or orthographic similarities of cognates (from any prior language) with L3 words will lead to the initial adoption of the cognate’s properties in determining the learner’s assumptions regarding the meaning, form, or syntactic behavior of the L3 words, which are then stored in long-term memory on the basis of such parasitic connections.

According to Ecke (2014), this process is modulated by numerous lexicon-external factors, including learner factors (e.g. learners’ perceptions, metalinguistic awareness), learning factors (e.g. L2 status, order of acquisition, proficiency), event factors (e.g. language mode, task, style, interlocutor) and language factors (which include the overall typological relationship between all the languages involved and degree of contact). Crosslinguistic similarity research has also looked at word recognition and lexical access, focusing on the processing effects of different types of cognates, e.g. identical cognates (words with identical meaning and orthography), non-identical cognates (words that share similar but not identical form and meaning), homographs or false friends (words similar in form but with different meanings), and interlingual neighbors (words from different languages differing only by one letter position). The Bilingual Interactive Activation (BIA) model (Dijkstra & van Heuven, 1998, 2002a), for instance, assumes that lexical access is
nonselective in nature, meaning that learners’ multiple language systems are stored in an integrated lexicon, and that competition and selection effects occur between lexical candidates of different languages. The effects of language proximity lexical activation are also not understood in isolation. Dijkstra et al. (1998), drawing on Grosjean’s (1997, 1998) concept of bilingual mode, identified four factors affecting the degree of selectivity involved in word recognition: target language proficiency, crosslinguistic similarity, (orthographic, phonological, or semantic), learning task, and intermixing (whether input incorporates elements of just one or more than one prior language). Evidence that additional factors interact with perceived and genetic typology in determining the source of transfer can be found in studies from different strands of CLI research (Cenoz, 2001; Dijkstra, 2005; Bardel & Lindqvist, 2007).

In the last two decades, several L3 studies have offered support to the hypothesis that (psycho)typological closeness facilitates transfer among learners’ known languages (Cenoz, 2001, 2003; De Angelis, 2005a, 2005b; Bardel & Lindqvist, 2007). CLI studies have looked at the effects of language distance and psychotypology in a variety of areas, such as syntactic transfer (Rutherford, 1983; Flynn et al., 2004; Leung, 2005, 2006; Bardel & Falk, 2006; Rothman, 2010; Rast, 2010; Park & Starr, 2016), morphosyntactic processing (Stowe & Haan, 2006; Tokowicz & Warren, 2010; Tolentino & Tokowicz, 2014), morphological awareness (Zhang, 2013), phonology (Llama et al., 2010; Trude & Tokowicz, 2011), lexical transfer (Cenoz, 2003; Bardel & Lindqvist, 2007; Hall et al, 2009), conceptual transfer (Hickmann & Hendriks, 2010), and multi-domain (Ahukanna, Lund, & Gentile, 1981; Singleton, 1987; Cenoz, 2001; Ringbom, 2002, 2008; Illomaki, 2005). Furthermore, Tokowicz and MacWhinney (2005) have found evidence of the interaction between sensitivity to grammar violations and language typology using ERPs. In SLA, there have also been attempts outside CA to operationalize and measure the distance between language systems. For example, Chiswick and Miller (2005) investigated the distance between English and
other languages, based on the difficulty experienced by L1 English speakers in second language learning. Talmy (1985) proposed a semantic typology of languages based on how cognitive concepts and notions are mapped onto lexical items and constructions. Talmy’s analysis takes into account the notion of universal events and domains, contrasting the different ways in which they are lexicalized in different languages. Analyses of phonological typological proximity can be found in James (1996) and Hyman (2014).

The importance of typological proximity has been especially recognized in Europe. As pointed out by Lüdi (2013), a functional and more inclusive conception of multilingualism (as endorsed by the Council of Europe, 2001) defines it as “the ability to interact, even imperfectly, in several languages in everyday settings” and acknowledges the important socio-political implications of cross-cultural communication enabled by the typological similarities among European languages (p. 142), a phenomenon which has been often referred to as receptive multilingualism (Braunmüller, 2007, 2013). Braunmüller (2013) defined receptive multilingualism as a form of “mutual, unmediated communication between different dialects and languages” (p. 215), where ‘unmediated’ means that no lingua franca is used. Rehbein, ten Thije, and Verschik (2012) called this mode of communication lingua receptiva (LaRa), which ten Thije (2013) claimed is not restricted to genetically related languages and involves a set of receptive skills developed from both the attention to crosslinguistic formal similarities and the use of discourse strategies. Several studies, including those published in a special issue of the International Journal of Multilingualism in 2013, have addressed the mutual intelligibility among Romance languages, West Germanic languages, Nordic/Scandinavian languages, and Slavic/Uralic languages. The relevance of receptive multilingualism in Europe and elsewhere, as well as its pedagogical implication, are discussed in Hufeisen and Marx (2007).
Models of CLI and L3 acquisition.

Generative accounts of CLI are those interested in what the interaction of multiple language systems tells us about the role of Universal Grammar (UG) in adult language learning. A common assumption of the CLI generative strand is that language learning is regulated by innate language-specific mechanisms, determined by universal principles and constraints, following Chomsky’s Principles and Parameters theory (1981, 1986). According to Chomsky, while parameter-setting is available during L1 acquisition, it may not be accessible after the critical period for learning of other languages, and L1 and L2 knowledge are thus believed to be acquired through different processes (White, 2003). Different generative theoretical accounts, however, make different predictions as to the availability of UG after the critical period. Some insist that UG is completely inaccessible in adulthood (the no-access hypothesis), while others suggest that UG might be partially or entirely available (the partial-access and full-access hypotheses, respectively). The order of language acquisition and the role the L1 and L2 play in the acquisition of further languages are, therefore, key concerns in the CLI generativist strand, since it could support arguments to prove or disprove hypotheses about UG accessibility in adults (Leung, 2007; Cabrelli, Iverson & Judy, 2009; Iverson, 2010). Evidence in support of the different UG theories have important implications for CLI, predicting what gets transferred from each prior language. In second language acquisition, six common (and overlapping) positions referring to the role of the learner’s L1 are (1) no-access/no-transfer; (2) full access/no-transfer, (3) no-access/partial-transfer, (4) full-access/partial transfer; (5) no-access/full-transfer; and (6) full-access/full-transfer (Sauter, 2002). While the no-access/no-transfer and full access/no-transfer positions pose opposite hypotheses about the availability of UG, both predict no transfer from L1. The no-access/partial-transfer and full-access/partial transfer positions also make opposite predictions concerning access to UG but admit that some properties of the L1 are transferable to L2 and later languages. Finally, the no-access/full-transfer and full-
access/full-transfer positions both assume that all instantiations of the L1 contribute to the learners’ initial theory of the L2.

In L3 acquisition, many studies have investigated parameter resetting, arguing that an L2 parameter setting that differs from the L1’s setting can only be transferred to the learner’s L3 if it is reset during L2 acquisition, which would support the full-access hypothesis. Cabrelli Amaro and Rothman (2010) tested and confirmed this prediction. Their findings in a study of L3 Portuguese acquisition led to the proposal of the Phonological Permeability Hypothesis (PPH), which holds that if the L2 or another non-native system achieves native-like status, its CLI effects are comparable to those from the L1. Generativist studies, then, pay special attention to the end state of L2 grammars (Iverson, 2010; García-Mayo & Rothman, 2012). Looking at L2 acquisition, evidence of parameter resetting was also found by Rothman (2007, 2009), Gallego (2008), Iverson and Rothman (2008, 2009), Pires and Rothman (2009), among others. In L3 research, Cabrelli et al. (2008), Guijarro-Fuentes et al. (2008), and Iverson (2009, 2010) found similar results. Additionally, Guijarro-Fuentes et al. (2008) and Iverson (2009) compared L1 English/L2 Spanish speakers to Heritage Spanish speakers and found that both groups successfully transferred Spanish parameters to their L3. These studies support the idea that native-like ultimate attainment in a second language is achievable, challenging the notion of a strong critical period and offering alternative explanation for L2 learning shortcomings (e.g. language distance, inhibitory effects, etc.). In terms of type of transfer, most generative CLI studies have produced evidence of positive and facilitative effects, supporting full-transfer or partial transfer hypotheses (although see García-Mayo, 2012, for studies supporting the no-access hypothesis).

A more recent methodological discussion in L3 generative studies concerns the amount of target language experience. Because other variables later interfere with development as learners become more proficient in their L3, early stages of L3 acquisition are believed to reflect more
faithfully the underlying grammatical representations of the L3 (Cabrelli, Iverson, Judy & Rothman, 2008; Iverson, 2010; García-Mayo & Rothman, 2012). Commenting on a series of CLI generative studies that have looked beyond initial states of L3 (e.g. Leung, 2007b; Jaensch, 2008, 2009; Na Ranong & Leung, 2009; Foote, 2009; Montrul et al., 2011), García-Mayo and Rothman (2012) argued that such studies cannot make theoretical predictions about UG, even though they still contribute valid information to the description of CLI phenomena.

Research in the generative strand has led to the postulation of different models of L3 acquisition, having CLI as a central component. Strong views of L1 transfer (e.g. Schwartz & Sprouse, 1994), for instance, posit a privileged role for the native language in second and third language acquisition and have been supported more recently by studies such as Na Ranong and Leung (2009), Hermas (2010, 2015), and Jin (2009). However, claims regarding the primacy role of L1 in L3 acquisition are only valid if there is evidence that the relevant L2 properties have been successfully acquired and are available for transfer, which is not always verified in CLI studies, as in the case of Hermas (2015). Also, the role of L1 is often conflated with other variables such as typology (e.g. Na Ranong & Leung, 2009). Therefore, while the role of L1 has been validated by many studies (White, 1986; Haznedar, 1997; Leung, 2005) and certainly cannot be ignored, findings from these studies do support the exclusion of L2 influence, as pointed out by Slabakova (2016).

Nevertheless, and although L1 primacy hypotheses have not actually been formalized as a model of L3 acquisition, they are sometimes referred to as the L1 Transfer Factor Model (as in Slabakova & García-Mayo, 2016). Drawing on Meisel’s (1983) idea of a foreign effect and on previous work by William and Hammarberg (2009 [1998]), Bardel and Falk (2007) proposed an alternative view of L3 acquisition, the L2 Status Hypothesis, also known as the L2 Status Factor Model. The model predicts that the learner’s L2 works as a filter inhibiting transfer from the L. When L1 knowledge is inhibited, knowledge of nonnative languages is selected as the source of transfer in the acquisition
of the new language systems regardless of language typology, materializing as either negative or positive transfer. Several studies offered support to these claims (Hammarberg, 2001; Bohnacker, 2006; Llama et al., 2010; Bardel & Falk, 2007, 2012; Falk & Bardel, 2011). In addition, Bardel and Falk (2012) claimed that the L2 is stored in both declarative and procedural memory, which would explain why it is more accessible than the L1. In a study of lexical transfer, however, Flynn et al. (2004) investigated the speech of Kazakh/Russian and Kazakh/Japanese bilinguals learning L3 English and found that all of the learners’ previously learned languages contributed some amount of CLI in L3 development, contradicting predictions of the L2 Status Factor Model. They concluded that CLI would be better explained in terms of a cumulative effect and proposed the Cumulative Enhancement Model (CEM), which predicts CLI from learners’ L1 and nonnative languages. In this model, CLI is always conducive to the learning process. Consequently, whenever knowledge of previously learned languages is not facilitative, CLI effects are neutralized. The model, however, does not explain why learners with different language backgrounds have more or less difficulty acquiring specific features of the L3 and why certain aspects of background languages transfer more than others. Further evidence of the CEM was found by Flynn (2009) and Berkes and Flynn (2012a, 2012b).

Rothman and Cabrelli Amaro (2010) investigated the acquisition of the null subject parameter in the performance L1 English/L2 Spanish speakers learning either L3 French or L3 Italian, where English and French are non-pro-drop languages and Spanish and Italian are pro-drop languages. They found that the pro-drop features of Spanish were transferred to both L3 Italian (resulting in a facilitative effect) and to L3 French (resulting in a non-facilitative effect). Although agreeing that their data could be explained by L2 Status Factor Model, they suggested that Kellerman’s notion of psychotypology provided a better explanation. They hypothesized that both the L1 and the L2 were actually available for transfer but that the perceived similarity between
language pairs (in their case, Spanish/Italian and Spanish/French) was a stronger conditioning factor for transfer than order of acquisition. This explanation would be in line with a modified version of the CEM, embracing the idea of cumulative effects while also accepting that properties of learned languages can be transferred correctly or erroneously to a psychotypologically close language. Rothman and Cabrelli Amaro could not confirm this hypothesis, as they did not have a control group formed by L1 Spanish/L2 English speakers learning L3 Italian or L3 French. In a later publication, Rothman (2010) re-examined these ideas and proposed the Typological Primacy Model (TPM). The TPM posits that L3 development is constrained by what the learner’s internal parser identifies as similar between the target language and any previously acquired system. When neither the L1 or the L2 are (psycho)typologically similar to L3, (psycho)typology will not be a relevant factor for transfer. In fact, in such conditions, the TPM assigns a strong role to the L1 as a source of CLI (Leung 2005). However, if any previously learned language is typologically close to the L3, (psycho)typology will be the strongest factor determining the source of CLI. Also, the closer a prior language is to the learner’s L3, the greater the chances its features will materialize in the L3. Investigating L3 Portuguese word order and relative clause attachment in the production of L1 English/L2 Spanish and L1 Spanish/L2 English bilinguals, Rothman (2010, 2011, 2013) found further evidence supporting the TPM. His findings showed that Spanish features transferred into L3 Portuguese irrespective of order of acquisition (i.e. as both L1 and L2 Spanish). Results from Carvalho and Silva (2006) and Montrul et al. (2011) are also consistent with TPM predictions.

The CEM, L2 Status Factor, and TPM are formal linguistic models of L3 transfer (Rothman & Halloran, 2013). Despite having different assumptions, these models focus on factors determining the source of CLI which take into account order of acquisition and the age of onset of the learner’s multiple languages. They tend to operationalize transfer as performance on offline tasks, such as Grammaticality Judgment Tasks (GJTs) and production tasks, without exposing participants to
treatment conditions. In addition, as pointed out by Slabakova (2016), while the TPM focuses on initial stages of third language acquisition, the L2 status and CEM address how linguistic development unfold beyond the initial states. Incorporating some assertions of both the CEM and the TPM, Slabakova (2016) proposed a new model of third language acquisition, integrating premises of both generative research and cognitive linguistics. Slabakova’s Scalpel Model postulates that (1) neither the L1 nor the L2 have a privileged status with respect to transfer, (2) transfer can be either detrimental or facilitative, and (3) transfer in initial states of L3 acquisition is not ‘wholesale,’ but feature-to-feature or property-specific. According to this model, the grammars already acquired by the learner act with scalpel-like precision extracting the L1 or L2 options that are most relevant to L3 development. While this mechanism more often results in facilitative effects, it can be blunted, shunted, or slanted by additional factors such as processing complexity, language experience, and other characteristics of the input, resulting in negative transfer (p. 13).

The Scalpel Model, therefore, clearly predicts differential development for linguistic items and features based on, but not restricted to, crosslinguistic similarity. Slabakova argued that, in line with Hal and Ecke’s (2003) Parasitic Model and Westergaard, Mitrofanova, Mykhaylyk and Rodina’s (2016) Linguistic Proximity Model, this selective view of CLI goes against the underpinnings of the TPM, which is motivated by the assumption of cognitive economy whereby influence of one grammatical system blocks or inhibits influence from another in its entirety.

In CLI research, language processing is addressed by psycholinguistic production models (Green, 1997; De Bot, 1992, 2004), speech perception models (Kulh, 1993, 2000a; Best, 1995; Flege, 1995), and general models of language acquisition (Hufeisen, 1998; Herdina & Jessner, 2001; Meißner, 2004). Perhaps the only model of language acquisition to encompass the role of the L2 in L3 input processing (albeit in later revisions) is the Competition Model (Bates &
MacWhinney, 1989; MacWhinney, 1997b, 2005, 2007). Some of these models will be discussed in
the section “Input processing, learning stages, and CLI.”

**CLI experimental studies.**

The current study investigates morphosyntactic and lexical CLI in a typologically close
language pair, predicting non-facilitative CLI Spanish effects in Portuguese acquisition. Therefore,
in this section I begin by discussing CLI studies that have investigated lexical transfer, focusing on
typological proximity and then on cognate effects. Next, I discuss studies that have examined
morphosyntactic transfer and studies that have shown evidence of negative transfer. Generative and
psycholinguistic studies that investigated CLI in Portuguese acquisition will be described in the next
section.

**Lexical transfer studies.** Falk and Bardel (2010) pointed out that one of the most
investigated areas in L3 acquisition and CLI is vocabulary, or lexical learning. For instance,
Ringbom (1983) conducted a qualitative corpus analysis of English essays written by L1 Finnish
speakers with or without knowledge of Swedish. He distinguished between two types of lexical
CLI: borrowings (e.g. false friends, hybrids, blends, relexifications) and transfer (semantic
extension and loan translation). Results showed very little transfer from Finnish into English for
both groups. While Finnish-Swedish speakers transferred and borrowed mostly from Swedish into
English, Finnish speakers who did not know Swedish transferred and borrowed from other
languages considered more closely related to English than Finnish. Ringbom hypothesized that in
eyarly stages of learning, storage is based on formal rather than on semantic similarities, and that the
formal similarities between English and Swedish led words to be stored so near to each other that
Swedish words were often activated in early English production. Singleton (1987) conducted a case
study examining transfer effects in the production of a native speaker of English learning French
and who also spoke Irish, Latin, and Spanish. His participant, who had learned French
naturalistically, was recorded in conversations with French native speakers and then asked to reflect
on aspects of his own language production. Results revealed a higher number of Spanish
expressions in L3 French, compared to interferences from English, Latin, and Irish. The
participant’s reflection also showed that he perceived Spanish and French to be structurally close,
although he did not always realize he was using borrowed words from Spanish while speaking
French.

Cenoz (2001) investigated whether factors such linguistic distance, age, and L2 status factor
(as in William & Hammarberg, 1998) affected CLI in the production of L3 English content and
functional words. Participants were L1 Basque/L2 Spanish or L1 Spanish/L2 Basque speakers
learning L3 English in elementary and secondary school. Data was collected using a story-telling
oral task, and CLI was coded as interactional strategies (metalinguistic comments), code-switching
(sentence level), and transfer (restricted to one or two terms). Cenoz found that, in general, content
words were transferred much more than functional words and that CLI effects in oral production
were greater for older learners than for younger learners. Also, all learners transferred more words
from Spanish than from Basque, irrespective of their L1, favoring typological proximity
(English/Spanish) and disfavoring the L2 status as a transfer factor. Similar results were found by
Cenoz (2003). Having one of the researchers as the participant, Bardel and Lindqvist (2007)
conducted a case-study in which they observed the effects of typology, proficiency, recency, and L2
status in L3 Italian. The participant’s prior languages were L1 Swedish, L2 English, L2 French, and
L2 Spanish. Recordings were obtained on four occasions: before, during, immediately after, and six
months after an intensive beginner course of Italian. The analysis of code-switching instances
showed that the participant transferred mostly from Spanish (51%) and French (30%) into Italian,
but that the source of transfer changed over time. Transfer instances decreased significantly from
pretest to the posttest (immediately after the course completion), but increased six months later, with a predominant use of French words (60%). The analysis of word construction attempts showed an overall predominance of French transfers (81%), with influences from other languages close to zero, and a relative stable amount of transfer from pre- to immediate posttest, which significantly diminished after six months. A qualitative analysis of the data showed that the different languages had different functions in L3 oral production. The authors concluded that transfer effects decreased with L3 experience and that typology (and not L2 status) had the most explanatory power determining the source of transfer, although recency could also explain the increased transfer from Spanish.

Looking at receptive bilingualism, van Bezooijen and Gooskens (2007) investigated attitudes and linguistic distance in the mutual intelligibility between written Dutch, Frisian, and Afrikaans, seeking to explain why it seemed easier for Dutch speakers to understand Afrikaans than Frisian. Their participants were adult L1 speakers of Dutch with no previous knowledge of Afrikaans and Frisian who were asked to complete a cloze test is each of the target languages, having to choose from a language bank containing five nouns, five adverbs, five adjectives, and five verbs. Accuracy results showed that the intelligibility of the Afrikaans text was significantly higher (81.8%) than for Frisian (50.3%). Language distance was calculated for lexical and functional words using seven different measures, including the number of cognates versus non-cognates, transparency of relatedness, and the Lewenshtein distance (which expresses the degree of orthographic dissimilarity between corresponding words). Results showed that both Afrikaans and Frisian shared a similar number of direct lexical cognates with Dutch. Also, whereas Frisian and Dutch shared a greater number of functional cognates, Afrikaans and Dutch had a greater number of cognates via paradigm. Transparency of relatedness was greater for function words in Frisian and for lexical words in Afrikaans. Finally, the Lewenshtein distance for cognate words was higher for
Frisian (34%) than for Afrikaans (20.9%). Attitude was assessed via a questionnaire about the participants’ impressions of the target languages, their speakers, and territories. The participants’ answers revealed that attitudes were overall more positive toward Afrikaans than toward Frisian, with Dutch speakers showing more motivation to learn Afrikaans than Frisian, judging South Africans as more intelligent than Frisians, and expressing more desire to visit South Africa than Friesland. Although highlighting the complexity and difficulties in measuring language relatedness, the study showed that both structural similarity and learners’ positive attitudes correlate with higher degrees of comprehension.

Lindqvist (2015) looked at how psychotypology affected both lexical and grammatical CLI in L3 French written production. L1 Swedish speakers enrolled in secondary school and who also spoke L2 English completed a perceptions questionnaire about how easy it was to learn French and English, and how close they perceived French, Swedish, and English to be in general and in respect to lexical words and grammar. Data from a story retelling corpus was coded for word-level instances of code-switching. Lindqvist found that most CLI lexical instances came from English (70%), compared to Swedish (25%). The same pattern was found for grammar (24% versus 13%). The perceptions survey revealed that not only did participants find English easier to learn; they also believed English to be closer to French than Swedish and French, confirming the hypothesis that learners transfer more from languages they perceive closer to the L3.

While the studies above point to a strong role of language proximity and psychotypology in CLI, as noted by Ecke (2014) in a review of studies supporting either the L2 status effect or typological proximity, not only the combination of target and prior languages does not allow for determining the primacy of one factor or the other in many cases, but even in studies reporting strong arguments in favor of the L2 status, (psycho)typological effects cannot be excluded. For example, Hall et al. (2009) examined whether L1 Spanish/L2 English speakers learning L3 German
and L3 French would assume that verbs shared syntactic frames with the respective cognate forms in the typologically closer language. In the experiment, participants were exposed to novel L3 (French or German) verbs together with English and Spanish translations, but without cues to their syntactic frame. There were three types of verbs: cognates with the L1 Spanish, cognates with L2 English, and non-cognates. Participants were tested on a forced-recognition task that presented the L3 verbs in syntactic frames from both English and Spanish. Hall et al. found that when the L3 shared typological similarity with either the L1 or the L2 (as in the case of cognates), typology was the most significant factor for transfer. However, when the novel L3 forms lacked any cognate status with the L1 or L2, participants preferred to transfer from the L2 status language. Bono (2011) investigated the relative influence of typological proximity, proficiency, and L2 status in the acquisition of L3 Spanish by L1 French/L2 English speakers, while also looking at the impact of metalinguistic awareness. Her participants were enrolled in first and third semester Spanish classes. Oral production data were recorded during classroom sessions, and CLI was coded as pragmatic language switches, such as metalinguistic reflections, explicit inserts, implicit inserts, and non-elicit inserts (which consisted of unintentional interferences). Bono found that the learners’ L1 was used as a mediating function in most instances of pragmatic, metalinguistic, and elicited switches. However, the source of 63% of non-elicit inserts was either the L2 or a combination of the L2 and the L1. She concluded that in unintentional interferences the L2 status was a strong predicted of transfer, but a detailed analysis of individual learners’ L2s showed that typology was also a mediating factor.

**Syntactic transfer studies.** Drawing on work by Vinnitskaya, Flynn, and Foley (2003), Flynn et al. (2004) looked at the acquisition of three types of L3 English restrictive relative clauses (free headed, and specific and unspecific lexically headed), examining the role of learners’ L1 (Kazakh) and L2 (Russian) in adults and children. They hypothesized that language learning was
cumulative, so knowledge of complementizer phrase (CP) features from L2 Russian would facilitate development of similar L3 English features. Results from an oral elicited imitation task confirmed this hypothesis, showing that L2 syntactic features could also transfer to the L3. Comparing their result to those of Flynn (1983, 1987), who investigated L2 English acquisition by Japanese and Spanish speakers, they concluded that both L1 and L2 influenced L3 development and proposed the Cumulative Enhancement Model (CEM) for language acquisition. Similar results were found by Berkes and Flynn (2012a, 2012b), who compared the production of relative clauses by L1 German speakers acquiring L2 English and L1 Hungarian/L2 German speakers learning L3 English.

Also from a generative perspective, Bardel and Falk (2007) investigated placement of negation in the acquisition of thematic and non-thematic verb phrases in initial states of L3 Swedish and L3 Dutch. In German, Dutch, and Swedish, sentence negation is post-verbal in the main clause, following the verb-second (V2) rule, unlike English and other non-Germanic languages. To test Håkansson, Pienemann, and Sayheli’s (2002) Developmentally Moderated Transfer Hypothesis (DMTH) and the CEM (Flynn et. al., 2004), which make different predictions about syntactic transfer from the L2 to L3, they conducted two experiments with a total of nine participants divided in two groups: those who had a non-V2 L1 (English, Italian, or Albanian) and a V2 L2 (German, Swedish, or Dutch) and those who have a V2 L1 (Swedish or Dutch) and a non-V2 L2 (English). Participants were learning either L3 Dutch or L3 Swedish (which are V2 languages) in a communicative (oral-only) classroom setting. Data consisted of recordings from class sessions and individual meetings. Bardel and Falk found not only that knowledge of the V2 rule was transferable from the L2 to L3 (contradicting the DMTH) but that learners with a V2 L2 outperformed learners with a V2 L1. They interpreted these results as a stronger evidence of the L2 status factor over the typology factor, and against the CEM, in line with Bohnacker’s (2007) findings. Falk and Bardel (2011) further investigated syntactic transfer from L1/L2 into L3 German at an intermediate level of
proficiency in the target language by testing the placement of object pronouns in both main and subordinate clauses using a grammaticality judgement/correction task (GJCT). Their participants were L1 English/L2 French and L1 French/L2 English learners of German. Results showed positive and negative transfer from the learners’ L2, supporting the L2 status factor. However, Pienemann, Lenzing and Jörg-U. Keßler (2016) contested the validity of Bardel and Falk’s (2007) design in a replication study. They claimed that the initial L3 word order and initial position of negation in the production of L2 German by L1 Swedish was neither determined by the L1 nor by the L2 but rather were predicted on the basis of processability.

Syntactic development in L3 acquisition was also examined by Kulundary and Gabriele (2012) in a study on the comprehension of English coordinating and relative clauses by L1 Russian speakers learning L2 English and L1 Tuvan/L2 Russian speakers learning L3 English. While English, Russian, and Tuvan are typologically distinct (and distant) languages, Russian and English share important similarities with respect to relative clauses, so positive transfer from Russian to English was expected. L2 Russian speakers were assessed in their proficiency of Russian and divided in three groups: near-native, advanced, and high intermediate. Results showed transfer from Russian as either L1 or L2. Also, the higher the proficiency in L2 Russian, the better the performance in L3 English. Higher English proficiency also predicted better performance and lower levels of CLI. However, the authors identified similar morphosyntactic error patterns in the English production of both groups, which they attributed to negative transfer from Russian, showing that once crosslinguistic structures are perceived as similar, learners may transfer full strategies from one language to another, disregarding subtle differences. Cheung, Mathews, and Tsang (2011) investigated backward transfer from L3 German in the use and interpretation of L2 English tense and aspect. They hypothesized that due to the overlap between the two languages, German would have a negative influence in the acquisition of the present perfect/past simple distinction. Results
from two groups were compared: L1 Cantonese/L2 English speakers who were in their third semester of L3 German and L1 Cantonese/L2 English speakers with no knowledge of European languages. The participants’ English proficiency was not reported. The authors analyzed the participants’ English written production and their intuitions on a GJT and found evidence of the influence of L3 German in English production, with non-target patterns that differed from those in the control group. Moreover, a comparison between English and the German essay versions revealed a tendency to extend the use of the perfect tense to English in contexts where the perfect tense had been correctly used in German. Results supported typological proximity and recency as the major conditioning factors for transfer.

Tolentino and Tokowicz (2014) conducted an experiment to investigate the effects of instruction, text manipulation (enhancement), individual differences, and crosslinguistic similarity in L2 grammar learning. Their participants were L1 English speakers with no knowledge of Germanic languages, exposed to L2 Swedish for the first time during a four-session training period and divided in three learning conditions: salience and no rule explanation, salience and rule explanation, and control (no salience and no rule explanation). Crosslinguistic similarity was operationalized with the choice of contrasting and converging features between English and Swedish: demonstrative determiner/noun plural agreement (similar feature) and noun phrase definiteness marking (dissimilar feature). Results from GJTs and rule verbalization tasks showed an effect for crosslinguistic similarity, with significant higher performance on the similar feature, which was more evident in early stages. Learning of dissimilar features was facilitated overall by input salience, as well as by explicit instruction at the very early stage and by absence of explicit explanation at later stages. Results also showed a trend effect for the positive interaction between grammatical sensitivity, as measured by the MLAT-WIS, and overall higher posttest scores. Looking at the effects of language similarity, Park and Starr (2016) examined the performance of
Chinese/English early bilinguals with or without formal instruction in additional languages (e.g. Japanese, German, French, Thai, Bahasa Indonesia) learning L3 Korean. A GJT was used to test the performance of the two groups on the acquisition of Korean case markers in four argument structures: intransitive verbs, transitive verbs with both arguments, transitive verbs with one omitted argument, and descriptive verbs. It was hypothesized that (1) the early bilingual group with an additional language (EBL+L2) would outperform the group without additional languages (EBL), (2) Japanese learners would outperform other learners due to the close typological proximity between Korean and Japanese, and (3) learners would perform better on L3 structures similar to their L1 or early L2. They found that the EBL+L2 group overall outperformed the EBL group, especially in the recognition of the Korean marking system (confirming their first hypothesis), and that Japanese learners slightly outperformed other participants, although the difference was not significant. The analysis of sentence type showed that both groups performed better on Korean sentence types that were analogous to English than on sentence patterns that were unique to Korean, confirming their third hypothesis.

In an earlier study, Birner and Ward (1998) examined the influence of Spanish and Basque as either L1 or L2 in the acquisition L3 English sentence Topicalization by testing learners’ perceptions of grammaticality in a GJT. Results were compared to an English monolingual control group. While English and Basque show a preference for object fronting without resorting to a resumptive clitic in argument position, Spanish uses clitic left dislocation constructions, so positive influence from Basque was expected in the recognition of English grammatical sentences. However, they observed the opposite pattern, with a significantly higher rate of participants rating Spanish-like Topicalizations in English as correct. They concluded that Spanish had a detrimental effect in the acquisition of English Topicalization patterns, irrespective of order of acquisition of Spanish (L1 or L2). To test the predictions of the L1 factor, the L2 Status Factor Model, the CEM, and the
TPM, Slabakova and García-Mayo conducted two studies investigating Topicalization and null objects in the interface of Spanish, Basque, and English, extending Birner and Ward’s (1998) work. Their participants consisted of four groups: two control groups (L1 Spanish/L2 English and L1 English monolinguals) and two groups of trilinguals varying by the order of acquisition of Spanish and Basque (L1 Spanish/L2 Basque/L3 English and L1 Basque/L2 Spanish/L3 English). All groups participated in both studies (Slabakova & García-Mayo, 2015; and García-Mayo & Slabakova, 2015). In addition, trilingual participants were advanced speakers of English and early bilinguals of Spanish/Basque, so their L1 status is based on home language and language dominance, more than order of acquisition. For both studies, the researchers predicted that, since Spanish would serve as a source of transfer for bilingual and trilingual groups due to linguistic similarities with English, Topicalization without a resumptive clitic/pronoun would be rejected, blocking facilitative influence from Basque (p. 8-9).

In García Mayo and Slabakova (2015), participants were exposed to stories in written and aural mode, which provided context for GJT sentences containing instances of null object constructions (NOCs). Two English sentences were presented at once, representing one of 12 linguistic contexts with [−definite, −specific] dropped objects or [+definite, +specific] dropped objects. In this case, the three languages involved displayed different semantic requirements for the target structure, with Basque allowing for null objects across the board, Spanish only under certain semantic conditions, and English disallowing it in the standard variety. The ratings from all experimental groups revealed successful acquisition of the English pronominal patterns. However, both trilingual groups (Spanish-dominant and Basque-dominant), as well as the L1 Spanish/L2 English group, displayed significantly higher ratings in favor of [−definite, −specific] NOCs than for [+definite, +specific] NOCs, confirming a predominance of Spanish CLI and contradicting the
predictions of the L1 factor and the L2 factor hypotheses. The presence of non-facilitative transfer strategies from Spanish features into L2 and L3 English did not support the CEM either.

García Mayo and Slabakova argued that while their results could appear to support the TPM (which predicts that the whole grammar of typologically similar languages is available for transfer), only an investigation of multiple linguistic item types that differed across the three languages could confirm TPM predictions or, alternatively, support a feature-by-feature approach to transfer. Slobakova and García Mayo (2015) employed the same experimental design as in García Mayo and Slabakova (2015), but the stimuli contained three dislocated constructions in English: Topicalization, focus fronting (FF), and left dislocation (LD) in root clauses embedded under the appropriate contexts. While Basque and English differ in the use of pronouns in LD constructions, Basque and Spanish differ on Topic and LD constructions, and English and Spanish differ on Topic constructions. Results showed that regardless of whether Spanish was the participants’ L1 or L2, it had the same drastic effect in terms of reducing their ability to acquire Topicalization in English. In other words, neither L1 positive transfer nor L2 positive transfer on their own can overcome the adverse effects of a conflicting value in the L2 or the L1, respectively (p. 221), providing evidence against the L1 factor, the L2 status, and the CEM.

**Contrastive analysis (CA) studies on nonnative Portuguese acquisition.**

Important in the PSS field, Portuguese and Spanish contrastive analysis (CA) studies describe converging lexical and structural features that allow for their high degrees of mutual intelligibility. These studies also provide descriptions of lexical, phonological, and morphosyntactic contrasts between the two languages referenced in the elaboration of pedagogical materials and curricular decisions. Publications in this area range from simple lists of observed similarities and contrasts to more in-depth analysis of underlying structures and usage, but irrespective of their scientific rigor they all contribute to the field of CLI research. Covering a broad range of linguistic
phenomena, some of these studies were written in the form of textbooks and pedagogical materials for PSL/PFL (Bachi, 1831; Ulsh, 1971; Feldman, 1975; Simões, 2009) or Spanish as a second language (SSL), such as Duarte’s (2005) and Moreno and Fernández’s (2007) comparative grammar books and Brione’s (2001) monograph on error and contrastive analyses. Others have examined more specific linguistic aspects such as false cognates and semantic differences (Resnick, 1945; Schmitz, 1970; Arriola, 1973; Amaral, 1989; Álvarez Martínez, 1997; Leiria, 1998, Briones, 2000; Alvez, 2002; Barbosa da Silva, 2002; Silva & Zerwes, 2010; Ceolín, 2003), cognates that diverge in gender (Resnick, 1953; Thogmartin & Courteau, 1985), borrowings (Vásquez Cusesta & Mendes da Luz, 1961), morphosyntactic contrasts (Beardsley, 1953; Cassol, 1969; Cavell, 1972; Azevedo, 1978; Hoyos, 1980, 1997; Brakel, 1980; Treshner, 1989; Amarante, 1998; Van de Wiel, 2001; Barros, 2002; Andrade, 2004; Carrera de la Red & Rodrigues, 2006; Gueslin & Guijarro-Fuentes, 2006; Cantero, 2014; Martins, 2014; Oliveira Santos, 2015), phonological contrasts (Abreu, 1964; Simões, 1989, 1999; Pletsch & García, 1994; Ferreira & Holt, 2014), and pragmatic differences (Trouch, 1971; Briones & Perez, 2002; Posio, 2008; Doerflinger, 2013).

Along with these mainly descriptive works, and following the error analysis tradition to a greater or lesser extent, researchers have also investigated areas of difficulty encountered by SSLPs and the and type of errors they produce in the classroom. For example, Chandler (1958) provided a list of morphological and lexical correspondences between Spanish and Portuguese intended to help learners, which included the ‘change’ of the suffixes –ción into –ão (emoción> emoção) and -tible into –ível (comestible>comestível), verb endings like –ice into –iz (dice> diz), intervocalic –ch into –it (hecho> feito), final –d into -de (ciudad> cidade), initial –h into –f (hermoso>formoso), diphthong –ie into /ɛ/ (tierra > terra), intervocalic –j into –lh (viejo > velho), suffix –aje into -agem (viaje > viagem), intervocalic –ll into –ch (llamar > chamar) or into –l (caballo> cavalo), final –n into –m (fin > fim), –ñ into –nh (sueño > sonho), –o into –ou (loco > louco), the loss of intervocalic
–c (acto > ato), and spelling conventions such as –cua into qua (cuarto > quarto), among others.

Azevedo (1978) referred to “resistance areas,” that is areas in which errors are particularly persistent across a group of learners (p. 19). Suggesting that more rigorous error analysis studies be conducted to quantify error persistency, he pinpointed those he believed deserved more attention: the contrast between open-mid and closed-mid vowels (/ɛ/ and /e/; /ɔ/ and /o/), the lack or overgeneralization of vowel nasal sounds, the pronunciation of stops as fricative consonants, the devoicing of /z/, plural formation, the insertion of an unnecessary personal a, the use of the present subjunctive for the future subjunctive, etc. Tarquino (1977) also analyzed phonological and morphosyntactic contrasts between Spanish and Portuguese from the learners’ perspective, offering his assessment of problematic areas, which included the perception and pronunciation of Portuguese vowel sounds not found in Spanish, preposition and definite article contractions, use and placement of clitics, differences in spelling, pragmatic uses of pronouns of treatment, and the distribution of personal infinitive and future subjunctive constructions. Akerberg (1998, 2013) called attention to the fact that the orthographic conventions of Spanish words interfered with the pronunciation of their Portuguese cognates. Grannier (2004) described problems of communication caused by mispronunciation of Portuguese words due to Spanish interference. Some of the problems she identified were the distinction between /b/ and /v/ and between /ɛ/ and /e/, as in words like ele ‘he’ and ela ‘she’, in which the quality of the initial vowel is crucial for comprehension. While affirming that the differences between the two languages are basically phonological and morphological, Jordan (1991) defended the use of CA as a pedagogical tool, giving special attention to the work of Takeushi (1984) who, in his study of L1 Portuguese speakers learning Spanish, concluded that lexical transfer errors were a great source of confusion.

These studies show that not all aspects of Portuguese acquisition are easy for SSLPs or facilitated by knowledge of Spanish. It is not uncommon for error analysis studies to allude to the
persistence of errors such as those mentioned above as some sort of interlanguage shortcoming or early fossilization. Most these assumptions come from anecdotal observations or quasi-experimental studies comparing the speech of SSLPs with different degrees of Portuguese experience. Carmolinga (1997) attributed the risk of fossilization to lack of challenge and motivation in later stages of Portuguese acquisition. In a case study of a 36-year-old Chilean man, Lombello (1983) looked at samples of oral speech collected after 3 months of his relocation to Brazil. She focused on lexical transfer of comparative, causative, and modal conjunctions whose semantics and pragmatic uses are not identical in both languages. By comparing the learner’s initial production to a second sample collected 2.5 months later at the end of an immersion Portuguese course, she concluded that there were no substantial differences, and that the learner’s interlanguage seemed to have had stabilized. Rojas (2006) compared the oral speech of two groups of L1 Spanish speakers with different times of arrivals in Brazil: 1 year (N=3) and approximately 4 years (N=3). She analyzed different types of errors and their effects on communication, and found no difference between groups. Noticing that only about 7.1% of errors caused breaks in communication, she posited that fossilization could be a consequence of the complacent attitude of Portuguese native speakers towards grammar errors and their perception of foreign accents as “charming.” In a qualitative analysis of SSLPs’ oral samples, Nobre (2002) described a study of persistent errors in pronunciation, such as consonant devoicing and depalatalization. His two experimental groups consisted of students in a PFL course in a Latin American country and students in an immersion language program in Brazil. Data were collected once after 35 days and again after 80 days of instruction for both groups. He hypothesized that Spanish speakers learning Portuguese in Brazil presented higher degrees of fossilization due to ease of communication with Portuguese native speakers. Results from his research, were not reported in the article, but the idea that when learners’ communication needs are met they display lower levels of motivation to improve is shared by Rojas.
(2006) and Ferreira (1995). SSLPs themselves, when surveyed about their perceptions of how Spanish helps them learn Portuguese and the easiness of learning a sibling language, have often reported that initially they see knowledge of Spanish as helpful, but later in the learning process they are confused or discouraged by the differences between the two languages (Arkerberg, 1996; Carvalho & Silva, 2006; Child, 2013).

One of the first studies to collect experimental data from SSLPs is Ferreira (1995). She analyzed a few examples of oral production of L1 Spanish speakers (N=3) after one year of language immersion course in Brazil and L1 Spanish speakers (N=3) after two years of formal Portuguese instruction as a foreign language. She found several examples of pronunciation errors and lexical transfer (e.g. devoicing of /z/, the use of Spanish words such as intentando ‘trying,’ similitude ‘similarity,’ apretar ‘to tighten’). She also compared the total number of errors in the samples and found that the immersion students erred 21.8% of the time versus 34.3% for students studying in a non-immersion context. Jensen (2004) analyzed CLI from Spanish in a corpus of written compositions in L3 Portuguese by groups of L1 English/L2 Spanish and L1 Spanish/L2 English speakers. He found that most errors could not be attributed to any of the learners’ prior language (no-transfer errors). The second major source of errors was Spanish. L1 Spanish speakers made more Spanish-related errors than L2 Spanish speakers. He also found that for both groups combined, CLI from Spanish was greater in spelling and vocabulary, while CLI from English was greater in the areas of syntax and vocabulary. Grannier and Carvalho (2001) also investigated the written production of SSLPs with different levels of proficiency. The data were samples from the written component of the CELPE-BRAS (2000) national Portuguese exam (N=15) and proficiency was determined by their scores on the exam (failed, level 1, and level 2). They identified a series of lexical, orthographic, morphosyntactic (e.g. wrong gender, verbal valency), syntactic (e.g. word order), and lexical-semantic errors (e.g. estoy a favor ‘sp.’ for ‘sou a favor ‘port.’). The analysis of
errors was not quantified. Instead, results were used in the design of pedagogical materials, and there was no comparison between the type and amount of errors by learners with different proficiencies. In a qualitative study, Melo Lucena and Martorelli (2013) analyzed 20 compositions written by learners in their first semester of Portuguese at the Federal University of Paraíba, Brazil. Participants were L1 Spanish speakers from Mexico or Spain. They identified several interlanguage interferences such as a razão por a qual ‘the reason why’ (morphosyntactic), fevereiro ‘february’ (phonological/orthographic), and a gente come muito ‘people eat too much’ (lexical/semantic).

Souza, Lystrup, and Scharff (2013) investigated the mutual interference of Spanish and Portuguese in written productions of 34 students enrolled in a first-semester Portuguese course for Spanish speakers. There were seven L1 Spanish speakers and 27 L2 Spanish speakers. However, participants were divided in groups based on their reported level of Spanish proficiency (very fluent, moderately fluent, and not fluent). There were two sets of data: (1) translations from English to Spanish collected once at mid-semester and later at the end of the semester, and (2) 5 Portuguese quizzes that combined grammar questions, vocabulary questions, and a free production task administered at five points during the semester. To measure the influence of nonnative Portuguese on participants’ Spanish, a two-way 2x3 ANOVA was conducted. Results showed a significant increase in the total amount of interferences from Portuguese overtime ($F(2, 26) = 8.41, p<.01$) and a significant difference by group ($F(1, 26) = 7.27, p=.01$), with higher levels of Spanish corresponding to less interference from Portuguese. The effects for group were only significant at the end of the semester, while by mid-semester all groups performed very similarly. The analysis of the Portuguese data showed that overall Spanish CLI decreased from 15% to 5% from the beginning to the end of the semester for all groups. There was no specific trend for the amount of CLI by group and time, perhaps due to the differences between the 5 quizzes. What is interesting about their results is that CLI from Spanish was smaller for the very fluent Spanish group than it was for
not fluent Spanish group, contradicting, for example, Rasuk’s (2008) predictions. Rojas (2006) examined the oral production of six L1 Spanish speakers from Latin America living in Brazil, using data collected from informal interviews. Her purpose was to verify possible signs of interlanguage fossilization through a quantitative and qualitative analysis of errors. Participants were divided in two groups based on time of residence in Brazil: one year (N=3) and 4 years (N=3). All participants had completed or were pursuing a college degree, but had different amounts of formal instruction in Portuguese. No measure of Portuguese proficiency was reported. Rojas classified the errors as interlingual (CLI from Spanish), intralingual (not associated with Spanish), ambiguous, and unique. From the total amount of errors, an average of 65% were interlingual errors in the production of the 1-year group and 50% in the 4-year group. Most interlingual errors for both groups were lexical interferences from Spanish. The amount of intralingual errors was similar for both groups, 12% (1-year group) and 11% (4-year group). Rojas interpreted these results as a relative stabilization of the learners’ interlanguage after 4 years of residence, with fossilization caused by Spanish CLI.

Moreover, 6 L1 Brazilian Portuguese speakers completed a survey about their perception of the SSLPs’ speech and classified the Portuguese learners’ interlingual errors as: (a) errors that did not impede comprehension, (b) errors that caused annoyance, or (c) errors that caused breaks in communication. Results showed that only 7.1% of the total interlingual errors were classified as causing breaks in communication. Rojas concluded that a high tolerance for errors that did not impede comprehension, the perception of the participants’ foreign accent as charming, and the low number of errors that actually caused communication problems contributed to an attitude of accommodation by Spanish speakers and lack of motivation to further develop their knowledge of Portuguese.

Pinto (2012) examined the written production of 32 L1 Arabic students from Morocco enrolled in a Portuguese Studies program. He divided them in three proficiency groups (elementary,
intermediate, and intermediate advanced) based on the year of the program they were in. Among the other languages spoken by participants were French (N=16), Spanish (N=11), English (N=2), and German (1). All Spanish speakers had completed the equivalent to a Bachelor’s Degree in Spanish. Pinto found 27 errors for the elementary group, 19 errors for the intermediate group, and eight errors for the intermediate/advanced group, for a total of 87% lexical errors and 13% morphosyntactic errors. 48% of the CLI found in the Portuguese writing tasks was considered to be from Spanish and 53% from French. Since participants in this study had such a diverse language background and no proficiency measure was used to assess their knowledge of Portuguese and other nonnative languages, it is difficult to draw any conclusions from results, other than the fact that lexical transfer seemed to be more prevalent. The greater amount of interferences from Spanish and French seems clearly connected to the fact that more participants spoke these languages, but the fact that very little CLI from Arabic was found offers supports to typological proximity theories and the L2 Status Factor, as pointed out by Pinto.

The studies above used oral and written corpora to identify and quantify a broad range of error types associated with the knowledge of Spanish in nonnative Portuguese. Other studies looked at more specific types of errors, such as lexical transfer (Leiria, 1998; Pinto, 2012), semantic and conceptual transfer (Salaberry & Martins, 2013, 2014), morphology (Galego, 2009; Akerberg, 2013), speech perception (Akerberg, 2001a, 2001b), pronunciation (Simões & Kelm, 1991; Akerberg, 2004; Grannier, 2004; Vaz, Coimbra, Teixeira, & Moutinho, 2003; Camargo, 2009), morphosyntax (Trullén, 2008) and pragmatics (Rodea, 1990; Koike & Flanzer, 2004, Araújo, 2008).

In an analysis of aspectual conceptualizations and the use of preterit and imperfect tenses in Portuguese and Spanish, Salaberry and Martins (2013) showed that, although mutual transfer is possible and relatively successful between the two languages, learners had difficulty learning more fine-grained conceptualizations of aspect that depended on complex levels of contextualization. In
the area of morphology, Galego (2009) conducted a CA study of nominalizations in Portuguese and English to identify of CLI influence from L1 English on/into nonnative Portuguese speech. Although the focus of her study was not the interaction between Spanish and Portuguese, she nonetheless found morphological influence from Spanish in the use of derivational morphemes such as –ción, –miento, –ad, and –aje, among others. However, no information was given about the language background of Portuguese learners other than their English L1. Akerberg (2013) investigated CLI from L1 Spanish into L2 Portuguese, looking at word formation (nominal derivation from 20 verbs and 10 adjectives). Her goal was to identify facilitative and non-facilitative factors in the acquisition of vocabulary. Participants were 77 students divided roughly according to their number of semesters of formal Portuguese instruction: an intermediate group (2 or 3 semesters), an advanced group (5 to 6 semesters), and a conversation group (from 3 to 6 semesters). While the overall accuracy for all groups was 26.18%, the average score for the intermediate group was 32% and for the advanced group 47% (data from the third group was not reported). Akerberg found that areas of positive CLI from Spanish (facilitative effect) included cognate words that followed the same derivational rule (e.g. llegar>llegar, chegar> chegada ‘to arrive>arrival’), words with different lexical bases (e.g. desarrollar> desarollo; desenvolver>desenvolvimento ‘to develop> development’), and words with salient suffixes (e.g. crer>crença). The facilitative effect in this case means that the learners’ accuracy scores for these words were higher. She also identified areas of negative CLI from Spanish (non-facilitative effect), including cognate words that follow different derivational rules (e.g. apto>aptitud/aptidão ‘capable>capability’), infrequent words with fewer salient suffixes (e.g. doido> doidice ‘crazy>craziness’), peculiar word formation in Portuguese (e.g. cair> queda ‘to fall>fall’), and words for which variants are found in the dictionary (e.g. conversar> conversa/conversação ‘to talk> talk’).
Akerberg also investigated the perception of the contrasts between the sibilants /s/ and /z/ (2001a) and between oral and nasal vowels (2001b). The problem with the acquisition of the distinction between /s/ and /z/ is not only the contrast in pronunciation between Portuguese/Spanish cognates, but spelling with both the letters s and z having different pronunciations if in word-initial, word-final, following a nasal vowel, or in intervocalic position. In Akerberg’s (2001a) study, 177 students participated in an oral perception task in which they heard Portuguese stimuli containing 25 words with the phoneme /s/ and 25 words with the phoneme /z/. Her participants were L1 Spanish speakers learning L2 Portuguese with different levels of language experience (from one to five semesters). Results showed an accuracy rate between 50% and 64% for learners in the first and second semesters of Portuguese instruction, 60% and 70% for learners in the third and fourth semesters, and 70% and 74% for learners in the fifth semester. She also conducted a qualitative analysis of the relationship between accuracy rates for specific words and their orthographic characteristics in contrast with Spanish. She hypothesized that spelling played an important role in the perception of Portuguese/Spanish cognates, together with learners’ beliefs about the importance of such distinction for communication. Akerberg (2001b) intended to verify if L1 Spanish speakers were able to discriminate between Portuguese oral and nasal vowels and whether their perception of nasal vowels improved with time. In a pilot study, she identified 40 words (20 minimal pairs) that presented problems for SSLPs (e.g. mau ‘bad’/mão ‘hand,’ mais ‘more’/mães ‘mothers,’ vida ‘life’/vinda ‘arrival’). Participants enrolled in Portuguese courses of different levels completed a task in which they listened to the stimuli and had to decide if they had heard a nasal or an oral sound. She found that the overall accuracy rates for all groups combined was between 40 and 90% and, while there was a slight improvement when comparing low level students to advanced students, more than half of the participants from levels 1 and 2 performed similarly to the majority of students in levels 4 and 5. Based on the results reported, it seems that in both Akerberg’s studies
the main emphasis of the analyses was to identify which phonemes/words were more problematic for L2 learners rather than determining how well they performed or how they improved with language experience.

At least five studies have addressed errors in Portuguese pronunciation due to Spanish CLI. Simões and Kelm (1991) studied the perception and production of open (/ɔ/ and /ɛ/) versus closed (/o/ and /e/) mid-vowels in the acquisition of nonnative Portuguese. They compared the performance of two groups, L2 Spanish speakers enrolled in a first-year Portuguese for Spanish Speakers course (N=4), and non-Spanish speakers enrolled in a traditional first-year Portuguese course (N=4). It was reported that participants in the Spanish group had a high level of Spanish, but it is not clear if Spanish was their L1, L2, or HL. The stimuli sentence trials were recorded by a native speaker of Brazilian Portuguese and consisted of 18 minimal pairs, four for each vowel contrast (/ɔ/ and /o/; /ɛ/ and /e/) and 10 distractors. Participants first listened and repeated the sentence trials in a production task. A few days later, they completed a perception task, listening to the trials and marking on a piece of paper the word they thought they had heard. Towards the end of the semester, they completed another production task. The results from the perception task showed that for the /ɔ/ and /o/ minimal pair, non-Spanish speakers had an average score of 64%, while Spanish speakers scored at 76%. Significant results, however, were found for the /ɛ/ and /e/ showing an opposite trend: while non-Spanish speakers were 89% accurate, Spanish speakers were 64% accurate. Simões and Kelm interpreted these results as a facilitative effect of English. However, students in both groups were English speakers. Given that fact, it is possible that the lower scores for the /ɛ/ and /e/ were due to a non-facilitative influence from Spanish. The results from the production task showed that Portuguese learners performed very similarly, with no significant differences between them. The average formant frequencies for /ɛ/ for the Spanish group were F1=498 (SD=61.6) and F2= 972 (SD=90.5) compared to F1=500 (SD=59.4) and F2=1624 (SD=120.5)
for the non-Spanish speakers. The average formant frequencies for /ɔ/ for the Spanish group were F1= 493 (55.5) and F2= 1005 (59.4) versus F1=498 (45.6) and F2=972 (90.5) for the non-Spanish speakers. Compared to values found for native speakers of Brazilian Portuguese (formant frequencies for /ɛ/: F1=516 and F=1779; formant frequencies for /ɔ/: F1=538 and F2=1066) in a study by Nobre and Ingemann (as cited in Simões & Kelm, 1991, p. 661) the production of Portuguese learners deviated little from the native norm. Results from the second production test showed that learners improved slightly but not significantly compared to earlier in the semester. In discussing the results, the authors mentioned the interference of orthographic systems and a possible interference in the acquisition of Portuguese vowels. Other studies have examined Spanish CLI in the acquisition of pronunciation (Simões & Kelm, 1991; Akerberg, 2004; Grannier, 2004; Vaz, Coimbra, Teixeira, & Moutinho, 2003; Camargo, 2009), morphosyntax (Trullén, 2008) and pragmatics (Rodea, 1990; Koike & Flanzer, 2004; Araújo, 2008).

Besides the more descriptive CLI Portuguese research, another set of studies still rooted in the CA tradition approached CLI from an experimental or quasi-experimental design, investigating the acquisition of Portuguese by SSLPs. In the following section, I will describe the findings of some of these studies and the describe more recent studies carried out under the modern tenets of CLI and L3 research and which have focused on the Portuguese/Spanish pair.

**CLI studies on nonnative Portuguese acquisition.**

In the last decade, a considerable number of CLI Portuguese studies have been published. What characterizes these more recent studies is a more rigorous methodology, a change in focus from qualitative to quantitative analyses, the investigation of new variables, and a more robust theoretical foundation, aligned with modern CLI and cognitive theories of language acquisition. We also see a greater focus on morphosyntax than on lexical and phonological transfer. Compared to the profusion of CLI studies in general, the Portuguese/Spanish pair has not received much
attention, but as emphasized by Rothman, Giancaspro, and Halloran (2014), findings from recent studies have made significant contributions to many subfields of linguistics, including those focused on the abstract representations of language, language processing, and formal theory. The study of Spanish CLI effects on Portuguese acquisition contributes to the general field of L3 research in unique ways. For example, it allows researchers to test the predictions of typological proximity theories against other models of L3 acquisition such as the Cumulative Enhancement Model (CEM) (Flynn et al., 2004) and the L2 Status Factor Hypothesis (Bardel & Falk, 2007; Falk & Bardel, 2011), which posit other factors as the main cause for transfer.

Rasuk (2008) looked at the acquisition of prepositional complements of transitive verbs in L3 Portuguese written texts by L1 English/L2 Spanish speakers. He first identified CLI patterns in two bilingual groups: L1 English/L2 Portuguese and L1 Spanish/L2 Portuguese. Next, he examined CLI from L2 Spanish in L3 Portuguese in 3 groups varying according to their proficiency in Spanish (low, medium, and advanced), which was determined based on information from survey questionnaires. He found that the greater the proficiency in L2 Spanish, the greater the CLI effects from Spanish. However, CLI from English was still greater than CLI from Spanish for all L3 groups. His study showed a strong role for typology but an even stronger role for L1. Koike and Palmiere (2011) examined pragmatic transfer of English and Spanish in L3 Portuguese oral and written production. They compared three groups that differed in terms of their order of acquisition of Spanish: L1 English/L2 Spanish, L1 Spanish/L2 English, and L1 English/Heritage Spanish. In a more qualitative analysis of results, they found a complex pattern of pragmatic CLI where the main source of transfer was not necessarily clear and greater CLI in oral speech than in written texts. They also analyzed CLI in terms of lexical items (false cognates, one-word borrowings) and phrasal-level borrowings. They found that CLI from Spanish was significantly greater in the performance of the L1 English/L2 Spanish group, followed by the HS group. For all groups,
transfer of lexical items was greater than phrasal structures. Graça Pinto and Carvalhosa (2012) investigated CLIs in L3 Portuguese written production by L1 Serbian university students with different L2s. They found a greater number of CLI from languages typologically close to Portuguese (e.g. French, Italian, and Spanish) than from Serbian. Spanish was, among these languages, the main source of CLI. Echoing findings from Koike and Palmiere (2011), they also found that CLI from Spanish was greater for content words than for function words.

One of the first studies to look at Portuguese and Spanish, considering more recent CLI theory was Carvalho and Silva (2006). They investigated the acquisition of the present and the future subjunctive in nonnative Portuguese by leaners divided in two groups: L1-English/L2-Spanish (N=8) and English/Heritage Spanish (which they considered Spanish L1) (N=8). They aimed at identifying CLI from Spanish and verifying qualitative differences in CLI transfer from Spanish between groups. Participants completed two writing tasks, each one containing a prompt text, an exercise eliciting the production of present subjunctive forms, and an exercise eliciting the production of future subjunctive forms. Results were combined in a present subjunctive (PS) task and a future subjunctive (FS) task. For the present subjunctive task, it was hypothesized that knowledge of Spanish would produce a facilitative effect, since the uses of the Portuguese present subjunctive greatly coincide with the present subjunctive in Spanish. Indeed, both groups performed better on this task than on the future subjunctive task: the L2 Spanish group made 7 errors on the PS task versus 15 errors on the FS task; the L1 Spanish group made 9 errors on the PS task versus 32 errors in the FS task. Overall, the L2 Spanish group performed better than the L1 Spanish group.

The authors concluded that both groups relied heavily on their knowledge of Spanish and that typological proximity overrode order of acquisition of Spanish as a determining factor for transfer. The problem with this analysis is that the L1 Spanish group was actually a group of bilinguals who grew up speaking both English and Spanish, and although the performance of heritage speakers has
been shown to approach the performance of L1 speakers (e.g. Cabrelli-Amaro & Rothman, 2010), these two language backgrounds are essentially different. Moreover, Spanish-like errors were identified only for the FS task leaving this task as the only way to compare negative Spanish CLI between groups. The problem in inferring the source of transfer in the FS task is that for conditional clauses (4 out of the task 8 trials) both English and Spanish use the same strategy: they convey the meaning of the future subjunctive using indicative present tense forms. Indeed, the percentage of errors in this task considered Spanish-like was very similar for both groups (60% for L1 Spanish speakers and 59% for L2 Spanish speakers), but we cannot tell for sure for at least half of the trials if the errors are due to Spanish or English transfer. The study showed, however, that facilitative effects from Spanish were possible irrespective of order of acquisition. Another important contribution of Carvalho and Silva’s (2006) study was the use of think-aloud concurrent protocols, which confirmed that learners heavily relied on strategies from Spanish to complete parts of the tasks. Other CLI studies that have looked at the interaction of Portuguese and Spanish are Thompson (2008), McCune (2011), Diaz Granado (2011), Rocío (2013), and Ionin (2015).

A group of studies within the generative strand of CLI research sought to investigate initial states of nonnative Portuguese, hoping to contribute to the debate about the effects of age in L2 and L3 acquisition. Most of them confirmed positive transfer of one language’s parameters to another, corroborating with full-access UG theories, while also trying to determine the primary factors for CLI (limited here to the order of acquisition and typological proximity of prior language knowledge). The distinction between Brazilian and European Portuguese is particularly important in the study of morphosyntactic transfer, since there are some crucial differences between the two Portuguese varieties. The study by Carvalho and Silva (2006) described above sought answers to some of the same questions asked by generative studies without making any direct connections or claims related to generative debates. Among these generative studies, some have studied the
Portuguese/Spanish pairing. For example, Guijarro-Fuentes, Iverson, Judy, and Rothman (2008) examined knowledge of the Brazilian Portuguese (BP) determiner phrase, which has the same gender/number agreement properties as Spanish, but differs from Spanish and English in the semantic interpretations for bare and definite plural nouns. They compared two L3 Portuguese groups (L1 English/L2 Spanish and heritage Spanish/English bilinguals with intermediate and advanced levels of Spanish), assessing their knowledge of the target structures in a grammaticality judgment and correction task (GJCT) and a context felicitousness task (CFT). Both groups performed comparably to the native control group, showing knowledge of gender agreement and a preference to reject sentences with bare plurals following a generic context (which in BP is felicitous). Results were interpreted as positive CLI from Spanish. Cabrelli, Iverson, Judy, and Rothman (2008) looked at the acquisition of gender agreement and noun drop in BP by a group of L1 English/L2 Spanish speakers and native controls. They used a scalar grammaticality judgment task (SGJT) to assess agreement and noun drop, and a contextualized translation task to measure noun drop. They found that the performance of L3 Portuguese learners was comparable to that of native speakers. This study was extended by Iverson (2009), who compared the performance of Portuguese native speakers to a group of Spanish/English heritage bilinguals and a group of L1 English/L2 Spanish speakers. Results were similar to Guijarro-Fuentes et al. (2008) and Cabrelli et al. (2008). In both studies researchers looked at noun agreement and interpreted the successful performance of L3 learners as evidence of positive Spanish CLI (feature-transfer) and of the acquisition of uninterpretable features by L2 learners. In Cabrelli-Amaro, Iverson, and Judy (2009) the acquisition of noun drop in BP was again explored. This time the authors compared the performance of English monolinguals learning L2 Portuguese and of L1 English/L2 Spanish bilinguals learning L3 Portuguese, testing the hypotheses of Failed Functional Features Approaches (FFFA) against Full Access Approaches (FAA). Results from a SGJT (interpretation task) and a
contextualized translation task (production) showed evidence of noun drop and noun agreement knowledge only for the L3 Portuguese group, who performed similarly to native controls, supporting FAA hypotheses and providing evidence of positive CLI. The studies above are based on the premise that, because of the similarity between Spanish and Portuguese, whenever semantic and morphosyntactic features are available in the L2 they can be transferred to L3.

In the area of phonology, Cabrelli-Amaro and Rothman (2010) proposed the Phonological Permeability Hypothesis (PPH), which states that early and late phonological acquisition are fundamentally different. Evidence of this difference is provided by differential cross-linguistic permeability (regressive interference) patterns between native and nonnative phonological systems, and among nonnative systems. They maintain that while L1 phonological attrition (or regressive CLI) is possible, L2 attrition (in the context of L3 acquisition) is much more rapid and pervasive when the L2 is acquired after the critical period. To verify or falsify the PPH they investigated perception and production of different phonological phenomena in two groups of L3 Portuguese learners: an L1 English/L2 Spanish group and an English/Spanish simultaneous bilingual group. No measures to assess Spanish proficiency for both groups were reported. Their findings corroborated the prediction that CLI would be greater for the Spanish sequential bilinguals. Trude and Tokowicz (2011) investigated pronunciation of nonnative Portuguese nouns and adjectives that were either Portuguese-Spanish (PS)cognates, Portuguese-Spanish-English (PSE) cognates, or non-cognates (NC). They compared the performance of two groups: L1 English speakers with no knowledge of L2 Romance languages learning Portuguese and L1 English/L2 Spanish speakers with more than 4 semesters of Spanish. Participants were given a computer-based Portuguese pronunciation tutorial with explanations and examples, followed by practice, and then tested on accuracy of pronunciation. Errors were coded by type (English-like or Spanish-like). Data showed that the L2 Spanish group made more Spanish-like pronunciation mistakes for all word types,
producing more errors than the control group. However, the non-Spanish group also made more Spanish-like mistakes compared to other types of mistakes for both types of cognates. Taken together, these two phonological studies show that negative CLI from closely related languages is possible and bidirectional. However, Trude and Tokowicz’ results from non-Spanish speakers call attention to other possible variables involved in the acquisition of pronunciation that may not involve transfer, such as learning strategies, interlanguage creations, and processes involving simplification and universal principals.

Marking a slight departure from inquiries concerned with critical period hypotheses, some CLI generative studies focused on order of acquisition and source of transfer, testing hypotheses of models specific to CLI in L3 acquisition. One of these models, the Cumulative Enhancement Model (CEM) predicts that CLI effects are cumulative and originate from any previously learned language, having only facilitative or neutral effects in the development of further languages (Flynn, Foley, & Vinnitskaya, 2004). The L2 Status Factor predicts that L2 and other nonnative languages function as a filter, blocking transfer of L1 into L3 (Bardel & Falk, 2007, 2012). In Rothman and Cabrelli-Amaro (2010), data from two experimental groups (L1 English/L2 Spanish/L3 French and a L1 English/L2 Spanish/L3 Italian) on the acquisition of null-subject properties led the authors to suggest that, although cumulative, CLI is strongly affected by typology when two or more close languages are involved. In such cases, CLI cannot be predicted by either the CEM or the L2 Status Factor. In their study, Spanish and French, as well as Spanish and Italian, were typologically closer between them than they were to English. However, only Spanish and Italian were positively valued for the Null Parameter. Their results suggested that knowledge from L2 could be transferred to L3, with some negative effects from Spanish on French. However, in this study, one other variable to consider is that the level of typological proximity between Romance languages varies and, ultimately, the target structures did not allow for the verification of negative transfer between the typologically closer languages. Rothman (2010)
later proposes the Typological Primacy Model to account for the role of typology, which Rothman (2011) further explores in the investigation of syntactic adjectival placement, comparing the performance of two experimental groups (L1 Italian/L2 English/L3 Spanish and L1 English/L2 Spanish/L3 Portuguese) in a semantic interpretation task and a production collocation task. Results showed that both groups were able to achieve native-like performance in their L3, which Rothman attributes to transfer from the language most closely related to the L3: L1 Italian, in the case of L3 Spanish, and L2 Spanish, in the case of L3 Portuguese. Here, as well, the language combinations and structures studied did not allow researchers to assess the existence of negative transfer.

Rothman (2010) addressed methodological issues, teasing apart the different variables determining the extent to which (non-facilitative) L3 transfer obtains due to either L2 Status or typological constraints. He examined the beginning stages of L3 BP acquisition in two groups with advanced levels of L2 proficiency: L1 English/L2 Spanish and L1 Spanish/L2 English. The selected target structures were relative clause attachment parameters (which coincide in Spanish and Portuguese in most linguistic contexts, but differ in English) and word order in interrogative and affirmative sentences (which are similar in English and Portuguese, but different in Spanish). Transfer strategies were assessed via a GJT with corrections for word order, and via a context-matching task for clausal attachment. Findings showed CLI from Spanish and not from English (as either L1 or L2) to BP as L3, even when the target structure contrasted in Portuguese and Spanish. We must remember, though, that participants had barely any knowledge of L3 Portuguese, so results are only to be taken as an evidence of direct transfer strategies from prior knowledge, without significant mediation of L3 knowledge and, therefore, not allowing for predictions of CLI effects across different stages of L3 development. Both positive and negative CLI effects from Spanish still need to be studied longitudinally as learners gain more knowledge of Portuguese. Overall, Rothman’s findings confirmed the predictions of previous studies in terms of the role of
typology and the possibility of negative CLI, leading him to propose the Typological Primacy Model (TPM).

Montrul, Dias, and Santos (2011) also tested L3 acquisition theories, comparing the CEM, the L2 Status Factor, and the TPM in a study of Spanish-English bilinguals learning Brazilian Portuguese (BP) as an L3. Their participants had either Spanish or English as their L1. Knowledge of Portuguese clitic and DP/NP object expression (which contrast in English, Spanish, and Portuguese) was assessed through a storytelling oral production task. It was hypothesized that incorrect use of syntactic structures such as DOM and clitic doubling (not licensed in Portuguese) would reflect negative CLI from Spanish. Indeed, both groups, regardless of order of acquisition of Spanish, produced these structures, supporting the TPM’s prediction for negative transfer and the role of typology. CLI effects from Spanish were greater for the L1 Spanish group, which the authors interpreted as a strong effect also for L1. In the L2 Spanish group, however, no measures were used to assess the participant’s L2 proficiency, and it is possible that the stronger influence of L1 was due to incomplete acquisition of L2 Spanish features. Giancaspro, Halloran, and Iverson (2015) replicated Montrul et al.’s (2011) study, and looked specifically at CLI of DOM structures in L3 Portuguese. This time, they tested L2 proficiency of both English and Spanish. Transfer of DOM was tested in a three-part SCJT in written and audio form, which included 4 types of direct objects varying in [+animacy] and [+specificity], and where [+animate] [+specific] features make DOM obligatory in Spanish. Results confirmed that in [+animate] [+specific] Portuguese sentences both groups gave significantly lower ratings than native controls, also supporting the predictions of the TPM. In the area of semantics, results from Ionin, Golla, Santos, and Montrul (2015) also provided evidence of cumulative positive CLI effects and the role of typology in the interpretation L3 Portuguese NPs in generic and existential contexts.
To date, results from L3 Portuguese studies have shown a strong role for typology as a factor for CLI and evidence of CLI facilitative and non-facilitative effects for learners with prior knowledge of Spanish. They show that the study of closely related languages can make unique contributions to the field, as noted by Rothman et al. (2014). It is by now agreed that knowledge of Spanish as either L1, HL, or L2 Spanish affects L2 and L3 Portuguese acquisition. There is no agreement, however, as to the actual role of order of acquisition in interaction with typology, an area that still calls for further investigation. Other mediating factors rarely explored in relation to Portuguese acquisition and Spanish CLI include motivation, memory capacity, aptitude, metalinguistic awareness, age, attitudes and beliefs, and other individual differences, although they have been show to interact with language learning (Robinson, 1996; De Angelis, 2007). One exception is Trude and Tokowicz (2011), who investigated the relationship between working memory and CLI from Spanish in L3 Portuguese pronunciation, comparing groups with and without knowledge of Spanish. Another is Thompson (2013), who looked at the effects of aptitude and bilingualism on L3 Portuguese development for speakers of Spanish. Akerberg (1996) and Child (2013) are among the few empirical studies that surveyed SSLPs about their perceptions, beliefs and motivation to learn Portuguese, but their data were not analyzed in correlation with learners’ performance and proficiency gains. In terms of the amount of L2 experience, it is believed that higher levels of L2 proficiency increase the chances of CLI effects on L3, as shown by Rasuk (2008) for L2 Spanish, but CLI effects from L2 have also been found for learners with low L2 proficiency for other language pairs, as in Yelland, Pollard, and Mercuri (1993) and De Angelis (2005). The effects of low or even minimal levels of exposure to L2 are worth exploring, since language learners nowadays seem to have many opportunities for self-directed learning and contact with other languages. Several aspects of the Portuguese/Spanish interaction, such as conceptual, pragmatic, and semantic transfer, have barely been touched upon. In addition, the issue of persistent
errors from Spanish is still a thorn in the side of L2 Portuguese educators. It calls for more longitudinal research and for empirical investigations concerning the effectivity of different types of instruction designed for SSLPs that can answer the pressing question of how much and what type of Portuguese experience is needed to overcome the extreme state of Spanish CLI sometimes referred as portunhol. (Limpski, 2006) We also know that lexical transfer from Spanish tends to be greater than morphosyntactic transfer in nonnative Portuguese, but we do not know if this and other CLI patterns are particular to Spanish, given the close proximity of both languages, or if and how they differ from CLI from other languages. Furthermore, consistent with the general CLI field, with the exception of Koike and Gualda (2008) and the early phonological studies on vowel and consonant perception (Simões & Kelm, 1991; Akerberg, 2001a, 2011b), there have been no attempts to look at Spanish CLI from the perspective of selective attention and language processing and how they affect language development. We can in fact make no assumptions about development, since we do not have enough evidence to show if knowledge of Spanish truly affects ultimate attainment of nonnative Portuguese or if it just changes the course of language development when compared to the development of leaners with other language backgrounds. The early CLI research on Portuguese and Spanish has not been scare nor inconsequential. It provides many interesting insights as to how the two languages interact in the mind of the learner. Much of it, however, falls short of current methodological standards (or perhaps simply does not report sufficient and necessary information regarding methods and results). Clearly, many of the issues raised deserve to be revisited in empirical analyses with greater internal and external validity.

**CLI, Input Processing, and Learning Stages**

Cognitive approaches to SLA are concerned with the general aspects of human cognition involved in language learning, that is how different cognitive resources are allocated so that language input is processed and subsequently stored in the brain. Different strands of research have
identified several internal factors related to language processing, e.g. working memory and long-term memory, attention to input, levels of awareness, depth of processing, and cognitive control. However, few CLI studies have sought to understand how prior language knowledge interacts with these aspects of cognition and affects the acquisition of new language systems. Research in the field of Portuguese for Spanish speakers has also not addressed how the proximity between the two languages influences processing mechanisms, constraining or facilitating language development, even though diminished attention and awareness due to prior knowledge of Spanish are often mentioned in the literature as possible causes for delays and fossilization in the acquisition of Portuguese (Carmolinga, 1997; Lombello, 1983).

In this section, I first review the roles attributed to attention and awareness in second language learning. I then describe models of language processing that address the roles of attention, awareness, and depth of processing, with emphasis on Leow's (2015a) model of the L2 learning process in ISLA, while also discussing measures of processes and products of language learning and the connection between language processing and the learning stages metaphor. I conclude by surveying the CLI literature in connection with input processing theories and by presenting the findings of CLI research that has addressed input processing in L2 and L3 acquisition.

The roles of attention and awareness in SLA.

The roles of attention and awareness have been long studied in connection with theories of memory in fields outside SLA, such as cognitive psychology and neuroscience. Following Robinson’s (1995), some of the most prominent attentional models outside the SLA field include filter theories (e.g. Broadbent, 1958; Triesman, 964, & Norman, 1968), capacity models (e.g. Sperling, 1960; Kahneman, 1973; Newmann, 1996; Wickens, 1980, 2007) and non-capacity models (e.g. Neisser, 1976; Sander, 1983). Filter theories view “processing of incoming information as
moving along a serial path comprising several storage structures,” starting with the sensory registration of input, which then passes through a series of selective filters. These filters restrict the information detected and subsequently encoded into short-term memory (Leow, 2015a, p. 25). Capacity models regard attention as a limited resource that can be voluntarily deployed toward particular aspects of incoming information (Posner & Klein, 1973; McLaughlin, Rossman, & McLeod, 1983; Wickens, 1990). They also entertain the idea of interference caused by divided attention during simultaneous performance on tasks that draw on similar attentional mechanisms. For example, Cowan (1995) suggested that the allocation of attention interfered with the prioritization of processing mechanisms, leading to a better performance on one task at the cost of poorer performance on others (p. 203). Non-capacity models, on the other hand, contest the concept of limited attentional capacity, offering different explanations for selective attention and interference, such as difficulties arising from local coordination and control (c.f. Allport, 1993).

These and other theoretical conceptualizations of attention have greatly influenced SLA models (Leow, 2015a). Robinson (2003), for instance, defined attention within the SLA field as “the process that encodes language input, keeps it active in working memory and short-term memory, and retrieves it from long-term memory” (p. 631). Inside and outside the SLA field, attention is seen as a necessary condition for language storage in long-term memory (Reber, 1967, 1989, 1993; Carlson & Dulany, 1985; Nissen & Bullemer, 1987; Schmidt, 1990, 2001; Lier, 1991; Posner, 1992; Carr & Curran, 1994; Tomlin & Villa, 1994; Williams, 1999), and SLA research investigating the role of focused attention has produced robust evidence of its positive effects on comprehension and language intake (Sharwood Smith, 1981; Hulstijn, 1989, 2001; Doughty, 1991; de Bot, 1992; Leow, 1997, 1998b; William, 1999; Leow, Hsieh, & Moreno, 2008; Hondo, 2012; Morgan-Short, Heil, Botero-Moriarty, & Ebert, 2012; although see Gass, Svetics, & Lemelin, 2003). Consequently, attention has been seen as a central component in several approaches to
language acquisition and teaching, such as focus on form (Long, 1991; Long & Robinson, 1998) and processing instruction (VanPatten, 1990).

While in classical psychology attention and awareness are often seen as two sides of the same cognitive mechanisms (Al-Hejin, 2004), they have been studied as two different constructs and assigned different roles and relevance for language processing, despite remaining closely linked concepts, as pointed out by Schmidt (2010). Tomlin and Villa (1994), for example, have sustained that attention can be theoretically and empirically differentiated from consciousness and awareness (p. 18). They defined awareness as “a particular state of mind in which an individual has undergone a specific subjective experience of some cognitive content or external stimulus” and, at the same time, as the capacity of reporting and describing this subjective experience to a certain extent (p. 193). The definition of attention, on the other hand, is in general less precise. Tomlin and Villa described it as a mental resource or capacity involved in perception and learning, concluding that “attention is not awareness, although awareness requires attention” (p. 198), and adopted Posner and Petersen’s (1990) view of attention as three separate but interrelated neural networks: alertness, orientation, and detection. Language research reflects this conceptual dichotomy and, while the importance of attention is fairly undisputed in SLA, there is no consensus as to whether awareness is a necessary condition for language learning (Robinson, Mackey, Gass, & Schmidt, 2012). Supporting claims can be found for both the role of awareness as central (Schmidt, 1990; Leow, 2000; Williams, 2004; Perruchet & Pacteau, 2008; Perruchet, 2008; Williams, 2009) or unnecessary to language acquisition (Reber, 1967, 1969, 1993; Krashen, 1981, 1982; Curran & Keele, 1993; Litman & Reber, 2005; Williams, 2005, 2011; Rebuschat & Williams, 2012). In SLA, many studies investigating the role of awareness under different learning conditions have produced evidence that it facilitates second language development (Leow, 1997, 2000, 2001; Rosa & O’Neil, 1999; Robinson, 1995, 1997, 2005b; Rosa & Leow, 2004; Gilakjani & Ahmadi, 2011).
A distinction is also made between consciousness and awareness. Consciousness is often seen as a multilevel process that is both phenomenological and computational in nature, while awareness is referred to as a state or capacity associated with certain levels of consciousness, but not to all of them (Cots, 2013). Van Lier (1996), for instance, proposed a 4-tiered organization of consciousness (including global or intransient consciousness, transient awareness, metaconsciousness, and critical awareness) in which the first level does not entail any degree of awareness. In Van Lier’s model, metaconsciousness refers to what is commonly known as metalinguistic awareness, that is the capacity to reflect upon language as an object of thought, to engage in formal analysis, and the creative control and use of language. This model adopts a stratified view of consciousness with progressively heightened degrees of awareness, from a rudimentary knowingly registration of events (transient cognizance) to a more permanent and verbalizable activation of knowledge. The same progression towards heightened states of consciousness and its implications for learning is found in different language processing models that address the role of attention and awareness. Some of these models are discussed below.

**SLA language processing models and learning stages.**

As noted by Leow (2015b), one of the first attempts to define the role of attention in early stages of L2 language processing is McLaughlin’s (1987) Cognitive theory. McLaughlin stated that learning a second language mobilizes the same mental resources as learning any other cognitive skills. His Cognitive theory of second language learning adopts a dichotomous view of information processing, distinguishing between controlled versus automated processing. According to him, controlled processing “is not a learned response, but a temporary activation of nodes in a sequence” (p. 135). Automatic processing, on the other hand, “is a learned response that has been built up through the consistent mapping of the same input to the same pattern of activation over many trials” (p. 134). While controlled processing requires a large amount of processing capacity and heavily...
mobilizes the learner’s attentional resources, *automatized* tasks demand relatively little cognitive effort. Focused attention in this view is selective and it is controlled by the learner. The theory predicts, then, that early stages of language learning are regulated by data-driven *controlled processing*, where isolated components of the tasks are approached via bottom-up mechanisms, with no attempt at overall organization of second language knowledge. These controlled processes have tight limited capacity and require more time for activation. In a second phase, skills are routinized after repeated use of controlled processes, and the attentional resources expended in these controlled processes can be allocated to higher-level processing. This phase is guided by top-down processes and organization-oriented procedures applied to relatively permanent associative connections that, as a result, are accessed more rapidly. A third phase called *restructuring* involves the integration of both bottom-up and top-down processes. In this phase, internalized representations are changed and restructured via further exposure to input, interactive uses of language, and/or feedback, resulting in greater refinement and consolidation of language knowledge.

Despite addressing the role of attention in his model, McLaughlin disputes the idea that controlled processing requires explicit conscious effort, and that automatic processing is implicit and unconscious (credited to Zobl, 1984). He believes, instead, that consciousness is a slippery construct and that, in theory, “both controlled and automatic processes can be either conscious or not” (p. 153). In sum, for McLaughlin, learning requires gains in automaticity through both practice and restructuring, and gains in automaticity entail freeing up attentional resources, which tend to be more heavily mobilized in early stages of acquisition.

Gass (1988) proposed a unifying framework incorporating sociolinguistic, psycholinguistic, and linguistic aspects of acquisition to explain how language input enters the learner’s grammatical system and is later used in production. Her framework comprises five processing levels:
apperceived input, comprehended input, intake, integration, and output. In the first stage, the ‘ambient speech’ interacts with the learner’s parsing mechanisms, which breaks down the stream of speech into meaningful units. This filtered information, or apperceived input, then may be noticed by the learner, becoming available for future integration into the learner’s language system (p. 202). Factors involved in filtering linguistic information include input frequency and novelty, prior knowledge, selective attention, and affect (e.g. motivation, attitude, etc.). Comprehended input, on the other hand, implies a more analytical understanding or ‘grasp’ of information meanings or structures. The level of analysis the learner achieves at this level determines whether comprehended input feeds into the intake component, which Gass sees as “the process of assimilating linguistic material” into the learner’s grammar (p. 206). In that sense, intake processes are directed towards learning and not simply for immediate use in communication. Next, integration involves processes of reanalysis, strengthening, and storage of information. The last level, output, is seen not merely as a product, but as an opportunity for further processing, which might include hypothesis testing and deeper grammatical analyses, which allow for language refinement. In this model, apperceived input is often equated to noticed input, requiring focused attention but not awareness.

One of the most influential accounts of the role of attention and awareness in language processing is Schmidt’s (1990, 1993, 1994, 1995, 2001) Noticing Hypothesis. Schmidt identified three different levels of awareness: perception, noticing, and understanding. While perception does not necessarily imply consciousness, noticing is understood as “the conscious registration of attended specific instances of language.” In the Noticing Hypothesis, focal attention and awareness are essentially isomorphic, and noticing is seen as a “necessary and sufficient condition for converting input to intake” (Schmidt, 1990, p. 129). Finally, consciousness as understanding indicates a “higher level of awareness that includes generalization across instances” and thinking about language (Schmidt, 2010, p. 725). However, while Schmidt suggests that understanding may
foster further learning, he claims that learning without intention and without understanding is possible. Schmidt, therefore, makes a distinction between consciousness and intention, asserting that noticing may take place in either incidental (unpremeditated) conditions or under intended (goal-directed) efforts towards learning. Tomlin and Villa (1994) challenged Schmidt’s assumptions regarding the necessary conditions for intake in language acquisition. They proposed a fine-grained analysis of attention, drawing on Posner and Petersen’s (1990) work and identifying three attentional functions: alertness, orientation, and detection. The defined alertness as a general readiness to deal with stimuli. Orientation, on the other hand, implied committing one’s attentional resources to specific sensory information at the exclusion of others (i.e. aligning one’s attention to parts of the stimuli), facilitating detection. Finally, detection was understood as the “process that selects, or engages, a particular and specific bit of information,” consuming attentional resources and making further processing possible (p. 192). None of Tomlin and Villa’s components of attention requires awareness. For Tomlin and Villa, then, not only awareness can be dissociated from attention, but conscious awareness is not a critical factor in second language acquisition, whereas orientation and detection are.

Robinson (1995) attempted to reconcile Schmidt’s and Tomlin and Villa’s theoretical underpinnings by adopting the fined-grained view of attention while still recognizing conscious awareness as a necessary condition for learning. He argued that differential performance on explicit and implicit learning tasks (used as measures of awareness) are actually due to the different conscious processes triggered by training tasks, rather than to a dichotomous view of conscious and unconscious learning (p. 283). For Robinson, orientation and detection are important processes determining the extent to which a certain aspect of input is noticed during task performance. However, while detection is responsible for encoding of information in memory, the effect of detection alone is transient. For intake to take place, activation in short-term memory must exceed a
certain threshold and achieve a minimal level of awareness prior to encoding in long-term memory. Robinson called this process *noticing*, redefining the term as “detection plus rehearsal in short-term memory” (p. 296). According to Leow (2015a), Robinson’s later model in 2003 adopts an unlimited capacity interference view of memory, where processing breakdowns are better explained by other sources, such as lack of comprehension, processing inefficiency, etc., rather than by limited attentional resources.

The idea of limited processing capacity reappears, however, in VanPatten’s (1990, 2004) Input Processing Model. One of VanPatten’s assumptions is that learners focus primarily on extracting meaning from the input. He postulated that *noticing* (as defined by Schmidt, 1990) is a necessary condition for grammatical intake, which he defined as “the subset of input that has been processed in working memory and made available for further processing (i.e. possible incorporation into the developing system)” (VanPatten, 2004, p. 7). VanPatten differentiated between *processing*, *perception*, and *noticing*. For him, *processing* referred to making form and meaning connections, while *perception* alluded to signal sensorial registrations (before assignment of meaning), and *noticing* referred to the conscious registration of forms (but not necessarily of meanings). Although this model predicts three different learning processes (input processing, accommodation or restructuring, and production procedures), great emphasis is given to the learner’s initial processing, that is input processing. Based on the premise that comprehension and grammatical intake involve effortful and competing mechanisms, both of which mobilize the learner’s attentional resources, VanPatten identified two principles (and their respective subprinciples) guiding the allocation of learners’ attention to input. The first principle (The Primacy of Content Words Principle) states that learners process for meaning before they process for form. It follows that more attention is given to content words than to functional elements of language, given that they have more communicative value. By the same token, when the same information is redundantly encoded in both a lexical item
and a grammatical form, learners tend to rely on the former. Learners are also more likely to process meaningful forms before non-meaningful forms, irrespective of redundancy, and tend to process items in sentence initial position before those in final sentence position. Importantly, and considering the taxing nature of comprehension, this principle states that in order for learners to process less meaningful forms, “they must be able to process informational or communicative content at no or little cost to attention” (VanPatten, 2004, p. 14). VanPatten’s second principle (the First Noun Principle) proposes a series of processing constraints at the sentential level that overlap with local constraints. This principle builds on the notion of linguistic processing cues, such as those posited by the Competition Model (Bates & MacWhinney, 1989, and elsewhere), in which learners rely on word order, subject agreement, and word inflections, among other cues, to assign thematic roles, infer semantic content or make sense of syntactic associations between words. The second principle thus states that learners tend to interpret the first noun or pronoun of a sentence as the subject/agent (word order cue). It also affirms that learners may possibly rely on semantics or event probability over word order, and that reliance on the First Noun Principle may also be mediated by preceding contexts that constrain the interpretation of a clause or sentence (VanPatten, 2004, p. 18). The model lays out a sequence in which the different aspects of the input are most likely to be attended to. Once attended to, parts of the input can be noticed and processed as intake.

Likewise, Leow’s (2015a) model of the L2 learning process in ISLA is premised on the role of attention. However, instead of ascribing the cause of learning difficulties to a limited attentional capacity, it postulates that potential breakdowns are due to a limited (and more complex) processing capacity. In other words, “attention to new L2 information in the input is regulated by several variables that accompany the allocation of attentional resources” (p. 241). These variables are: cognitive registration, depth of processing, and level of awareness, and it is the extent to which these variables moderate the allocation of attention that determines the likelihood elements of the
input get processed or are made available for further processing. Leow defines *cognitive registration* as “the process that selects or engages a particular bit of information” (p. 241) and *depth of processing* as the relative amount of cognitive effort, level of analysis, and elaboration of intake employed while paying attention, together with mechanisms that involve prior knowledge, hypothesis testing, and rule formation. Using Craik and Lockhart’s (1972) levels of processing framework, we can contrast *shallow processing* (e.g. perceptual processing) to *deep processing* (e.g. conceptual or semantic processing). Deep processing (or processing associated with greater expenditure of cognitive effort) is assumed to be superior to shallow processing in terms of memory performance and the enduring memory traces it creates, facilitating language learning. The model predicts three main *processing* stages: *input processing*, *intake processing*, and *knowledge processing*. It also assumes three major products as a result of each processing stage: *intake*, the product of input processing; *L2 knowledge*, the product of intake processing; and *output*, the product of knowledge processing. For Leow, the *input processing* stage is largely dependent upon the level of attention (peripheral, selective, or focal). At this stage, the depth of processing and levels of awareness that accompany the allocation of attention may lead to different types of intake (or phases of intake): *attended intake*, *detected intake*, and *noticed intake*. *Attended intake* results from peripheral attention, low levels of processing, and no cognitive registration or awareness of linguistic data, and it is most likely to be discarded without further processing. *Detected intake* (in line with Tomlin and Villa’s notion of detection), indicates some amount of selective attention and cognitive registration of information, but with a still very low level of processing and without awareness. Its availability for further processing increases compared to attended intake and may depend on the learner’s working memory. *Noticed intake*, in line with Schmidt’s (1990) notion of *noticing*, implies focal attention and cognitive registration accompanied by (at least) a low level of awareness and a relatively higher level of processing (although still at a low level) and “holds the
most potential to remain stored in working memory and made available for further processing that may lead to the incorporation into the L2 learner’s grammar system” (p. 243). Processing variables such as depth of processing, levels of awareness, and activation of prior knowledge also mediate the second processing stage, intake processing. Leow identifies at least two differential ways data is processed at this stage: (1) either through a minimal data-driven processing that allows data to enter the learner’s developing system as non-systemized chunks; or (2) higher-level conceptually-driven processing (that may be accompanied by high levels of awareness) that allows data to be incorporated to the learner’s systemized grammatical system (p. 244). At the knowledge processing stage, production of language can also be affected by depth of processing and level of awareness, which mediate activation of L2 knowledge. Therefore, awareness is not deemed as an indispensable condition for input-to-intake in this model, although in the absence of awareness the chances intake will be further processed are diminished. At the same time, all phases of intake can potentially disappear from working memory in the absence of further processing. Awareness plays a more important role in intake and L2 knowledge processing, and it may be heightened by deeper levels of processing. The tenets of this model were tested by Calderón (2014). She employed eye-tracking and think-aloud protocols during reading comprehension, recognition and production tasks performed by Spanish learners, and found evidence of the role of depth of processing for incorporation of intake into the L2 developing system, as well evidence of different types of intake and differential processing based on type of linguistic item.

Other theoretical frameworks have been proposed with different accounts of the role of attention and consciousness, including the Awareness and Affordances Theory (Gibson, 1979; Otwinowska-Kasztelanic, 2011), the Modular Online Growth and Use of Language Model (MONGUL) (Truscott & Sharwood Smith, 2004, 2005, 2011), the emergentist model CREED (Ellis, 2006), and variationist frameworks (e.g. Tarone, 1985, 2002). They have not, however,
become as influential as the models described above, which despite their differences underscore the importance of attentional resources for the intake of linguistic information. A common trend among the models of language processing reviewed here is the understanding of learning as a series of successive cognitive processes, or processing stages, with the recognition of at least three stages: (1) an initial, more superficial, and transient registration of selected input; (2) additional processing leading to more permanent and organized mental representations, and (3) further processing that involves activation of old knowledge and production mechanisms, resulting in further development and consolidation of knowledge.

Leow’s (2015a) model of the L2 learning process in ISLA embraces the distinction between learning processes (cognitive mechanisms) and learning products (knowledge), although both are considered stages of learning. From this perspective, the investigation of aspects of human cognition such as attention, awareness, or depth of processing is the investigation of processes. In contrast, intake, L2 knowledge, and output/production are learning products. In various publications, Leow (Leow, 1997, 1999; 2000; Leow & Morgan-Short, 2004; Leow & Hama, 2013; Leow et al., 2011; Leow, 2015a, 2015b) has critiqued how processes are measured and operationalized in SLA and psychology research, arguing that many studies claiming to measure cognitive processes actually measure their products, which constitutes a problem of internal validity. According to Leow (2000), data-elicitation procedures for the measurement of awareness typically fall into three categories: (1) offline elicitation measures such as questionnaires, (2) online elicitation measures such think-aloud protocols, or (3) a combination of both offline and online measures. These different operationalization approaches can be easily applied to the study of attention and depth of processing. The argument made by Leow and his collaborators is that only online measures, that is measures that are employed concurrently as language processes take place, provide reliable evidence of the amount and nature of the learner’s internal processing.
Among the most common online data-elicitation procedures currently used in SLA research are reaction time (RT), eye-tracking (ET), and verbal reports or think-aloud (TA) protocols. RT data-elicitation usually involves recording the time participants take to press a button on a keyboard or mouse, as a response to a particular stimulus. The different reaction speeds provide cues as to the level of automaticity and differential processing related to native versus nonnative languages or different linguistic item types, etc. ETs gather information about the eye movement of learners while they complete written learning tasks. ET information includes eye-fixation location, directionality, eye-movement and fixation time, and backtracks. Its use, while slightly more controversial, has the benefit of being non-intrusive and sensitive to subtle effects. Finally, TAs elicit oral verbalizations of the learners’ thoughts regarding the completion of a specific task. They may be introspective (gathered while the learner performs the task) or retrospective (gathered immediately after the completion of the task). Retrospective TAs, however, have been criticized for potential memory constraint effects. TAs can also be either metacognitive (learners are asked to verbalize their reasoning and/or to explain their rationale while thinking out loud) or non-metacognitive (learners voice their thoughts without explaining them or attempting to produce specific information). The issue of reactivity, that is the intrusiveness of the procedure and its effects on the cognitive processes themselves, is often associated with the use of TAs, with mixed results from reactivity research. To minimize potential reactivity risks, the use of non-metacognitive TAs is recommended over the use of metacognitive TAs (Leow, 2015).

Alternatively, to address learning as a product, offline measures are typically employed (e.g. offline questionnaires and verbal reports, receptive and productive assessment tasks, offline elicited recalls, GJTs, confidence ratings, etc.). As pointed out by Leow (2015a), receptive tasks are usually used to assess the product of early processing stages, such intake (as in studies like VanPatten & Cadierno, 1993; Leow, 2000; Leung & Williams, 2014, etc.). He differentiated between two types
of receptive tasks: concurrent (interpretation/selection) and non-concurrent (offline multiple-choice recognition or interpretation) tasks. In non-concurrent multiple-choice recognition tasks, learners are presented with several item options and must recognize the one that best answers a certain question or helps them achieve an outcome. In concurrent interpretation tasks, learners are presented with an oral or written stimulus and, based on the interpretation of the stimulus, must act upon it by making a selection (e.g. choosing between two pictures, between two linguistic items, or between the options right or wrong). Non-concurrent receptive tasks do not offer enough evidence that language items have been internalized further than at the minimal level of intake. Concurrent receptive tasks, on the other hand, are premised on “the activation of some type of knowledge that participants gained during the experimental treatment phase” (p. 131) and therefore allow for inferences of gains beyond the intake stage. In line with his fine-grained conceptualization of intake, Leow stated that “both detected intake, noticed intake, and, to a substantially lesser extent, attended intake may be lodged in working memory and made available for subsequent recognition by L2 learners.” Leow suggested that results from input processing could be measured more robustly by simple controlled production assessment tasks of old exemplars (p. 243). In general, in SLA, when assessing learning gains beyond the level of intake, that is information that has been incorporated to the learner’s internal system, production assessment tasks are commonly employed. In addition, for both concurrent receptive tasks and production tasks, performance on old items is associated with gains in un-systemized item knowledge, while performance on new items elicits evidence of gains in systemized knowledge. In sum, in a parallel between measures of learning outcomes and learning stages, as defined in Leow’s model of the L2 learning process in ISLA, offline receptive measures (such as recognition tasks) can be said at most to correspond to Learning Stage 2, showing evidence of learning products that result from input processing (i.e. intake), although such recognition scores on their own are not sufficient to differentiate between attended
intake, detected intake, or noticed intake. In Leow’s model, production outcomes are related to Learning Stage 6 (the final stage of the learning process). Given the progression established by the model, this stage implies development of L2 knowledge, involving processes other than those required for recognition.

Performance on immediate production tasks, however, tends to decrease considerably after as little as one week. Leow (2015a) called attention to the fact that, although many processing studies use a short retention interval design (consisting of immediate assessment tasks), outcomes from measures at larger retention intervals may have important implications for learning as they are “a good indicator of deep processing and, ultimately, robust learning” (p. 207). In a similar line of thought, Hulstijn (2001) affirmed that “processing new lexical information more elaborately (e.g., by paying attention to the word’s pronunciation, orthography, grammatical category, meaning and semantic relations to other words) will lead to higher retention than by processing new lexical information less elaborately” (p. 270). This assumption led to the postulation of the Involvement Load Hypothesis by Laufer and Hulstijn (2001), according to which the higher the processing (or involvement) load determined by characteristics of the learning task, the greater the retention of language knowledge. In their study, results confirmed that prediction: learners in the writing condition (the condition with highest involvement load) demonstrated greater retention than leaners in the fill-in and gloss conditions. Additional support for this hypothesis was found by Kim (2008), Keating (2008), and Rott (2005), among others. The different sensitivity of assessment measures was also emphasized by Leow and Hama (2013) in the context of awareness, who advocated for the use of multiple offline procedures to provide a more comprehensive panorama of learners’ performance. While Leow’s (2015a) Learning Stage 6 does not capture this distinction between performance in immediate versus delayed production, we can assume that the outcomes of delayed production tasks measure more robust L2 knowledge compared to immediate production tasks. In
other words, delayed production tasks are more reliable measures of L2 systematized and systematized knowledge, and retention may indicate a qualitative difference in processing, that is deeper processing with higher levels of focused attention and awareness, resulting in diminished loss of L2 knowledge.

The distinction between learning processes and products is instrumental, as it establishes methodological criteria for the measurement of attention, awareness, and cognitive effort. Online data-elicitation measures are considered the most appropriate and direct means to verify processing mechanisms. Nevertheless, while the measurement of learning products cannot tell us precisely what levels of attention, awareness, and depth of processing led to them, they give us an indirect reading of the processing stages they result from. For instance, when learners are able to recognize old items in immediate assessment tasks, we may assume their performance to have captured some level of intake, which entails the minimal level of input processing necessary for linguistic information to enter the learner’s working memory. The important aspect to not about this is that recognition is measured after the learners’ first exposure to linguistic information. Otherwise, performance on the recognition task could reflect other processing levels and learning stages, including prior knowledge. Performance on production immediate tasks may provide solid evidence that intake was subsequently processed and internalized in the learner’s internal system. Finally, delayed production assessments capture L2 knowledge at an even further in the learning process. Learning products as measured by recognition, production, and delayed assessments, therefore, can be interpreted as a progression, loosely placed along a continuum of outcomes from input processing to knowledge processing.
Language processing and CLI.

While generative CLI models of L3 acquisition focus on source and type of transfer, many cognitive accounts of CLI refer to the interaction between prior knowledge and both the development of mental representations and production processes. Ringbom (1987), for example, claimed that the semantic weight of previously learned words affected the development of semantic associations for new words. For Poulisse and Bongaerts (1994), the conditioning factor for selection of functional elements used in production was linked to frequency effects of L1 that led to more robust memory associations. Offering an explanation for high transfer effects from L2 English into L3 Swedish production, Williams and Hammarberg (1998) argued that learners perceived nonnative languages as a more reliable source of transfer compared to their L1, and chose one of them as a default linguistic supplier when learning a new language — what they called the foreign effect. A great number of psycholinguistic CLI studies have addressed issues involved in language production (i.e. in later stages of language processing), focusing on processes such as activation and inhibition (c.f. Dijkstra et al., 1998; Dewale, 1988; 2001; De Angelis & Selinker, 2001; Dijkstra & Heuven, 2002a, 2002b; Burton, 2012; Hall & Ecke, 2003, Hall et al., 2009). Production models have greatly influenced CLI research, and while some of these models have investigated monolingual processing (e.g. Levelt, 1989) or bilingual processing (Green, 1997; De Bot, 1992; Grosjean, 1988, 1998; Dijkstra & van Heuven, 1998; 2002a, 2002b), others have more explicitly addressed the interaction of multiple language systems (Kroll & Dijkstra, 2002; Clyne, 2003; Dijkstra, 2003; De Bot, 2004). Research on bilingual lexical access has looked, more specifically, at the mental representation of multiple lexical systems and is especially productive (Caramazza & Brones, 1979; De Groot & Nas, 1991; De Groot, 1992; Fledge & Munro, 1994; Dufour & Kroll, 1995; Coleman, 2002; de Groot, Borgwaldt, Bos & van den Eijnden, 2002; Costa, Santesteban, & Caño, 2005; Sánchez-Casas, & García-Albea, 2005; Brown & Harper, 2009; Dijkstra et al, 2010;
Amengual, 2012). To test theories of lexical access, many studies have investigated the role of cognate translations across languages, showing that crosslinguistic representations with semantic or formal overlap (or both) are not processed the same way as words that bear no type of resemblance. For instance, they have found that cognates have a facilitative effect on retrieval speed (Caramazza & Brones, 1979; Sánchez-Casas et al., 1992; Dijkstra et al., 1998; Dijkstra et al., 1999) and are easier to learn (De Groot et al., 2002). Dijkstra and van Heuven (1998, 2002a), proposed the Bilingual Interactive Activation (BIA) model, later revised and expanded as BIA+, as a theoretical framework for bilingual word recognition that provides information about how representations from different languages are activated and enter decision and response selection mechanisms. The BIA+ model addresses the role of homographs and cognates with different levels or orthographic and phonological overlap and proposes that the multiple language systems are stored together in an integrated lexicon such that different language candidates are simultaneously activated and in competition (non-selective activation), as opposed to the idea of two separate lexical systems in which each language is activated in isolation and competition is limited to the active language only (selective activation).

This connectionist model introduces the notion of language nodes, which function as language tags and modulate the activation of word representations at different levels. It also postulates that word recognition is task-dependent and can be affected by crosslinguistic orthographic, phonological, and semantic overlap. The BIA+ model, as later elaborated by Dijkstra et al. (2010), accounts for both facilitatory effects in cognate processing (found in lexical decision and progressive demasking tasks) and inhibitory effects associated with orthographic and phonological similarity (found in language decision tasks). According to Dijkstra et al. (2010), in a lexical decision task, two cognate words are simultaneously activated (global activation) and the higher their orthographic and semantic overlap, the higher are their facilitatory effects in word
recognition. In a language decision task, on the other hand, the relative activation of the two language nodes intensifies response competition, causing inhibition effects, which increases with greater orthographic overlap.

However, most lexical access studies that offer support to the BIA+ model do not directly examine language processing at initial states of acquisition, but the performance of advanced L2 or L3 speakers. Therefore, although Dijkstra and Van Heuven (2002b) have argued that the BIA+ model may shed light on how sentences are initially parsed by bilinguals, recognition in the related studies is most likely to reflect the effect of language representations at later processing stages, such as systematized or un-systematized knowledge, rather at initial stages of input processing. This view is similar to Grosjean’ (1998, 2001) updated version of the Language Mode Hypothesis, in which he argues for a bilingual mode activation role during perception, but equated it to comprehension, basing his analysis on studies that involved advanced L2/L3 learners, with no distinction made between processing of novel and learned words.

Moreover, studies on lexical access often operationalize the effect of cognates in input processing as the learners’ performance on comprehension, measured by RTs, picture-matching tasks, and meaning-based recognition scores. For instance, Comesaña, Soares, and Lima (2010), had L1 Portuguese participants judge if a L2 Basque word was the correct translation to a Portuguese word. Participants’ decision was mediated by meaning correspondence, with the Basque words provided as a possible translation being either semantically identical, semantically associated, or semantically unrelated to the Portuguese counterpart. Temnikova and Nagel (2015) looked at processing of Russian and English semantically related and unrelated words. Although the semantically related word-pairs in their study also had a high degree of formal overlap, participants were simply asked to decide whether the target word was also an existing English word. Bosma, Blom, Hoekstra and Versloot (2016) studied cognate effects on Dutch and Frisian bilingual children
using a receptive vocabulary test based on the Peabody Picture Vocabulary Test-III-NL (Schlichting, 2005). Their participants were asked to choose one among two pictures that best represented the given target words. In general, therefore, evidence of a facilitation cognate effect in input processing seems to reflect CLI triggered by semantic similarity, without considerations about the acquisition or processing of form. These studies also define the cognate facilitation effect in terms of processing speed, which involves the nature and strengthening of representations and their activation, but do not say much about how the intake of cognate forms compares to the intake of non-cognates after first exposure.

Only in studies such as Dijsktra et al. (1998) and Dijsktra et al. (2010), more attention is given to the formal aspect of cognates during input processing. In these studies, cognate orthographic overlap is found to have a positive effect only in tasks where participants are asked to judge if a given word is a real word in the target language. When participants are presented with the task of deciding which language a given word belongs to, typological similarity is shown to produce the opposite effect, with higher degrees of orthographic and phonological overlap corresponding to diminished performance compared to performance on non-cognates. Studies examining L2 and L3 lexical production have also found facilitative cognate effects for performance in picture naming task, in which participants name as many pictures they can in a given language. For example, Gollan and Acenas (2004) found that retrieval problems often associated with production in bilinguals were lessened for cognate words in English and Spanish. However, researchers have pointed out that word retrieval in production may be influenced by other factors, such as language-dominance and level of bilingualism (Gollan et al., 2007), preferred-language (Rossalli et al., 2014) and phonemic activation (Costa, Santesteban, & Caño, 2005). More importantly, these studies do not control for amount of exposure to the target forms and tend to assess the language of more
advanced participants, for which higher degrees of L2 metalinguistic knowledge may also play a role.

In the area of conceptual transfer, Slobin’s (1991) ‘thinking for speaking’ and linguistic relativity theories make predictions about the degree of separation between conceptual categories in the mind of multilinguals, indirectly alluding to restructuring processes. In contrast to Whorfian theories (Whorf, 1956; Regier & Kay, 2009; Bowerman, 1996; Bowerman & Choi, 2001), they claim that background languages affect the elements of mental representations selected for verbalization instead of the mental representations themselves. However, as noted by Jarvis (2011), it is difficult to demonstrate if CLI arises at the conceptual level and, therefore, conceptual transfer studies focus on “whether the predicted linguistic consequences of hypothesized differences of these types can in fact be found” in the learner’s output rather than on how conceptualizations from previously learned languages affect the acquisition of another language (p. 4).

A relatively small number of experimental studies have investigated how prior language knowledge affects early processes moderated by attention and awareness, even though this interaction has been acknowledged by different theoretical SLA and CLI frameworks. For instance, Gass (1988) hypothesized that learning involved the integration of new and prior knowledge, and that prior knowledge constituted another factor (besides attention and awareness) determining whether language data was apperceived or not (p. 203). Leow’s (2015a) model of the L2 learning process in ISLA also postulates that activation of prior knowledge plays an important role in language learning, together with attention, depth of processing, and levels of awareness. Leow posited that L2 knowledge is attained through the ‘strengthening of the cognitive bonds between incoming information and existing knowledge’ and that the role of prior knowledge relates to conceptually-driven processes during intake processing (p. 53). The latent linguistic representations formed by prior knowledge then affect unconscious processing of new information, facilitating
comprehension and retrieval. Both Gass (1988) and Leow (2015a) refer to prior knowledge of the L2 target language (or L2 experience), rather than to the learner’s L1 and other nonnative languages. They also focus on aspects of intake processing leading to the consolidation of L2 knowledge. The CLI literature, however, offers ample evidence supporting the extrapolation of this premise to knowledge of previously learned languages, especially when languages share conceptual, semantic, or phonomorphological features. Prior knowledge, in this broader sense, is also hypothesized to affect initial processing of language input, both positively and negatively. For instance, White (1987) claimed that learners’ internal grammar guided the selection of intake, by unconsciously directing their attention to aspects of the input relevant to i+1. Klein (1986) suggested that the inability to notice crosslinguistic discrepancies was one of the reasons why learners did not advance beyond a certain point of development when languages were closely related (p. 139). Long (2003) argued that L2 learners’ reduced sensitivity to input (or failure to register the existence of items in the input) in interaction with perceptual salience (inherent to language structures) could be a strong predictor of stabilization in language learning, which would explain why some elements of language fossilize more than others. The same position is defended by Han (2004). In Jarvis’s (2007) Conceptual Transfer Hypothesis, he differentiated between concept and conceptual transfer, suggesting that the former could be affected at the perceptual and recognition levels (following Goldstein, 2007). Research on speech perception also shows that the L1 phonological system affects both the sensory perception and the mental categorizations of L2 sounds, which partially explains the development of foreign accents (see Guion-Anderson, 2013, for a review). Another growing area of study addressing the interaction between CLI and perceptual mechanisms is the research on orthography and literacy. Despite the methodological difficulties in measuring the effects of orthography in second and third language learning, studies have shown evidence of facilitative and inhibitory effects of orthography on areas such as nonnative

The effect of prior knowledge on input processing has been discussed also within the field of typologically close languages. As Kellerman (1995) pointed out, in the mid-1970’s transfer was commonly seen as related to input selectivity, which is intensified by the similarity between L1 and L2 (p. 126). This idea is captured by the Skaggs-Robinson’s Hypothesis (cited by James, 1980, p. 180), according to which inhibition (the opposite of facilitation) triggered by L1 habits constitutes a bigger obstacle in the acquisition of a typologically close L2 than in the acquisition of a distant L2. For Corder (1983), transfer effects resulted from overconfidence in the use of strategies borrowed from the L1: learners are hypothesized to make prior assumptions when processing nonnative input in a similar L2 and jump ahead of themselves by wrongly interpreting meanings and forms. The same idea is found in Faerch and Kasper’s (1987) understanding of overgeneralization, a process triggered by the perceived similarity across two languages that leads to excessive confidence in the transfer of conscious and unconscious learning strategies from the L1, resulting in the oversight of L2 linguistic forms. Similarly, Long (1996) speculated that “[p]aradoxically, comprehensible input may actually inhibit learning on occasion, because it is often possible to understand a message without understanding all the structures and lexical items in the language encoding it, and without being aware of not understanding them all” (p. 425).

Psycholinguistic researchers investigating speech perception have proposed language perception and production models that recognize the effect of prior language knowledge on
perception, categorization, and production of foreign language sounds. For instance, Kuhl’s (1993, 2000a, 2000b) Native Language Magnet Model (NLM) states that, although infants initially show the ability to perceive universal phonetic patterns, their perceptual systems become accustomed to and are later constrained by exposure to the sounds of their L1. According to the model, repeated exposure to the phonetic realizations of L1 sounds cause learners as young as 6-months old to develop phonological prototypes, defined by Kuhl, Williams, Lacerda, Steven, and Lindblom (1992) as speech sounds identified by speakers of a given language as ideal representatives of a given phonetic category (p. 606). These prototypes function as magnets for neighboring sounds that end up being assimilated, that is perceived as identical to the prototypical sound. By mediating the perception of phonetic stimuli, prototypical sounds reduce the learner’s sensitivity to sound contrasts that are not present in their L1, shrinking perceptual sound distances. Reduced perception, in turn, hinders the development of new L2 prototypical categories. One of the first studies to provide evidence supporting magnet effects is Kuhl et al. (1992), who tested the ability of 64 L1 English infants and 32 L1 Swedish infants to associate variants of the English prototypical sound /i/ and variants of the Swedish prototypical sound /y/ to their respective prototypes. Using a head-turn (HT) technique, they found that infants were able to associate the L1 variants to the L1 prototypical sound significantly better than they associated the L2 variants to the L2 prototypical sound, showing perceptual bias. Several other studies have corroborated their findings (Grieser & Kuhl, 1989; Kuhl, 1991, 1993, 1998; Bosch & Sebastian-Galles, 1997; Bosch, Costa, & Sebastian-Galles, 2000; Iverson & Kuhl, 1995). This idea has been expanded in other theoretical frameworks, as in Werker et al. (2012), who explained the L1 sound perceptual tuning through a domain-general statistical learning mechanism called distributional learning (DL).

The Perceptual Assimilation Model or PAM (Best & Strange, 1992; Best, 1994, 1995) also assumes phonetic perception to be mediated by prior language experience in which non-native
phonemes are assimilated into our native phonemic inventory. The model predicts that non-native sound assimilation happens in one of three ways: (1) as categorized phonemes (coinciding with L1 sounds), (2) as uncategorized phonemes (sounds that fall between native phonological categories, and (3) as non-assimilable phonemes (sounds with no bearable similarity to the native language and therefore unrecognizable). In addition, uncategorized sounds can be processed in two different ways: (1) as two-category assimilations (one native phoneme is interpreted as two different non-native phonemes) or (2) single category assimilations (two non-native phonemes are interpreted as one single native phoneme). These patterns of assimilation are derived from articulatory phonology frameworks such as Browman and Goldstein’s (1986) and make predictions with respect to levels of difficulty encountered by adult learners. Both NLM and PAM describe perceptual processes at initial stages of language acquisition.

The Speech Learning Model (SLM) was proposed by Flege and his collaborators, following more than a decade of research investigating the causes of foreign accent in L2 speech production. This model is primarily concerned with ultimate attainment in nonnative pronunciation, and therefore addresses learning processes of more advanced learners, beyond the early stages of second language acquisition. According to Flege (1995), four postulates guide the SLM: the idea that (1) L1 mechanisms (including category formation) are applied to L2 learning, (2) features of speech sounds are stored in long-term memory as phonetic categories, (3) L1 phonetic categories evolve over the life span as to include the L2 phones, and (4) bilinguals strive to maintain a distinction between L1 and L2 phonetic categories, which share a common phonological space (p. 239). The SLM model thus shares with the NLM and PAM the assumption that knowledge of L1 may block category formation of L2 sounds. However, it also assumes that the L2 systems remain adaptative and that the L1’s effect on L2 phonetic perception depends highly on the L2 age of onset. The earlier learners are exposed to the L2, the more their chances to achieve native-like perception and
production of L2 sounds increase (Flege & Eefting, 1987). In fact, Flege argued that learners of all ages can eventually gain perceptual access to properties needed to interpret L2 speech sounds, even if such properties are not necessary to process their L1 (see Flege, 2003, 2007; Flege, Schirru, & MacKay, 2003). More recently, Onishi (2013) examined whether the perception of phonological contrasts differed among L1 English and L1 Korean speakers learning L2 Japanese, and L1 Korean L2 English speakers learning L3 Japanese. She found an overall facilitative effect of English knowledge in the discrimination of Japanese stops. In sum, the extensive literature on speech perception offers empirical evidence of the role of previously learned languages in nonnative input processing in interaction with age, proficiency, and other cognitive factors (Werker, Gilbert, Humphrey, & Tees, 1981, Werker, 1995; Flege & Strange, 1995; Gleason & Ratner, 1998; Best, 1999; Best, McRoberts, and Goodwell, 2001; Flege & Mackay, 2004; Connie & Best, 2010; Ayoama & Flege, 2011; Mora & Nadeu, 2012; Tsukada, Yukari, and Roengpitya, 2014). Moreover, according to Wang (2002), theoretical accounts of speech perception in the 1990s witnessed a shift toward the view of perceptual constraints as the attentional reorganization of speech functions rather than the loss of sensory abilities in adulthood, which implies that reallocation of attention in L2 learning and increased perceptual ability are possible through perpetual training and increased exposure to the L2 (e.g. Werker & Polka, 1993; Werker, 1994; Strange et al., 1998).

In multilingualism, different models have offered theoretical accounts for the role of prior knowledge and processing of language input. Hufeisen’s Factor Model of language acquisition (Hufeisen, 1998; Hufeisen & Marx, 2007) identifies different groups of factors that influence language learning processes: neurophysiological factors (e.g. aptitude, age), learner external factors (e.g. input, learning context), affective factors (e.g. motivation, anxiety, perceived closeness), and cognitive factors (e.g. metalinguistic awareness, learning strategies). The model posits that third language acquisition (TLA) differs substantially from second language acquisition (SLA) as it is
also mediated by foreign language specific factors (e.g. experiences in foreign language learning, transfer strategies, interconnectivity of interlanguages, target language proficiency). The assumption is that learners gather individual techniques and strategies when learning a foreign language that enhance the learning of a third or subsequent language. Both the learner’s L1 and L2, then, function as a bridge supporting TLA development. These learned strategies are assumed to result in increased metalinguistic skills and awareness of transfer possibilities between languages, with the continual transfer of declarative knowledge and procedural knowledge that affect (although not exclusively) the learner’s receptive skills in initial stages of language acquisition (Hufeisen & Marx, 2007, p. 311). Metalinguistic awareness is also a key component in the Dynamic Model of Multilingualism (Herdina & Jessner, 2001; Jessner, 2008), in which multilingual proficiency is defined as the dynamic interaction between the learner’s various psycholinguistic systems (LS1, LS2, LS3, LSn), crosslinguistic interactions (CLIN), and the Multilingualism-Factor. According to Jessner (2006), the Multilingualism-Factor, or M-effect, refers to the set of qualities developed by the multilingual speaker in a non-additive or cumulative way due to language contact, the most important one being metalinguistic awareness. In this model, metalinguistic awareness is defined as the ability to focus on linguistic form and to switch between form and meaning, and it is assumed to develop from prior linguistic and metacognitive knowledge, having a catalytic effect on third language processing, particularly in the case of typologically related languages (Jessner, 2008, p. 277).

Another model of multilingual processing was proposed by Meißner (2004) and applies specifically to typologically related languages. It assumes that at early stages of language learning, learners systematically rely on their knowledge or previously learned languages, using them as the bases for hypothesis building that result in the development of a spontaneous or hypothetical grammar, which in turn facilitates understanding of the new language (i.e. the learner’s receptive
skills). In order to build a hypothetical grammar, three conditions must be met: (1) there must exist an etymological relationship between the languages, (2) the learner must be proficient in the bridge language(s), and (3) the learner must have been instructed in how to use his prior language as a bridge language (Jessner, 2008). The learner’s hypothetical grammar is under constant revision and undergoes four different stages. In the first stage, the hypothetical grammar is formed through the systematization and generalization of interlingual regularities from the target language input. In the second stage, an interlingual correspondence grammar is created, with the development of correspondence rules that allow for transfer. In the third stage, a multilingual inter-system is constructed, consisting of successful transfer strategies and working as the basis for further decoding and understanding of the new language. At the fourth stage, learning experiences and knowledge are stored as a collection of metacognitive strategies that mediate comprehension of new target language input.

In the area of vocabulary acquisition, the Parasitic Model (Hall, 2002; Hall & Ecke, 2003; Ecke, 2014) suggests that both typological similarity and L2 status come into play affecting lexical acquisition and use, on an item-by-item basis. The model presupposes that knowledge of any prior language heavily constrains further language learning by both altering perception and partially regulating how novel word structures are assimilated in the mental lexicon through a network of pre-existing stable representations and access routes. Ecke (2014) describes three stages predicted in the Parasitic Model: (a) establishing a form representation, (b) building connections to frame and concept representations, and (c) strengthening and automatization of representations and access routes. In each of these stages, novel L3 items may enter a parasitic relation with items from prior languages due to perceived and structural similarity, being associated with their form, syntactic frame, or conceptual representation. Also, although more common in initial stages of acquisition, these processes may result in fossilized mental configurations. The initial and early stages of
acquisition are associated with the models’ first two stages, resulting in increased CLI. Moreover, “the learner’s initial focus on establishing and integrating a novel form of representation into a network of existing triads” would result in a disproportional high rate of form-based errors compared to meaning-based errors (Ecke, 2014, p. 7). Evidence of parasitic relations in L2 and L3 vocabulary acquisition has been provided by numerous studies (Ecke & Hall, 2000; Ecke, 2003; Hall & Ecke, 2003; Hall & Schultz, 1994). The model, although centered on the acquisition of vocabulary, integrates grammar learning through the abstraction and internalizations of word-specific frames that take place with repeated exposure to input and revision of mental connections.

The Competition Model, a functionalist and connectionist approach to language learning, is perhaps the most influential model addressing initial stages of language processing in the context of prior knowledge (Bates & MacWhinney, 1981, 1982, 1989). It predicts that learners start constructing their L2 knowledge by employing parasitic constructs from their L1, and progressively build an independent new language system by mapping function and form through language use. The learner’s L1 is seen as a developmental ancillary strategy. Bates and MacWhinney hypothesized that learners make the correct form-function connections leading to language acquisition by interpreting cues in the language input based on their validity and strength. **Cue validity** is determined by conditional probabilistic cue features such as availability, task frequency, simple reliability, and conflict reliability. The main cue processing predictor, availability, represents the extent to which a cue is present when it is needed, e.g. the agent role in preverbal position, which is largely available in English. **Task frequency** is understood as the raw frequency of the linguistic task (e.g. determining an anaphoric reference). **Simple reliability** represents the degree to which a cue leads to the correct interpretation whenever it is available; again, the agent role in preverbal position is a very reliable cue in English. **Conflict reliability** is a comparative measure of reliability, given the interaction of two or more cues. The psycholinguistic instantiation of cue
validity in the mind of the learner is the cue strength, that is the weight of form-function connections associated with a linguistic cue (MacWhinney, 1997). Cues compete, entering a hierarchical relation that generates different dominance patterns in different languages, and “[t]he outcome of these competitions is determined by the relative strength of the relevant cues” (MacWhinney, 2005, p. 50). L2 learning occurs with the strengthening of L2 cues, but L1 hierarchical patterns are borrowed in early stages of L2 acquisition to process L2 input. The focus is, therefore, on the learners’ external factors (input-driven learning), which are mediated by prior language knowledge as one of their internal factors, determining how form and function are attended to in the input and integrated into the developing L2 system. A considerable number of studies have been conducted to identify cues hierarchies in different languages and test the models’ predictions, providing evidence of cue-based strategy transfer in the context of L2 learning (McDonald, 1987; Kempe & MacWhinney, 1995; Yoshimura & MacWhinney, 2010; Morett & MacWhinney, 2013) and, more recently in third language learning (Stafford, Bowden, & Sanz, 2012; Sanz, Park, & Lado, 2014; Riestenberg, Maimone, Jan, & Sanz, 2015). Discussing the underpinnings of the Competition Model, MacWhinney (2005) argued that linguistic cues across typologically close languages may be neglected since ill-formed connections often do not impede comprehension. MacWhinney (1997) also emphasized the need to consider the degree of separation between systems in the study of bilingualism, that is the degree of processing independence between two languages. For him, the more separation achieved when encoding lexical, phonological, and syntactical information, the less interference is likely to occur. This view is in line with the concept of mixed interlanguages (Selinker & Cohen, 1995) and the idea that typologically close languages are constructed as shared psycholinguistic representations (Lipski, 2006).
Finally, N. Ellis’s (2006b) Associative Learning theory offers an explanatory account of why input fails to become intake, leading to learning shortcomings. According to this theory, processing of input features (varying in frequency, recency, context, and salience) is mediated by associative phenomena (such as contingency, cue competition, interference, overshadowing, blocking, and perceptual learning), which are shaped by prior language knowledge (more specifically, the L1). For N. Ellis, living in complex environments where multiple predictive cues are available causes perceptual biases to naturally emerge in human learning. Learning is understood, therefore, as a probabilistic achievement that is nonetheless filtered by the lens of our previous cognitive experiences. In other words, “our perceptual systems change their structure during their history of processing the stimuli” or usage (p. 181). N. Ellis also argued that, as a consequence

without there being any contingency between the perceptual stimuli they process and any other outcomes or events, perceptual systems alter their sensitivity to stimulus features, becoming more sensitive to those which are psychologically significant dimensions of variation amongst stimuli, and becoming insensitive to those that are redundant characteristics which do not play any role in accurate classification (N. Ellis, 2006b, p. 181).

This mechanism, called perceptual learning, results in different selective attention effects such as overshadowing and blocking. The phenomenon of overshadowing refers to an outcome being associated with the most predictive and salient amongst several linguistic cues, while the less predictive cues are ignored, or overshadowed. Repeated instances of overshadowing over time produce a blocking effect. Blocking is understood, therefore, as the result of an automatically learned inattention (p. 178). N. Ellis believed that L2 learners fail to adopt and use certain linguistic features as a result of this attentional tuning, irrespective of the later availability of these features in
the input. He pointed out that “a language learner might never get around to noticing low salience cues, particularly when the interpretation accuracy afforded by the other more obvious cues does well enough for everyday communicative survival” (p. 170). This hypothesis pertinently applies to the case of typologically close languages with high degrees of mutual intelligibility, such as Spanish and Portuguese. In fact, the associative learning theory incorporates crosslinguistic phenomena, offering an explanation of transfer and interference. Drawing on classical interference theory, it postulates that the effects of prior language learning are due to proactive inhibition (PI), in which old memories interfere with the retention of new learning, particularly those memories derived from highly similar (linguistic) experiences. Moreover, inspired by Rescorla and Wagner’s (1972) model, the theory provides an account of fossilization, understood as a product of low salience cues that repeatedly fail to be associated with an outcome consequently becoming negligible and never being integrated into the new developing linguistic system (N. Ellis, 2006a). As explained by Ellis and Sagarra (2011), once a learner associates a particular stimulus with a particular outcome or form, it becomes harder to learn another cue paired with that same outcome (p. 590).

**CLI studies and input processing.**

In SLA, research on input processing has been as prolific as research on the roles of attention and awareness. Most research in input processing, however, has looked at L2 acquisition without directly addressing how different L1s mediate perception and processing of the L2 input. Fewer studies have focused on L3 or multilingual processing. Testing VanPatten’s model of input processing, for example, a few studies have looked at learners with different L1s and L2s when exposed to a language feature or language system for the first time but have not reported data comparing the performance of learners with different language backgrounds. In one of these studies, Han and Peverly (2007) asked how true beginners of Norwegian with different L1s (Polish, Korean, Turkish, English, Chinese, or Japanese) and different L2s (Italian, English, German, Spanish,
Chinese, Japanese, etc.) approached primary input processing: if through meaning-based or form-based processes. They also asked if *sequential processing* of meaning and form was superior to *simultaneous processing*. Results revealed no differences between *sequential* and *simultaneous processing* conditions and showed that the *ab initio* leaners primarily adopted a form-based approach to input processing. These results referred to group differences based solely on learning conditions and task type, irrespective of learners’ L1 or L2. On the other hand, a great number of CLI studies, as discussed above, investigated later processes in language acquisition, such as those involved in restructuring and production. In this section, I describe CLI studies that have focused on input processing by either explicitly addressing the role of a specific prior language, or by comparing the performance of participants with different language backgrounds when first exposed to target language input. For that reason, participants in the studies described below are naïve learners with little or no prior exposure to the targeted structures.

Following a functional approach to crosslinguistic influence, Sanz, Park, and Lado (2015) investigated the *ab initio* acquisition of Latin by native speakers of English who were also speakers of L2 Japanese or L2 Spanish. Adopting the Competition Model theoretical framework (Bates & MacWhinney, 1989), they asked whether learners with different L2 backgrounds would exhibit similar processing strategies and similar learning development over time (from pre- to delayed posttest). In their study, 25 undergraduate students with no previous knowledge of Latin learned thematic role assignment to Latin nouns in transitive sentences through input-based aural and written activities and without receiving any metalinguistic explanations. The fact that the cue strength hierarchies for thematic role assignment were different for English (SVO word order> Agreement> Animacy), Spanish (Agreement> SVO/‘flexible’ word order), Japanese (Case > Animacy> SVO/’flexible’ word order), and Latin (Case > AGR > SVO/‘flexible’ word order), allowed researchers to identify if learners relied on strategies borrowed from their L1 or L2 when
processing L3 Latin. Language gains were assessed via a written and an aural interpretation test that combined different types of sentences based on the availability of the different cues to thematic role assignment. Results revealed no significant differences between the two L2 groups in overall accuracy or cue-based learning strategies, indicating that L2 knowledge was not instrumental in the learning of L3 Latin. Instead, participants in both groups showed greater reliance on L1 strategies and similar developmental patterns. These results are in line with predictions of the Competition Model, which presupposes initial L1 transfer due to entrenchment of L1 cues, and contradict predictions made by the L2 status factor (Falk & Bardel, 2011) and typological proximity models, such as the TPM (Rothman, 2011). In a similar study, Riestenberg, Maimone, Jan, & Sanz (2015) adopted the Competition Model theoretical framework to investigate the effects of L1 English and L2 Arabic in initial stages of L3 Latin acquisition. In Arabic, subject-verb agreement (AGR) cues have more strength than case marking (Case) cues, which are stronger than word order cues. It was hypothesized, then, that participants would rely mostly on knowledge of AGR and Case from their L2 when processing Latin than on word order cues (SVO) from their L1. In addition, the researchers examined whether amount of L2 experience affected reliance on L2 cue hierarchy and whether L3 explicit knowledge was a predictor of overall accuracy. They employed the same aural and written implicit learning tasks as Sanz et al. (2014), and measured the participants’ performance on both recognition and production tests at three points in time (pretest, immediate posttest, and delayed posttest). Participants were divided into three groups based on their exposure to L2 Arabic, for a total of 15 beginners (1-2 semesters), 14 intermediate (3-5 semesters), and 6 advanced Arabic learners (more than 6 semesters). Results showed that learners relied significantly more on SVO at all points in time compared to AGR and Case. However, while performance on SVO remained relatively stable over time, use of AGR and Case cues significantly improved after treatment. No significant differences were found between the use of AGR and Case, but results showed a trend
towards the reliance on AGR. Also, although no significant differences were found between L2 proficiency groups, learners showed a slight advantage in the use of Case. Explaining their findings, Riestenberg et al. speculated that the lack of significant differences between groups could be due to the small sample size, as well as instruction-related issues affecting the acquisition of the Arabic Case system, such as instructors’ dialectal differences and the diminished use of Case in oral Arabic speech compared to written speech.

Carroll (2005) investigated the sensitivity of L1 English speakers with little or no knowledge of L2/L3 French to different cues to French gender classes (phonological, morphosyntactic, or semantic). In her experiment, participants learned lists of noun or verb phrases with instances of gender agreement and were later tested on a translation and guessing tasks with novel items. Although inspired by the Competition Model approach to input processing, Carroll theorized that processing was regulated by the learners’ internal system and other aspects of input (such as natural vs. non-natural gender and order of presentation) rather than on cue values. Therefore, in her experiment she sought to eliminate cue competition by presenting stimuli based on a single cue to each experimental group and controlling for cue frequency and reliability across groups. Among her findings, she highlighted the fact that participants in all cue groups were able to learn gender patterns that were not part of their L1, with learners in the phonological cue group doing slightly better. She also pointed out that, in general, learners performed better on natural semantic gender (gender associated with female-sex and male-sex animate entities), suggesting that symbolic associations related to phenomenological experiences facilitates learning of gender in French and showing that other factors interact with both the learners’ L1 knowledge and the L2 input. In Carroll’s study, some of the participants were reported to speak other Romance languages (which have grammatical gender), but the effect of these different L2s was not investigated. These three studies address transfer of learning strategies from prior languages in initial processing stages of
nonnative language input. While they did not find evidence of CLI effects from the learners’ L2, they showed that L1 prior knowledge mediates the learning of second and third languages.

A series of studies have looked at CLI in the context of word recognition and comprehension. For example, Rast (2006a) examined the strategies of naïve learners of L3 Polish during their first contact with the target language while performing a translation task in both aural and written modes. Participants were L1 French speakers with an intermediate level of L2 English and knowledge of other L2s, such as German, Spanish, Latin, Italian, or Russian. Rast predicted that psychotypology (Kellerman, 1977, 1979) would be an important factor determining semantic transferability and affecting comprehension. However, instead of the perceived similarity between two language systems as a whole, she hypothesized that learners would draw on knowledge of the perceived morphophonological proximity of individual words from different known languages when processing Polish input. She found that words recognized by 76 to 82% of the participants shared great similarity with several of the participants’ background languages but ultimately resembled French words, e.g. francusku (Polish), français (French), francés (Spanish), franzuskim (Russian). Words with an accuracy rate of 18 to 74% were translated correctly mostly by speakers of German (67%) and Russian (59%) and consisted of a great number of words with rich inflectional morphology, e.g. hiszpański (Polish), espagnol (French), ispanskij (Russian). Words with an accuracy rate of 9% consisted basically of function words and pronouns, which bared greater similarity to Russian, e.g. mój (Polish), mon (French), my (English) and moj (Russian). Indeed, they were recognized by 31% of Russian speakers versus 2.5% to 5% of speakers of other L2s. The same applied to words with an accuracy rate of 6% and 3%, which were recognized by 37% and 18% of Russian speakers respectively, compared to 0% to 3% of learners with no knowledge of Russian. In general, Russian and German speakers performed better on a combination of lexical and grammatical accuracy (17.4% and 18.1% respectively). Based on these results, Rast suggested
that the target language lexical items could be plotted along a transparency continuum (from opaque to identical), defined by their degree of phonological and orthographic similarity to words from previously learned languages. This perceived transparency causes learners to focus their attention on words in the input that are more readily identifiable, in line with the ‘parasitic’ role of prior language knowledge in early stages of comprehension defended in Hall (2002) and Ecke (2001). A study conducted by Hall et al. (2009), described in detail in the CLI section above examined whether learners first exposed to L3 verbs would assume that the presented verbs shared syntactic frames with cognates and non-cognate equivalents from either their L1 or L2. Their results confirmed that learners formed lexical-frame assumptions based on item formal similarity, as well as overall typological proximity and L2 status.

Rast (2010b) examined crosslinguistic influence in third language comprehension and use of negation relative to language typology, while also looking at the effects of L3 proficiency. All participants in this study were L1 French speakers with knowledge of L2 English (plus a variety of other L2s). Participants were either exposed to L3 Polish for the first time or were tested after receiving up to eight hours of language instruction. Rast hypothesized that after 1.5 hours of Polish instruction, learners completing a word order test would place the Polish clausal negator nie in pre-verbal position regardless of their language background, as had been shown by previous research on other languages. She found that learners with different L2s showed different patterns in the use of the Polish negator, which were consistent with their L2s. For instance, L2 German speakers placed the negator after the verb, and mixed patterns were produced by L2 speakers of Romance languages (e.g. Spanish, Portuguese). The sample, however, was very small, and results could not be generalized through inferential statistics. After seven hours of instruction, the same 15 participants responded to the word order task with 100% accuracy. Eight learners of Polish also completed a GJT in which learners were asked to detect and correct ungrammatical sentences consisting of
incorrect placement of the Polish clausal negator. Results showed that learners without knowledge of L2 Russian accurately identified and corrected the errors 29% of the time after 1.5 hours of instruction, 50% of the time after 3.5 hours of instruction, and a 100% of the time after 7.0 hours of instruction. Learners with knowledge of Russian had an accuracy rate of 56% after just 1.5 hours of instruction and reached a 100% accuracy at 3.5 and 7.0 hours of instruction. In a similar study, Rast (2010a) investigated CLI along with other factors involved in language comprehension at initial stages of L3 exposure. She administered a written sentence translation test to participants divided into three groups according to their additional L2s (besides English), for a total of seven L2 Russian speakers, five L2 German speakers, and eight L2 Romance-language speakers. A one-way ANOVA with the translation accuracy scores revealed a significant effect for language group, with L2 Russian speakers showing a slight advantage over L2 German speakers, but not necessarily over speakers of Romance languages. In a parallel study, Rast’s (2010a) results from a sentence repetition task showed that CLI from the learners’ L2 was mediated by word stress, phonemic distance, transparency, and word position, but not by phonemic distance or word length after initial exposure to Polish. This pattern remained the same after 4.0 hours of exposure, and only after 8.0 hours of instruction an effect was found for word frequency. Results from an aural sentence translation task after initial exposure further revealed a significant effect for word length, word stress, transparency, word position, but not for word frequency and phonemic distance.

Shoemaker and Rast (2013) investigated the recognition of Polish words by 18 native speakers of French who also spoke English and a Romance language but who had not been exposed to Polish prior to the experiment. Participants were tested before and after a 6.5 hours-five-day Polish course, using a word identification task in which they heard a Polish sentence first, followed by a Polish word in isolation, and were asked to report whether the isolated word was present in the sentence stimulus. Words in the experiment varied by transparency, frequency, and sentence
position (initial, medial, or final). Frequency was defined as a word appearing zero times (low frequency) or 20 times (high frequency) throughout the duration of the course. The level of transparency was determined by French speakers’ judgments of word similarity in an aural French-Polish task. Results after zero hours of exposure (pretest) revealed a significant effect for transparency, with better performance on high transparency words (88.4%) compared to low transparency words (63.7%). There was also a significant effect for word position, with words in final position being recognized significantly better (96.3%) than words in initial position (75.4%), which in turn were recognized significantly better than words in medial position (56.3%). These results reflect participants’ performance before any exposure to the target language, showing direct CLI effects on comprehension. At the end of the course, the same pattern was found for transparency and word position, and no effect was found for word frequency. Moreover, transparency in both pre- and posttests interacted with word position, showing that prior knowledge affected the relative salience of the language input, although the direction of the CLI effect (positive or negative) for words in each sentence position is not reported. Based on the results for transparency, this study makes claims as to the role of prior knowledge in the recognition of L3 acoustic signals, but since the language background of French speakers whose judgements were used to define transparency is not reported, it is difficult to determine if the perception of transparency was due to similarity with their L1 or other learned languages.

In Processing Instruction, one study indirectly addressed L1 effects in L2 acquisition. The classroom experiment conducted by Benati (2005) compared the effects of different types of instruction on the acquisition of the English simple past by school-age L1 Chinese and L1 Greek speakers studying L2 English in their respective home countries. Participants were taught the English simple past tense for the first time through either processing instruction (PI), traditional instruction (TI), or meaning-based output instruction (MOI). Their performance was measured by
an aural interpretation task and a written production task before and after treatment. Results revealed that speakers of both L1s in the PI condition performed significantly better on the interpretative task compared to participants in the TI and MOI conditions. No difference was found for type of instruction in the written production task. In all tasks and conditions, Greek speakers performed better than Chinese speakers, which could be explained by the fact that the Chinese language does not mark verbs for tense, using other grammatical devices to indicate time. However, the cause, magnitude, and significance of this L1 effect is not reported or discussed in the study, which contributes to CLI research by showing that English learners with different L1s benefit in similar ways from PI, TI, and MOI. One important point to signal is the fact that, although participants are claimed to have never been exposed to the English simple past before the experiment, results from the pretest show otherwise. Not only does the author report that participants who scored less than 60% on the pretest assessment tasks were included in the experiment, but that the pretest already showed differences between groups for both the interpretation and production tasks. For example, L1 Greek speakers in the PI condition attained a mean score of 2.4 (out of 10) in the pretest and 5.1 in the posttest, while Chinese speakers attained a mean score of 0.85 (out of 10) in the pretest and 3 in the posttest. In the interpretation task, Greek speakers’ mean scores were 4.5 in the pretest and 7.5 in the posttest, and Chinese speakers’ mean scores were 1.67 in the pretest and 7.6 in the posttest. It is possible, then, that participants had previous knowledge of the English simple past prior to the experiment (which might have varied individually and/or by L1 group). It also suggests that the two L1 groups processed the L2 English simple past differently. For instance, although the L1 Chinese group had inferior performance on the interpretation task on the pretest, it was able to catch up with the Greek group after treatment. However, although the performance of both L1 groups was comparable on the interpretation task in the posttest, L1 Greek speakers had a superior performance on the posttest production task.
Another area in which CLI and input processing research intersect is the study of attention and awareness in SLA. In an early study, for instance, Musumeci (1989) investigated attention to adverbial cues in the acquisition of tense assignment (present, past, and future) and verb morphology by L1 English speakers learning either L2 Spanish, L2 French, or L2 Italian after one and three semesters of language instruction. Although it draws on assumptions associated with the Competition Model, this study can be situated in relation to attention, since it explores the interaction of L1 knowledge and perceptual characteristics of the L2 input. During the first six weeks of classroom instruction, learners participating in this study received explicit explanations of the present and past tenses. Input was manipulated as to control for three types of cues to tense assignment: morphological (verb form), lexical (temporal adverbial expression), and gestures (performed by the instructor). At the end of the first and third semesters, participants completed a 54-item tense assignment task, a paper and pencil test of verb morphology recognition, and a test of sensitivity to the pairing of temporal adverbials and tense. The verb morphology recognition task presented stimuli formed by different combination of cues to verb assignment, ranging from the combination of all three cues together to the presentation of one single cue. Musumeci hypothesized that because the languages were typologically similar there would not be differences in language development, but she also entertained the possibility that phonological differences between the target languages could affect the perceptual quality of morphological cues. She found a significant effect for L2 language in tense assignment after one semester of instruction, with leaners of L2 Italian performing better overall than L2 French and L2 Spanish learners. Also, while no differential performance on tense was found for the Italian group, both the French and Spanish groups performed better on the use of past tense. After the third semester, all groups improved significantly on the use of past and future tenses compared to the first-semester learners. At this stage, the performance of the Italian and French groups was similar, and only the Italian group statistically
outperformed the Spanish group. The morphology recognition tasks further revealed that participants did better on the condition combining all three cues to tense assignment and worse on conditions with fewer cues, generating different levels of processing difficulty, and showing lexical cues to be more predictive of processing ‘easiness.’ Overall, this study shows that the acquisition of L2 tense assignment and morphology is mediated by the interaction of L1 knowledge and morphological and phonological characteristics of different L2s, even for L2s that are typologically close.

More recently, Park and Han (2008) posited that prior knowledge contributes to learners’ perception of what is salient in the target input (internal-regulated salience) and that learners with no knowledge of the target language adopt a form-based approach to input, while learners with some knowledge of the target language adopt a meaning-based approach. They reported on a study investigating learner spontaneous attention during L2 input processing, while also tracing the effects of target language knowledge (TL) and L1 knowledge (L1), seeking to identify what features of the input were noticed by learners with different L1s and either zero or some knowledge of the L2. Participants were L1 English or L1 Japanese speakers (often with different L2s), exposed to L2/L3 Korean for the first time or after having learned six words in Korean. Participants in both conditions (no L2 knowledge or some L2 knowledge) were exposed to similar (but not identical) short written texts in Korean and asked to perform two online tasks: underline input forms and ask questions (in writing) related to any aspect of the input that stood out for them. A qualitative analysis of the results showed that despite the different L1s, participants with no knowledge of Korean tended to notice recurring patterns and forms, based on input frequency and shape. Also, while L1 English speakers noticed more nominal suffixes and punctuation markers than L1 Japanese speakers, the later noticed isolated syllables and grapheme elements. On the other hand, participants who had previously learned the Korean words displayed similar noticing patterns irrespective of their L1,
identifying the learned words in the text more than other forms, and with more questions generated by the L1 English speakers. An analysis of the type of questions asked by participants also showed a preference for meaning-based questions, followed by form-based questions, and orthography related questions. In the no L2 knowledge condition, the pattern of questions was similar for both L1s, but in the some L2 knowledge condition L1 Japanese speakers asked more questions about meaning, while L1 English speakers asked more questions about form. The researchers interpreted the results as evidence of L1 effects on L2 processing and concluded that, when constrained by absence of knowledge of the target language, leaners have no alternative than to focus on form. Consequently, for them, input processing of a typologically distant L2 tend to be form-oriented, while processing of a typologically close L2 tends to be meaning-oriented. If that is true, it would explain why Spanish speakers seem to pay less attention to form when processing Portuguese input. It is difficult, however, to draw any conclusions from this study regarding the internal regulated salience of diverse language items, given the absolute disparity of the English and Korean writing systems (and even between the Japanese and Korean writing systems), which deprived learners of any reliance on their L1 for both meaning and form processing.

In a later study, Park (2011) continued to explore self-generated (or spontaneous) noticing of the L2 input in a replication of Park and Han (2008). Participants were again either L1 English or L1 Japanese assigned to two different conditions: no knowledge of L2 Korean (-L2) and some knowledge of L2 Korean (+L2). The treatment materials and research questions were the same as in Park and Han (2008), but noticing was operationalized as (1) input marking (underlining or circling), (2) stimulated recall of marked items, and (3) two post-exposure question (if something had caught their attention in the text and what they had learned about the language). Results for the -L2 condition mirrored the results from Park and Han (2008) with position appearing as another physical attribute of input mediating noticing. For both L1 groups in this case, forms in sentence-
final position were noticed more often. For the +L2 condition, results were again similar to those in Park and Han (2008), indicating a shift from reliance on learner-external factors to learners’ internal factors, such as the acquired L2 knowledge and learners’ expectations regarding L1 and L2 similarities. The same study is further explored in Park (2013).

To my knowledge, the only empirical study addressing input processing in the context of L3 Portuguese acquisition is Koike and Gualda (2008). Their study investigated noticing of Portuguese possessive adjectives under implicit and explicit conditions by three different groups of Spanish/English bilinguals: L1 Spanish-L2 English, L2 Spanish-L1 English, and heritage Spanish speakers. Treatment consisted of a task based on a recorded audio dialogue containing instances of the possessive adjectives plus instructor feedback, and a list of the target forms provided to participants only in the explicit condition. It was hypothesized that L1 Spanish speakers would learn Portuguese more intuitively, while L2 Spanish learners would benefit from explicit instruction. Noticing was operationalized as the intake of grammatical forms after treatment, measured by two offline production tasks, a 9-item partial translation task and a 5-item fill-in-the-blank production task, which were administered at three points in time (pre-, post-, and delayed posttest). Results from the immediate posttest showed significant improvements from pre- to posttest only for L1 Spanish speakers and L2 Spanish learners in the implicit condition. A visual inspection of the results also indicates that L2 Spanish learners performed better than heritage learners, followed by L1 Spanish speakers. This pattern is in line with the researchers’ initial hypothesis, but no statistical analyses are reported to support it. In the explicit condition, a visual inspection of data shows a slight advantage for heritage speakers of Spanish over the other two groups, followed by L2 Spanish learners and with L1 Spanish speakers last. This pattern, on the other hand, contradicts the researchers’ hypothesis, but, again, no statistical analyses were carried out to confirm it. Overall, there seems to be a negative effect for L1 Spanish on accuracy posttest scores. Results from the
delayed posttest that would allow inferences about retention for the different language groups were not reported. Koike and Gualda addressed transfer from Spanish by quantifying the use of different types of Portuguese possessive adjectives (e.g. the preference for *seu* ‘his-masc-sing’ over *dele* ‘his-masc-sing’ was interpreted as negative influence from Spanish). They found overall less Spanish CLI by the L1 English group, which also produced more instances of transfer in the implicit condition than in the explicit condition. Their participants, however, had previous knowledge of the target forms as shown in the pretest, so results cannot be attributed to initial input processing. Koike and Gualda’s study, while showing that order of acquisition of Spanish and learning condition affect the acquisition of Portuguese possessive adjectives, does not give us any insight about what participants actually noticed during treatment. The combination of the lack of a recognition task, the fact that participants already had some knowledge of the target structures, and the lack of results from the delayed posttest do not allow us to draw any conclusions as to how knowledge of Spanish translated into CLI at different learning stages.

**Aptitude and Analytical Ability**

The large degree of variance in learners’ second language acquisition attainment has motivated research on a variety of individual factors which are believed to explain difficulties in L2 learning, such as intelligence, attention, memory, learning strategies, aging, and motivation (Trofimovich et al., 2007). Success in adult language learning has also been credited to differences in language aptitude, loosely understood as a natural talent for languages. Interest in language aptitude research reached a peak in the 1950s and 1960s, largely in response to demands in selecting ‘good language learners’ for military and diplomatic language programs in the U.S., but also in an effort to increase the cost-effectiveness of language education. These demands fueled the development of the first modern language aptitude tests (Aguado, 2012). From the beginning, aptitude has been seen as componential, that is as a set of abilities rather than a single cognitive
trait. However, as Robinson (2013) pointed out, aptitude (or its sub-components) cannot be directly observed but can only be inferred from performance on psychological tests designed to measure it (p. 1). The challenge, therefore, has been to design assessment tools that can successfully isolate and measure the various components of aptitude. In educational psychology, for example, cognitive components traditionally linked to language aptitude include fluid intelligence, verbal abilities (e.g. comprehension and fluency), domain specific knowledge, abstract reasoning, self-regulatory capacity, and other aspects of general cognition, with great weight placed on the role of intelligence (Kormos, 2013). In SLA research, on the other hand, the prevailing idea is that aptitude is independent of intelligence (Skehan, 1989), a view grounded in work by Carroll (1965), Gardner and Lambert (1972), and Skehan (1982), among others. In the context of foreign and second languages, aptitude was initially believed to (a) be innate and specific to language learning, (b) be relatively stable and not very susceptible to training, (c) apply to initial stages of adult learning, and (d) play a more significant role in instructional (less naturalistic) contexts (Skehan, 2015).

This multi-dimensional approach to aptitude is represented in one of the best known and still widely used language aptitude tests, the Modern Language Aptitude Test (MLAT), developed by Carroll and Sapon (1959). The MLAT contains five sections: number learning (in which participants learn a set of numbers through aural input), phonetic script (which tests the correspondence between speech sounds and phonetic symbols), spelling cues (which tests the recognition of words written with unconventional spelling), words in sentences (in which participants match words from different sentences that perform the same function), and paired associates (a memory vocabulary test). In a more explanatory work, Carroll (1965, 1981) proposed a theoretical framework that distinguished four aptitude sub-components: phonemic coding ability (the capacity to analyze and retain input sounds), associative memory (the capacity to remember form and meaning associations, intra and crosslinguistically), inductive language learning ability
(the capacity to infer patterns from language material), and grammatical sensitivity (the capacity to identify the function of words in a sentence). In the MLAT, however, none of the subtests discretely measures any one of Carroll’s aptitude constructs, and Carroll’s notion of inductive language learning ability is not represented by any subtest. As noted by Skehan (1989) and Robinson (2002b), the MLAT subtests were chosen from a larger battery of tests based on their predicative validity and low intercorrelations, rather than strictly on a theory of aptitude. The relatively high positive correlation between MLAT scores and classroom learning success (reported as between 0.4 and 0.65) made the test popular, supporting Carroll’s claim that it predicted rate and speed of foreign language learning. Similar tests developed in the subsequent years include the Defense Language Aptitude Battery (DLAB) by Petersen and Al-Haik (1976) and the Pimsleur Language Aptitude Battery (PLAB) by Pimsleur (1996) and collaborators. Compared to the MLAT, the PLAB emphasizes auditory factors. It also incorporates measures of verbal ability, motivation, and a subset of inductive language learning ability. Just like the PLAB, the DLAB also emphasizes auditory and inductive language learning factors (Skehan, 2002).

Since the MLAT, research has shown that aptitude positively correlates with L2 achievement (Sparks & Ganschow, 1991; Ganschow & Patton, 1995). Criticisms of the intended uses of aptitude scores and of the construct validity of aptitude tests are associated with a diminished production in aptitude research in the 1970s and 1980s, but new findings in cognitive sciences and second language acquisition have progressively renewed interest in the field, giving rise to new theories and operationalizations of aptitude. One of the greatest shifts in the conceptualization of aptitude was toward an information-processing perspective, with stronger focus given to the relationship between aptitude and cognitive processes rather than language instruction outcomes. Robinson (2001, 2005, 2007), for instance, proposed a theoretical model of aptitude consisting of sets of hierarchically intertwined cognitive abilities that interact differently
with contextual and environmental conditions, as well as with other affective factors (e.g. motivation). In this model, cognitive resources (e.g. attention, working memory, short-term and long-term memory) allow for cognitive processes to take place, drawing on primary abilities involved in language learning (e.g. speed of processing in phonological working memory, pattern recognition, grammar sensitivity, etc.). Robinson hypothesized that these primary cognitive abilities combine into higher-order sets (e.g. noticing the gap, deep semantic processing, memory for contingent speech, memory for contingent text, and metalinguistic rule rehearsal) that support different aspects of language learning. These sets of abilities themselves can be grouped into third-order abilities, or aptitude complexes, which are believed to influence language learning under different psycholinguistic processing conditions (Robinson, 2001, p. 372). Robinson’s framework, therefore, assumes that language learning is regulated by a multitude of aptitudes that, combined in different ways, help learners meet the information-processing demands of specific learning and teaching contexts (e.g. implicit learning, incidental learning, explicit learning, etc.). The importance of the interaction between individual differences (IDs) and treatments is also discussed in DeKeyser (2012). Similarly, Skehan (2002, 2012) established a connection between distinct aptitude components and the role they play at different SLA processing stages, such as noticing, pattern identification, extending, complexifying, integrating, becoming accurate/avoiding error, creating a repertoire/achieving salience, automatizing rule-based language/achieving fluency, and lexicalizing. A parallel account of aptitude and learning stages was proposed by Dörnyei and Skehan (2003).

Another development concerns the role of working memory (WM). As it has gained in relevance in SLA research, WM has also been investigated in connection with aptitude (e.g. Daneman & Carpenter 1980; Harrington & Sawyer, 1992; Engle, Kane, & Tuholski, 1999; Sawyer & Ranta, 2001; Robinson, 2002, 2005; Unsworth & Engle, 2007; Safar & Kormos, 2008; French & O’Brien, 2008; Bolibaugh & Foster, 2013), becoming a central component in aptitude research.
Likewise, experimental studies conducted in the last three decades have challenged other corollaries of early aptitude research. For instance, disputing the notion of stability in language aptitude, a number of studies have looked at aptitude levels and language experience and, although some have found no changes in aptitude over time (e.g. Sawyer, 1992; Harley and Hart, 1997), evidence that aptitude increased with training in second language learning was found by others (Eisenstein, 1980; Sparks, Ganshow, Fluharty & Little, 1995; de Graaff, 1997; Sáfár & Kormos, 2008). Concerning the restriction of aptitude effects to L2 development, differential aptitude scores found for early bilinguals in DeKeyser (2000) and for native speakers in Abrahamsson (2013) support the idea of a connection between aptitude and L1 development (Skehan, 2015, p. 378). Moreover, the traditional construct of aptitude as a set of language-specific abilities was challenged in the design of the new High-level Language Aptitude Test Battery (Hi-LAB) by researchers at Maryland University. In the theoretical approach behind the Hi-LAB, aptitude is defined as “a composite of domain-general cognitive abilities and specific perceptual abilities that, together, can support or constrain one’s ability to attain high-level proficiency as an adult learner” (Linck et al., 2013, p. 535). To operationalize aptitude, researchers identified nine constructs that, despite some overlap with early aptitude test designs, are associated with domain-general learning: working memory updating, inhibitory control, task switching, phonological short-term memory (PSTM), associative memory, long-term memory retrieval, processing speed, implicit learning, and auditory perceptual acuity. Finally, contradicting the belief that aptitude is only relevant for learning taking place in conventional, explicit, and rule-focused teaching contexts, Reves (1983, as cited in Skehan, 2002, p. 77) found positive correlations between aptitude and both formal and informal language development, showing that aptitude can be relevant in naturalistic, non-instructed settings as well. Reves’ findings are further corroborated by results...

More recently, there has been increased interest in how explicit and implicit learning relate to different types of language aptitude that are, in turn, captured by different measures. In a validation of the LLAMA test, for instance, Granena (2013) proposed that the phonetic memory component (LLAMA_D) measured implicit knowledge, while the other LLAMA sub-tests measured explicit knowledge. In Granena (2015), explicit learning aptitude was operationalized as components B, E, and F of the LLAMA test. To measure implicit aptitude Granena used a probabilistic serial reaction time (SRT) task. A similar task is used in the Hi-LAB aptitude test battery as a measure of implicit inductive learning ability (Doughty et al., 2010; Linck et al., 2013).

These recent advances in aptitude research led Skehan (2015) to divide measures of aptitude into two broad categories, one “which follows the aptitude structure proposed by Carroll, and work reflecting contemporary research in second language acquisition and cognitive psychology” (p. 369). According to Skehan, the major development following Carroll’s model has been the LLAMA Aptitude Test Battery by Meara (2005), which includes sub-tests measuring vocabulary learning through paired associates (LLAMA_B), sound recognition (LLAMA_D), sound-symbol associations (LLAMA_E), and grammatical inferencing (LLAMA_F). Other tests that fit this category are the VORD test, developed by the Department of Defense (see Parry & Child, 1990) and the English version of the analytical ability test designed by Ottó (1996, 2002) and employed in studies by DeKeyser (2000), Sheen (2007a, 2007b), Schmitt, Dörnyei, Adolphe, and Durow (2003) and Dörnyei, Durow, and Zahran (2003). For Skehan, the greatest development within the cognitive psychology framework is the Hi-LAB test, where the most discriminating power was found for the PSMT, associate memory, and implicit learning sub-tests. Also in this category is the Cognitive Ability for Novelty in Acquisition of Language (Foreign) Test (CANAL-F) by Grigorenko,
Sternberg, and Ehrman (2002), based on Sternberg’s (2002) triarchic theory of human intelligence. The CANAL-F addresses language acquisition processes such as selective encoding, accidental encoding, selective comparison, selective transfer, and selective combination at lexical, morphological, and syntactic levels. The test is innovative in that learners must cope with novelty and ambiguity while being introduced to an artificial language (Thompson, 2013). Granena (2015) adds that, unlike the psychometrically orientated tests, these new proposals measure mental processes using reaction times, error rates, and other indicants.

In sum, aptitude in modern SLA research has been established as one of the most predictive individual differences for language development (Robinson, 2013; Li, 2015a). Researchers have approached aptitude either from a theoretical or a pedagogical perspective, in areas such as long-term language achievement and sensitive periods in L2 (Harley & Hart, 1997, 2002; DeKeyser 2000; Abrahamsson & Hyltenstam 2008; Bylund, Abrahamsson, & Hyltenstam, 2010; Granena & Long, 2013a; Bylund et al., 2013; Granena, 2014), language awareness (Alderson et al. 1997; Roehr, 2008; Bell, 2009; Jackson, 2014); L1 learning (Skehan, 1986, 1989, 1990; Sparks & Ganschow, 1991; Bylund et al., 2010, 2012; Bylund & Ramirez-Galan, 2014), bilingual effects (Thompson, 2013), explicit and implicit instruction (Robinson, 1995, 1997a, 1997b, 2001, 2002a, 2002b; Erlam, 2005; Van Patten & Borst, 2012a, 2012b; Hwu & Sun, 2012; Granena, 2012; Linck et al., 2013; Granena & Long, 2013b; Granena, 2015), and types of feedback (Trofimovich et al., 2007; Sheen, 2007a, 2007b; Li, 2013, 2015c; Yilmaz, 2013; Yilmaz & Granena, 2016). Detailed reviews of language aptitude research can be found in Robinson (2005, 2013), Skehan (2002, 2015); Aguado (2012), and Kormos (2013).

Analytical language ability.

As posited by Skehan (2002), a different way to look at aptitude is to avoid the need of a composite construct represented by a battery of tests and to explore instead one or more components
of aptitude in order to understand it better or refine its measurement (p. 6). Indeed, several studies have investigated the separability of aptitude constructs and their individual contributions to language development. Grammatical sensitivity, operationalized as PART IV of the MLAT, is the most researched of Carroll’s aptitude components (Robinson, 1997; VanPatten & Borst, 2012b), and it has been found to have the most power for predicting L2 proficiency compared to other aptitude components (Ehrman & Oxford, 1995; Ranta, 2002; Hummel, 2009). Carroll (1981) defined grammatical sensitivity as “the ability to recognize the grammatical functions of words in sentence structures” (p. 105). Carroll’s initial aptitude framework, however, included another language analysis component that was never represented in the MLAT, namely inductive language ability, which referred to the capacity of learners to “infer or induce the rules governing a set of language materials, given samples of language materials” (Carroll, 1981, p. 207). Skehan (1998) argued that these two components represented two sides of a single language-related dimension (p. 201). Proposing a simplified model of aptitude, he combined grammatical sensitivity and inductive language ability into one component called language analytic ability, defined as “the capacity to infer rules of language and make linguistic generalizations or extrapolations” (p. 207). Later, in line with an information-processing view of aptitude, Skehan (2002) defended the need to separate grammatical sensitivity from inductive language learning once again, arguing that they related to different stages of the acquisition process. In his new model, he suggested that grammatical sensitivity affected the pattern identification processing stage, in which learners make hypotheses about language patterns they perceive, and that inductive language ability was involved in extending the domain of these initial hypotheses. Both grammatical sensitivity and inductive language ability would affect complexifying processes, in which leaners identify limitations and constraints of previously perceived patterns, noticing new aspects of the target language that allowed them to restructure these patterns. For Skehan, grammatical sensitivity is more relevant for
initial pattern detection, as it focuses on the extraction of discrete information, requiring a more passive kind of analysis. On the other hand, inductive ability focuses on the capacity to make generalizations and extrapolate, and is therefore a more active type of skill. Together, grammatical sensitivity and inductive language learning ability reflect the capacity to detect and manipulate language patterns and require noticed input to be analyzed, processed, generalized, and extended (p. 91). In a simplified version of Skehan’s (2002) model, Dörnyei and Skehan’s (2003) proposed that both grammatical sensitivity and inductive language learning ability interacted with pattern identification and pattern restructuring/manipulation.

Although Skehan’s (2002) updated model of attitude has become quite influential, it is not clear how these components in the model should be operationalized. Few studies have measured both grammatical sensitivity and inductive language learning ability (e.g. Bell, 2009). In fact, several studies have equated analytical language ability with grammatical sensitivity (e.g. Erlam, 2005; Trofimovich et al., 2007) or with inductive language ability alone (Alderson et al., 1997; Yilmaz, 2013), and only a few studies have approached analytical ability from a multi-componential perspective; for instance, Granena (2012) used subtests B, E, and F of the LLAMA Aptitude Test Battery. Part IV of the MLAT ‘Words in Sentences’ (WS) has been the more widespread measure of grammatical sensitivity. In a study by Ehrman and Oxford (1995), for example, performance on the WS was found to be the individual difference that correlated most strongly with language proficiency. Other tests based on the MLAT include the English version of Ottó’s (2002) aptitude test and Part IV of the PLAB (e.g. in Harley & Hart, 1997). Part IV of the PLAB, however, has also been claimed to measure inductive language learning, since it requires learners to infer and generalize language rules and patterns (Bell, 2009). Alderson et al. (1997) and Yilmaz (2013) have used other grammatical inferencing tasks to measure analytical language learning ability: the Swahili Test (Davies, 1971) and the LLAMA F subtest (Meara, 2005), respectively. In the next
section, I will focus on studies that have looked at analytical language learning ability and pedagogical treatments. I also review research that relates analytical ability to metalinguistic awareness and their potential connection to crosslinguistic influence.

Analytical language ability (as either grammatical sensitivity, grammar inferencing, or both) has been found to correlate with overall L2 learning success (Horwitz, 1987; Ehrman & Oxford, 1995; Harley & Hart, 2002; Ranta, 2002, 2005; Rysiewicz, 2008; Sparks, Patton, Ganschow & Humbach, 2011; VanPatten & Borst, 2012a) and to be specifically relevant to adult learners’ attainment of high-level L2 proficiency (Sasaki, 1996; DeKeyser, 2000). A prevalent discussion in SLA research concerns the interaction of analytical language ability and different learning contexts, from explicit and formal to implicit and naturalistic. This discussion relates to theories of explicit and implicit learning and the notion of a critical period. Ranta (2005) pointed out that analytical ability has emerged as a predictor of language learning taking place in traditional grammar-based and audiolingual classrooms, concurring with Krashen’s (1981) claim that aptitude can only predict conscious learning. Similarly, Zobl (1992) argued that meaning-focused tasks without focus on form would result in smaller individual difference effects, suggesting that the interaction of analytical ability was stronger with form-focused learning than with meaning-focused learning. The hypothesis that followed was that learners’ analytical abilities primarily helped adult learners in grammar-focused and explicit learning contexts. The explicit nature of aptitude is capture by traditional aptitude tests (e.g. the MLAT, PLAB, and LLAMA). For Granena (2015), what they all have in common is “the fact that they tap cognitive abilities in the domain of explicit and attention-driven cognitive processes… that are especially relevant to learn a language intentionally through reasoning, deliberate hypothesis testing, and memorization” (p. 1-2).

The relationship between aptitude and metalinguistic awareness (or explicit knowledge) is especially relevant for the current study, as it might relate to the learners’ ability to perceive
contrastive crosslinguistic patterns and morphology in the input, interacting with CLI effects. The inclination of learners to pay attention to forms and consciously process specific parts of the input has been extensively investigated in awareness research, which shows that higher levels of awareness result in improved language learning (Schmidt, 1990, 1993, 1994, 1995; Leow, 1997, 2000, 2001; Rosa and O’Neil, 1999; Robinson, 1997, 2005b; Gilakjani & Ahmadi, 2011). This connection is addressed, for example, by Robinson (1997), who claimed that grammatical sensitivity triggers awareness of forms in the input, explaining why some learners tend to notice more linguistic features than others do. Robinson (2002b) also related metalinguistic skills (as an aptitude component) to the ability of learners to ‘notice the gap’ (p. 126). Similarly, Trofimovich et al. (2007), having found that analytical ability accounted for a significant proportion of variance in L2 French morphosyntactic accuracy, suggested that it likely determined the “learners’ capacity to identify and focus on the structural properties of their own speech and the speech addressed to them” (p. 193). Discussing bilinguals’ cognitive advantages, Sanz (2000) proposed that advantages in attentional and cognitive control together with increased metalinguistic awareness aided learners in focusing on the most helpful linguistic cues in the input. Moreover, considering a weak-interface position to explain the limited success of naturalistic language learners, Ellis and Larsen-Freeman (2006) defended the idea that explicit knowledge played a role in “the perception of and selective attending to L2 forms by facilitating the processes of ‘noticing’ (i.e. paying attention to specific linguistic features of the input) and ‘noticing the gap’ (i.e. comparing the noticed features with those the learner typically produces in output” (p. 569).

In CLI research, metalinguistic awareness (or knowledge) is much more often associated with prior language experience than with aptitude. Although this interaction is still not very well understood, Odlin (1989) pointed out that “whatever the exact nature of the role that linguistic awareness plays, such awareness is a nonstructural factor that interacts with cross-linguistic
influences” (p. 140). James (1996) distinguished between metacognition of separate language systems (e.g. knowledge of either one’s native or nonnative language) and metacognition of the relationship between them, claiming that the latter complemented the former. According to James, this crosslinguistic metacognition can be held at the procedural level of performance or at the cognitive level of intuition (crosslinguistic intuition), as well at the explicit (declarative) level. While learners with no crosslinguistic intuition would transfer from L1 to L2 indiscriminately, learners with a modicum of crosslinguistic intuition would transfer selectively. James (1996) also hypothesized that cross-linguistic relationships resulted in input salience strengthening. For him, one of the determiners of perceptual salience is the contrastive dimension between one’s mother tongue and one’s foreign language(s). This contrast-dependent cross-linguistic salience would have the opposite effect on learning than the inherent salience of linguistic features, that is it would make contrastive forms less learnable (p. 143). Fostering conscious-raising and metalinguistic activities in the classroom would help learners transfer their L1 metacognition to L2 processing, increasing cross-linguistic awareness and intuition, and mitigating the ‘negative’ salience of cross-linguistic contrasts. A similar account is given by Cenoz (2003) and Jessner (2006). Additionally, in a study about the effects of age, L2 status, and linguistic distance in third language acquisition, Cenoz (2001) pointed out that cognitive and metalinguistic development could be related to CLI and psychotypology in multilinguals, as older children (reported to advance more quickly in the first stages of second language acquisition) are thought to “have more accurate perception of linguistic distance that could influence the source language they use when transferring terms from one of the languages they know” (p. 10). Many studies have addressed metalinguistic awareness as a sub-product of bilingualism (Cummins, 1978; Galambos & Goldin-Meadow, 1990; Yelland, Pollard, & Mercuri, 1993; Bialystok, 1991, 2001, 2002) and in the context of third language acquisition (Thomas, 1988; Schweers, 1993; Galambos & Haruta, 1988; Swain, Lapkin, Rowen, & Hart, 1990;
Aptitude experimental studies.

Many SLA studies provided evidence of the role of analytical language ability under explicit conditions (Skehan, 1989; de Graaff, 1997; Robinson, 1997; Erlam, 2005; Sheen, 2007a, 2007b; Yilmaz, 2013). Contrary Krashen’s hypothesis, nonetheless, analytical language ability was also shown to play a role under controlled implicit conditions (de Graaff, 1997; Robinson, 1997; Sheen, 2007; Trofimovich, Ammar, & Gatbonton, 2007) and naturalistic learning contexts (Reves, 1983; DeKeyser, 2000; Harley & Hart, 2002; Abrahamsson & Hyltenstam, 2008; DeKeyser, Alfi-Shabtay & Ravid, 2010; Granena & Long, 2013b). Therefore, aptitude has been posited by some researchers to be a central factor in all learning contexts (Sawyer and Ranta, 2001; Skehan, 2012). As noted by DeKeyser (2000) and Granena (2013), however, the relationship between analytical language ability and implicit learning outcomes has not been consistent, with some studies failing to find significant correlations between the two (Li, 2010; Sheen, 2007b; Yilmaz, 2013).

Robinson (1995, 1996, 1997b, 2002a) examined Krashen and Reber’s claim that nonconscious learning was insensitive to individual differences such as aptitude. In Robinson (1997b), participants were L1 speakers of Japanese, Korean, or Mandarin Chinese learning L2 English at the intermediate level. They were divided into four learning conditions (implicit, incidental, rule-search, and instructed) in which they learned structures representing a hard and an easy English rule. In the implicit condition, participants were informed they were participating in a memory task; in the incidental condition, they were asked to focus on comprehension; in the rule-search condition, they were instructed to look for rules exemplified by the stimuli sentences; and in the instructed condition, they received explanations about the easy and hard rule prior to completing the training tasks. To measure aptitude, Robinson used the English version of two MLAT subtests,
Part IV (Words in Sentences) and Paired Associates. He found significant correlations between performance on the grammatical sensitivity test and both easy and hard rule scores for all conditions except incidental learning. Robinson reasoned that the high levels of participants’ analytical ability in the implicit condition triggered a switch to conscious rule search, so learning in all conditions was fundamentally similar and occurred as a function of conscious processing induced by the nature of the task demands during training. Explaining the results found for the incidental condition, Robinson (2002a) suggested that the measure of analytical ability used in the study might not have been sensitive to the processes engendered by the incidental task, which related more closely to working memory (p. 221).

Robinson (2002a) replicated and extended Reber, Walkenfield, and Hernsdadt’s (1991) study to further explore the interaction between incidental learning, language aptitude, and awareness. This time he used Sasaki’s (996) Language Aptitude Battery for the Japanese (LABJ), which is based on Carroll and Sapon’s MLAT and contains measures of grammatical sensitivity, phonemic sensitivity, and symbol-sound association in Japanese. L1 Japanese speakers learning L2 English were divided into explicit, implicit, and incidental learning conditions. Following Reber et al.’s (1991) design, in the explicit condition participants were exposed to a Markovian grammar in which they were told they would later have to complete letter sequences similar to those in the exposure phase. In the implicit conditions, participants were exposed to the same stimuli, but were simply asked to memorize the letter strings. He found that aptitude, as measured by the LABJ, significantly correlated with posttest GJT scores for the explicit learning condition (r=.38, p<.05), but not for the implicit learning condition. The incidental learning condition required participants to first complete a vocabulary task in which they learned the meaning of three types of lexicalized Samoan sentences. They then completed a training task in which they were asked to try to understand the Samoan sentences as best as they could, answering follow-up comprehension
questions. Robinson assessed the learning outcomes of participants in the incidental learning condition in three ways: through untimed written and listening grammatical judgment tests, and through a production task. Besides the immediate posttest, learners also completed a one-week delayed posttest and a six-month delayed posttest, before which they were able to review the previously learned Samoan sentences. Results showed a significant correlation between aptitude and the delayed production task, but not the GJTs. Robinson concluded that the GJTs were not sensitive to IDs and that IDs (including WM) are less involved in initial exposure to Samoan in incidental conditions, but have more of an impact on further learning from repeated exposure. De Graaff (1997) also investigated the interaction between aptitude and instructional condition (presence or absence of explicit grammar instruction). Two groups of L1 Dutch students were tested on the acquisition of an artificial language (eXperanto) after a 10-lesson course targeting four different linguistic item types that varied in complexity and language domain (morphology or syntax). While instruction for both groups included input and output activities (e.g. translation and focus-on-form tasks), only learners in the explicit condition received a series of grammar explanations throughout the course. To measure aptitude, De Graaff used Dutch versions of the MLAT’s Part IV (Words in Sentences) and Paired Associates. No significant correlation was found between learning outcomes and the Paired Associates scores, but grammatical sensitivity (measured by Part IV of the MLAT) tended to be significant for all proficiency tasks. The combined mean score of the two aptitude subtests significantly correlated with posttest results for the judgement task with time pressure, gap-filling task, and correction task, but surprisingly not for the judgement task without time pressure. More importantly, there was no significant effect for type of instruction, pointing to a similar role for aptitude in explicit and implicit learning conditions.

Studying the acquisition of French direct pronouns by secondary school learners, Erlam (2005) looked at the effects of aptitude on listening comprehension, reading comprehension, timed
written production, and oral production tests under three different conditions (deductive, inductive, and structured input instruction). He operationalized aptitude as language analytical ability (Part V, MLAT), phonemic coding ability (Sound Discrimination Test from the Pimsleur Aptitude Battery), and working memory (Baddeley’s multisyllabic word test, 1999). In the deductive instruction condition, students received explicit rule explanations followed by focus-on-form activities with both input and output activities. In the inductive instruction condition, students practiced the target forms in hypothesis-testing and production activities without being told the explicit rules. In the structured input instruction condition, students received explicit explanations of the rule and performed input-processing activities but had no output practice. Erlam found no significant correlations between analytical ability and the proficiency measures for the deductive instruction group. For the induction group, analytical ability significantly correlated with listening comprehension (r=.51) and with delayed written production (r=.59). For the structured input group written production significantly correlated with both analytical ability (r=.49) and working memory (r=.49). Erlam’s results showed a more restricted relationship between analytical ability and learning outcomes. While she did not actually have an implicit condition, she found different effects of aptitude under explicit instruction depending on the type of exercises students performed. She concluded that the production of structures in situations where students had not had the opportunity to complete output practice required ability to analyze structural patterns within the language input, but aptitude differences were neutralized if output practice and explicit instruction were provided.

Analytical ability has also been investigated in terms of its interaction with different types of feedback. For example, Sheen (2007) examined the effect of written corrective feedback and analytical ability in the acquisition of L2 English articles. In her study, students were assigned to two feedback conditions (direct-only and direct-metalinguistic correction). In the direct-only correction group, students had their errors pointed out to them in the text and replaced by the correct
form or structure. In the direct-metalinguistic correction group, in addition to error location and correction, students received metalinguistic explanations about the error and the correct form. Analytical ability was measured using the Ottó’s test (as in Schmitt et al., 2003). Results showed that learners with a high level of analytical ability benefited more from both types of feedback. The relationship between scores gains and analytical ability, however, was stronger for the direct metalinguistic group where feedback included metalinguistic information. Trofimovich et al. (2007) looked at whether working memory, attention control, phonological memory, and analytical ability affected L1 French ESL learners’ ability to notice and benefit from recasts given during a picture-description task. Students were exposed to three different types of construction, containing either a possessive pronoun, an intransitive verb, or a combination of a possessive pronoun and a transitive verb. They did not receive any grammar explanations, and analytical ability was measured with Part IV of the MLAT (Words in Sentence) subtest. Noticing was operationalized by prompting students to say ‘yes’ or ‘no’ to whether they had noticed a difference between their description of a sentence and the recast immediately after the presentation of each trial. Although no significant associations were found between analytical ability and noticing of recasts, analytical ability strongly correlated with learners’ accuracy at producing the grammar target forms. Li (2013) further explored the interaction between working memory and grammatical sensitivity (measured by Part IV of the MLAT) and implicit versus explicit feedback. Seventy-eight L1 English speakers learning L2 Chinese were exposed to Chinese classifiers. A multiple regression analyses of participants’ oral production showed that language analytic ability was predictive of the effects of implicit feedback only, while working memory mediated the effects of explicit feedback.

In another study, Yilmaz (2013) investigated the effects of language analytic ability and working memory capacity on the performance of L1 English speakers learning the Turkish locative case /-DA/ and the plural /-lAr/ morphemes under either explicit or implicit feedback conditions.
During the training phase, students described pictures so that the researcher could identify them. Recasts were operationalized as simple reformulations of the learners’ production, while explicit feedback consisted of the rejection of their production followed by a target-like reformulation. Analytical ability was measured using the LLAMA F subtest and performance was assessed through a composite of scores in oral production, comprehension, and recognition tests. Yilmaz found that, compared to the no-feedback group, explicit correction on plural morphemes was effective for learners with both high and low analytical ability scores. Compared to recasts, however, explicit feedback was more effective for learners with higher analytical ability. Similar effects were found for high WMC in the explicit condition, but neither WMC nor analytical ability played a role in the implicit condition. The explicit condition in Yilmaz’s study, however, did not involve any metalinguistic comments or explanations. It is possible, though, that the negative feedback increased the salience of recasts by making learners aware of the existence of errors. Following a similar design, Yilmaz and Granena (2016) found that analytical ability, measured by subtests B, E, and F from the LLAMA, predicted immediate posttest performance only under the explicit feedback condition.

These studies provide evidence that, at least to some extent, language development under explicit learning conditions is mediated by language analytical ability, suggesting that it facilitates mental processes elicited in learning that involves higher levels of attention and conscious manipulation of language input. In implicit learning conditions, the role of language analytical ability is less clear. Mixed results were also found in studies examining the relationship between proficiency, analytical ability, and age of L2 acquisition in immersion (naturalistic) contexts (Harley & Hart, 1997, 2002; DeKeyser 2000; Abrahamsson & Hyltenstam, 2009; DeKeyser et al. 2010; Cox, 2013; Granena & Long 2013b; Bylund et al., 2013). The meta-analysis study conducted by Li (2015a) supports the differential role of aptitude (measured by traditional test batteries such as
the MLAT, PLAB, and LLAMA) in implicit versus explicit learning conditions, showing that aptitude correlates more strongly with explicit treatments than implicit treatments. The role of analytical ability in incidental conditions is less explored. As described above, Robinson (1995, 1997b) found no relationship between analytical ability and learning in incidental laboratorial conditions, which he operationalized as meaning-focused tasks. In Robinson (2002a), analytical ability and learning of Samoan sentences positively correlated only in the delayed posttest.

Commenting on these results, de Graaff (1997) suggested that perhaps the effects of aptitude could not be generalized to learning without any focus on form (p. 158-9). In fact, an effect for analytical ability was found in both de Graaff’s (1997) implicit condition and Erlam’s (2005) inductive condition, in which participants completed focus-on-form training activities without explicit grammar explanations. Lack of correlation between grammatical sensitivity and learning in incidental-like conditions was also found by VanPatten and collaborators in more recent studies. For example, VanPatten and Borst (2012a) investigated the acquisition of nominative accusative case marking on masculine nouns in object-verb-subject and subject-verb-object German sentences by L1 English speakers learning L2 German under explicit and structured input instruction (a type of focus on form without any explicit component). They measured grammatical sensitivity using Part IV of the MLAT. In the structured input condition, participants heard the stimuli sentences and selected from two pictures presented simultaneously. After selecting a picture, they received either a ‘Correct’ or ‘Incorrect’ feedback prompt. The explicit condition differed from the structured input condition in that participants received an explanation of the rules with examples before training.

Learners’ performance was assessed using a trials-to-criterion measurement, that is how long it took participants to begin processing sentences correctly. Results showed that participants in the explicit condition performed better than in the structured input condition, and that grammatical sensitivity as a covariate weakly correlated with performance for participants in the explicit instruction condition.
Employing the same design, VanPatten and Borst (2012b) examined the relationship of grammatical sensitivity and the performance of L1 English speakers on the use of L2 Spanish clitic direct object pronouns. This time, no difference between groups or correlations between grammatical sensitivity and trials-to-criterion were found. Finally, VanPatten and Smith (2015) examined the role of grammatical sensitivity as a factor in predicting sensitivity to syntactic violations in early stages of L2 Japanese acquisition. Their input treatment involved passive exposure to three types of Japanese sentences matched with pictures and followed by a comprehension quiz, in a design similar to Robinson’s incidental conditions. Sensitivity to grammatical violations was detected by reading times of whole sentences in a reading test. In VanPatten and Smith’s analysis, grammatical sensitivity did not emerge as a factor differentiating learners grouped by the type of sentence violations they were able to identify. They also found that participants across groups were sensitive to case-marking violations. They interpreted the results as evidence that grammatical sensitivity plays no role in the acquisition of underlying features related to case-marking and word order. However, they did not compare grammatical sensitivity scores to learners’ overall sensitivity to grammatical violations, and they recognized that the assessment measure used did not measure rule knowledge and was essentially different from measures typically employed in this type of research, such as GJTs.

Ranta (2002) pointed out that meaning-focused practices are the core of communicative language teaching (CLT) approaches, vastly preferred in a variety of educational settings, but that little empirical evidence is available to shed light on whether aptitude is relevant to learning in this environment. She investigated the role of analytical ability and performance in a five-month ESL program focused on interpersonal oral communication. Participants were 150 francophone sixth-grade children who were tested on vocabulary recognition, listening comprehension, an English metalinguistic task, and a cloze test (for a total of six measures). She found significant moderate
correlations (r=.28 to r=.40) between analytical ability and all but one proficiency measure, a picture-matching listening comprehension task. A cluster analysis also revealed that strong analytical ability was associated with strong performance and weak analytical ability with poor performance. However, instead of a traditional measure of analytical ability, Ranta administered a French error-correction metalinguistic task specially developed for her student population. In a later study, Ranta (2005) divided participants into two groups based on their level of analytical ability (high and low) measured by the same metalinguistic task. The participants’ oral production was assessed with respect to grammatical development (question formation and use of possessive determiners) and fluency (e.g. speech rate, pausing, and self-repair). No significant differences were found between groups for fluency, but the group of ‘analytic learners’ was found to be significantly more advanced in their use of determiners.

Because of differences in research design, however, it is difficult to compare results such as Ranta’s and Robinson’s, and more research is certainly needed to further understand the role of analytical ability in meaning-focused instruction. One could argue that Ranta’s metalinguistic task is a measure of explicit knowledge and, even though it was administered to the participants in their L1, it could have drawn on knowledge and abilities other than analytical ability. Ranta (2002) herself highlighted that while analytical ability (as aptitude) is often viewed as a stable trait, metalinguistic ability (as the skills needed to develop metalinguistic awareness) is influenced by endogenous and exogenous variables and has been shown to emerge over the course of human development as a function of factors such as age, literacy, and L2 experience (p. 162). However, Ranta (2002) also maintained that when viewed under closer scrutiny, analytical ability and metalinguistic awareness are overlapping concepts, as shown by moderate-to-strong correlations between the two found in the literature (e.g. Masny & d’Anglejan, 1985; Masny, 1987; Steel & Alderson, 1994; Alderson, Clapham, & Steel, 1997; Elder, Davies, Hajek, Manwaring, & Warren,
1997; Robinson, 1995, 2002a; Roher, 2008). In Robinson’s (2002b) aptitude framework, for instance, grammatical sensitivity is linked to metalinguistic rule rehearsal, which combines with other cognitive abilities to form aptitude complex 4 or ‘aptitude for explicit rule learning’ (p. 119). Kormos (2013) claimed that inductive ability and metalinguistic awareness both facilitated syntactic analysis of the input and integration of knowledge (p. 142), and Sheen (2007) described language analysis as the capacity to acquire explicit knowledge (p. 276). Bell (2009) investigated both grammatical sensitivity (as Part IV of the MLAT) and inductive language learning ability (as Part IV of the PLAB) as predictors of awareness at the level of noticing and understanding. She found an effect only for the inductive scores ($r^2=0.2$), which predicted awareness levels 72.22% of the time.

In an interesting development in aptitude research, Granena (2012) investigated to what extent analytical ability (measured by the LLAMA test) and sequence learning ability (measured by a probabilistic SRT task) related to long-term L2 achievement for early and late L1 Chinese L2 Spanish bilinguals in an immersion setting. She used a set of six L2 attainment measures in a continuum from controlled to automated use of language and found that both early and late bilinguals with high analytical ability outperformed those with low analytical ability on tasks that required controlled use of language knowledge, such as an untimed auditory GJT, an untimed written GJT, and a metalinguistic knowledge test (a written GJT with error-correction). Results from a Principal Components Analysis (PCA) showed that while LLAMA’s subtests B, E, and F loaded on one component, the SRT task and LLAMA D loaded on another component, with no significant association between them ($r=-.093$). Because LLAMA B, E, and F all involve working with a data set and include a study phase prior to testing, allowing for rehearsal time and the use of problem-solving strategies, Granena concluded that they all captured explicit cognitive processes relevant for explicit language learning. In contrast, LLAMA D and the SRT task captured implicit cognitive processes. These results led Granena to propose the existence of two types of aptitude: an
aptitude for explicit learning related to analytical ability, and an aptitude for implicit learning, related to sequence language learning ability (p. 87). If analytical ability enhances metalinguistic awareness and facilitates the development of explicit knowledge, learners with higher levels of analytical ability may develop greater explicit knowledge, which in turn has been shown to facilitate second language learning (Sorace, 1985; Schoonen, Hulstijn, & Bossers, 1998; Elder & Manwaring, 2004; Roehr, 2004, 2006, 2008; Correa, 2011; Bono, 2011; Miguel, 2012; Hanson, 2013; Arghamiri & Sadighi, 2013; Gutiérrez, 2013; Brooks & Kempe, 2013; Zhang & Koda, 2013).

Metalinguistic awareness and aptitude in CLI studies.

In a pivotal study on metalinguistic awareness, Thomas (1988) compared English monolinguals to English/Spanish bilinguals learning French and found that bilinguals had an advantage over monolinguals when performing classroom grammar and communicative tasks. She further compared bilinguals who had received formal instruction to those who learned L2 Spanish in an informal setting and found that, after a two-year training period, second language learners developed higher levels of conscious awareness of language, providing them additional advantages when learning a third language. Schweers (1993) examined the relation of psychotypology and CLI in the speech of ESL learners with different L1s. In her study, CLI effects (positive or negative) tended to be higher among learners with a higher degree of awareness of the proximity between their first language and the target language. She also found that high metalinguistic awareness (measured by verbalization protocols) related to greater choice of communication strategies in production tasks, intervening as “a critical factor in analyzing the potential and controlling the use of … crosslingual associations to facilitate communication” (p. 211). Schweers described awareness as responsiveness to CLI, which she defined as (1) a predisposition to make sense and (more or less) consciously analyze forms, meanings, and uses of one’s nonnative language, (2) a willingness
to make inferences about meanings and forms of a nonnative language system based on perceived interlingual relationships, and (3) a willingness to activate prior language knowledge when interpreting input and planning for output (p. 190-191). Jessner (2006) reported on a study of 17 Italian/German bilinguals in Tyrol learning English as third language in which he collected think-aloud protocols to investigate linguistic awareness during a series of writing tasks. He found a greater use of German than Italian strategies (e.g. approximation, simplification, or avoidance), explained by both German dominance and proximity to English. A qualitative analysis of the learner’s metalanguage episodes revealed awareness of all the learners’ language systems, expressed tacitly or explicitly, suggesting at least two dimensions of awareness for multilinguals: metalinguistic awareness and crosslinguistic awareness. Jessner proposed that these two components interact, influencing the organization of the multilingual lexicon and directly affecting multilingual proficiency (p. 116). He further related the role of metalinguistic abilities to the role of language aptitude, stating that the more language systems are involved, the more difficult it is to know which one influences the language acquisition progress and, for this reason, one single acronym (MLA) was adopted to represent both concepts in the Dynamic System Theory (DST) for multilingual learning (p. 68). In a later study, Jessner (2008) defined metalinguistic awareness as “the ability to focus on linguistic forms and to switch focus between form and meaning” (p. 277).

More recently, Gibson and Hufeisen (2011) tested the hypothesis that cumulative multilingual experience would help English learners to better ignore distracting erroneous semantic information and to correctly identify grammatically incorrect sentences containing preposition errors. Participants were L1 German speakers with multilingual backgrounds ranging from two to five previous learned languages, learning English at advanced levels. Their results confirmed their hypothesis and also showed that more experienced multilinguals processed the severity of errors less harshly than less experienced learners. Falk et al. (2015) explored the role of L1 Swedish
metalinguistic language knowledge (MLK) in initial states of L3 Dutch acquisition. Participants also spoke a Romance language as a second language. MLK was measured by a test administered after data collection, containing seven questions about Swedish grammar and requiring varying degrees of explicit knowledge. Results showed that high MLK correlated with correct placement of Dutch adjectives and low MLK correlated with incorrect placement in oral production tasks. Learners with higher MLK also tended to transfer more from their L1 into the L3 than from their L2.

One of the few studies investigating aptitude in the context of crosslinguistic influence is DeKeyser et al. (2010). They looked at age effects in native speakers of Russian learning either English or Hebrew. They also measured participants’ verbal aptitude using the verbal sections of the Russian Inter-University Psychometric Entrance Test (National Institute for Testing and Evaluation, 2001). Results showed not only evidence of a critical period for both groups, but strong correlations between learning and verbal aptitude for adult learners of both English and Hebrew (but not for early learners). DeKeyser et al.’s study suggests that aptitude for language learning does not lead to differential effects for specific target languages. The role of varying L1s spoken by the participants (e.g. Ukrainian, Polish, Georgian, Romanian, French, German, and Yiddish) or even the effect of multilingualism, however, was not explored in their study. VanPatten, Borst, Collopy, Qualin, and Price (2013) looked at explicit information and grammatical sensitivity in the context of second language processing instruction. Grammatical sensitivity was measured using Part IV of the MLAT. The two treatment conditions, either explicit or implicit, followed a Processing Instruction (PI) design (Lee & VanPatten 1995; 2005; Wong, 2004; and elsewhere), both comprising structured input activities. Only in the explicit condition did participants receive explicit grammar explanations and examples prior to training. Participants in VanPatten et al.’s study were monolingual speakers of English, learning a second language (either Spanish, German, Russian, or French). They
completed the PI activities on specific structures of the second language they were learning. Results from this study revealed that there were marginal processing differences by L2 group and that explicit information had a positive effect for some structures but not others. Grammatical sensitivity, however, only affected learning outcomes for the L2 German group in the explicit instruction condition. Kemp (2001) investigated the relationship between grammatical metalinguistic awareness, language experience, and third language ultimate attainment in initial stages of Basque acquisition. Her participants were L1 English speakers with different language backgrounds. To measure metalinguistic awareness of grammar, Kemp used a series of tasks, which comprised a GJT, knowledge of Basque rules, implicit and explicit artificial grammar tests, a translation task from Egyptian, and Part IV of the MLAT. She classified the metalinguistic tasks into explicit and implicit, considering the test of grammatical sensitivity from the MLAT as an explicit awareness task. The results showed that the more languages participants knew, the better they were at learning Basque. Multilinguals were also found to perform better in explicit metalinguistic awareness tasks, and metalinguistic awareness (as the compound score of explicit tasks) was found to assist learning above language experience.

Thompson (2008) analyzed the effects of language aptitude (operationalized as grammatical sensitivity) and language experience on initial stages of third language acquisition. Her participants were English native speakers with a wide range of previously learned languages (such as Spanish, French, German, Japanese, and Italian) enrolled in a first semester Portuguese course. Thompson used Part IV of the MLAT to measure grammatical sensitivity and a composite score of the students’ test grades to measure overall achievement. Students were divided into two groups: those who spoke a second language at a high proficiency level and those who spoke only their mother tongue or a second language at a low level of proficiency. Thompson found a moderate non-significant correlation between aptitude and performance in the Portuguese course and attributed the
lack of significant results to the small sample size (N=14). No significant correlation was found between previous language experience and language aptitude or achievement either, thus offering no support Thompson’s hypothesis that multilingualism predicts higher aptitude level. In a later study, Thompson (2013) once more explored the relationship between aptitude and multilingualism in a group of EFL learners. This time she measured aptitude using the Cognitive Ability for Novelty in Acquisition of Language (Foreign) Aptitude Test (CANAL-F). Her participants were either monolingual speakers of Brazilian Portuguese or native speakers of Brazilian Portuguese who had a variety of L2s (French, German, Greek, Italian, Japanese, Spanish, etc.). He classified participants in two ways. First, they were characterized simply as monolinguals or bilinguals. In a second categorization, multilinguals that reported perceiving a positive interaction between the nonnative languages studied were classified as multilingual learners, but those who did not report such positive interaction were classified as second language learners and grouped together with the Portuguese monolinguals. Thompson found significant differences in aptitude scores between groups for both categorizations. She concluded that aptitude is affected by language experience, challenging the notion of aptitude as a static construct. Results from Kemp (2001) and Thompson (2013) provide evidence that amount of prior knowledge positively interacts with aptitude by enhancing it and, more specifically, with analytical and verbal abilities. However, they shed no light on the opposite direction of this interaction, that is how aptitude affects the activation and use of prior knowledge in second or third language learning. The only study to somewhat address this question is Falk et al. (2015), who investigate metalinguistic knowledge as a factor in determining source of transfer. So far, however, no CLI study has looked at analytical ability (as either grammatical sensitivity or inductive ability) independently from explicit/metalinguistic knowledge as an intervening variable mediating CLI effects.
Linguistic Item Type

Overview.

As discussed in the previous sections, prior language knowledge is a learner-internal factor that potentially affects the development of other languages and whose effects are usually referred to as CLI or transfer. Other learner-internal factors, however, also affect language acquisition, as shown by extensive research in cognitive linguistics on age of onset, working memory capacity (WM), cognitive control, motivation, and aptitude (among others). Besides learner-internal factors, language acquisition is also affected by learner-external factors (using terminology from Schmidt, 2001), which include context of acquisition, sociocultural variables, and characteristics of the input itself. Park (2011), for instance, differentiated between input features and learner factors that mediate semantic and structural processing, adopting VanPatten et al.’s (2004) terminology. For her, input features refer to quantitative and qualitative differences in the discrete elements of language that result in different learning outcomes and intermediate semantic and structural processing. As noted by DeKeyser (2005), one way to look at second language acquisition is to try to understand what elements or characteristics of the L2 are hard to acquire (p. 1). Long (2003) alluded to the importance of differential characteristics of language structures, arguing that low sensitivity to less salient input items could cause them to be more susceptible to fossilization than others (p. 517). Similarly, VanPatten (1994) suggested that different aspects of language are processed and stored differently (p. 31) based on their inherent characteristics, learning contexts, and the type of knowledge their processing requires or produces.

In fact, the effects of characteristics of linguistic item types on language learning have been investigated by different SLA strands. Researchers have been particularly interested in answering the question of whether different types of classroom instruction are equally effective when teaching different linguistic structures (Spada & Tomita, 2010). This question has been explored from

These studies have compared a great variety of linguistic item types within and across linguistic domains, e.g. bound and unbound morphemes, cognates versus non-cognates, word order, syntactic categories, clitics, lexical items, irregular and irregular verb forms, tense and mood, prepositional constructions, type of subordinate clause, active and passive voice, among others. Their overall results indicate that no two linguistic structures are processed and learned the same (Ellis, 2007; Leeman, 2003; Ortega & Long, 1997; Yilmaz & Yuksel, 2011; Cerezo, 2010; Uggen, 2012; Bulté & Housen; 2012). For convenience, I will henceforward use the term *linguistic item type* (or simply *item type*) to refer to a discrete part of the input distinguished from others by any of
its features, structural components, domain membership, and other characteristics. The criteria used for the selection and comparison of different linguistic item types vary, as do the theoretical underpinnings informing their selection. Frequently, linguistic items are distinguished based on their relative salience, complexity, or perceived difficulty. Other characteristics include levels of abstractness and concreteness (Gass et al., 2003), unmarkedness versus markedness (Bardovi-Harlig, 1987), scope and reliability (Husltijn & Graaff, 1994; Bates & MacWhinney, 1989), frequency (Ellis R, 1999, 2006; Olmsted, 1999), semantic and formal redundancy (Husltijn & Graaff, 1994; VanPatten, 1990, 1995, 2004), morpheme boundedness (VanPatten, 1990; Barcroft & VanPatten, 1997), and morphological regularity or syntactic categories (Goldschneider & DeKeyser, 2001). However, pinpointing the relevant features facilitating or delaying the acquisition of linguistic item types is not a simple task. One complication is that the characteristics of linguistic items are not easily defined and tend to be operationalized and conceptualized in different ways by different researchers. Also, the definition of certain language features often falls into circularity, as suggested by Goldschneider and DeKeyser (2001). For example, salience can be broadly defined as a combination of phonological distinctiveness, morphological regularity, frequency, and complexity. On the other hand, the construct of salience has been used to define complexity (Bulté & Housen, 2012) and difficulty (Leonard, 1998). In the next part of this section, I address different definitions of complexity, difficulty, and salience of linguistic item types and describe the findings of SLA and CLI studies investigating the role of salience.

**Complexity and difficulty of linguistic item types.**

Linguistic item types are often described as hard or easy, and are therefore categorized in terms of difficulty. Krashen (1982), for instance, stated that levels of simplicity and clarity of meaning made grammatical rules easier or harder to learn. Robinson (1996) differentiated between rule (as the knowledge represented in the learner’s mind) and pedagogical rules, claiming that they
require different processes and strategies and impose different levels of difficulty to learners. In his study, Robinson analyzed judgments of experienced instructors to determine the complexity of pedagogical rules. Teachers’ judgments and textbooks’ explanations were also employed by Van Baalen (1983) to classify grammar structures by difficulty levels. Later, Robinson (2002a) defined *difficulty* as the interaction of item complexity and the learners’ cognitive abilities. R. Ellis (2006) argued that the proper understanding of *difficulty* could only be achieved through the distinction between implicit and explicit knowledge, that is how difficult a structure is to acquire as implicit knowledge compared to how difficult it is to learn as explicit knowledge. This idea is also entertained by DeKeyser (2005) as an explanation for why the English third-person verb morphology –s was deemed easy by Krashen (1982) and difficult by Ellis (1990). DeKeyser (2005) assumed that the different appreciations of *difficulty* given by Krashen and Ellis were due to the adoption of a narrow sense of learning (explicit and conscious) by the former and of a broader sense of learning (implicit, unconscious) by the latter. Bulté and Housen (2012) cautiously noted, however, that the notion of *difficulty* has often been conflated in the literature with the notion of *complexity*. For them, *complexity* is defined either in relation to the language users (relative complexity) or to concrete properties of language (absolute complexity). While absolute complexity refers to objective and quantifiable observations about inherent aspects of language, relative complexity refers to the mental ease or difficulty with which learners process a language feature. Therefore, relative complexity is learner-dependent to the extent it draws on individual psycholinguistic and cognitive resources. In that sense, only relative complexity equals *difficulty*. DeKeyser (2003) made a similar observation, differentiating between *objective* and *subjective difficulty*.

A different view of *difficulty* was proposed by DeKeyser and Sokalski (1996) in the context of morphosyntactic structures, based on how easy it is to perceive or to produce a certain linguistic
structure. In their study, L1 English speakers had difficulty perceiving Spanish direct object clitics because, for these learners, SVO cues to word order carried more weight than the unstressed Spanish clitic morphology. However, learners found clitics easy to produce, since they presented a straightforward mapping of thematic relations onto simple forms. DeKeyser and Sokalski compared the processing of clitics to that of conditional verb forms. They found that, in contrast to clitics, Spanish conditionals were more easily perceived by L1 English speakers due to the easy mapping of the stressed suffix –ía and the conditional meaning. But because they required morphological knowledge of the six personal verb endings, they were more difficult to produce (p. 621-622).

Housen, Pierrard, and Van Daele (2005) pointed out that the problem of determining exactly what makes rules harder or easier to learn persists and that several other aspects of the input related to language processing (such as complexity, perceptual salience, communicative load, crosslinguistic contrast, ease of memorization, and clarity) contribute to the notion of difficulty.

The notion of complexity is widely employed in SLA and, similarly to difficulty, it has multiple interpretations. Bulté and Housen (2012) defined complexity as the ‘property or quality of a phenomenon or entity in terms of (1) the number and the nature of the discrete components that the entity consists of, and (2) the number and the nature of the relationships between the constituent components’ (p. 22). From a learner-centered perspective, Skehan (2003) loosely defined complexity as a quality of the developing interlanguages (p. 8). Hulstijn and Graaff (1994) adopted a cognitive definition of complexity, arguing that it is not possible to define linguistic complexity independently from language development (p. 102). Under their view, the degree of complexity is contingent upon the number of derivational rules (or permutations) applied to arrive at a correct linguistic form rather than upon the number of discrete elements and qualities of the form itself. They coined the term declarative complexity, distinguishing it from constructs such as complicatedness or difficulty, which are phenomena experienced by learners. In a comprehensive
analysis of complexity, DeKeyser (2005) identified three aspects affecting the learning of morphosyntax and determining the level of grammatical difficulty: (1) complexity of meaning, (2) complexity of form, and (3) complexity of form-meaning mapping. Complexity of meaning arises, for example, from different levels of abstractness and novelty or language-specific grammaticalizations (e.g. grammatical gender). Complexity of form refers to the interplay of phonological and prosodic features, morphological richness, and syntactic distribution and constraints. For DeKeyser, the most problematic aspect of complexity is form-meaning mapping, which relates to lack of transparency, which in turn depends on factors such as redundancy, optionality, and opacity (p. 8). He defined redundant elements as those whose meanings are expressed by another neighboring structure, or that could be recovered from context (e.g. gender, expressed at the same time by nominal inflection and a determiner). The optionality of linguistic elements is linked to very subtle differences in meaning, pragmatics, and dialectal preferences, which require exposure to communicative and authentic language use (e.g. the use of null and overt objects in pro-drop languages). Lastly, opacity refers to how reliably meanings attach to specific forms. The less reliable the mapping (e.g. homophonous morphemes and allomorphs), the more opaque they are to the learner. On one hand, DeKeyser’s assessment of complexity takes into account elements of language that are essentially structural. On the other hand, it also ties these concrete linguistic properties to the active participation of learners by acknowledging the role of cognitive demands that arise in the interaction between the stimuli and individual learner differences. DeKeyser’s definition of complexity therefore incorporates both contextual and functional aspects of language (such as frequency, redundancy, optionality, and transparency), as well as its formal characteristics.
Perception and salience of linguistic item types.

Salience has been often associated with the learnability of linguistic structures (Larsen-Freeman 1975; Henderson & Nelms 1980; Hatch 1983; Klein 1986; Bardovi-Harlig 1987; Sharwood Smith 1991; DeKeyser, 2000; Hawkins, 2001; Ellis, 2003, 2008; Goldschneider & DeKeyser, 2001; Campfield & Murphy, 2013). However, as noted by MacLeod (2015), the notion of salience invoked as an explanatory factor for various linguistic phenomena also varies between studies. Another challenge relates to the fact that few studies have actually investigated how learners perceive linguistic target items and why they do so. Instead, most studies attribute greater or lower salience to linguistic items based on the learners’ intake of forms, when many factors other than salience could have affected the learners’ performance. This goes back to Leow’s (2001) discussion of think-aloud protocols as a way to verify amount of noticing and levels of awareness and attention. Think-aloud protocols in incidental or implicit learning tasks could give us an idea of the inherent degrees of salience of different linguistic item. Salience (or perceptual saliency) has been deemed the most prominent prosodic properties of the input (Bardovi-Harlig, 1987; Barcroft & VanPatten, 1997; Williams & Lovatt, 2005; Carroll, 2012). In Ravid (as cited in Goldschneider & DeKeyser, 2001, p. 35), salience is defined as “the property of a structure that is perceptually distinct from its environment.” For Larsen-Freeman (1975), features of perceptual saliency in language include stress, segmentation, vowel reduction, and sentence position (p. 419). More recently, Goldschneider and DeKeyser (2001), broke down perceptual saliency into three factors: *phonetic substance* (the number of phones in a morpheme), *syllabicity* (whether a morpheme contains a vowel sound), and *sonority* (the perceptual auditory quality of the sound). The greater the phonetic substance, syllabicity, and sonority of a morpheme, the greater the chances an item will be perceived as more salient and will be acquired earlier. Describing the characteristics of Russian diminutives, Kempe and Brooks (2005) adopted a notion of salience that related prosody and
morphological complexity. This connection between morphophonology and salience echoes Goldschneider and DeKeyser’s (2001) study. Kempe and Brooks (2005) suggested that morphophonological regularity lead to more abstract forms of salience, the salience of form-meaning connections (p. 36). The same idea appears in DeKeyser’s notion of transparency (2000, p. 18). The definition of salience, however, is not always based on inherent properties of discrete acoustic stimuli. Following VanPatten’s (1996) Sentence Location Principle, Barcroft and VanPatten (1997) claimed that the acoustic salience of grammatical forms in L2 Spanish was determined by their location in the utterance: utterance-initial items are more salient. Results from their study showed that the intake of utterance-initial items were twice greater than that of items in medial and final positions. Also, stressed units were twice as salient as unstressed units and salience was not affected by boundedness, that is it was similar for bound and unbound morphemes. A similar analysis can be found in Collentine (1997). Another example comes from Bardovi-Harlig (1987), who claimed that item frequency contributed to the salience of morphosyntactic phenomena. Notions of salience can, therefore, apply to both the characteristics of discrete elements of language (such as morphemes and phonemes) and to the relationship between linguistic elements. It can also incorporate the role of the learner, as argued by R. Ellis (2006), for whom salience can be better understood as “the intensity of the subjective experience to stimuli and not to the objective intensity of the stimuli themselves” (p. 16).

Overall, perceptual salience is believed to facilitate learning by helping learners single out words, discriminate between words in language input, and identify sound signals as phonological units. Whatever the case, salience is associated with increased attention to linguistic items, directed to either the physical properties of the input or to the mental representations learners create of them (Carroll, 2012, p. 42). Conversely, low perceptual salience forms are believed to be delayed in acquisition due to the learners’ reduced opportunities to perceive and process them (Leonard, 2003,
2008). For instance, Goldschneider and DeKeyser (2001) looked at the order of acquisition of English grammatical morphemes and concluded that perceptual salience was by far the highest contributing factor to L2 development. Bardovi-Harlig (1987) studied the order of acquisition of two linguistic items in ESL, an unmarked form (pied piping) and a marked form (preposition stranding). She found that preposition stranding constructions were learned first and attributed the result to a greater degree of salience of these forms. Barcroft and Rott (2010) examined the relationship between the learnability of German and Spanish vocabulary and the salience of word parts. Corroborating previous findings from Barcroft (2000, 2008), they found that word-initial fragments were learned better in L2 initial stages, possibly due to their perceptual saliency combined with learners’ parsing strategies. However, Carroll (2012) questioned the role of salience in language development beyond the early stages of acquisition. She investigated differences in perceptual aural salience based on word length and sentence position (initial, medial, or final) by L1 German speakers with advanced levels of L2 English. She found no effects for sentence position or word length, suggesting that perhaps salience did not play a significant role for experienced learners or in the case of closely related languages. Most studies directly assessing perceptual salience are interested in the perception of prosodic properties (e.g. Peters, 1985; Stewart, 2010). Although most studies investigating linguistic salience have focused on aural input, salience has also been operationalized for written input (e.g. Bardovi-Harlig, 1987; Leow, 1993) and has been investigated in SLA research in fields such as text enhancement and reading comprehension (Shook, 1994; Alanen, 1995; Leow et al, 2003; Gass et al., 2003; Tolentino & Tokowicz, 2014). More research is needed, however, to investigate the effects of the different properties of written input, and especially in interaction with CLI. In sum, a great number of studies have examined the acquisition of different linguistic items, showing that items varying in complexity, difficulty, and salience are
processed differently and that these and other structural characteristics of the input not only affect each other but also interact with learner-internal and additional external factors.

**The role of salience in input processing.**

Relevant to the study of input processing are the various perceptual characteristics of linguistic items that draw attention to parts of the input, promote their awareness, and facilitate intake. These properties are particularly important in the context of spontaneous and self-generated attentional focus and noticing, since in the absence of explicit instruction such properties directly mediate the interaction between learners’ psychoperceptual abilities and the input. Defining what linguistic structures are more noticeable than others is not as straightforward as it may seem. As noted by Schmidt (1995), “while all aspects of language learning require some degree of local attention, different aspects may require more or less of it” (p. 14). Thus, learners may notice some language structures before they notice others, depending on the characteristics of these structures. Schmidt (1990) acknowledged that learners may not freely notice whatever they want, and that several factors influence the noticeability of forms, such as task demands and skill levels. For Schmidt, both input related-factors (such as frequency and perceptual salience) and learner-related factors can potentially increase the likelihood items will be noticed. For instance, unexpected events (which depend on the learners’ expectations) are usually more effective in capturing one’s attention (p. 143). The role of the learner in perception is also acknowledged by R. Ellis (2006), as mentioned above, and implies that individual characteristics (including prior knowledge) could increase or diminish structural salience. From the perspective of limited capacity theories and in reference to the item-based/rule-based distinction, Schmidt (1995) suggested that lexical (or lexicalized) items are better learned in naturalistic contexts than abstract syntax rules:

Because communicative interaction is always a divided attention task (requiring attention to literal, figurative, pragmatic, and interactional meaning in addition to
linguistic form at all levels for full comprehension), this would predict that naturalistic, uninstructed language learners should be relatively better at acquiring vocabulary and formulaic expressions than at acquiring complex syntax, which seems to be generally the case. (Schmidt, 1995, p. 15)

Later, Schmidt (2001) revisited this topic, suggesting that the noticeability of structural regularities (i.e. syntax) would require a higher level of metalinguistic awareness than surface structures:

[T]he objects of attention and noticing are elements of the surface structure of utterances in the input – instances of language, rather than any abstract rules of principles of which such instances may be exemplars. Although statements about learners ‘noticing [i.e. becoming aware of] the structural regularities of a language are perfectly fine in ordinary language, these imply comparisons across instances and metalinguistic reflection. (Schmidt, 2001, p. 5)

de Graaff (1997) investigated which types of instruction were more useful when teaching different aspects of grammar (syntactic versus morphological structures) and concluded that when target forms can be noticed and processed spontaneously, explicit instruction is unnecessary. For him, “[t]he likelihood of spontaneous noticing and processing may depend on, among other things, the complexity of the target structure” (p. 251). DeKeyser and Sokalski (1996) also made a link between perception and complexity when comparing processing of conditionals and object pronouns. They affirmed that morphologically complex structures were easier to notice (although harder to produce) than simpler structures. They hypothesized that clitics were less perceivable because they are unstressed and their perception is hindered by learners’ L1 processing word order strategies. Conversely, the stressed suffix –ía and multisyllabic forms of Spanish conditionals make them morphologically richer (or complex) and easier to perceive. DeKeyser and Sokalski (1996)
indirectly measured the noticeability of forms by predicting that learners would: (a) show greater improvement in comprehension tasks after input practice with forms that are less easily perceivable and (b) show greater improvement in production tasks after output practice with forms that are easier to perceive, but harder to produce. Their results confirmed their predictions.

Robinson (1996) defined perceptual salience as the ease with which each structural element and rules are noticed and learned (p. 31). He affirmed that the effects of salience and noticing facilitate language processing if the structures themselves are not too complex. Similarly, he believed that pedagogic rules facilitated noticing, but not as efficiently when pedagogic rules became more complex. Carroll (2012) pointed out that in most studies investigating attention, salience is only called upon post hoc to explain developmental patterns in language acquisition. She operationalized salience as utterance location, based on L1 development research. For her, word segmentation strategies lead to the identification of prominent stretches of speech which are, then, processed and learned first (p. 40). Gass et al. (2003) indirectly referred to salience while investigating learning conditions that promoted more or less attention to form in the acquisition of L2 Italian. They compared the acquisition of lexical, morphosyntactic, and syntactic structures, differentiating between these types of linguistic items based on their level of abstractedness. VanPatten (1990, 2002, 2004) also hypothesized that lexical items were potentially more salient and easily noticeable than verb inflectional morphology. One of the principles of VanPatten’s (2004) Input Processing Theory states that “[l]earners will tend to rely on lexical items as opposed to grammatical form to get meaning when both encode the same semantic information” (p. 9). This is to say that the relative salience of an item depends on how it relates to other items in the sentence, and whether it expresses a unique or redundant meaning. Whenever redundancy occurs, learners tend to process lexical items first, and the identification of these major units of meaning is aided by prosodic cues. Grammatical forms competing in meaning with lexical items may be perceived or
noticed, but because they are not essential in connection to meaning and function, they are often dropped from further processing. For instance, an adverb of time may have primacy over mode/tense inflection; and a subject pronoun may be more noticeable and processed first than a person verbal desinence. Similarly, a numeral would more salient than the English plural suffix –s. At the same time, some grammatical features have no competing lexical counterparts, do not enter redundant constructions, and are therefore relatively more meaningful (e.g. the marker of progressive aspect –ing in English). On the other hand, some forms are naturally less meaningful, such as the grammatical gender markers in nouns representing inanimate objects in Romance languages. VanPatten called the overall meaning a form contributes to a sentence, operationalized as a function of the features [+/- semantic information] and [+/-redundancy], communicative value. In this view, the salience of an item is defined in terms of its communicative value and in indirect reference to its prosodic prominence. VanPatten’s concepts of salience and communicative values are largely employed in SLA research to differentiate linguistic items in input processing studies interested in differential effects on comprehension and intake of target forms. Some studies, for instance, have investigated simultaneous attention to form and meaning (VanPatten, 1990; Lee, 1999; Greenslade et al., 1999; Wong, 2001; Leow et al., 2008), text enhancement (Shook, 1994; Alanen, 1995; Leow et al, 2003; Gass et al., 2003), text simplification (Leow, 1993; 1995), degree of explicitness and implicitness in language instruction (Robinson, 1996, 1997, 2005b), and output versus input practice (Uggen, 2012). Some of the research on text enhancement has also looked at different learning conditions in terms the explicitness of instruction (Shook, 1994; Alanen, 1995; Gass et al., 2003; Uggen, 2012).

Linguistic items have also been defined in terms of language domains within Universal Grammar (UG) approaches that assume differences in learnability for aspects of the L2 language that fall within or outside the scope of UG (Hulstijn & de Graaff, 1994) and that maturation
constraints apply to the acquisition of L2 syntax but not the lexicon (Birdsong, 1992). The terms *rule-based learning* and *item-based learning* are often used in reference to this language domain dichotomy, lexicon versus morphosyntax. However, the language domain or rule-based/item-based distinction is also used in research not related to UG to simply acknowledge processing differences between items from different domains (e.g. Leow, 1997; Calderón, 2013). Gass et al. (2003), for instance, adopted a rule-based/item-based distinction based on abstractness versus concreteness.

Drawing on the DeKeyser’s (1995) and Schwartz’s (1993) work, they assumed that syntax, morphosyntax, and lexical structures could be understood in a continuum going from higher levels of abstractness to lower levels of abstractness. At one end of the spectrum syntax phenomena correspond to higher abstractedness, with the lexicon at the opposite end. Gass et al. suggested that learners have their attention drawn more to the lexicon than to morphosyntax and syntax because lexical items are more “isolatable,” less abstract and less complex (p. 508). Less abstract (or more concrete) structures, such as lexical words, would be easier to memorize and learn than abstract rules that, besides memorization, require deeper levels of attention and understanding. Using Schwartz’s analogy, rule-based systems develop and item-by-item systems grow with language exposure. Overall, in the SLA literature lexical items are believed to be both less complex and more salient, and their processing is aided by learners’ processing strategies (as posed by VanPatten’s Model of Input Processing), making them easier to learn than morphosyntactic items. While all the characteristics of linguistic items certainly contribute to language learning, salience and complexity seem especially relevant to the study of CLI, as they can potentially affect both focus of attention and noticing of lexical and grammatical forms.

**Linguistic item type and SLA empirical studies.**

Many studies comparing the acquisition of different linguistic items come from SLA studies on attention and processing that examine either intake or comprehension. One of the first such
studies is VanPatten’s (1990), who investigated listening comprehension of L2 Spanish input by L1 English speakers with different levels of L2 experience. VanPatten’s premise was that focus on grammatical form (or on more complex forms) would have a negative impact on comprehension. In his study, he assessed input processing in four different conditions: attention to meaning only, attention to meaning and one lexical item (the word inflación ‘inflation’), attention to meaning and the verb morpheme –n (3rd person plural marker), and attention to meaning and the grammatical functor la (female singular definite article). The grammatical morphemes were selected based on their different levels of meaningfulness and salience. Conscious attention to form was manipulated via the tasks’ instructions (by having participants intentionally focus on form while listening to the content for meaning). Attention was operationalized by having participants put a check mark on a piece of paper every time they heard the target form, and comprehension was measured by a free-written recall task in English. VanPatten found that recall scores significantly dropped for the grammatical morpheme -n when participants were asked to listen for comprehension. Moreover, not only were performance differences found for the two grammatical morphemes, but conscious attention to form was detrimental to the comprehension of grammatical items only, not affecting comprehension of lexical items. Greenslade et al. (1999) replicated VanPatten’s (1990) study, adapting the same materials and procedures to the written mode. Unlike in VanPatten’s study, they found that only conscious attention to the Spanish grammatical item la negatively affected comprehension, while both the grammatical morpheme -n and the lexical item inflación ‘inflation’ did not. They assumed that, because -n is not a standalone morpheme, it had been processed in conjunction with the semantic value of the verb, making it comparable to lexical items and less equivalent to the grammatical form la.

Lee (1998) investigated the effects of morphology on reading comprehension and input processing. He compared the recognition of the Spanish present subjunctive endings to the
recognition of other verb endings. For example, in one condition, the subjunctive forms were replaced with the infinitive morphology (endings such as -ar, -er, and -ir) and in another with a made-up verb ending, e.g. -u in enseñu (replacing enseñe, show-3rd-sing-pres. subjunctive). He also measured learners’ reading comprehension under these three conditions. Comprehension was assessed via an immediate written recall task that participants completed in their L1 (English). Recognition was assessed in a word identification task in which participants were asked to mark words that they remembered seeing in the stimulus text. Lee’s assumption was that learners would be able to identify forms that they had previously noticed, detected, or cognitively registered (p. 38). He found that learners exposed to the passage with subjunctive endings comprehended significantly less of the text when compared to learners who read the passages containing the other forms. Lee hypothesized that because the subjunctive forms encoded more linguistic information (person, number, time, mood, and aspect) they were harder to process and required more attentional resources, supporting VanPatten’s (1990) premise that learners’ attention to form detrimentally affects comprehension. Results from the identification task, however, showed no differences in the recognition of the three verb endings, which somewhat contradicts Lee’s explanation as to why comprehension was diminished in texts containing the subjunctive forms. In summary, the studies above found a differential effect for lexical versus grammatical (or less meaningful) items with respect to the effects of processing for comprehension. These findings, however, contrast with those of Leow et al. (2008), who extended VanPatten’s study in the written modality, replacing the target lexical item inflación ‘inflation’ with sol ‘sun’ to equalize the salience of the various target forms. They also included the clitic lo ‘it’, a form carrying both grammatical function and meaning. They found no differential effect on comprehension while paying conscious attention to the different linguistic items. These results were corroborated by Morgan-Short et al. (2012) in a replication of Leow et al.’s (2008) study.
A series of studies by Leow and his collaborators examined the interaction of linguistic item and attention (or noticing) in instructional conditions involving the manipulation of language input. For instance, Leow (1993) examined the intake of L2 Spanish forms in conditions where first- and fourth-semester Spanish learners read either a simplified or an unsimplified written passage in Spanish. The text passages contained two target linguistic items, the Spanish present perfect and the present subjunctive. He hypothesized that learners would attend significantly more to present perfect forms in the input, as these forms allegedly have a higher communicative value than present subjunctive forms. No specific measures were employed to investigate the amount of attention to or noticing of the target forms. Intake, defined as parts of input that were attended to by learners while processing the input (p. 334), was then measured using a multiple-choice recognition task administered immediately after exposure to input. No significant effects were found for linguistic item. Interpreting the results with caution, Leow concluded that text simplification did not appear to have a facilitative effect on intake, but amount of language experience did. He speculated that the low salience of the two target forms, both consisting of verbal morphemes, could explain the lack of difference between the two items. Leow (1995) replicated this earlier study (Leow, 1993) using aural stimuli. L2 learners of Spanish with either one semester or four semesters of language experience were exposed to a recorded version of the simplified or unsimplified text passages containing Spanish present perfect and present subjunctive forms. Results revealed greater intake of present perfect forms compared to subjunctive forms for first semester learners, but not for fourth semester learners. Leow, Egi, Nuevo, and Tsai (2003) extended Leow’s (2001a) investigation of the roles of text enhancement, comprehension, and noticing in L2 Spanish by also looking at the role of linguistic item (the Spanish present perfect versus present subjunctive forms). In both these studies, concurrent data from think-aloud protocols were gathered to measure noticing of the target forms in enhanced and unenhanced written passages, and intake was elicited in an immediate multiple-choice
recognition task. Leow et al. (2003) found no significant differences in the amount of noticing between the enhanced and unenhanced conditions, but the amount of noticing in both conditions significantly correlated with performance on the recognition task. They also found significantly greater noticing of present perfect forms compared to subjunctive forms in both groups.

Shook (1994) also investigated the intake and controlled written production of two L2 Spanish forms, the present perfect and the relative pronouns *que/quien(es)* ‘who/whom’. He distinguished the target forms in terms of their meaningfulness, where the present perfect was assumed to carry more meaning than the choice of pronoun. Learners were randomly assigned to three different conditions, in which attention to the target forms was manipulated by the type of task (with or without explicit directions) and text enhancement (bold upper case versus normal lower case). Intake was measured in a recognition ask while learning was measured in a controlled written production task. While knowledge of the present perfect morphology was measured in both assessment tasks, the production task also measured aspectual choice. For the relative pronouns, form and syntactic distribution were assessed in both recognition and production tasks. His results showed a significant effect for the ‘higher’ attention condition, a facilitative effect of language experience in the production tasks, and a significant main effect for grammatical form, with greater performance on present perfect forms in both recognition and production tasks. Collentine (1997) looked at the differential processing of Spanish regular and irregular present subjunctive forms (group 1) or regular and irregular present indicative forms (group 2). His participants were L1 English/L2 Spanish speakers who completed a word rearranging task. He found no overall differences in performance for accuracy by group (subjunctive versus indicative). However, participants took longer to process irregular forms of the subjunctive compared to irregular forms in the indicative, and took longer to process regular forms of the indicative compared to regular forms in the subjunctive. Gass et al. (2003) investigated intake of L2 Italian forms by L1 English
Speakers. Their study compared three linguistic areas (syntax, morphosyntax, and lexicon) in two learning conditions [+focused attention] and [- focused attention], predicting that attention would have the greatest effect on lexical items. The morphosyntax items were Italian indirect pronouns (e.g. *mi*, *ti*, *ci*, etc.), syntax items included word formation in biclausal sentences (focusing on placement of prepositions and complementatizers), and lexical items comprised five words (*squalo* ‘shark,’ *boccone* ‘bite of food,’ *inghiottire* ‘to swallow,’ *contorno* ‘side dish,’ and *forno* ‘oven’). Contrary to their predictions, they found that treatment under the [+ focused attention] condition had a greater effect on syntax (the more complex structure), although participants improved on all linguistic item types. On the other hand, participants performed better on lexical items in the [- focused attention] condition.

Within in the attention/noticing framework, Uggen (2012) examined whether the production of L2 English forms impacted the learner’s attention to and awareness of these forms on a subsequent reading task while also looking at differential learning of less complex (present hypothetical-conditional) versus more complex grammatical structures (past hypothetical-conditional). Learning outcomes were measured through a written composition and a stimulated recall task. She found that learning was greater for more complex structures. Calderón (2014) investigated depth of processing and level of intake of grammatical versus lexical items in L2 Spanish development. The selected target items included singular Spanish nouns (11 masculine and 9 feminine words) and third-person singular preterit verb forms. Intake was measured through a recognition task and was analyzed by comparing the performance on lexical versus grammatical items by learners grouped according to type of intake: attended intake, detected intake, and noticed intake. Results revealed greater intake of grammatical forms over lexical forms for all intake levels, although these differences were statistically significant only for the noticed and detected intake groups.
Some studies that investigated noticing and attention to form did not necessarily compare two different target structures but, instead, exposed learners to manipulated input attempting to artificially enhance one specific linguistic form comparing it to its own unenhanced form (e.g. Alanen, 1995; Jourdenais, Ota, Stauffer, Boyson, & Doughty, 1995; Jourdenais, 1998; Izumi, 2002; Leeman, 2003; Martínez-Fernández, 2008, Gass et al., 2003). Others focused on salience as a result of learner interaction (Kuiken & Vedder, 2005; Sicola, 2008). However, as pointed out by Leow (2009) and Sharwood (2008), results from textual enhancement research have overall failed to produce conclusive evidence that the enhancement of forms in the input increased their salience and their perception by learners (although see Doughty, 1991; Jourdenais et al., 1995; Tolentino & Tokowicz, 2014). Taken together, studies investigating learning of different linguistic items types have produced mixed results, highlighting the need for further research. Differential effect on comprehension was found in some input processing studies (VanPatten, 1990; Lee, 1999, Greenslade et al., 1999) but not in others (Leow et al., 2008; Morgan-Short et al., 2012). Some studies investigating the effects of attention and noticing on intake found no differential effects based on the salience and communicative value of linguistic forms (Leow, 1993; Yilmaz & Yuksel, 2011), while others were able to show such effects (Shook, 1994; Leow, 1995; Collentine, 1997; Leow, 2001a; Leow et al. 2003; Gass et al., 2003). Also, greater intake was found for more complex structures in Uggen (2012) and Calderón (2014).

**Linguistic item type and CLI empirical studies.**

The long tradition of contrastive analysis and typological proximity research has shown that when linguistic structures contrast across languages another level of difficulty is added to the learning process, providing ample evidence that type of linguistic item relates to type, amount, and source of CLI. More recently, generative approaches to CLI have examined problematic areas in L2 learning that arise from crosslinguistic contrasts, explaining them as a matter of markedness and
parameter resetting. Only a limited number of studies in the generative and psycholinguistic
tradition, however, have directly compared the effects of prior knowledge on more than one type of
linguistic structure. In this section, I will present the results of some of these studies. In CLI studies,
however, transfer is measured by the number of errors traceable to one or another prior language
without controlling for exposure to the target linguistic items. To my knowledge, no CLI study has
investigated differential intake of various linguistic items types after immediate and controlled
exposure. Therefore, results from these studies give us an insight into (short-term and long-term)
learning difficulties mediated by CLI, but they do not provide information about the initial
processing of the different items types and their processing outcomes. Furthermore, most CLI
studies looking at different items types are interested in how prior language knowledge affects their
acquisition but do not make quantitative comparisons between performance on different kinds of
item types.

In her study of Spanish/Basque bilinguals learning L3 English, Cenoz (2001) found that
cognate words were transferred in greater number compared to functional words. Examining the
effects of lexical relatedness between Dutch and Frisian and Dutch and Afrikaans words, Bezooijen
and Gooskens (2007) found that higher orthographic similarity, measured by the Lewenshtien
distance, resulted in higher receptive skills. Dijkstra et al. (1998) compared reaction times by
English/Dutch bilinguals when processing different lexical items based on their degree of formal
and semantic overlap (from true cognates to non-identical cognates and non-cognates). They found
that the cognate effect (i.e. higher processing speed corresponding to higher degrees of typological
and semantic similarity) decreased as the degree of similarity between Dutch and English words
decreased. Lindqvist (2015) compared the effects of CLI from Swedish and English on lexical and
grammatical production in L3 French. Although her goal was to investigate source of transfer on
type of linguistic items, her results showed that learners made more errors on lexical items (N=63)
than on grammatical items (N=58), considering transfer from both languages. Tolentino and Tokowicz (2014) investigated the acquisition of L2 Swedish demonstrative determiners and definite markers by L1 English speakers. They further differentiated the item types by manipulating salience via text enhancement and found that learning was superior for demonstrative marking (a converging structure between English and Swedish) versus definite markers (a diverging structure between English and Swedish), and that participants performed better overall on enhanced target items.

Slobakova and García Mayo (2015) studied the acquisition of three dislocated constructions in L3 English (topicalization, focus fronting, and left dislocation) by Spanish/Basque bilinguals. They found evidence that knowledge of Spanish (as either L1 or L2) had positive or negative effects on the production of English structures whenever some degree of similarity was perceived to exist between English and Spanish for each specific structure. Therefore, performance on L3 English was not the same for topicalization, focus fronting, and left dislocation, showing that learning outcomes varied for different linguistic items. This differential learning in Tolentino and Tokowicz (2014) and Slobakova and García Mayo (2015), however, was not associated with characteristics of the linguistic structures themselves, but rather was caused by influence of prior knowledge. The studies above are described in more detail in the section “Crosslinguistic Influence.”

In a series of studies, starting with Flynn et al. (2004) and continuing with Berkes and Flynn (2012a, 2012b) and collaborators, the acquisition of L3 English relative clauses was examined. Flynn et al. (2004), investigated three types of L3 English relative clauses (free headed, and specific and unspecific lexically headed clauses) produced by L1 Kazakh/L2 Russian speakers who had learned features of compleamentalizer phrases (CPS) in L2 Russian. CP features in this case are different between Kazakh and English, but similar between Russian and English. The patterns of acquisition of bilingual learners in their study diverged from the patterns found in other studies for monolinguals learning an L2, where monolinguals learned free relative clauses first. Results from
Flynn et al. revealed no developmental advantages for free-headed relatives in the L3. Similar results were found by Berkes and Flynn’s (2012b). Berkes and Flynn (2012a) examined the acquisition of the same three types of relatives, although their main goal was to measure cognitive advantages of bilingualism. Their participants were L1 Hungarians learning L2 English, and L1 Hungarian/L2 German speakers learning L3 English. Results confirmed a cognitive advantage for bilinguals, who were able to learn lexical-headed clauses better than monolinguals, with no advantages found for free relatives. The criteria for discriminating between the linguistic items in these studies were based on the different UG constraints believed to regulate their acquisition. The primary contribution of these studies is that they show how L2 knowledge, or simply the effects of bilingualism, can neutralize the different levels of difficulty associated with different constructions. They have not, however, compared CLI or bilingual effects in groups with different language backgrounds.

In Portuguese CLI research, a few studies have looked at different linguistic item types. For example, Carvalho and Silva (2006) examined the production of present subjunctive and future subjunctive forms by different groups of Spanish speakers, and found that learners performed better on the use of the present subjunctive (which converge to a great extent with the Spanish present subjunctive). Guijarro-Fuentes et al. (2008) examined the acquisition of gender agreement and noun ellipsis (noun-drop) in L3 Brazilian Portuguese by groups of L1 English/L2 Spanish bilinguals, employing a GJCT and a Context Felicitousness Task (CFT) with corrections to test the learner’s intuitions in the L3. In this study, learners did not participate in training tasks, but were tested on knowledge they acquired after limited classroom instruction. The authors found that, overall, participants correctly accepted grammatical instances of non-drop and rejected ungrammatical instances. They also concluded that learners at initial states of Portuguese acquisition had the gender features necessary for parameter resetting, showing additional evidence of transfer from Spanish.
No comparison was made as to the differential performance between non-drop and gender features. The same two features were examined in L3 studies by Cabrelli et al. (2008) and Iverson (2009), who reported that both features were successfully acquired in L2 Spanish and then transferred to initial states of L3 Portuguese acquisition. No differences in the acquisition of the two features were reported. In addition, differences in the perception of Brazilian Portuguese phonemes were found in Akerberg (2001a) and Akerberg (2001b).

Within the attention/noticing strand, almost no studies examined CLI for groups with different language backgrounds. One exception is Park (2007), who looked at spontaneous noticing by L1 English and L1 Japanese speakers with no knowledge or some knowledge of L2 Korean. She operationalized spontaneous noticing as the circling and underlining of written forms, learners’ questions about linguistic structures, and reports from a stimulated recall task. Spontaneous verbalizations (think-aloud protocols) were also obtained. Results revealed that learners with no knowledge of Korean attended to different aspects of language, such as verb endings, topic markers, lexical items, and frequently occurring syllables. Verb endings accounted for the most prevalent noticed items by both L1 English and L1 Japanese participants, followed by the Korean words for “university” and “Columbia.” L1 English participants also highly noticed punctuation marks and case markers, while the L1 Japanese group highly noticed graphemes making up syllable blocks. Results for the group with some knowledge of L2 Korean revealed that both L1 English and L1 Japanese participants noticed more instances of the verb for “to be” in Korean, as well as the topic marker eun/neum, and the collocation meaning “to major in.” For this group, Park found differential noticing behavior based on the learners’ L1, with L1 Japanese speakers focusing their attention more on ‘meaning’ and L1 English speakers focusing their attention more on formal properties of the L2 input.
In another study, Koike and Gualda (2008) investigated the acquisition of L3 Portuguese possessive adjectives by L1, L2, and heritage speakers of Spanish. In Portuguese, two possessive forms are available for the third person singular, *seu/sua* ‘his/her’ (which in Portuguese agree with the object) and *dele/dela* ‘his/her’ (which agree with the subject). In Brazilian Portuguese, the *seu/sua* forms are increasingly falling into disuse to avoid ambiguity, since they are also used to refer to the second-person singular pronoun *você* ‘you.’ In Koike and Gualda’s study, results revealed differences in the pragmatic choice of possessives depending on type of task and language background group. Although in SLA research the differential roles of linguistic item types in language acquisition are recognized, CLI studies comparing learning and processing of different linguistic item types by learners with different language backgrounds are still scarce. In the PSL/PFL field, a great number of error analysis studies have pointed out that certain Portuguese structures are more challenging for Spanish speaker than others, but experimental studies have not produced evidence to support their hypotheses.

**Summary.**

As the review of the literature shows, CLI research has provided ample evidence of the effects of prior language knowledge in second and third language acquisition. One of the main factors found to trigger CLI is structural or perceived typological proximity. Essentially, the more closely related two language are, the more likely they are believed to influence each other, be it at the local level as posited by the Scalpel Model (Slabakova, 2016) or at the holistic level as posited by the TPM (Rothman, 2010). Although few empirical studies have focused on the study of the interaction between Portuguese and Spanish knowledge, research from different SLA strands, including language typology, suggest that prior knowledge of Spanish may have both facilitative and non-facilitative effects in the acquisition of L2 and L3 Portuguese.
CLI studies, however, have mainly focused on the investigation of source and domain of CLI, and less attention has been given to how prior knowledge affects language processing. While different models have been proposed to account for the effects of L1 on L2 speech perception and production, only a few have focused on the role of prior knowledge in early L3 processing stages, or more specifically on the learning of formal aspects of language. For instance, the Competition Model predicts that learners make use of L1 cue processing strategies in early states of acquisition (as novice learners). In the study of vocabulary acquisition, the Parasitic Hypothesis and the BIA+ model make predictions as to how new information is represented in the brain and later activated based on similarities to previously learned information. In fact, findings from L2 speech perception suggest that prior knowledge affects initial processing of nonnative sounds (Kuhl, 2000a; Best & Strange, 1992; Werker et al., 2012), and lexical studies have shown a facilitative effect on comprehension for cognate words (Dijkstra et al., 1998; Dijkstra et al., 2010). Despite the favorable evidence supporting a role for prior knowledge in input processing, very few studies have looked at differential intake of linguistic forms or at performance on production tasks by groups with different language experiences.

Moreover, findings from different SLA strands have shown that the product of early stages of language processing is also a function of the characteristics of the input (Ellis, 2007; Leeman, 2003; Yilmaz & Yuksel, 2011; Cerezo, 2010; Bulté & Housen; 2012). Different item types are known to be processed differently based on their inherent and contextual features, such as frequency, salience, complexity, and meaning-form transparency, among others (Leow, 1993; Husltijn & Graaff, 1994; Gass et al., 2003DeKeyser, 2005; Carroll, 2012; Uggen, 2012). In CLI research, lexical items have been found to transfer to a second or third language more often than grammatical structures (e.g. Lindqvist, 2015), and CLI was shown to affect simpler structures more than complex ones (Flynn et al., 2004; Berkes and Flynn, 2012a, 2012b). However, data comparing
two item types in CLI studies often come from more advanced learners and as part of experimental designs in which exposure to the target structures has not been controlled for. Few CLI studies, therefore, have compared the differential effect of CLI on specific linguistic item types after first exposure, during early learning stages.

Finally, aptitude has been established as one of the most predictive individual differences for language development (Robinson, 2013; Li, 2015a). The multi-dimensional nature of aptitude has been captured by various test batteries that assess different aptitude components, including phonemic coding ability, memory, spelling and orthographic knowledge, and analytical abilities. Grammatical sensitivity, first operationalized as Part IV of the Modern Language Aptitude Test (Carroll & Sapon, 1959), is one of the most researched components of aptitude and has been shown to have the greatest power in predicting learning outcomes (Robinson, 1997; VanPatten & Borst, 2012b). According to Skehan (2002), it is involved in initial pattern detection and in the extraction of discrete information. Together with grammar inferencing, grammatical sensitivity has been found by Granena (2013, 2015) to predict explicit learning. In other words, both seem to be involved in the development of metalinguistic knowledge. In CLI studies, metalinguistic knowledge (or awareness) is hypothesized to facilitate L3 learning (Jessner, 2008; Kemp, 2007; Gibson & Hufeisen, 2011; Falk, Kindqvist, & Bardel, 2015), but only a small number of studies have examined the effect of aptitude and metalinguistic knowledge on learning for groups different prior knowledge. Findings, although incipient, point to an interaction between prior knowledge, aptitude for explicit learning, and learning outcomes, with higher aptitude (or metalinguistic knowledge) affecting source of transfer (Falk et al., 2015) and facilitating learning more for one language group than for others (VanPatten et. al., 2013).
Research Questions and Hypotheses

The lack of empirical evidence addressing the effects of Spanish CLI on the learning of lexical versus morphosyntactic item types at different learning stages in L3 Portuguese, as well as the interaction of the analytical components of aptitude and CLI, motivated the following research questions and hypotheses.

RQ1 – How does CLI from Spanish affect the recognition and written production of L3 Portuguese cognate and non-cognate lexical items?

H1 – Following Slabakova’s (2016) Scalpel Model of third language acquisition and Hall’s (2002) Parasitic Model of second language processing, it is hypothesized that knowledge of Spanish will not result in any type of CLI in the recognition and production of non-cognates, since there is no formal overlap between these Spanish and Portuguese words. Therefore, no difference in performance is expected between the L1 English/L2 Portuguese and the L1 English/L2 Spanish/L3 Portuguese groups. These predictions go against Rothman’s (2011) TMP and the wholesale effects triggered by psychotopology, as claimed by Kellerman (1977). It is also hypothesized that negative CLI will affect recognition and production of Spanish/Portuguese non-identical cognates in L3 Portuguese due to typological proximity, against the predictions of both the Scalpel Model and the TPM. Therefore, the L1 English/L2 Portuguese group is hypothesized to outperform the L1 English/L2 Spanish/L3 Portuguese group with respect to non-identical cognates, but the groups are expected to have similar performance on non-cognates. The predictions for non-identical cognates contradict the facilitative effect found by Dijkstra et al. (2010).

RQ2 – How does CLI from Spanish affect the recognition and written production of L3 Portuguese morphosyntactic linguistic items?

H2 – Following Slabakova’s (2016) Scalpel Model and the TPM (Rothman, 2010), Spanish CLI is hypothesized to affect performance on the recognition and production of both regular and
irregular Portuguese double past participles, since these verb constructions share not only form but some of the syntactic constraints in both languages. However, since the distribution of regular past participles and derivational morphological rules are identical in Spanish and Portuguese for regular past participles, Spanish CLI in this case is expected to be positive (or facilitative). Due to facilitative CLI from Spanish, the L1 English/L2 Spanish/L3 Portuguese group is expected to outperform the L1 English/L2 Portuguese group on regular past participles. On the other hand, for the selected Portuguese irregular past participles there are no respective counterparts in Spanish (which makes use of the regular forms instead) and, consequently, the syntactic constraints that guide the use of irregular forms in Portuguese do not apply in Spanish. Therefore, Spanish CLI is hypothesized to have a negative effect on the recognition and production of irregular past participles, with the L1 English/L2 Portuguese group outperforming the L1 English/L2 Spanish/L3 Portuguese. In this study, a more fine-grained understanding of CLI from Spanish is proposed by analyzing the CLI effects on subject-verb agreement (AGR) and choice of verb form (FORM) separately. It is hypothesized that Spanish LI will have a facilitative effect on AGR for both regular and irregular past participles, a facilitative effect on FORM of regular past participles, and a negative effect on FORM of irregular past participles. These predictions are also in line with the TPM and Kellerman’s notion of psychotypology.

**RQ3 – How does Spanish CLI affect the recognition and written production of Portuguese lexical items at different learning stages?**

**H3 –** It is hypothesized that CLI will interfere with mechanisms of perception and input processing (as measured by the immediate recognition task), diminishing intake of lexical items and affecting performance on the immediate recognition task. Considering that other mechanisms are involved in production (as noted by Chaudron, 1985) and that these mechanisms are also susceptible to CLI, as predicted by the Parasitic Model, it is hypothesized that CLI will have a
greater effect on the immediate production task compared to the immediate recognition task. Spanish CLI is not expected to affect retention of lexical items.

**RQ4 – How does Spanish CLI affect the recognition and written production of Portuguese morphosyntactic linguistic items at different learning stages?**

H4 – Similarly to the predictions for lexical items, it is hypothesized that CLI will interfere with mechanisms of perception and input processing (as measured by the immediate recognition task), diminishing intake of morphosyntactic items and affecting performance on the immediate recognition task. Considering that other mechanisms are involved in production (as noted by Chaudron, 1985) and that these mechanisms are also susceptible to CLI, it is hypothesized that CLI will have a greater effect on the immediate production task compared to the immediate recognition task. Spanish CLI is not expected to affect retention of morphosyntactic items.

**RQ5 – Is there a differential performance on the recognition and production of Portuguese lexical items compared to morphosyntactic linguistic items? Does Spanish CLI interact differently with these different types of linguistic items?**

H5 – It is hypothesized that learners will perform better on lexical items than on morphosyntactic items, following VanPatten’s (2002) Input Processing model and Hulstijn and de Graaff’s (1994) predictions of greater difficulty attributed to complex structures and rule-based learning compared to item-based learning. However, due to expected negative CLI from Spanish in the processing of Portuguese non-identical cognates, it is possible that knowledge of Spanish will hinder learners’ performance on these particular items. It is also expected that positive CLI from Spanish will facilitate the recognition and production of regular past participles. Therefore, I hypothesize that performance on lexical versus morphosyntactic linguistic items will be mediated by CLI and the specific CLI effects acting upon each type of linguistic structure.
RQ6 – What is the role of aptitude in the recognition and written production of Portuguese lexical items?

H6 – It is hypothesized that higher aptitude scores, as either grammatical sensitivity, grammar inferencing, or both (i.e. analytical ability), will correspond to better performance on the recognition and production of Portuguese lexical items.

RQ7 – What is the role of aptitude in the recognition and written production of Portuguese morphosyntactic items?

H7 – It is hypothesized that higher scores on aptitude, as either grammatical sensitivity, grammar inferencing, or both (i.e. analytical ability), will correspond to better performance on the recognition and production of Portuguese morphosyntactic items.

RQ8 – Does aptitude mediate Spanish CLI in L3 Portuguese acquisition?

H8 – It is hypothesized that diminished performance on the recognition and production of lexical and morphosyntactic Portuguese linguistic items will be mitigated by aptitude (as either grammatical sensitivity, grammar inferencing, or analytical ability)—that is, higher scores on aptitude will correspond to higher performance on Portuguese language tasks for which negative CLI is found. Likewise, aptitude is hypothesized to enhance positive CLI from Spanish—that is, higher scores on aptitude will correspond to higher performance on Portuguese language tasks for which positive CLI is found.
Participants

Demographic data.

Participants were 123 adult naïve learners of nonnative Portuguese who either did not speak Spanish or spoke Spanish as a second language (L2 Spanish) at intermediate or higher levels. Second language (L2) in the context of this study refers to any languages acquired after the participants’ first language (sequential bilingualism), with age of onset (AO) greater than or equal to 12 years and prior to exposure to nonnative Portuguese. In turn, L3 Portuguese refers to the acquisition of Portuguese by participants who spoke at least one L2. At the time of the experiment, participants were enrolled in an initial-level (first semester) Portuguese language course at different North American universities. The participating universities were either public (N= 3) or private institutions (N=4) located in the Midwest (N=1), the South (N=1) or on the East Coast (N=5) of the United States. After the exclusion criteria were applied, data from 56 participants were used in the final analysis. Participants were assigned to one of two groups according to their language background: No Spanish (N=28) and L2 Spanish (N=28). Participants in the No Spanish group had no previous knowledge of Spanish. Participants in the L2 Spanish group had learned Spanish as a foreign language in the United States, or as second language in study abroad programs. All participants in the final sample were native speakers of English.

Six participants in the No Spanish group reported having taken one semester of Spanish in middle school or high school and were asked to complete a Spanish C-test to assess their proficiency in Spanish. Their average score was 5.67 (out of 125) or 4.54 %. Because their scores in the Spanish C-test were low and they reported not being able to understand or speak Spanish, they were included in the No Spanish group. Only one participant in the No Spanish group reported having traveled abroad to a Spanish speaking country and only for a one-week vacation. The
average AO of Spanish for participants in the L2 Spanish group was 15.36 years old (min=12, max=20) and coincided with their first exposure to Spanish instruction. None of the L2 Spanish participants spoke Spanish at home growing up. Participants in this group reported having taken more than one semester of Spanish in middle school (M=2.29), high school (M=4.64), college (M=2.070), and in other learning contexts (M=0.50). Among the L2 Spanish participants, 21 reported having studied Spanish abroad or lived in a Spanish-speaking country for an average of 5.69 months (min=0.25, max=22). Ten participants (both groups combined) reported having traveled to a Portuguese-speaking country on vacation or as a missionary for a minimum of four days to a maximum of two weeks. While no participants in the No Spanish group were majoring in a language-related field, three participants in the L2 Spanish group were enrolled as Spanish majors and three were enrolled as Linguistics majors.

In the No Spanish group, 12 participants reported knowing one language other than English (Italian, Korean, German, French, Tamil, or Hungarian) and two participants reported knowing two languages other than English (German and Latin or Chinese and Japanese). The other 14 participants in the No Spanish group reported speaking English only. In the L2 Spanish group, 12 participants reported knowing one language other than English and Spanish (e.g. Farsi, German, Russian, Telugu, Mandarin, French, Arabic, and Hindi) and one participant reported knowing Italian and American Sign Language, besides English and Spanish. Ideally, to control for any cognitive advantages that could arise from learners’ bilingual experience, all participants would have been learners of Portuguese as a third language. However, finding Portuguese learners with no previous knowledge of Spanish in American universities proved to be a hard task, and controlling for their monolingual/bilingual status would have considerably reduced the sample size of this study. The fact that half of the No Spanish group were English monolinguals should be taken into account, as they did not benefit from advantages usually attributed to bilinguals, such as improved
language learning strategies and increased metalinguistic awareness or cognitive control, which may have had an effect on their analytical ability and performance scores. The demographic data for both groups is displayed in Table 1.

Table 1

*Participants’ demographic information by experimental group*

<table>
<thead>
<tr>
<th>Group</th>
<th>Age Average (min, max)</th>
<th>Undergraduates</th>
<th>Graduates</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish</td>
<td>21.04 (min=18, max=50)*</td>
<td>27</td>
<td>1</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td>21.25 (min=19, max=26)</td>
<td>22</td>
<td>6</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>21.14 (min=18, max=50)</td>
<td>49</td>
<td>7</td>
<td>16</td>
<td>40</td>
</tr>
</tbody>
</table>

* Note: Only 1 participant older than 26

All participants were drawn from post-secondary first-semester Portuguese courses taught by a native speaker of Brazilian Portuguese. All courses employed the same Portuguese textbook: *Ponto de Encontro: Portuguese as a world language* (Jouët-Pastré, Klobucka, Sobral, Moreira, & Hutchinson, 2013). Informal individual interviews conducted with the different instructors to gauge the methods used in class revealed that all instructors used a communicative approach to language teaching, implemented a flipped classroom pedagogical model, and deployed similar classroom activities, homework assignments, and course assessments. Courses at the different universities met either three times a week for 50 minutes or twice a week for 115 minutes.

In return for their participation in the experiment, participants at one of the universities received extra points on one assignment they had completed for their Portuguese class that semester. Students who chose not to participate in the study were offered the opportunity to complete an alternative task to earn the extra points. No non-participating students completed the alternative activity. Participants from other universities received a $15 gift card from Amazon.com or Starbucks for their participation in all three sessions of the experiment.
Inclusion and exclusion criteria.

The selection criteria determined that participants should be native speakers of English and adult postsecondary students at initial stages of nonnative Portuguese acquisition with or without prior knowledge of Spanish. Knowledge of other second or foreign languages other than French and Italian was acceptable. Participants with knowledge of Spanish (Spanish learners) were included in the study only if they (1) started learning Spanish after puberty (12 years old or later) in formal settings and (2) if they did not grow up speaking Spanish at home or as a heritage language in any capacity. Spanish learners also needed to have had at least four semesters of Spanish instruction and to have scored 65% or higher on the Spanish C-test, ensuring they had at least an intermediate level of L2 Spanish. Results from the pilot study showed that at this level Spanish learners have already acquired the Spanish linguistic structures parallel to the Portuguese target forms used in this study, a necessary condition for CLI. Participants should not have been exposed to Portuguese during childhood (as a heritage language), have studied Portuguese abroad, or lived in a Portuguese-speaking country. A cut-off score of 50% or lower on the Portuguese C-test was established as an inclusion criteria. The Portuguese proficiency cut-off score was set relatively high to account for the immediate receptive and productive skills enjoyed by learners with knowledge of Spanish, due to the close typological proximity between the two languages.

Of the 123 students who participated in the study, 11 were excluded for not having completed all activities or for having formally withdrawn. Another 11 participants were excluded due to technical problems that resulted in loss of data (during or after the experimental treatment). Data from the demographic information questionnaire revealed that 11 participants were native speakers of Spanish, 15 were heritage speakers of Spanish (early bilinguals), six were native speakers of languages other than English and Spanish, and two were heritage speakers of Portuguese. To avoid conflation of the effects of order of acquisition and language status Spanish,
and since there were not enough L1 Spanish speakers for a control group, only data from L2 Spanish learners (age onset ≥ 12) were included. One participant was excluded for speaking advanced L2 Italian. Three other participants were excluded for scoring lower than 22% on the Spanish C-test. Seven outliers were identified and excluded from the final analysis, following Larson-Hall (2010). The outliers included one participant who scored at 89% in the Portuguese C-test (compared to a native speaker baseline of 93.5%) and three participants (one from the L2 Spanish group and two from the No Spanish group) who scored very high on the pretest for both lexical items (M=88.5%) and morphosyntactic items (M=74.1%). Three participants (two from the L2 Spanish group and one from the No Spanish group) who achieved scores lower than 2% across all tasks in both the post- and delayed posttests were also excluded as outliers. In total, data from 56 Portuguese learners were included in this study, with 28 participants in the L2 Spanish group and 28 participants in the No Spanish group.

**Target Structures**

Two linguistic item types were selected as target structures: morphosyntactic items and lexical items. The morphosyntactic items are the two past participle forms of Brazilian Portuguese abundant verbs. Abundant verbs in Portuguese are verbs that have two productive past participle forms in complementary syntactic distribution. Regular past participle forms enter perfective constructions and follow the same derivational rules as in Spanish, resulting in identical or almost identical forms in both languages. For that reason, knowledge of Spanish is hypothesized to have a facilitative effect on the processing and learning of regular Portuguese past participles. Irregular past participle forms, on the other hand, are required in Portuguese passive voice constructions and have distinctive formal characteristics. The Spanish verb counterparts selected for this study have no irregular forms, and the respective Spanish passive voice constructions are formed with regular past participles. Therefore, Spanish CLI is expected to negatively affect the learning of the selected
Portuguese irregular forms. The lexical items selected for this study are Portuguese nouns that are either non-identical cognates or non-cognates with Spanish. Non-identical cognates differ slightly in form but share the same meaning in both languages. The crosslinguistic forms are sufficiently similar that knowledge of Spanish could have a facilitative effect in the semantic processing of the Portuguese counterparts. However, their incomplete formal overlap is hypothesized to have a negative effect on the acquisition of the Portuguese morphology.

**Double past participles (PPs).**

Past participle forms in Spanish and Portuguese evolved from preterit participle forms in late Latin, used around the 3rd and 4th centuries AD. More specifically, they originated from the verbal ending –ĀTUS, associated with verbs of the conjugation –ĀRE, and the verbal ending –ĪTUS, associated with the verbs of the conjugation –ĪRE (Lloyd, 1993). Spanish and Portuguese still share most of the verb morphology associated with past participles (see Table 2), which are considered nominal forms and do not express tense or mode distinctions. The existence of two past participle forms (rhizotonic and arhizotonic) associated with a single verb also comes from Latin (Lobato, 1999; Villalva and Almeida, 2004). In arhizotonic forms the stress falls on the thematic vowel of the verb. They are called regular forms because their bear greater resemblance with the infinitive form of the verb, e.g. *cantar* ‘to sing’ > *cantado* ‘sang.’

**Table 2**

*Examples of past participle regular forms in Spanish and Portuguese*

<table>
<thead>
<tr>
<th>Conjugation</th>
<th>Infinitive Form</th>
<th>Spanish Past Participles</th>
<th>Portuguese Past Participles</th>
</tr>
</thead>
<tbody>
<tr>
<td>–AR</td>
<td><em>Cantar</em> ‘to sing’</td>
<td>cantado</td>
<td>cantado</td>
</tr>
<tr>
<td>–ER</td>
<td><em>Comer</em> ‘to eat’</td>
<td>comido</td>
<td>comido</td>
</tr>
<tr>
<td>–IR</td>
<td><em>Sentir</em> ‘to feel’</td>
<td>sentido</td>
<td>sentido</td>
</tr>
</tbody>
</table>
In rhizotonic forms, the stress falls on the stem of the verb. Also called irregular participles, they are usually shorter than arhizotonic forms, e.g. aceitar ‘to accept’ > aceito (Lobato, 1999). In Portuguese, verbs with two participle forms are known as abundant verbs and are still very productive, co-existing with verbs that have only a rhizotonic or an arhizotonic form. Abundant verbs are more numerous in the first conjugation (–AR). Lobato (1999) has identified 36 abundant verbs ending in the –AR (e.g. salvar ‘to save’ > salvado/salvo), nine ending in –ER (e.g. prender ‘to arrest, to secure’ > prendido, preso), and 12 ending in –IR (e.g. emergir ‘to emerge’ > emergido, emerso). While many of these forms come directly from Latin, others evolved exclusively in Portuguese, such as pago, the irregular form of pagar ‘to pay’ (Said Ali, 1966). The derivation of arhizotonic forms essentially follows the rules inherited from Latin. Verbs of the first and third conjugation (–AR and –IR, respectively) add –DO to the thematic vowel a and i respectively; while verbs in the second conjugation (–ER) have the thematic vowel changed from e to i, which is then followed by –DO. The same rules apply in Spanish.

According to Lobato (1999), the derivation of rhizotonic Portuguese forms depends heavily on the conjugation to which the verbs belong. Verbs of the first conjugation present a great variety of endings (e.g. sso, ço, xo, co, cho, go, gue, nho, ndo, po, te, vre), with the most common being –TO and –SO. This variety can be partially explained by the fact that, in general, irregular participles in this conjugation rarely undergo stem changes, and are usually formed by adding a nominal thematic vowel to the verb stem (e.g. libertar ‘to free’ > liberto). On the other hand, rhizotonic forms of second and third conjugations usually adopt the endings –TO, –SO, and –DO (+nasal), but very often undergo stem changes, with the loss of the final consonant or nasality and final consonant (e.g. benzer ‘to consecrate’ > bento; revolver ‘revolve’ > revolto). Double participle forms are not to be confused with participles that have lost their aspectual function and are now used as
adjectives (e.g. cansado ‘tired,’ correto ‘correct,’ atento ‘watchful, mindful’), a very common phenomenon in both Portuguese and Spanish.

The morphosyntactic distribution of rhizotonic and arhizotonic Portuguese forms is relatively stable. The arhizotonic forms combine with the auxiliary verbs ter ‘to have’ or haver ‘to have, to exist’ to form active-voice perfective tenses and are invariable—that is, they do not agree with the subject of the sentence, as in (1a). The rhizotonic forms tend to combine with the auxiliary verb ser ‘to be’ to form the passive voice for action predicates or with the auxiliary verbs estar ‘to be’ and ficar ‘become’ (resultative meaning) to form the passive voice for stative predicates, as in (1b). In the passive voice, the participle forms agree in gender and number with their subject. As indicated by Bechara (2009 [1999]) and Celso and Cintra (2001), rhizotonic forms may appear with the auxiliary verbs ter ‘to have’ or haver ‘to have, to exist’ in compound passive voice constructions, as in (1c), but this use is infrequent.

(1) a. Ele tem aceitado muitos convites para ir ao cinema

   ‘He has accepted many invitations to go to the movies (lately)’

   b. O prêmio foi aceito pelo representante do governo

   ‘The prize was accepted by the state representative’

   c. Os documentos têm sido aceitos como de costume

   ‘The documents have been being accepted as usual’

The vernacular use of participle forms does not always follow the prescriptive grammar rules as described above. In vernacular Portuguese, very often one form is preferred over the other in both linguistic contexts, allowing for constructions such as foi libertado ‘he/she was freed’ (instead of foi libertado) and tem pago ‘he/she has been paying’ (instead of tem pagado). The predominant use of one form usually leads to the neglect and loss of the other form. This variation is both diachronic
and synchronic and affects certain verb paradigms more than others (Teixeira da Silva, 2008; Teixeira da Silva & Schwindt, 2013). But while some past participle forms are clearly undergoing changes in use, others preserve the passive/perfective distribution inherited from Latin (Bechara, 1989; Pagani, 1994; Lobato, 1999; Celso & Cintra, 2001; Villalva & Almeida, 2004; Teixeira da Silva, 2008; Castilho, 2010; Miara, 2013). Double past participle forms were also common in old Spanish, but in modern Spanish most double participle forms are no longer productive. Most Spanish rhizotonic forms (e.g. *frito* ‘fried’ and *impreso* ‘printed’) are used as predicative and nominal complements in adjectival constructions and their use otherwise vary considerably geographically, especially when we compare American and Peninsular Spanish. Some Spanish dialects, for instance, preserve both rhizotonic and arhizotonic forms of certain verbs and allow for the use of either in passive and perfective constructions (with either the auxiliary *ser* ‘to be’ or *haber* ‘to have’). In many cases, one form is preferred over another and adopted in both linguistic contexts, as is the case in Portuguese. The Real Academia Española (RAE) recognizes that double forms are still acceptable for a few verbs: *imprimir* ‘to print’ > *imprimido/impreso*; *freír* ‘to fry’ > *freído/frito*; *elegir* ‘to elect’ > *elegido/electo*; *prender* ‘to arrest, to catch’ > *prendido/preso*; and *prove* ‘to provide’ > *proveído/provisto* (2010, p. 65-66). Many Portuguese verbs that in Spanish have converged to one single past participle form preserve the rhizotonic and arhizotonic forms, causing Spanish speakers to produce ill-formed Portuguese sentences by selecting the wrong participle form in passive voice constructions. The higher frequency of *se*-passive perfect constructions (2a) in Spanish reinforces the strength of arhizotonic over rhizotonic cues. In *se* constructions, the pronoun *se* replaces the auxiliary *ser* ‘to be’ and selects the rhizotonic form, the same form required in constructions with the auxiliary *ter/haber* ‘to have.’ In Portuguese, on the other hand, passive constructions with *ser* ‘to be’ (2b) are more common than *se*-passives, resulting in a higher frequency of rhizotonic forms. In Spanish present perfect *se*-passive constructions with
the verb _haber_ ‘to have’ compete with instances of _haber_ ‘to have’ in active-voice present perfect constructions, making the auxiliary verb _haber_ ‘to have’ a less reliable cue in the selection of rhizotonic participles. Native Spanish speakers seem, therefore, to have lost their intuitive sense of the syntactic constraints involved in the selection of rhizotonic and arhizotonic forms, despite the survival of a few double participles in modern Spanish. This hypothesis was confirmed in a survey of L1 Spanish use of regular and irregular past participles in the pilot study phase and the use of Portuguese past participles forms by speakers of Spanish. The intuitions of Portuguese native speakers regarding the use of rhizotonic and arhizotonic forms of Portuguese abundant verbs was also investigated during the pilot study phase to guarantee that the verbs selected for this study conformed to the prescriptive rules of syntactic distribution (see “Pilot study” subsection).

(2) a. Tem-se prendido muitos ladrões
   ‘Many thieves have been arrested’

   b. Muitos ladrões têm sido presos
   ‘Many thieves have been arrested’

Findings from the pilot study surveys investigating the use of rhizotonic and arhizotonic forms in Portuguese and Spanish resulted in a list of 10 Portuguese abundant verbs selected as target forms, shown in Table 3. Although the verb _prender_ ‘to arrest’ also has two past participle forms in Spanish, it was maintained as a target item for two reasons: its rhizotonic form (_preso_ ‘arrested’) did not appear in the L1 Spanish speakers’ survey as either a Spanish or Portuguese choice. Native Spanish speakers also reported not using the verb _prender_ in the sense of ‘to arrest.’ They reported not being familiar with the form and meaning of the irregular participle of _prender_, showing a preference for the verb _arrestar_ ‘to arrest’ or _detener_ ‘to detain’ in contexts where the Portuguese verb _prender_ ‘to arrest’ is used. Furthermore, some native speakers of Spanish reported
using the form *preso* only as noun, meaning prisoner. Also, results from the L1 Portuguese speaker’s survey revealed that the rhizotonic/arhizotonic paradigm for the verb *prender* ‘to arrest’ remains stable in modern Portuguese.

Table 3

*Regular and irregular participle Portuguese target forms*

<table>
<thead>
<tr>
<th>Portuguese infinitives</th>
<th>Irregular form rhizotonic</th>
<th>Regular form arhizotonic</th>
</tr>
</thead>
<tbody>
<tr>
<td>aceitar ‘to accept’</td>
<td>aceito (a) (s)</td>
<td>aceitado</td>
</tr>
<tr>
<td>acender ‘to light up, to turn on’</td>
<td>aceso (a) (s)</td>
<td>acendido</td>
</tr>
<tr>
<td>cozinhhar ‘to cook’</td>
<td>cozido (a) (s)</td>
<td>cozinhado</td>
</tr>
<tr>
<td>expulsar ‘to expel’</td>
<td>expulso (a) (s)</td>
<td>expulsado</td>
</tr>
<tr>
<td>gastar ‘to spend’</td>
<td>gasto (a) (s)</td>
<td>gastado</td>
</tr>
<tr>
<td>pegar ‘to catch, to grab’</td>
<td>pego (a) (s)</td>
<td>pegado</td>
</tr>
<tr>
<td>prender ‘to arrest’</td>
<td>preso (a) (s)</td>
<td>prendido</td>
</tr>
<tr>
<td>salvar ‘to save’</td>
<td>salvo (a) (s)</td>
<td>salvado</td>
</tr>
<tr>
<td>soltar ‘to free’</td>
<td>solto (a) (s)</td>
<td>soltado</td>
</tr>
</tbody>
</table>

**Lexical items.**

*Overview.* Spanish and Portuguese share a great number of cognate words—that is, words that partially or entirely overlap in meaning, form, or both. These similarities are believed to account for up to 80% of their lexicon (Jensen, 1989; Santos, 1999; Henriques, 2000; Lipski, 2006; Torres & Aluízio, 2011). While many cognates are identical across both languages, most of them do not have the exact same meaning, pronunciation, or spelling (Crystal, 1991). Heuven and Dijkstra (1998) referred to words that differed only by a single letter (while respecting word length and letter position) as word neighbors, found both intra- and crosslinguistically. Dijsktra et al. (2010) expanded this concept to include crosslinguistic words with different degrees of morphophonological variation, calling them non-identical cognates. Evidence of the facilitative role
of cognates in comprehension has been found by research in typological proximity and contrastive analysis (Kellerman, 1977, 1979; Carroll, 1992; Gibson & Hufesein, 2003; Jessner, 2003; Wei, 2003; Ringbom, 2007). Studies in psychology and cognitive science have also shown advantages for cognate processing compared to non-cognates and false-cognates (De Groot & Nas, 1991; Sánchez-Casas, Davis, & García-Albea, 1992; Dufour & Kroll, 1995; Lavaur & Font, 1998; Dijkstra, Grainger, and van Heuven, 1999; Frisch, Large, & Pisoni, 2000; Sánchez-Casas and García-Albea, 2005; Costa, Santesteban, & Caño, 2005; Lemhöfer, Dijkstra, Schriefers, Baayen, Grainger, & Zwitserlood, 2008). Few studies, however, have addressed CLI effects of cognates or non-cognates versus non-identical cognates. In one of these, Dijkstra et al. (2010) found some degree of facilitation effect in Dutch and English non-identical cognate processing, but to a much lesser degree than the facilitation effect found for true cognates (i.e. identical cognates). They pointed out that the CLI effects of non-identical cognates were far from straightforward and might combine positive and negative influence. Similarly, Heuven and Dijkstra (1998) found inhibitory effects in the activation of word neighbors between L1 English and L2 Dutch. In fact, the literature on Portuguese acquisition has long underscored the learning difficulties encountered by speakers of Spanish in respect to morphologically similar but not identical words (Carmolinga, 1997; Akerberg, 1998, 1999, 2013; Grannier & Carvalho, 2001; Melo Lucena & Martorelli, 2013). Thus, one of the aims of this study is to compare the effects of non-cognates and non-identical cognates in Portuguese acquisition.

**Non-identical cognates.** Ten non-identical Spanish-Portuguese cognate nouns were selected for this study, as shown in Table 4. Six of them are also non-identical cognates with the English words *lamp, population, competition, survival, pleasure,* and *turtle.* The 10 non-identical cognates have different degrees of morphological overlap, involving not less than two and no more than four transformational rules separating both languages. The criteria for the selection of the non-identical
cognates include words that (a) are unlikely to have been acquired by first-semester Portuguese learners (although learners might have been incidentally exposed to them), (b) share the same meaning in Spanish and Portuguese (and therefore are not partial cognates, as defined by Frunza and Inkpen, 2008), (c) have most likely been acquired by intermediate learners of L2 Spanish, and (d) have between three and four syllables. Knowledge of the Spanish counterparts by L2 Spanish learners was tested in the pilot study phase (see the “Pilot Study” subsection).

Table 4

*Portuguese/Spanish non-identical cognates*

<table>
<thead>
<tr>
<th>Portuguese</th>
<th>Spanish</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>almoço</td>
<td>almuerzo</td>
<td>lunch</td>
</tr>
<tr>
<td>cenouras</td>
<td>zanahorias</td>
<td>carrots</td>
</tr>
<tr>
<td>competição</td>
<td>competencia</td>
<td>competition</td>
</tr>
<tr>
<td>escadas</td>
<td>escaleras</td>
<td>stairs</td>
</tr>
<tr>
<td>lámpada</td>
<td>lámpara</td>
<td>lamp</td>
</tr>
<tr>
<td>penteado</td>
<td>peinado</td>
<td>hair-do</td>
</tr>
<tr>
<td>perigo</td>
<td>peligro</td>
<td>danger</td>
</tr>
<tr>
<td>população</td>
<td>población</td>
<td>population</td>
</tr>
<tr>
<td>tartaruga</td>
<td>tortuga</td>
<td>turtle</td>
</tr>
<tr>
<td>tubarão</td>
<td>tiburón</td>
<td>shark</td>
</tr>
</tbody>
</table>

*Non-cognates.* Ten Portuguese/Spanish non-cognates nouns were selected as target structures, as shown in Table 5. The criteria for the selection of non-cognates included nouns that (a) bear no similarity in form between Portuguese and Spanish, (b) are likely to have been acquired by L2 learners of Spanish at the intermediate level, (c) are unlikely to have been acquired by Portuguese learners during the first semesters of language instruction (although learners might have been incidentally exposed to them), (d) show a straightforward semantic correspondence between Portuguese, Spanish, and English, and (e) have three to four syllables. High-frequency Portuguese words that participants would have most likely been exposed to in the first week of Portuguese instruction were avoided (e.g. *frango* ‘pollo, chicken,’ *janela* ‘ventana, window’). The different
factors determining the selection of non-cognates made it difficult to find words with the same degree of morpho-phonological similarity.

Table 5

*Spanish/Portuguese non-cognates.*

<table>
<thead>
<tr>
<th>Portuguese</th>
<th>Spanish</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>abacaxi</td>
<td>piña</td>
<td>pineapple</td>
</tr>
<tr>
<td>bochechas</td>
<td>mejillas</td>
<td>cheeks</td>
</tr>
<tr>
<td>canudo</td>
<td>paja</td>
<td>drinking straw</td>
</tr>
<tr>
<td>garrafa</td>
<td>botella</td>
<td>bottle</td>
</tr>
<tr>
<td>macarrão</td>
<td>pasta</td>
<td>pasta</td>
</tr>
<tr>
<td>moleque</td>
<td>niño</td>
<td>kid</td>
</tr>
<tr>
<td>óculos</td>
<td>gafas</td>
<td>glasses</td>
</tr>
<tr>
<td>soneca</td>
<td>siesta</td>
<td>nap</td>
</tr>
<tr>
<td>tapete</td>
<td>alfombra</td>
<td>rug</td>
</tr>
<tr>
<td>tijolo</td>
<td>ladrillo</td>
<td>brick</td>
</tr>
</tbody>
</table>

**Materials**

Materials and measures used in this study include (1) a language background survey, (2) a Spanish C-test, (3) a Portuguese C-test, (4) a Portuguese familiarization vocabulary task, (5) a picture-matching recognition task, (6) a controlled multiple-choice translation task, (6) a lexical decision task (LDT), (7) a multiple-choice recognition assessment task, (8) a controlled production assessment task, (9) the LLAMA F aptitude test component, (10) Part IV of the MLAT, and (11) a debriefing questionnaire. Most the vocabulary items used in the experimental tasks were taken from the first five lessons of the Portuguese textbook *Ponto de Encontro* (Jouët-Pastré et al., 2013), with the exception of the target items. A large number of Portuguese words used in the sentence stimuli were English-Portuguese and Spanish-Portuguese cognates. Words that did not appear in the first five lessons of the Portuguese textbook (considered unfamiliar) were included in the vocabulary familiarization task during treatment to guarantee that participants could understand the sentence stimuli throughout the experiment.
**Language background survey.**

The language background survey elicited participants’ demographic information (such as age, sex, education, major, etc.) and information about their language experience (e.g. languages spoken, order of language acquisition, amount of formal language instruction, etc.). This task took participants from four to seven minutes to complete (M=5.36). See Appendix A.

**Language proficiency measures.**

Three measures were used to control for knowledge of Portuguese: class enrollment, the language background questionnaire, and the Portuguese C-test (Appendix B). L2 Spanish was assessed via the language background questionnaire and the Spanish C-test (Appendix C). C-tests are measures of reduced redundancy (Spolsky, Bengt, Sako, and Aterburn, 1968; Spolsky, 1971, 1973) which were first proposed by Raatz and Klein-Bradley (1981) as a modification of the Cloze Test. They have since been studied and validated as a measure of global proficiency in many languages (Klein-Braley & Raatz, 1984, 1985; Grotjahn, 1987; Grotjahn, Klein-Braley & Raatz, 2002; Klein-Braley, 1997; Norris, 2009; Lee-Ellis, 2009). The Portuguese C-test used in this study has been designed and validated by the researcher (Maimone, in preparation). The Spanish C-test has been designed and is being validated by Riggs and Maimone (in preparation). The Portuguese and the Spanish C-tests used in this study consisted each of five authentic 1-paragraph length texts in which the second half of roughly every other word was deleted, for a total of 25 deletions per text and a total 125 deletions per test. The C-tests were delivered electronically on a computer and hosted online on a private server. Before each C-test, participants received instructions on how to enter accents using the online platform and completed a practice activity in English. Participants were instructed to complete the missing parts to the best of their ability. Each of the five C-test texts was presented individually and in random order. Once participants had completed one text and submitted their answers, they were directed to the next text. The test was not timed. Participants
were able to review and make changes to the text they were working on, but once submitted they could not go back to the previous text. Each text presented different levels of difficulty (from very easy to very difficult). Both the Portuguese and the Spanish C-test took from 10.5 to 25 minutes (M=12.25) to complete.

**Exposure Tasks.**

*Portuguese familiarization vocabulary task.* The purpose of this task was to guarantee that the novice learners of Portuguese understood the sentence stimuli. The task consisted of two parts. In the first part, participants were presented with a printed list of 40 Portuguese words, 25 of which were less frequent words taken from the five first lessons of their textbook *Ponto de Encontro* (Jouët-Pastré et al., 2013), 10 were the infinitive forms of the target verbs, and five were words not found in the five first lessons of the textbook. On the back of the page containing the list of Portuguese words was a list of the same words and their English translations. Participants were asked to circle words they did not know and look up the meaning of the unknown words using the list on the back of the page. They were given a few minutes to complete this activity and asked to return the lists to the researcher. This task took participants from 3 to 5 minutes to complete (M=4.15). The second part of the task was computer-delivered, designed using the Paradigm Experiment Builder software (Perception Research Systems Incorporated, version 2.5 for Windows), designed to mimic a flash-card study activity. The task contained 25 of the same words used in the first part of the task. Participants were presented with a Portuguese word at a time, for which two possible English/Spanish translation pairs were provided. They were asked to read the Portuguese word and click on the correct translations. The task was not timed. After selecting a choice, participants received a yes/no feedback. The task design was recursive, meaning that if participants got the meaning of a word wrong, the same word would reappear until they translated it
correctly. This task took participants from 3 to 7 minutes to complete (M=4.5). Participants were also instructed that they could, at any moment, ask for clarification about any words in the prompts.

**Picture-matching recognition task.** The purpose of this task was to expose learners to new language input through a task-essential design. Attention to the target form was necessary to successfully complete the task. The task was computer-delivered (See Appendix D) and designed using the Paradigm Experiment Builder software (Perception Research Systems Incorporated, version 2.5 for Windows). It comprised 90 trials in which each of the 10 non-identical cognates, the 10 non-cognates, and the 2 past participle forms of the 10 target verbs appeared twice. The task also contained 10 distractors, consisting of present tense sentences with present participle (gerund) constructions. The sentence trials containing the target cognates and non-cognates consisted of present participle (gerund) constructions or present indicative constructions. The sentence trials containing the regular forms of the verbs consisted of present perfect constructions, and the sentence trials containing the irregular forms of the verbs consisted of simple past passive voice constructions. Trials including the past participle forms in the passive voice agreed in gender and number with the subject of the sentence. The number of feminine/masculine and singular/plural subjects was balanced. Equal numbers of masculine/singular, masculine/plural, feminine/singular and feminine/plural subject combinations were also kept in the sentence stimuli containing past participle regular forms, even though the verb in Portuguese perfective constructions does not agree with the subject of the sentence.

All illustrations used in the trials were created specifically for this task. Participants were instructed to focus on comprehension and choose the picture that best represented the Portuguese sentence on the screen. They were presented with one Portuguese written sentence at a time and its English translation on a computer screen, together with two pictures that differed only with respect to the target form being learned. Participants chose one of the two pictures by clicking on it using
the mouse. After making a selection, participants received yes/no feedback on meaning. If their selection was right, they saw a smiley face and a reproduction of the correct sentence. If their selection was wrong, they saw a frowny face and a reproduction of the correct sentence. The feedback page was presented for 2350ms before participants were shown the next trial. The task was recursive, meaning that participants repeated the trials one more time if they did not select the correct picture the first time. The correct sentence-picture pair was shown in the feedback page to maximize learners’ exposure to the target forms. The task was not timed. This task took participants from 8 to 17 minutes to complete (M=10.3).

**Controlled multiple-choice translation task.** The task was computer-delivered and designed using the Paradigm Experiment Builder software (Perception Research Systems Incorporated, version 2.5 for Windows). The purpose of this task was to increase the learners’ exposure to the target linguistic items. It comprised 80 trials in which the target forms (non-identical cognates, non-cognates, and double past participle forms) appeared twice each. In this task, participants were presented with an English sentence and a partial Portuguese translation containing one blank space. They were also presented with three answer options and were instructed to choose the word that best translated the English sentence, completing the Portuguese sentence. To facilitate the selection of the right answer, an effort was made to make the correct answer obvious. For instance, if the correct answer was a verb, only one of the answer options contained a verb. The Portuguese sentence and picture stimuli in this task were the same as in the Picture-Matching Task. To select the correct option participants clicked on the word of their choice. After completing each translation, participants received yes/no feedback on meaning. If their selection was right, they saw a smiley face and a reproduction of the correct sentence. If their selection was wrong, they saw a frowny face and a reproduction of the correct sentence. The feedback page was presented for 2350ms before participants were shown the next trial. The task was recursive, meaning that
participants repeated the trials one more time if they did not select the correct picture the first time. The correct sentence-picture pair was shown in the feedback page to maximize learners’ exposure to the target forms. The task was not timed. This task took participants from 10 to 16 minutes to complete (M=11).

Figure 1. Sample trial of the Controlled Multiple-Choice Translation Task

Assessment Tasks.

*Lexical decision task (LDT).* This task was designed to minimize the comparison between Portuguese and Spanish forms found to occur in the traditional 4-option multiple-choice recognition task during the pilot study phase. The LDT was computer-delivered and designed using the Paradigm Experiment Builder software (Perception Research Systems Incorporated, version 2.5 for Windows). There were a total of 40 trials, 20 target item trials, and 20 distractors. The 20 target item trials consisted of the 10 non-identical cognates and the 10 non-cognates. The target items appeared just once in this task. In sentences containing target items, Portuguese words were presented together with a non-word. In sentences containing distractors, the Portuguese words were presented either with non-words or Spanish words. Participants were presented with two words simultaneously and asked to select the correct Portuguese word. The words appeared for 1200ms, one on the right and the other on the left side of the screen. Participants used the keyboard to select
which word they believed to be the Portuguese word while visualizing the words or after they had disappeared from the screen. After words disappeared from the screen, participants were shown the picture of a little duck and had as much time as needed to make a selection. The task was not timed. It took participants from 3 to 6 minute to complete (M=4.42).

**Multiple-choice recognition task.** This task was computer-delivered and designed using the Paradigm Experiment Builder software (Perception Research Systems Incorporated, version 2.5 for Windows). Two versions of the task were created: version 1 was used in the pretest, and version 2 was used in the post- and delayed posttests. Version 1 of the Multiple-Choice Recognition Assessment Task comprised 40 trials: 20 items containing target-items and 20 trials containing distractors. The target items were the two past participle forms of 10 target verbs (for a total of 20 target items). The distractors were 10 high-frequency Portuguese verbs and 10 high-frequency Portuguese nouns taken from the five first lessons of the Portuguese textbook *Ponto de Encontro* (Jouët-Pastré et al., 2013). Version 2 of the Multiple-Choice Recognition Assessment Task comprised 25 trials, 20 trials containing target items, which were the same as in version 1, and 5 distractors. Each target item was elicited only once in both versions of the task. Participants were presented with a Portuguese sentence prompt containing one blank and its English translation. They were asked to choose one of four options that best completed the Portuguese sentence by using the mouse and clicking on the option of their choice. The incorrect answer options included the alternative past participle form of the verb (either a regular or an irregular past participle), a non-word that resembled the regular form, and a non-word that resembled the irregular form of the verbs. The distractor trials contained a present participle construction with the main verb in the present tense, as in (4). It took participants 5 to 15 minutes (M=11) to complete this task.
(3) O juiz tem _____________ as pessoas inocentes.

‘The judge (masculine) has been letting the innocent people go’

a. soltado
b. soltao
c. solto
d. solhado

(4) A professora está _________________ português.

‘The professor (feminine) is teaching Portuguese’

a. ensinando
b. ensenhando
c. encinando
d. encinindo

Controlled production task. This task was computer-delivered and designed using the Paradigm Experiment Builder software (Perception Research Systems Incorporated, version 2.5 for Windows). Two versions of the task were created: version 1 was used in the pretest, and version 2 was used in the post- and delayed posttests. Version 1 of the Controlled Production Assessment Task (pretest) comprised 60 trials: 40 target item trials and 20 distractor trials. The target items were the two past participle forms of 10 verbs (for a total of 20 target items), the 10 non-identical cognates, and the 10 non-cognates. The distractors were 10 high-frequency Portuguese verbs and 10 high-frequency Portuguese nouns taken from the five first lessons of the Portuguese textbook Ponto de Encontro (Jouët-Pastré et al., 2013). Version 2 of the Controlled Production Assessment Task (post- and delayed posttests) comprised 40 target-item trials and no distractors. The target items were the same in version 1 and 2, and each target form was elicited once in both versions.
Participants were presented with a Portuguese sentence containing 1 blank and its English translation as shown in the example in (5). They were instructed to complete the blank with the appropriate Portuguese word that would accurately complete the translation of the English sentence. Before starting, participants practiced entering accented vowels in an Office Word document. Participants took 10 to 16 minutes to complete this task (M=12.71).

(5) As batatas foram_______________ por 10 minutos.

‘The potatoes were cooked for 10 minutes’

**Analytical ability measures.**

**Part IV of the MLAT (WIS).** Section IV of the Modern Languages Aptitude Test (MLAT) (Carrol & Sapon, 1969) was used as a measure of grammatical sensitivity (Carroll, 1965). The task comprised 45 trials and was administered in English through SurveyMonkey.com (See Appendix E). In each trial participants were presented with two or more English sentences, with some of the words in bold or underlined, and could select from four different answer options. They were asked to match the function that a word performed in a given sentence (the main sentence) with another word that performed the same function in another sentence. They selected the correct answer by clicking on the option of their choice.

**LLAMA F.** Component F of the Language Aptitude Test (LLAMA) was used as a measure of grammatical inferencing. The task was computer-delivered using the program designed by Meara (2005). In this task, participants were exposed to 20 sentences in a made-up language along with pictures that depicted the action and the subjects represented in each sentence, as in Figure 2. Participants studied the sentence and picture combinations for five minutes and could take notes, but could not copy the target sentences. After studying the language stimuli, participants completed
an assessment task comprising 20 trials. In the assessment task trials, participants saw a picture and two sentences and had to click on the sentence that described the picture.

Figure 2. LLAMA F screenshot showing a training trial with a sentence in a made-up language and a picture that depicts the sentence.

Debriefing Questionnaire.

The debriefing questionnaire was computer-delivered, designed and hosted online on SurveyMonkey.com. It comprised 12 open-ended questions and 10 Likert-scale questions, divided into 6 sections that probed participants’ (i) assessment of the quality and easiness of the tasks (4 items), (ii) awareness of target forms and underlining grammatical rules (3 items), (iii) crosslinguistic awareness (3 items), (iv) motivation to study Portuguese (3 items), (v) perceptions and beliefs about linguistic distance and facilitative effects of previous language knowledge (7 items), and (vi) further comments and verification of previous instruction about the target forms (2 items). A full version of the questionnaire with 22 items was administered to the L2 Spanish group, since some questions exclusively pertained to the relationship between Portuguese and Spanish. A shorter version of the questionnaire with 15 items was administered to the No Spanish group and
contained 2 fewer questions about crosslinguistic awareness and 5 fewer questions about the participants’ perceptions and beliefs. The questions pertaining to awareness and noticing of forms were based on Robinson (1997). Although they do not compare to online measures of awareness (as suggested by Leow, 2000, 2015), given the limitations the current design poses to the use of think-aloud protocols, this offline measure aimed at providing insights into how learners processed the target forms and the amount of metalinguistic awareness they developed during treatment. The crosslinguistic awareness questions administered only to L2 Spanish speakers aimed at probing their awareness of the similarities and contrasts between Portuguese and Spanish cognates and past participle forms, following the distinction proposed by James (1996) between metacognition of a single language system and metacognition between two language systems. According to James, higher crosslinguistic awareness of the relationship between two systems is expected to moderate CLI. The questions about participants’ perceptions of the degree of proximity between Portuguese and Spanish aimed at eliciting information related to the role of psychotypology (Kellerman, 1977), following Thompson (2013). For the entire list of questions, see Appendix F.

Design

Overview.

The design of this study is quasi-experimental. Portuguese learners were not randomly assigned to treatment groups. Instead, they were placed in one of two groups based on their previous exposure to Spanish. The study is also correlational in nature, since it investigates the relationship between analytical ability and learning outcomes in nonnative Portuguese acquisition (Mackey & Gass, 2005). Participants were divided into two groups based on their prior language knowledge: in the No Spanish group participants had no previous knowledge of Spanish, and in the L2 Spanish group participants had intermediate to advanced levels of Spanish as a second language.
The current study seeks to create a learning condition that resembles learners’ exposure to language input in the communicative L2 classroom, where students frequently perform activities in which they are not explicitly instructed to pay attention to form. Therefore, the tasks were designed to investigate how learners process the target items while focusing on comprehension, even though spontaneous awareness of forms can arise during the tasks. Robinson (1997a) has referred to tasks in which “subjects are encouraged to process for meaning” (p. 224) as an incidental condition, contrasting it with explicit and implicit conditions. For Robinson, implicit conditions involve sequence learning that is heavily based on memorization, and explicit conditions involve explicit instructions and grammar explanations about the target items. In this view, incidental conditions do not consist of focus-on-form activities, and learning is rather unintentional (Hulstijn, 2001).

Martinez-Fernandez (2007) adopted a similar interpretation of incidental conditions, defining them in terms of the type of learning they promote—that is, learning that takes place in conditions where learners process language for meaning rather than for form (p. 210). Incidental learning conditions have been explored in the form of spontaneous attention or noticing by various researchers (Jacobs, Dufon, & Hong, 1994; Ellis, 1994; Robinson, 1997b; Qi & Lapkin, 2001; Park & Han, 2008; Park, 2007, 2011; Kachoub, 2013; Li, 2013), and typically comprise reading or listening comprehension tasks without manipulation of the input. They tap into learners’ receptive skills and do not require a more active role on the part of the learner (e.g. making decisions, comparing, producing language). However, evidence of incidental learning in laboratorial experiments is not robust, which could be a result of the limitations inherent to laboratorial designs, e.g. the limited time of exposure and practice during laboratorial language training. It has been suggested that for intake to be further processed, learners must engage in deeper levels of processing (Hulstijn, 1992; Watanabe, 1997; Laufer & Hulstijn, 2001; Laufer, 2001; Gass, et al., 2003; Rott, 2005; Leow, 2011, 2015a), and it is
possible that incidental laboratorial tasks as those describe in the literature do not promote sufficient depth of processing to produce measurable results.

While the focus of the current study is not to investigate the effect of any learning condition per se, classroom-based incidental learning conditions would be the ideal locus of CLI research, as they correspond to most of the learners’ language exposure in the context of formal instruction following a communicative approach. However, because finding enough non-Spanish-speaking participants implies recruiting them from several different language classes at different universities, a classroom-based design was not feasible. For this reason, this study adopts a laboratorial design with task-essential language practice that requires some level of focus on form to promote deeper processing without providing explicit instruction or metalinguistic explanations about the target forms. During treatment, participants were only instructed to focus on comprehension, but instead of simply reading or listening to input, they had to attend to the target forms and select from picture pairs or lists of words to complete the task. The focus-on-form nature of the tasks in this study also makes it more evident what the target forms are, so we cannot affirm that unintentional learning is involved. Instead, spontaneous noticing here refers to the learners’ noticing of morphological features of the target forms and their syntactic distributions (in the case of morphosyntactic items), and not noticing or no noticing of the target words instances. Explicit instruction or activities that overtly drew the learners’ attention to morphological aspects of the target words were avoided, as they could conceal CLI affecting spontaneous noticing and awareness.

Procedure.

Postsecondary beginner courses were identified in different American universities. To recruit students, the researcher contacted the instructors and visited the Portuguese classes. Students signed up to receive more information about the study and were contacted by email, through which they received a copy of the consent form and a copy of the study IRB approval form. Participants
from one of the universities received extra points on assignments in their Portuguese course, while participants from the other universities received compensation in the form of gift cards (see “Participants” subsection) after completion of all experimental sessions. After agreeing to participate in the study, participants received instructions by email regarding the dates and place of each session.

The experiment comprised three sessions of approximately 60 minutes each (M=42 minutes), with one week in between each. All tasks were computer-delivered, using computers provided by researcher. Participants completed the sessions in a university language lab or in a reserved room at their own universities in the presence of the researcher or a research assistant. A counter-balanced design was not adopted because the tasks needed to be presented in a specific order. In the pre-, post-, and delayed posttests the production assessment tasks were completed first, followed by the recognition assessment tasks. For each task, items were presented in randomized order. Participants completed a language background survey, a Portuguese C-test, four treatment/exposure tasks, three assessment tasks at three points in time (pre-, post-, and delayed posttest), the Spanish C-test (for Spanish learners only), the LLAMA F component, Part IV of the MLAT, and a debriefing questionnaire.

Treatment tasks consisted of a vocabulary check, a vocabulary translation task, a picture-matching task, and a controlled translation task. The assessment tasks consisted of a production task (for both lexical and morphosyntactic items), a lexical decision recognition task, and a multiple-choice recognition task targeting the morphosyntactic items only. Two versions of the assessment tasks were created: an extended version with more distractors used in the pre-test, and a shorter version used in the post- and delayed posttests. The target sentence stimuli in the production task and the multiple-choice recognition task were different in version 1 and 2. In the first session, participants read and signed consent forms agreeing to participate in the study and completed (1) a
language background questionnaire, (2) the Portuguese C-test, and (3) version 1 of the assessment tasks. In the second session, they completed (1) the Spanish C-test (administered only to participants who reported knowing Spanish), (2) the exposure/treatment activities, and (3) version 2 of the assessment tasks. In the third session, participants completed (1) the LLAMA F test, (2) Part IV of the MLAT (Carroll & Sapon, 1959), (3) version 2 of the assessment tasks, and (4) the Debriefing Questionnaire.

Data collection was set up to start after learners had been exposed to at least five weeks of Portuguese instruction. However, knowledge of Spanish gives initial-level Portuguese learners an immediate advantage in listening and reading comprehension, as well as in the use and awareness of morphological transformation rules (Akerberg, 2002). Therefore, it was expected that after five weeks of language instruction, learners with prior knowledge of Spanish would show higher Portuguese proficiency levels than learners with no knowledge of Spanish tested after the same amount of exposures. To compensate for the expected differences in language ability, data collection started at different points in the semester for each experimental group. For the L2 Spanish group, data collection started following the fifth week of language instruction (during the students’ sixth week of classes). Participants in the No Spanish group were given more time of Portuguese exposure. Data collection for this group took place between the 10th and the 12th week of Portuguese instruction, depending on which language program and university students were enrolled in. This decision was curriculum-based. While participants in the L2 Spanish group were all from the same university and attended an accelerated Portuguese program, participants in the No Spanish group came from different universities and attended regular Portuguese classes. After five weeks of classes, L2 Spanish learners had finished Lesson 5 of Ponto de Encontro (Jouët-Pastré et al., 2013) and were starting Lesson 6. Data collection for participants in the No Spanish group were also collected after participants had finished Lesson 5 of Ponto de Encontro, with dates varying
slightly depending on the university. This guaranteed that all participants had been exposed to roughly the same instructional content (vocabulary and grammar structures), while allowing the No Spanish participants more time for practice and exposure to language input.

Table 6

Experimental procedure

<table>
<thead>
<tr>
<th>Session 1 – Pretest</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Language Background Questionnaire</td>
<td>Portuguese C-test</td>
<td>Assessment Task (version 1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 2 – Exposure and Posttest (1 week after pretest)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spanish C-test (when applicable)</td>
<td>Exposure/Treatment Tasks</td>
<td>Assessment Task (version 2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 3 – Delayed Posttest (1 week after posttest)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Llama F /Part IV MLAT</td>
<td>Assessment Task (version 2)</td>
<td>Debriefing Questionnaire</td>
</tr>
</tbody>
</table>

Scoring and coding procedures.

Portuguese and Spanish C-tests. Both the Portuguese and the Spanish C-tests were coded following an all-or-nothing method, meaning that participants needed to produce the missing parts of words with a 100% accuracy to be awarded points. Participants received either one point for a correct answer or zero points for an incorrect answer. Each C-test comprised five texts with 25 blanks each, for a minimum of zero and a maximum of 125 points in each C-test. Participants’ raw scores were used in the analyses.

Part IV of the MLAT (WIS). The MLAT task was binarily coded, meaning that participants received one point for a correct answer and zero points for a wrong answer, for a minimum of zero and a maximum of 45 points. MLAT raw scores were used as a measure of grammatical sensitivity.

LLAMA F. The Llama F assessment component consists of 20 multiple-choice items. The coding is binary, meaning that participants received one point for a correct answer and zero points
for a wrong answer. The program automatically generates a percentage score from 0% to 100%.

The percentage scores were used as a measure of grammar inferencing.

**Analytical ability.** MLAT scores were first converted to percentage scores. Then a combined average of the MLAT and the LLAMA percentage scores was calculated as a measure of analytical ability.

**Recognition assessment tasks.** Both the lexical decision task and the multiple-choice recognition task were coded following an all-or-nothing method: participants received either one point for a correct answer or zero points for an incorrect answer. In both versions of the Lexical Decision Recognition Task only the target items counted toward the participants’ score, for a minimum of zero and a maximum of 10 points for non-identical cognates and a minimum of zero and a maximum of 10 points for non-cognates. Participants’ raw scores for non-identical cognates and non-cognates entered the analyses concerning CLI and learning stages. For the comparison of performance on lexical versus morphosyntactic items, the raw scores were converted to percentage scores, since the number of items for these item types were different.

**Written production assessment tasks.** The controlled production assessment task for lexical items was coded following an all-or-nothing method: participants received either one point for a correct answer or zero points for an incorrect answer. Accuracy points were awarded only for production items that were identical to the target lexical items. Lexical items were also coded for type of error. Errors were categorized as (1) borrowings from Spanish (production words that involved a Spanish-like morphology or use of a Spanish word, e.g. *población, población, gafas*), (2) borrowings from English (production words that involved an English-like morphology or use of an English word, e.g. *jaws, carota*), (3) other (omissions, spelling errors, wrong word choice, morphology errors, gender errors, and other developmental errors, e.g. *tapeta, moquete, socesa, marracão, xícara*, etc.).
The controlled production assessment task for morphosyntactic items was coded in three different ways. First, accuracy (ACC) scores were coded following an all-or-nothing method: participants received either one point for a correct answer or zero points for an incorrect answer. Accuracy (ACC) points were awarded only for production items identical to the morphosyntactic target. Second, production items were scored for subject-verb agreement (AGR): participants received either one point for the correct subject-verb agreement or zero points for incorrect subject-verb agreement. For irregular forms in passive voice constructions, which inflect for gender and number, this means that verb forms should show overt morphological inflection when applicable. For regular forms in perfective constructions, which do not inflect for gender and number, this means that overt morphological inflection was illicit. Third, production items were coded for correct choice of regular versus irregular verb form (FORM): participants received either one point for the correct choice of FORM or zero points for the incorrect choice of FORM.

*Debriefing questionnaire.* Questions 7, 8, and 9 from the debriefing questionnaire were coded following Leow (1997, 2012, 2015a), with the identification of three levels of awareness (noticing, reporting, and understanding). The lowest level of reported awareness is the level of noticing, with evidence of minimum cognitive effort, usually represented by repetition or some type of overt registration of the target forms. The second level of awareness, the level of reporting, represents a deeper, medium level of processing and cognitive effort, but with no evidence of hypothesis testing and rule formation. The highest level of awareness, the level of understanding, implies a high level of processing, in which at least some evidence of hypothesis testing and rule formation is reported (Leow, 2015, p. 218-220). It is important to notice that Leow’s coding system derived from data produced by think-aloud protocols—that is, that is oral online data, which is essentially different from data collected offline—as the data elicited by the debriefing questionnaire. In an offline questionnaire, in which participants are not spontaneously reporting their self-
generated awareness of the target forms, but are instead asked to reflect upon language, the written instances that represent each level of awareness do not take the same form as instances from oral data. Having that in mind, the descriptors for each level of awareness used to code answers to question 7 to 9 were derived from the data from the debriefing questionnaire itself and are presented in Table 7 with concrete exemplars. This coding system was specifically tailored for reports on verb constructions (past participles), since the target nouns in this study did not follow a specific morphological or transformational pattern. Therefore, comments referring to any other aspect of language other than the verbs were not coded.

Table 7

Coding procedure for level of (offline) awareness

<table>
<thead>
<tr>
<th>Awareness at the Level of Noticing</th>
<th>lowest level of awareness and low level of processing, minimum cognitive effort</th>
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</thead>
</table>
| ▪ Repetition/reproduction of target forms without context or explanations | ‘Tem prendido’
 | | ‘cozido, cozida, also cozinhado?’
 | | ‘aceça aceso appeared a lot of times’
 | | ‘For example, the words “expulsado” and “salvado” were used’
 | | ‘maybe add dido’
 | | ‘Words ending in -ing and past tense’
 | | ‘ado edo verbs as in Spanish’
 | ▪ Registration of specific verb endings | ‘Most verbs were some form of the past but there were a few in the present’
 | | ‘There was a significant amount of passive voice in all 3 of the sessions’
 | ▪ Naming verb tense/aspect/voice | ‘Most words I was learning translated to -ed in English’
 | ▪ Minimum crosslinguistic awareness | ‘I just know that the verb endings have to change’
 | | ‘I think I learned the present perfect verb tense and how it contrasted with Spanish’
 | | ‘Yes I think I was learning how to say someone “has been” doing something or how to say that things happened to someone.’
 | ▪ More elaborated metalinguistic comments |
 | ▪ Use of strategies | ‘I tried agreement (fem/masc) on all verbs but it not always worked’
 | ▪ Specific crosslinguistic similarities or differences | ‘It seems similar to French and Italian in using ter/ser +past participle’
 | | ‘The verbs are similar to English constructions with have, and the second verb becomes -do’

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A lot of the words that ended in -ado/-ido had a verb form of ter before them, which is a little different from Spanish. I noticed that in Spanish they have cocinada but in Portuguese cozinhado is always masculine. The ir/er verbs end in “ido.” The ar verbs end in “ado.” There are some irregular verbs. Like Spanish, ‘frequently two verbs were presented together, the second one in the past’

### Description of verb constructions/transformation

- The ir/er verbs end in "ido.
- The ar verbs end in "ado.
- There are some irregular verbs. Like Spanish.

<table>
<thead>
<tr>
<th>Awareness at the Level of Understanding</th>
<th>even deeper level of processing, high cognitive effort, evidence of hypothesis testing or rule formation</th>
</tr>
</thead>
</table>
| Partial or complete explanations of the rule | 'I used one form with the verb ser and the other with ter (the Spanish ones)’
- ‘One form agreed with feminine and masculine forms and the other did not’
- ‘Ser+preso (corresponding to gender/number) ter + prendido (not corresponding to gender/number’
- ‘I think some forms were conjugated, like in the plural, and others did not change’
- ‘The shorter ones agreed with the subject’
- ‘preso was always in the singular and prendido in the plural’

| Attempts to explain the rule, even if not totally accurate | I think some verbs followed a pattern like in Spanish ido and ado but others were different although sometimes also similar to Spanish irregulars, which followed another pattern’
- ‘tem__, foi___’
- ‘ser + adjective (then they can go feminine and plural too)’
- ‘I think the difference was between when it was something like “tem__” vs “foi___”’

| Comparisons between Spanish and Portuguese rules |

| Evidence of some hypothesis formulation |

### Pilot Study

A pilot study was conducted to identify the optimal target structures for the investigation of CLI from Spanish in nonnative Portuguese acquisition and to verify the feasibility of the main study. Different experiments were conducted during the pilot study phase, which took place one or two semesters before the data collection for the main study. The experiments conducted in the pilot study included (1) L2 Spanish leaners’ lexical recognition and production, (2) L2 Spanish leaners’ knowledge of L3 Portuguese lexical items, (3) L1 Spanish use of L1 Spanish and L3 Portuguese PPs, and (4) L1 Portuguese use of PPs.
Experiment 1 - L2 Spanish learners’ lexical recognition and production.

This experiment was conducted to verify if learners of Spanish at an intermediate level of proficiency were able to recognize and produce Spanish nouns that were non-identical cognates with Portuguese and Spanish verbs whose Portuguese counterparts were included as target items in the main study. Sixteen postsecondary learners of L2 Spanish completed a Spanish lexical recognition and a lexical production task. The participants were enrolled in different sessions of Intermediate Spanish I (their second or third semester of Spanish instruction) and were offered a $10 Starbucks gift card for their participation in one session of 45 minutes in which they completed a pencil and paper version of the tasks. There were 11 female and five male students. The mean age was 20.94 years. All participants were native speakers of English and were older than 14 years old when they first started to learn Spanish. The participants’ average score on the Spanish C-test was 77.59 (SD=8.43, min=59, max.=91). Both tasks contained the same 25 Spanish nouns and 15 verbs that were also cognates with Portuguese. The recognition task consisted of a 3-option multiple-choice task in which participants read a sentence in Spanish containing one blank and had to choose which option best completed the sentence. The production task consisted of a controlled translation task with the same stimuli sentences and target structures as the recognition task. Participants were presented with a Spanish sentence containing one blank and the translation of the sentence in English. They were asked to complete the Spanish sentence with the appropriate word in Spanish, based on the English translation. Participants first completed a language background survey, followed by the Spanish C-test, the production task, and then the recognition task. For the production task, results showed an 87% accuracy rate (two incorrect responses out of 16) for the word peinado ‘hair-do,’ and an 94% accuracy rate for peligro ‘danger,’ and zanahorias ‘carrots.’ The words lámpara ‘lamp’ and competencia ‘competition’ also had a 94% accuracy rate (one incorrect response each, with the error in lámpara consisting of a missing accent). For the
recognition task, all learners but one performed at 100%. One learner did not recognize the word *peinado* ‘hair-do.’

**Experiment 2 - L2 Spanish learners’ knowledge of L3 Portuguese target items.**

Eleven students enrolled in a postsecondary first-semester Portuguese class for Spanish speakers completed a production task and a recognition task to test their knowledge of the target nouns and irregular past participles used in this study. The participants were enrolled in a section of Portuguese for Spanish Speakers (their first semester of Portuguese instruction) and were offered a $10 Starbucks gift card for their participation in one session of 45 minutes in which they completed a pencil and paper version of the tasks. There were nine female and two male students. The mean age was 22 years. All participants were native speakers of English and were older than 16.7 years old when they first started to learn Spanish, and older than 19 years old when they started learning Portuguese. The study was completed after six weeks of Portuguese instruction. Results revealed that learners were able to produce the targeted lexical and past participle items with 0% accuracy, except for *morto* ‘dead,’ which had one accurate response (9%). They were able to recognize the word *população* ‘population’ and *cenoura* ‘carrot’ with a 9% accuracy rate (corresponding to one accurate response out of 11) and 18% for the item *almoço* ‘lunch’ (corresponding to two accurate responses out of 11). Participants also recognized the verb *cozido* ‘cooked’ and the verb *preso* ‘arrested’ with an accuracy rate of 9%.

**Experiment 3 - L1 Spanish use of L1 Spanish and L3 Portuguese PPs.**

An experiment with native speakers of Spanish was conducted to investigate the use of Spanish regular and irregular past participles whose Portuguese counterparts entered the main study as target items, as well as their knowledge of Portuguese past participles. Participants were 5 female and 5 male students enrolled in master’s or PhD programs at an American university. The average
age was 28 years (min.= 23, max.=32) most participants had experience teaching Spanish as a second language (80%). All participants had completed one semester of Portuguese postsecondary instruction and none received any compensation for participating in this experiment. Participants met with the researcher for one session of 30 minutes and completed a language background survey, the production tasks, and a short debriefing interview regarding their use of Spanish past participles.

The first production task consisted of a Spanish fill-in-the blank production test (Appendix G), comprising 20 trials in which 10 target Spanish verbs appeared once in a passive voice construction and once in a present perfect construction. The Spanish verbs were the 5 verbs with double participles recognized by the RAE (*elegir, prender, freír, imprimir, proveer*) and the Spanish translation of 5 abundant Portuguese verbs with stable double participle paradigms (*encer, cocinar, expulsar, morir, salvar*). Participants were presented with a Spanish sentence containing one blank and with the infinitive form of the missing Spanish verb in parentheses. Results showed that native speakers of Spanish used the past participle forms of the five Spanish abundant verbs recognized by the RAE inconsistently. All native speakers of Spanish picked one out of the two forms and used it in both contexts, but the form they chose varied. There was an overall preference for the rhizotonic forms *frito* ‘fried’ and *impresso* ‘printed.’ For Spanish verbs corresponding to five of the Portuguese target items in the main study, all participants used the arhizotonic (regular) form in all contexts, confirming the prediction that Spanish speakers no longer select the rhizotonic forms in passive voice constructions. The only exception was the verb *morir* ‘to die,’ for which the preferred past participle form was *muerto* ‘died,’ used in both contexts, while the form *morido* ‘died’ was not used by any participant. The rhizotonic form *salvo* ‘saved’ was also not selected by any participant. Some of the participants commented that the form *salvo* is sometimes used in religious contexts and might be acceptable in some dialects of Spanish. Seven participants commented that they did not use the verb *prender* meaning “to arrest” and that they preferred
instead the verbs *arrestar* ‘to arrest’ or *detener* ‘to detain.’ When asked about the syntactic constraints determining the use of rhizotonic and arhizotonic forms, only two participants recognized it as a valid rule in Spanish, and four participants referred to it as rule used in old Spanish, but all participants reported not knowing how to apply the rule.

The second production task consisted of a Portuguese fill-in-the blank production test (Appendix G), comprising 24 trials in which 12 target Portuguese verbs appeared once in a passive voice construction and once in a present perfect construction. The Portuguese verbs were the same verbs used as target items in the main study (*cozinhar, salvar, prender, expulsar, morrer, eleger, acender, aceitar, pegar, soltar*) and two other verbs (*elegir, imprimir*). Participants were presented with a Portuguese sentence containing one blank and with the infinitive form of the missing Portuguese verb in parentheses. Results showed that with the exception of the verb *imprimir* ‘to print’ all participants preferred the arhizotonic forms of the verbs for both linguistic contexts. The form *impresso* ‘printed’ was used by 8 out of 10 Spanish speakers in both morphosyntactic contexts. One participant used the form *electo* ‘elected’ in both contexts. The form *electo* however, is the Spanish counterpart of the Portuguese form *eleito*. Based on the results of this survey, the verbs *imprimir* and *elegir* were not selected as target items in the main study.

**Experiment 4 - L1 Portuguese use of PPs.**

Because the use of regular and irregular participle forms of abundant verbs has been undergoing changes in Brazilian Portuguese (Miara, 2013), a group of 16 Brazilian Portuguese native speakers was surveyed on their use of 13 abundant Portuguese verbs to test their intuitions regarding the morphosyntactic distribution of their past participles. Forms knowingly undergoing variation (e.g. *pagar* ‘to pay’ and *ganhar* ‘to earn, to win’) were not included in the experiment. Participants were 10 female and six male adults, between 28 to 47 years old, and with Bachelor’s degrees in different professional areas. They spoke three different Southern dialects of Brazilian
Portuguese (north of Paraná, city of São Paulo, and Belo Horizonte) and were recruited online. None of the participants had ever taught Portuguese or studied linguistics. The participants completed a language background survey, a production task, and a short debriefing interview on their use of and perceptions about the different past participle forms. The language background survey and production task were administered via an online form on SurveyMonkey.com. The interview was conducted using Skype. Participants did not receive any compensation for their participation.

The production task consisted of a Portuguese fill-in-the blank task, comprising 26 trials in which 13 target Portuguese verbs appeared once in a passive voice construction and once in a present perfect construction. Participants were presented with a Portuguese sentence containing one blank and the infinitive form of the missing Portuguese verb in parentheses (Appendix H). Results showed a 100% accuracy rate for 11 of the 13 target verbs. Two verbs (expressar ‘to express’ and eleger ‘to elect’) had a 94% accuracy rate (corresponding to one wrong answer each in one of the linguistic contexts). The verb entregar ‘to deliver’ was later discarded as a target form for not following the same paradigm as the other verbs for passive constructions (the rhizotonic form entregue ‘delivered’ does not inflect for gender, just for number). Only verbs for which the two past participle forms were used with a 100% accuracy rate by native speakers of Portuguese were selected as target items in the main study.
CHAPTER FOUR: Results

This section describes the primary analyses, the analyses conducted to answer the research questions, and the results of the Debriefing Questionnaire. Results for the Language Background Questionnaire are given in the Methods section, under Participants. All parametric analyses were conducted using IBM Statistical Package for the Social Sciences (SPSS, Version 23) with an alpha level set to 0.05 throughout. Results are reported following the recommendations in Field (2009, 2012) and Larson-Hall (2010). The Levene’s Test of Equality of Error Variance was considered significant at \( p < .001 \). Cohen’s \( d \) effect sizes were reported for T-test analyses and partial eta squared effect sizes \( (\eta_p^2) \) were reported for the mixed model ANCOVAs, following Field (2012). As suggested by Cohen (1988, 1992), effect sizes were interpreted as following:

- Cohen’s d: \( d = 0.2 \) (small), \( d = 0.5 \) (medium), effect size, and \( d = 0.8 \) (large).
- Partial Eta Squared: \( \eta_p^2 = 0.01 \) (small), \( \eta_p^2 = 0.06 \) (medium), and \( \eta_p^2 = 0.14 \) (large)

Preliminary Analyses

Language proficiency measures.

Portuguese C-test. A Portuguese C-test was used to measure participants’ global proficiency in nonnative Portuguese. Both descriptive statistics and a multi-faceted Rasch Model Analysis using FACETS version 3.71.3 (Linacre, 2015) were employed to verify the reliability of the five texts that compose the C-test. Portuguese C-test scores were then submitted to an Independent-Samples T-test to compare the proficiency levels between groups. Table 8 shows the descriptive statistics for the Portuguese C-test. The variance explained by the Rasch measures was 86.60% at a significance level of \( p < .001 \). The degree of separation for the sampled population was high at 12.14 (strata 16.52), reflecting the extent to which the texts differed from each other in assessing different
performance levels. The degree of separation between participants’ abilities was 2.94 (strata 4.25). The reliability found by the Rasch Model for the Portuguese C-test was α=.99.

Table 8

*Descriptive statistics for the Portuguese C-test results*

<table>
<thead>
<tr>
<th>Groups</th>
<th>Descriptive Statistics</th>
<th>M (%)*</th>
<th>SD</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish</td>
<td></td>
<td>17.32 (14%)</td>
<td>11.73</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td></td>
<td>32.75 (26%)</td>
<td>10.79</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>ALL Participants</td>
<td></td>
<td>24.53 (19%)</td>
<td>13.33</td>
<td>2</td>
<td>49</td>
</tr>
</tbody>
</table>

* Out of a maximum of 125 points

Table 9 displays the fit statistics, point-biserial correlations, item measures, estimated item discrimination, and standard errors produced by the Rasch Model analysis. The texts are numbered by their degree of difficulty, Text 1 being the easiest and Text 5 being the most difficult. Item measures are indications of item difficulty of each item relative to the average ability level of examinees, and are set at zero on the Rasch Model (negative scores indicate easier items and positive scores indicate more difficult items). The Rasch Model showed that the ability estimates of examinees were well spread among the three texts of lower difficulty, with 29% of examinees scoring lower than the easiest text, 40% of the examinees scoring between Text 1 and Text 2, and 21% scoring between Text 2 and Text 3. Higher scores were expected for examinees with prior knowledge of Spanish and, in fact, 2 out of the 13 examinees who scored above the level of Text 2 were L2 Spanish speakers. The low standard error estimates and infit/outfit statistics fell within the expected range for all texts, indicating that they worked as stable indicators of the differences between examinees. The relatively strong point-biserial correlation coefficients indicated that all texts contributed in equivalent ways to examinees’ overall test scores, especially given the fact that the sampled population fell within a lower to mid-range of proficiency, which explains the lower point-biserial correlation for Text 5.
Despite the precautions taken to compensate for higher Portuguese proficiency of participants in the L2 Spanish group, with data from the No Spanish group collected later in the semester, results from an Independent-Samples T-test showed that there were significant differences in Portuguese proficiency between the No Spanish ($M=17.32$, $SD=11.73$) and the L2 Spanish ($M=31.89$, $SD=11.05$) groups, $t(54)=-4.784$, $p<.001$, $d=1.28$. Therefore, Portuguese C-test scores as a measure of Portuguese language proficiency were included in the subsequent analyses as a covariate to reduce within-group error variance.

Table 9

*Item Measurement Report for the Portuguese C-test*

<table>
<thead>
<tr>
<th>C-test Texts</th>
<th>Item Measure</th>
<th>S. E.</th>
<th>Infit MnSq</th>
<th>Z-Std</th>
<th>Outfit MnSq</th>
<th>Z-Std</th>
<th>Item Discrimination</th>
<th>Point Biserial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text 1</td>
<td>-0.50</td>
<td>0.07</td>
<td>1.07</td>
<td>0.30</td>
<td>0.94</td>
<td>-0.20</td>
<td>1.07</td>
<td>.72</td>
</tr>
<tr>
<td>Text 2</td>
<td>0.69</td>
<td>0.07</td>
<td>1.01</td>
<td>0.10</td>
<td>0.98</td>
<td>0</td>
<td>1.01</td>
<td>.76</td>
</tr>
<tr>
<td>Text 3</td>
<td>0.88</td>
<td>0.07</td>
<td>0.90</td>
<td>-0.40</td>
<td>0.85</td>
<td>-0.70</td>
<td>0.98</td>
<td>.75</td>
</tr>
<tr>
<td>Text 4</td>
<td>1.92</td>
<td>0.10</td>
<td>0.67</td>
<td>-1.50</td>
<td>0.61</td>
<td>-1.80</td>
<td>1.39</td>
<td>.78</td>
</tr>
<tr>
<td>Text 5</td>
<td>2.02</td>
<td>0.10</td>
<td>0.92</td>
<td>-0.60</td>
<td>1.10</td>
<td>0.40</td>
<td>0.92</td>
<td>.61</td>
</tr>
</tbody>
</table>

*Texts are numbered by level of difficulty, 1 being the easiest and 5 the most difficult.*

**Spanish C-test.** To make sure participants in the L2 Spanish group had sufficient knowledge of Spanish, they completed a Spanish C-test. A cut-off score of 45% was defined as an exclusion criterion, meaning that data from L2 Spanish participants who scored lower than that were not included in the subsequent analyses. Scores from six participants in the No Spanish included in the Rasch Model Analysis, since their data entered further analyses. Their accuracy rate on the Spanish C-test was lower than 6%, and some of their correct answers to the test corresponded to items identical to Portuguese forms, e.g. para ‘to,’ vamos ‘we go-present,’ horario ‘schedule.’ Both descriptive statistics and a multi-faceted Rasch model using FACETS version 3.71.3 (Linacre, 2015) were employed to verify the reliability of the five texts that compose the Spanish C-test and the Spanish C-test as a whole. The variance explained by the Rasch measures was 93.11% at a
The significance level of \( p < .001 \). The degree of separation of the five Spanish texts for the sampled population was 9.17 (strata 12.56), and the degree of separation between participants’ abilities was 4.58 (strata 6.44). The reliability found by the Rasch Model for the five Spanish C-test texts was \( \alpha = .99 \). Table 10 shows the descriptive statistics for the Spanish C-test.

### Table 10

Descriptive statistics of the Spanish C-test results

<table>
<thead>
<tr>
<th>Experimental Groups</th>
<th>Descriptive Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (%)</td>
</tr>
<tr>
<td>No Spanish (N=6)</td>
<td>5.67 (4%)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td>78.71 (63%)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 125 points

Table 11 displays the fit statistics, point-biserial correlations, item measures, estimated item discrimination, and standard errors produced by the Rasch Model analysis. The texts are numbered by their degree of difficulty, Text 1 being the easiest and Text 5 being the most difficult. The Rasch model showed that the ability estimates of L2 Spanish examinees were well spread above the second easiest text (above logit 0), while all No Spanish participants scored at levels considerably lower that the easiest text (between logits -3 and -4). Among the L2 Spanish participants, 18% scored at the level of Text 2, 25% between texts 3 and 4, 25% between Texts 4 and 5, and 32% above the level of Text 5. The low standard error estimates and infit/outfit statistics fell within the expected range for almost all texts, indicating that they worked as stable indicators of the differences between examinees. The only misfitting item was Text 3, with a MnSq infit measure of 1.25 (slightly high), showing that it somewhat overlapped with Text 2 in the level of ability measured. The strong point-biserial correlation coefficients indicated that all texts contributed in equivalent ways to examinees’ overall test scores.
Performance on the two types of Portuguese cognates.

The target lexical items in this study were Portuguese nouns that were either cognates or non-cognates in Spanish. The initial set of cognates containing 10 target forms was divided into two sets of cognates to control for English CLI, given that 6 out of the 10 target forms were cognates only in Spanish and Portuguese (Cog. Port/Span) and 4 out of the 10 target forms were also cognates with English (Cog. Eng+). To investigate if participants performed differently on the two types of cognates, their scores from pre-, post-, and delayed posttests were submitted to two 2x3x2 mixed models ANCOVAs (one for the recognition task scores and one for the production task scores), using a one between-subject, two within-subject design, with Portuguese proficiency as a covariate. The between-subject factor was Group (No Spanish vs. L2 Spanish) and the within-subject factors were Cognate Type (Cog. Port/Span and Cog. Eng+) and Time (pretest vs. posttest vs. delayed posttest). Because there was a different number of items for each type of cognates, percentage scores were calculated for both the recognition and production tasks. Each ANCOVA was also followed by a Bonferroni post hoc test and means comparisons. The ANCOVAs were conducted on the IBM SPSS Statistics suite, Version 23, with the alpha level set at .05.

Recognition of Port/Span and Port/Span/Eng cognates. Table 12 shows the descriptive statistics for the recognition scores for both types of Portuguese/Spanish cognates.
Table 12

*Descriptive statistics for recognition scores on both types of Port/Span cognates*

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M % (SD)</td>
<td>M % (SD)</td>
<td>M % (SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog. Port/Span</td>
<td>19.64 (18.73)</td>
<td>75.59 (16.02)</td>
<td>69.64 (16.38)</td>
</tr>
<tr>
<td>Cog. Eng+</td>
<td>16.07 (18.27)</td>
<td>68.75 (25.11)</td>
<td>69.64 (18.45)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog. Port/Span</td>
<td>16.07 (18.41)</td>
<td>51.78 (28.81)</td>
<td>49.40 (21.02)</td>
</tr>
<tr>
<td>Cog. Eng+</td>
<td>9.82 (14.17)</td>
<td>43.75 (35.11)</td>
<td>34.82 (29.92)</td>
</tr>
</tbody>
</table>


Results of the 2x3x2 mixed ANCOVA for the recognition of cognates revealed no significant main effect for Group, $F(1, 53)=15.003, p<.001, \eta^2_p=.22,$ power=0.97. There was no main effect for Cognate Type, $F(1, 53)=0.38, p=.541, \eta^2_p=.01,$ power=0.09, but a main effect was found for Time, $F(2, 106)=67.17, p<.001, \eta^2_p=.56,$ power=1. No interaction was found between Cognate Type and Group, $F(1,53)=0.22, p=.882, \eta^2_p=.02,$ power=0.05, and between Cognate Type and Time, $F(2, 106)=0.45, p=.641, \eta^2_p=.01,$ power=0.05. An interaction was found between Time and Group, $F(2,106)=5.32, p=.006, \eta^2_p=.10,$ power=.83, indicating that the performance of the two groups changed differently across time. Portuguese Proficiency was not a statistical covariate in this model. Bonferroni corrected post hoc tests showed that participants’ scores for both cognate types improved from pretest to posttest ($p<.001$), and did not significantly decrease from posttest to delayed posttest ($p=.365$). Figures 3 and 4 show the performance scores on the recognition of each type of cognate for each group separately.
**Production of Port/Span and Port/Span/Eng cognates.** Table 13 shows the descriptive statistics for the production scores on cognates.
Table 13

Descriptive statistics for production scores on both types of Port/Span cognates

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M % (SD)</td>
<td>M % (SD)</td>
<td>M % (SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog. Port/Span</td>
<td>5.36 (12.87)</td>
<td>48.21 (30.54)</td>
<td>39.88 (23.72)</td>
</tr>
<tr>
<td>Cog. Eng+</td>
<td>6.25 (11.02)</td>
<td>58.03 (28.10)</td>
<td>38.39 (29.25)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cog. Port/Span</td>
<td>5.39 (10.19)</td>
<td>36.90 (20.47)</td>
<td>19.64 (15.75)</td>
</tr>
<tr>
<td>Cog. Eng+</td>
<td>4.46 (11.89)</td>
<td>29.46 (24.58)</td>
<td>20.53 (19.31)</td>
</tr>
</tbody>
</table>


The 2x3x2 mixed models ANCOVA for the production task revealed a main effect for Group $F(1,53) = 30.94, p < .001, \eta_p^2 = .37$, power=1, after means were corrected for the effect of Portuguese proficiency, $F(1,53) = 14.45, p < .001, \eta_p^2 = .21$, power=.96. There was no significant main effect for Cognate Type, $F(1,53) = 0.65, p = .425, \eta_p^2 = .012$, power=0.12, showing similar performance on the production of both types of cognates, but a main effect was found for Time, $F(2, 106) = 27.18, p < .001, \eta_p^2 = .34$, power=1. No significant interaction was found between Cognate Type and Group, $F(1,53) = 0.611, p = .438, \eta_p^2 = .011$, power=0.12. An interaction was found between Cognate Type and Time, $F(2,106) = 3.1, p = .049, \eta_p^2 = .05$, power=0.59, and between Group and Time, $F(2,106) = 12.35, p < .001, \eta_p^2 = .19$, power=0.99. Bonferroni-corrected pairwise comparisons showed that there was a significant increase in the recognition of both types of cognates from pre- to posttest ($p < .001$) and from pre- to delayed posttest ($p < .001$), and a significant decrease in recognition scores from post- to delayed posttest ($p < .001$). Figure 5 and 6 show the performance on the production of each type of cognate for each group separately.
Figure 5. Scores for the No Spanish group on the production of both types of cognates.

Figure 6. Scores for the L2 Spanish group on the production of both types of cognates.

To address the main effect for Group, results will be interpreted via the significant interaction between Group and Time. Follow-up 2x2 RM ANCOVAs were conducted with production scores for each point in time separately with Group as the between-subject factor, Cognate Type as the within-subject factor, and Portuguese proficiency as a covariate. The RM
ANCOVA for the pretest production scores found no between-subject effects for Group,
\[ F(1,53) = 2.33, p = .133, \eta_p^2 = .04, \text{ power} = 0.32, \]
after means were corrected for the effects of Portuguese proficiency, \[ F(1,53) = 5.03, p = .391, \eta_p^2 = .10, \text{ power} = 0.60. \] There was no main effect for Cognate Type, \[ F(1,53) = 0.75, p = .029, \eta_p^2 = .02, \text{ power} = 0.14, \]
and no interaction between Cognate Type and Group, \[ F(1,53) = 0.16, p = .901, \eta_p^2 = .0, \text{ power} = 0.05. \] The RM ANCOVA for the posttest production scores found a between-subject effects for Group, \[ F(1,53) = 24.4, p < .001, \eta_p^2 = .32, \text{ power} = 0.99, \]
after means were corrected for the effects of Portuguese proficiency, \[ F(1,53) = 10.90, p = .002, \eta_p^2 = .17, \text{ power} = 0.90, \] showing that overall the No Spanish group outperformed the L2 Spanish group. However, there was no main effect for Cognate Type, \[ F(1,53) = 0.52, p = .473, \eta_p^2 = .01, \text{ power} = 0.11, \]
and no interaction between Cognate Type and Group, \[ F(1,53) = 2.19, p = .144, \eta_p^2 = .04, \text{ power} = 0.31. \] The RM ANCOVA for the delayed posttest production scores also found a between-subject effects for Group, \[ F(1,53) = 25.08, p < .001, \eta_p^2 = .32, \text{ power} = 0.99, \]
after means were corrected for the effects of Portuguese proficiency, \[ F(1,53) = 8.52, p = .005, \eta_p^2 = .14, \text{ power} = 0.82. \] There was no main effect for Cognate type, \[ F(1,53) = 0.39, p = .531, \eta_p^2 = .01, \text{ power} = 0.09, \]
and no interaction was found between Cognate Type and Group, \[ F(1,53) = 0.003, p = .957, \eta_p^2 = .0, \text{ power} = 0.05. \] Because there were no significant differences in the recognition and production of the two types of Spanish/Portuguese cognates for either group, the scores for the two types of cognates were combined into a single cognate score including all 10 cognate target items. The raw composite cognate scores were used in the subsequent analyses.

**Research Question 1 – Spanish CLI Effects on the Recognition and Written Production of L3 Portuguese Lexical Items**

The first research question asked whether CLI from Spanish affected the recognition and production of the different lexical item types: Portuguese nouns that are either cognates or non-
cognates in Spanish. In other words, it asked whether there were performance differences between the No Spanish and the L2 Spanish groups on the recognition and production of cognates and non-cognates after treatment. To address this research question, a series of Univariate ANCOVAs were conducted on the raw pretest recognition and production scores of both cognates and non-cognates to establish whether the two experimental groups were statistically similar in ability at the outset of the study. These analyses were followed by separate 2x2x3 mixed model ANCOVAs conducted on participants’ scores in the recognition and production of cognates and non-cognates, respectively, using a one between-subject, two within-subject design, with Portuguese proficiency as a covariate. The between-subject factor was Group (No Spanish vs. L2 Spanish) and the within-subject factors were Lexical Items (cognate vs. non-cognate) and Time (pretest vs. posttest vs. delayed posttest). The mixed model ANCOVA design was chosen to control for differences in performance between groups in the pretest and differences in Portuguese proficiency.

Each ANCOVA was also followed by a Bonferroni post hoc test and means comparisons. Finally, to assess each group’s respective performance growth or loss across test sessions (Time), individual within-subject ANCOVAs and means comparisons were also performed for each group when Portuguese proficiency was found to be a statistical covariate. Paired-sampled T-tests were conducted as follow-up analyses for models in which Portuguese proficiency was not a statistical covariate. All inferential analyses were conducted on the IBM SPSS Statistics suite, Version 23, with the alpha level set at .05. Results for the production of cognates and non-cognates were also coded for type of borrowing, that is, errors that involved morphological characteristics from either English or Spanish, or that were considered developmental instead of CLI, errors. These results are presented first.
Spanish and English borrowings in the production of Portuguese lexical items.

The purpose of this analysis was to provide additional information concerning the participants’ performance on the posttest production lexical task by identifying errors that conformed to the following error type categories: Spanish borrowings, English borrowings, and developmental errors. Borrowed words are a direct reflect of CLI, and are therefore informative of the source of transfer. However, CLI is not limited to the use of borrowings, as it may affect other aspects of language processing and acquisition. Results revealed that the errors produced by the No Spanish group included no borrowings from Spanish, but a relatively small percentage of English borrowings (16%), while the great majority of errors were developmental. The errors produced by the L2 Spanish group, on the other hand, included no borrowings from English (even though participants were L1 English speakers), a considerable amount of Spanish borrowings (27%), and most errors also categorized as developmental. Table 14 shows the quantification of errors by item, error type, and group. Figures 7 and 8 visually display the average for type of borrowings in the production of cognates and non-cognates by group.

Table 14

Type of lexical production errors and source of transfer in the posttest production task.

<table>
<thead>
<tr>
<th>Cognates</th>
<th>No Spanish Group</th>
<th>L2 Spanish Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spanish</td>
<td>English</td>
</tr>
<tr>
<td>almoço</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>cenoura</td>
<td>0 (0%)</td>
<td>2 (13%)</td>
</tr>
<tr>
<td>escada</td>
<td>0 (0%)</td>
<td>1 (8%)</td>
</tr>
<tr>
<td>penteado</td>
<td>0 (0%)</td>
<td>2 (9%)</td>
</tr>
<tr>
<td>perigo</td>
<td>0 (0%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>tubarão</td>
<td>0 (0%)</td>
<td>3 (17%)</td>
</tr>
<tr>
<td>competição</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>lâmpada</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>população</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>tartaruga</td>
<td>0 (0%)</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>Partial Total</td>
<td>0 (0%)</td>
<td>11 (9%)</td>
</tr>
<tr>
<td>Non-Cognates</td>
<td>Spanish</td>
<td>English</td>
</tr>
<tr>
<td>--------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>abacaxi</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>bochechas</td>
<td>0 (0%)</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>canudo</td>
<td>0 (0%)</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>garrafa</td>
<td>0 (0%)</td>
<td>1 (7%)</td>
</tr>
<tr>
<td>macarrão</td>
<td>0 (0%)</td>
<td>1 (6%)</td>
</tr>
<tr>
<td>moleque</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>óculos</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>soneca</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>tapete</td>
<td>0 (0%)</td>
<td>2 (17%)</td>
</tr>
<tr>
<td>tijolo</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Partial Total</td>
<td>0 (0%)</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Total</td>
<td>0 (0%)</td>
<td>17 (16%)</td>
</tr>
</tbody>
</table>

Figure 7. Borrowings in the production of cognates.

Figure 8. Borrowings in the production of non-cognates.
CLI effects on the recognition of lexical items.

Table 15 shows the descriptive statistics for the recognition of lexical items. All participants completed all tasks and there were no cases of missing data. Univariate ANCOVAs conducted for each lexical item type separately revealed no significant differences between groups for the recognition of cognates ($F_{2, 53} = 1.22, p = .179, d = 0.32$) and non-cognates ($F_{2, 53} = 6.24, p = .433, d = 0.11$) in the pretest. It could be assumed, then, that any gains in recognition scores from the pretest to the posttest and delayed posttest were due to the treatment rather than to any preexisting difference between groups. Portuguese proficiency was not a significant covariate in this model.

Table 15

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognates</td>
<td>1.82 (1.52)</td>
<td>7.28 (1.60)</td>
<td>6.96 (1.37)</td>
</tr>
<tr>
<td>Non-Cognates</td>
<td>1.71 (1.65)</td>
<td>6.57 (2.30)</td>
<td>5.82 (2.05)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognates</td>
<td>1.35 (1.31)</td>
<td>4.86 (2.72)</td>
<td>4.36 (2.02)</td>
</tr>
<tr>
<td>Non-Cognates</td>
<td>1.53 (1.69)</td>
<td>4.89 (2.84)</td>
<td>4.86 (2.12)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 10 points.

The 2x2x3 mixed model ANCOVA for the recognition of lexical items revealed a significant main effect for Group, $F(1,53)=9.62, p = .003, \eta_p^2 = .154$, power=.86, no significant main effect for Lexical Item (cognates versus non-cognates), $F(1, 53)=3.29, p = .075, \eta_p^2 = .058$, power=.43, and a significant main effect for Time, $F(2,106)=38.31, p < .001, \eta_p^2 = .42$, power=1. No significant interaction was found between Lexical Item and Group, $F(1,53)=1.921, p < .172, \eta_p^2 = .035$, power=.36, and between Lexical Item and Time, $F(1,106)=0.931, p < .398, \eta_p^2 = .02$, power=.21. A significant interaction was found between Time and Group $F(2,106)=3.27, p < .042, \eta_p^2 = .058$, power=.61. Portuguese proficiency was not a significant covariate in this model. The lack of differential performance in the recognition of cognates versus non-cognates is shown in Figures 9 and 10.
To address the main effect for Group and for Time, it is necessary to interpret these main effects via the significant interaction between Group and Time, visually displayed in Figures 11 (for cognates) and 12 (for non-cognates). Follow-up Independent-Samples t-tests revealed that the
performance between groups significantly differenced for the recognition of both cognates \( t_{54}=4.07, p<.001, d=1.08 \) and non-cognates in the posttest \( t_{51.72}=2.427, p=.019, d=0.65 \), and for the recognition of cognates in the delayed posttest \( t_{47.55}=5.54, p<.001, d=0.73 \). The No Spanish group statistically outperformed the L2 group in the recognition of both cognates and non-cognates in the post- and delayed posttests, suggesting that negative CLI from Spanish might have interacted with performance, especially in the recognition of cognates. Paired-samples T-tests were conducted for each group separately to investigate changes in performance over time. Results for the No Spanish group showed significant gains from pre- to posttest for cognates \( t_{27}=-18.10, p<.001, d=-4.7 \) and non-cognates \( t_{27}=-11.07, p<.001, d=-2.43 \) and from pre- to delayed posttest for cognates \( t_{27}=-23.11, p<.001, d=-3.75 \) and non-cognates \( t_{27}=-6.69, p<.001, d=-2.21 \). There was no significant loss in performance for the No Spanish group from post- to delayed posttest for cognates \( t_{27}=-1.56, p=.130, d=0.22 \) and non-cognates \( t_{27}=1.08, p=.291, d=0.34 \). Results for the L2 Spanish also showed significant gains from pre- to posttest for cognates \( t_{27}=-11.96, p<.001, d=-1.64 \) and non-cognates \( t_{27}=-6.76, p<.001, d=-1.44 \) and from pre- to delayed posttest for cognates \( t_{27}=-10.45, p<.001, d=-1.77 \) and non-cognates \( t_{27}=-8.47, p<.001, d=-1.74 \). There was no significant loss in performance for the L2 Spanish group from post- to delayed posttest for cognates \( t_{27}=-1.55, p=.133, d=0.21 \) and non-cognates \( t_{27}=0.07, p=.941, d=0.02 \). Figure 13 shows in more details the distribution of scores for both groups in the posttest recognition task.
Figure 11. Recognition of cognates by group.

Figure 12. Recognition of non-cognates by group.
To further investigate the main effect for Time in the recognition of cognates, Paired-Samples t-tests were conducted for each group separately. Results revealed that both groups improved from pre- to posttest and from pre- to delayed posttest, and that there was no significant decrease in performance between post- and delayed posttest for either group. Table 16 displays the results from the Paired-Samples t-tests for the recognition of cognates.

Table 16

<table>
<thead>
<tr>
<th></th>
<th>Pre-to Post</th>
<th>Post-to Del.</th>
<th>Pre-to Del.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t (df)</td>
<td>p</td>
<td>t (df)</td>
</tr>
<tr>
<td>No Spanish (N=28) Cognates (k=10)</td>
<td>-18.10 (27)</td>
<td>&lt;.001</td>
<td>1.56 (27)</td>
</tr>
<tr>
<td>L2 Spanish (N=28) Cognates (k=10)</td>
<td>-11.96 (27)</td>
<td>&lt;.001</td>
<td>1.55 (27)</td>
</tr>
</tbody>
</table>

**CLI effects on the production of lexical items.**

The descriptive statistics for production scores of lexical items are provided in Table 17. All participants completed all tasks and there were no cases of missing data.
Table 17

Descriptive statistics for production scores on lexical items

<table>
<thead>
<tr>
<th>Group</th>
<th>Group</th>
<th>Pretest M (SD)</th>
<th>Posttest M (SD)</th>
<th>Del. Posttest M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish (N=28)</td>
<td>Cognates</td>
<td>0.57 (1.06)</td>
<td>5.39 (2.20)</td>
<td>3.93 (2.24)</td>
</tr>
<tr>
<td></td>
<td>Non-Cognates</td>
<td>0.25 (0.51)</td>
<td>4.14 (1.96)</td>
<td>2.61 (1.47)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td>Cognates</td>
<td>0.50 (0.69)</td>
<td>3.39 (1.85)</td>
<td>2.00 (1.28)</td>
</tr>
<tr>
<td></td>
<td>Non-Cognates</td>
<td>0.14 (0.45)</td>
<td>3.11 (1.87)</td>
<td>1.71 (1.58)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 10 points.

Univariate ANCOVAs conducted on production scores for each separate lexical item type in the pretest revealed no main effect for Group in the production of cognates ($F_{2, 53} = 1.82, p = .183, \eta_p^2 = .03, \text{power} = .26$), but found a significant main effect for Group in the production of non-cognates ($F_{2, 53} = 4.39, p = .041, \eta_p^2 = .01, \text{power} = .54$) after means were corrected for the effect of Portuguese proficiency, $F(2, 53) = 6.29, p = .015, \eta_p^2 = .11, \text{power} = .69$. It could be assumed, then, that any gains in production scores from the pretest to the posttest and delayed posttest for cognates were due to the treatment rather than to any preexisting difference between groups. For the production of non-cognates, the No Spanish group significantly outperformed the L2 Spanish group in the pretest, but with a small effect size ($\eta_p^2 = .01$) (Cohen, 1988; Richardson, 2011). To address this issue, a mixed models ANCOVA design with scores from all three points in time as a within-subjects variable was employed, as the calculations performed by the model take into account the differential performance between groups in the pretest when analyzing mean differences in the post- and delayed posttest.

The 2x3x2 mixed models ANCOVA for the production of lexical items (cognates and non-cognates) returned a main effect for Group, $F(1, 53) = 36.32, p < .001, \eta_p^2 = .41, \text{power} = 1$, after means were adjusted for Portuguese proficiency, $F(1, 53) = 19.47, p < .001, \eta_p^2 = .27, \text{power} = .99$. Because the assumption of sphericity was not satisfied for Time, Greenhouse-Geisser, estimates are reported for this analysis. No main effect was found for Lexical Item (cognates versus non-cognates), $F(1,
A main effect was found for Time $F(1.75, 92.9) = 14.42, p < .001, \eta^2_p = .21$, power=.99. There was no interaction between Lexical Item and Group, $F(1.53) = 3.919, p = .053, \eta^2_p = .07$, power=.49, and between Lexical Item and Time, $F(1.86, 93) = 0.36, p = .686, \eta^2_p = .01$, power=.10, but an interaction was found between Group and Time, $F(1.75, 92.9) = 13.57, p < .001, \eta^2_p = .20$, power=0.99, and between Time and Portuguese proficiency, $F(1.75, 92.92) = 4.68, p = .015, \eta^2_p = .08$, power=.73. The comparative scores for the production of cognates versus non-cognates are shown in Figures 14 and 15 for each group separately.

Figure 14. Production of cognates and non-cognates by the No Spanish group.
To address the main effect for Group, it is necessary to interpret this main effect via the significant interaction between Group and Time, visually displayed in Figures 16 (for cognates) and 17 (for non-cognates). Bonferroni corrected pairwise comparisons showed significant changes in performance for the production of lexical items from pre- to posttest ($p < .001$), pre- to delayed posttest ($p < .001$), and post- to delayed posttest ($p < .001$). Paired-samples T-tests were conducted for each group separately to examine changes in performance across time and revealed the same pattern found for both groups combined, as shown in Table 18.

Table 18

*Results from Paired-Samples T-tests for the production scores of lexical items.*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre- to Post-</th>
<th>Post- to Del.</th>
<th>Pre- to Del.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t (df)</td>
<td>p</td>
<td>d</td>
</tr>
<tr>
<td>No Spanish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognates</td>
<td>-12.75 (27)</td>
<td>&lt;.001</td>
<td>-2.79</td>
</tr>
<tr>
<td>Non-Cognates</td>
<td>-11.24 (27)</td>
<td>&lt;.001</td>
<td>-2.72</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognates</td>
<td>-7.43 (27)</td>
<td>&lt;.001</td>
<td>-2.07</td>
</tr>
<tr>
<td>Non-Cognates</td>
<td>-7.95 (27)</td>
<td>&lt;.001</td>
<td>-2.18</td>
</tr>
</tbody>
</table>
To further investigate differences between groups at different points in time, follow-up Univariate ANCOVAs were conducted with Portuguese proficiency as a covariate. For posttest scores, results revealed a main effect for Group in the production of cognates ($F_{1,53}=24.87, p<.001, \eta^2_p=.32, \text{power}=.99$) after means were corrected for the effect of Portuguese proficiency ($F_{1,53}=9.39, p=.003, \eta^2_p=.15, \text{power}=.85$), and a main effect for Group in the production of non-cognates, ($F_{1,53}=12.06, p=.001, \eta^2_p=.18, \text{power}=.86$) after means were corrected for the effect of Portuguese proficiency ($F_{1,53}=9.19, p=.004, \eta^2_p=.15, \text{power}=.84$). For delayed posttest scores, there was also a main effect for Group in the production of cognates, ($F_{1,53}=24.92, p<.001, \eta^2_p=.32, \text{power}=.99$), after means were corrected for the effect of Portuguese proficiency, ($F_{1,53}=7.42, p=.009, \eta^2_p=.12, \text{power}=.76$), and a main effect for Group in the production of non-cognates, ($F_{1,53}=12.81, p=.001, \eta^2_p=.19, \text{power}=.94$) after means were corrected for the effect of Portuguese proficiency, ($F_{1,53}=8.82, p=.004, \eta^2_p=.14, \text{power}=.83$). In both post- and delayed posttests, the No Spanish group outperformed the L2 Spanish group in the production of cognates and non-cognates. Figure 18 shows in more details the distribution of scores for both groups in the posttest production task.

![Production of cognates](image)

Figure 16. Production of cognates by both groups.
Figure 17. Production of non-cognates by both groups.

Figure 18. Posttest production scores for lexical items by group.
**Summary.**

These results indicate that participants from both groups improved in their ability to recognize Portuguese cognates and non-cognates after treatment (from pre- to posttest) and maintained the same performance level one week later (from post- to delayed posttest). However, the No Spanish group outperformed the L2 Spanish group in the recognition of both cognates and non-cognates after treatment. These results were partially not expected, since although negative CLI was expected to affect the performance of the L2 Spanish group on non-identical cognates, it was not expected to affect their performance on non-cognates either negatively or positively. The results showing comparable performances on both types of lexical items found by the ANCOVA were expected for the No Spanish group only, and not for the L2 Spanish group, for which CLI from Spanish was hypothesized to hinder the recognition of non-identical cognates. Overall, results point to negative CLI from Spanish affecting the recognition of both cognates and non-cognates.

Portuguese proficiency did not appear to play a role in participants’ ability to recognize target lexical items.

Also, the No Spanish group statistically outperformed the L2 group in the production of both cognates and non-cognates in post- and delayed posttests, suggesting that negative CLI from Spanish might have interacted with performance. However, because the No Spanish group had outperformed the L2 Spanish group in the production of non-cognates in the pretest, results for the production of non-cognates in subsequent points in time should be interpreted with caution. Both groups showed significantly improved performance on the production of cognates and non-cognates after treatment, and a significant decrease in performance one week later for both lexical items.

Table 19 shows a summary of the directionality of Spanish CLI found in this study for the recognition and production of Portuguese/Spanish cognates and non-cognates. For the recognition of lexical items, it had been hypothesized that Spanish CLI would negatively affect the performance
of the L2 Spanish group on non-identical cognates at all points in time, but would have no effect on non-cognates. This hypothesis was met for non-identical cognates in both the post- and delayed recognition posttests. The hypothesis that CLI from Spanish would have no effect on the recognition of non-cognates was confirmed in the pre- and delayed posttests, but not in the immediate posttest, where negative CLI was found. For the production of lexical items, it was hypothesized that CLI would negatively affect the performance on non-identical cognates and have no effect on non-cognates. While this hypothesis was confirmed for cognates in both the post- and delayed posttests, the prediction for non-cognates was not met, with negative CLI found in the post- and delayed posttests.

Table 19

Type of Spanish CLI on Portuguese lexical items.

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
<th>Delayed Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cognates</td>
<td>Non-Cognates</td>
<td>Cognates</td>
</tr>
<tr>
<td>Recognition</td>
<td>none</td>
<td>none</td>
<td>–</td>
</tr>
<tr>
<td>Production</td>
<td>none</td>
<td>none</td>
<td>–</td>
</tr>
</tbody>
</table>

= Negative (non-facilitative) CLI; + = positive (facilitative) CLI

Research Question 2 – Spanish CLI Effects on the Recognition and Written Production of Portuguese Morphosyntactic Linguistic Items

The second research question asked whether CLI from Spanish affected the recognition and production of the different morphosyntactic item types: regular and irregular past particles of Portuguese abundant verbs. In other words, it asked whether there were performance differences between the No Spanish and the L2 Spanish groups on regular and irregular past particles separately, since CLI from Spanish was expected to affect performance on the two verb forms in different ways. Because the regular past participles are similar in Portuguese and Spanish, Spanish was expected to have a facilitative effect (positive CLI) on the recognition and production of these forms, resulting in overall better performance for the L2 Spanish group. On the other hand, because
Spanish does not have irregular past participles for the selected target verbs, it was expected that knowledge of Spanish would result in negative CLI, with the No Spanish group performing better than the L2 Spanish on the overall recognition and production of irregular forms. Production scores were also analyzed by performance on choice of regular or irregular form (FORM) and subject-verb agreement (AGR). The L2 Spanish group was expected to perform better on AGR for both regular and irregular verbs, since they could draw on their knowledge of agreement from Spanish applying it to both types of Portuguese verbs. In respect to FORM, the L2 Spanish group was expected to perform better on regular verbs, since they are similar to those in Spanish, and perform worse than the No Spanish group on irregular verbs.

To answer this question, recognition and production scores were analyzed separately. The analysis of the recognition scores is presented first, followed by the analysis of the production scores. First, a series of Univariate ANCOVAs with the raw pretest scores were conducted to establish whether the two experimental groups were statistically similar in ability at the outset of the study. These analyses were followed by separate 2x2x3 mixed model ANCOVAs conducted on participants’ scores in recognition and production of regular and irregular verbs, respectively, using a one between-subject, two within-subject design, with Portuguese proficiency as a covariate. The between-subject factor was Group (No Spanish vs. L2 Spanish) and the within-subject factors were Verb (regular vs. irregular) and Time (pretest vs. posttest vs. delayed posttest). For the specific analysis of FORM and AGR, the within-subject factors were irregular verb-FORM vs regular verb-FORM and irregular verb-AGR vs. regular verb-AGR, respectively. The mixed model ANCOVA design was chosen to control for differences in performance between groups in the pretest and differences in Portuguese proficiency. Each ANCOVA was also followed by a Bonferroni post hoc test and means comparisons. Finally, to assess each group’s respective performance growth or loss over test sessions (Time), individual within-subject ANCOVAs and means comparisons were also
performed for each group. Inferential analyses were conducted on the IBM SPSS Statistics suite, Version 23, with the alpha level set at .05.

**CLI effects on the recognition of regular and irregular PPs.**

The descriptive statistics for recognition scores of past participles are provided in Table 20. All participants completed all tasks and there were no cases of missing data. Univariate ANCOVAs conducted for each type of verb separately revealed no significant differences between groups for the recognition of regular past participles in the pretest ($F_{1, 53} = 1.08, p = .185, \eta^2_p = 0.03$), after means were corrected for the effects of Portuguese proficiency ($F_{1, 53} = 9.84, p = .038, \eta^2_p = 0.08$). There were also no significant differences between groups for the recognition of irregular past participles in the pretest ($F_{1, 53} = 0, p = 1, \eta^2_p = 0$). It could be assumed, therefore, that any gains in recognition scores from pre- to posttest and from pre- to delayed posttest were due to the treatment rather than to any preexisting difference between groups.

Table 20

*Descriptive statistics for the recognition of past participles.*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>3.14 (1.40)</td>
<td>5.89 (1.73)</td>
<td>5.57 (1.81)</td>
</tr>
<tr>
<td>Irregular</td>
<td>1.61 (1.39)</td>
<td>5.00 (1.61)</td>
<td>4.18 (1.89)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>4.32 (1.63)</td>
<td>5.53 (1.99)</td>
<td>5.93 (2.07)</td>
</tr>
<tr>
<td>Irregular</td>
<td>1.36 (1.52)</td>
<td>3.21 (2.48)</td>
<td>1.71 (2.29)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 9 points.

The 2x3x2 mixed models ANCOVA for the recognition of regular and irregular past participles returned a main effect for group, $F(1,53) = 9.59, p = .003, \eta^2_p = 0.15$, power = 0.86. There was no main effect for Verb, but the main effect for Verb approached statistical significance, $F(1, 53) = 3.83, p = .056, \eta^2_p = 0.08$, power = 0.58, indicating a trend towards differences in the recognition of regular versus irregular past participles for the combined scores of both groups. A main effect
was found for Time $F(2, 106)=19.62, p<.001, \eta^2_p=0.27$, power=1. An interaction was found between Group and Verb, $(F_{1,53}=4.12, p=.047, \eta^2_p=0.07$, power=0.51) and between Group and Time. $(F_{2, 106}=9.51, p<.001, \eta^2_p=0.15$, power=.98). Portuguese proficiency was not a statistical covariate in this model. To address the main effect for Group, it is necessary to interpret this effect via the significant interaction between Group and Verb and between Group and Time. To explore the differential performance of each group on the different types of verbs at different points in time, Paired-Sampled T-test were conducted for each group and point in time separately. Results showed that for the No Spanish group alone there were significant differences in the recognition of regular versus irregular past participles in the pretest $(t_{27}=3.33, p=.003, d=1.10)$ and delayed posttest $(t_{27}=2.42, p=.023, d=0.75)$, but not in the posttest $(t_{27}=1.88, p=.071, d=0.53)$. For the L2 Spanish group alone, there was a significant difference in the recognition of regular versus irregular past participles in the pretest $(t_{27}=6.06, p<.001, d=1.46)$, posttest $(t_{27}=3.11, p=.004, d=0.78)$, and delayed posttest $(t_{27}=6.17, p<.001, d=1.32)$. Figures 19 and 20 show the comparative performance in the recognition of regular versus irregular verbs for each group over time.

![Recognition of Past Participles by the No Spanish Group](image)

Figure 19: Recognition of past participles by the No Spanish group.
Figure 20. Recognition of past participles by the L2 Spanish group.

To further explore differences in performance between groups, follow-up Independent T-tests were conducted for each verb type at each point in time, with Group as the independent variable. Results revealed no significant differences between groups in the recognition of regular verbs at any point in time. For the recognition of irregular verbs, there was a significant difference between groups in the post- ($t_{54}=3.19$, $p=.003$, $d=0.85$) and delayed posttests ($t_{54}=4.75$, $p<.001$, $d=1.27$), with the No Spanish group outperforming the L2 Spanish group at both points in time.

Figure 21 and 22 show differences in performance between groups for each type of verb over time.

Figure 23 displays the distribution of recognition scores in the posttest task for both types of past participles.
Figure 21: Recognition of regular past participles by group.

Figure 22: Recognition of irregular past participles by group.
The interaction between Group and Time indicated that differences in performance over time might have varied by group. To explore this assumption, follow-up Paired-sampled T-tests were conducted for each group and type of verb separately, with Time as the within-subject factor. Table 21 displays the results of the Paired-sampled T-tests, showing that both groups improved their performance on regular and irregular forms from pre- to posttest. The No Spanish group did not show significant losses in performance from post- to delayed posttest for neither the regular or irregular verbs. The L2 Spanish group, however, showed a significant loss in performance from post- to delayed posttest for irregular verbs. In addition, the No Spanish group showed significant gains in performance from pre- to delayed posttest for both verb types, while the L2 Spanish group had significant gains in performance from pre- to delayed posttest only for regular verbs.
Table 21

Results from Paired-Samples T-tests for the recognition of past participles

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre- to Post-</th>
<th>Post- to Del.</th>
<th>Pre- to Del.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>t (df)</td>
<td>p</td>
<td>t (df)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular PP (k=9)</td>
<td>-7.23 (27)</td>
<td>&lt;.001</td>
<td>0.91 (27)</td>
</tr>
<tr>
<td>Irregular PP (k=9)</td>
<td>-9.79 (27)</td>
<td>&lt;.001</td>
<td>2.04 (27)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular PP (k=9)</td>
<td>-2.83 (27)</td>
<td>.009</td>
<td>-0.80 (27)</td>
</tr>
<tr>
<td>Irregular PP (k=9)</td>
<td>-3.33 (27)</td>
<td>.003</td>
<td>3.29 (27)</td>
</tr>
</tbody>
</table>

**Summary.** These results show that for both types of types of past participles taken together, the No Spanish group had superior performance on recognition than the L2 Spanish group. When performance on each verb type was analyzed separately, there was no difference between groups in the recognition of regular past participles at any point in time, but the No Spanish group outperformed the L2 Spanish group in the recognition of irregular past participles in both post- and delayed posttests. While the results for irregular past participles were predicted, suggesting that negative CLI from Spanish might have affected the performance of the L2 Spanish group, results for the regular past participles were not expected. For regular past participles, positive CLI from Spanish was expected to give the L2 Spanish group an advantage, but this hypothesis was not confirmed.

Results also show that for the L2 Spanish group alone there was a significant difference in the recognition of regular versus irregular past participles in all points in time with higher performance on regular versus irregular forms. For the No Spanish group, higher performance on regular over irregular past participles was verified in the pre- and delayed posttests. Finally, results also indicated that participants from both groups improved in their ability to recognize Portuguese regular and irregular past participles after treatment (from pre- to posttest). Both groups were also able to maintain performance gains on regular past participles one week later (from post- to delayed posttest). However, only the No Spanish group was able to retain performance gains from post- to
delayed posttest for irregular past participles. Not only the performance of the L2 Spanish group on irregular past participles significantly decreased from post- to delayed posttest, but it did not significantly differ from pre- to delayed posttest.

**CLI effects on accuracy production scores (ACC) for regular and irregular PPs.**

Table 22 shows the descriptive statistics for total accuracy production scores (ACC) for regular and irregular past participles. All participants completed all tasks and there were no cases of missing data. Univariate ANCOVAs conducted for each type of verb separately revealed no significant differences between groups for the production of regular past participles ($F_{1,53}=0.38, p=.552, \eta^2_p=0.07, \text{power}=.09$) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=9.17, p=.004, \eta^2_p=0.15, \text{power}=.84$). There was no significant difference between groups in the production of irregular past participles in the pretest ($F_{1,53}=2.33, p=.133, \eta^2_p=0.04, \text{power}=.32$). It could be assumed, therefore, that any gains in production scores from pre- to posttest and from pre- to delayed posttest were due to the treatment rather than to any preexisting difference between groups.

Table 22

**Descriptive statistics for total accuracy production scores on past participles.**

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td><strong>ACC Regular PPs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td>0.14 (0.45)</td>
<td>2.11 (2.06)</td>
<td>1.71 (1.65)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td>0.32 (0.67)</td>
<td>2.89 (1.68)</td>
<td>2.89 (1.62)</td>
</tr>
<tr>
<td><strong>ACC Irregular PPs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td>0.07 (0.26)</td>
<td>2.14 (1.53)</td>
<td>1.03 (1.26)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td>0.00 (0.00)</td>
<td>1.11 (1.37)</td>
<td>0.25 (0.70)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 9 points.

The 2x3x2 mixed models ANCOVA for ACC production scores found no main effect for group, $F(1,53)=1.47, p=.231, \eta^2_p=0.03, \text{power}=.22$, after the effects of Portuguese proficiency were partialled out, $F(1,53)=6.625, p=.013, \eta^2_p=0.11, \text{power}=.71$ (as shown in Figure 24). There was no main effect for Verb, $F(1,53)=0.37, p=.547, \eta^2_p=0.007, \text{power}=.09$, but a main effect was found for
Time, $F(1.8106)=7.43$, $p<.001$, $\eta_p^2=0.12$, power=.94. Because the assumption of sphericity was not satisfied for either Time or the interaction between Time and Verb, Greenhouse-Geisser estimates are reported. An interaction was found between Group and Verb, $F(1.77,94)=8.96$, $p=.004$, $\eta_p^2=.15$, power=.84, and between Verb and Portuguese Proficiency, $F(1, 53)=6.55$, $p=.013$, $\eta_p^2=0.11$, power=.71.

![Production of Past Participles](image)

Figure 24. Combined ACC scores for regular and irregular past participles.

Although no main effect was found for Group for the combined performance on regular and irregular past participles, differences between groups must be interpreted via the interaction between Group and Verb, which suggests that differences in performance between groups varied when each type of verb was considered separately. Follow-up Univariate ANCOVAs were carried out for each type of verb separately at each point in time, with Portuguese proficiency as a covariate to account for the Verb and Portuguese proficiency interaction. Results showed no differences between groups in ACC production scores for regular past participle in the post- ($F_{1, 53}=0.13$, $p=.719$, $\eta_p^2=0.01$, power=.06) and delayed posttest ($F_{1, 53}=0.94$, $p=.935$, $\eta_p^2=0.02$, power=.16).
There was, however, a significant difference in ACC production scores for irregular past participles in both the post- \((F_{1, 53} = 8.15, p = .006, \eta_p^2 = 0.13, \text{power} = .80)\) and delayed posttests \((F_{1, 53} = 5.21, p = .027, \eta_p^2 = 0.09, \text{power} = .61)\), with the No Spanish group outperforming the L2 Spanish group at both points in time.

To investigate changes in performance over time for each verb type, RM ANCOVAs were conducted for each group separately with Time as the within-subject factor and Portuguese proficiency as a covariate. Results for the No Spanish group revealed no main effect for Time in ACC production scores for regular past participles \((F_{2, 52} = 3.03, p = .057, \eta_p^2 = 0.10, \text{power} = .56)\). However, Bonferroni corrected pairwise comparisons showed significant gains from pre- to posttest \((p < .001)\) and from pre- to delayed posttest \((p < .001)\), and no significant decrease from post- to delayed posttest \((p = .942)\). For ACC production scores on irregular past participles there was a main effect for Time \((F_{2, 52} = 7.17, p = .002, \eta_p^2 = 0.22, \text{power} = .92)\). Bonferroni corrected pairwise comparisons revealed significant gains from pre- to posttest \((p < .001)\) and from pre- to delayed posttest \((p < .001)\), and a significant decrease from post- to delayed posttest \((p = .005)\). Portuguese proficiency was not a statistical covariate in this model. For the L2 Spanish group, results revealed no main effect for Time in ACC production scores for regular past participles \((F_{2, 52} = 2.64, p = .081, \eta_p^2 = 0.09, \text{power} = .50)\). However, Bonferroni corrected pairwise comparisons showed significant gains from pre- to posttest \((p < .001)\) and from pre- to delayed posttest \((p < .001)\), and no significant decrease from post- to delayed posttest \((p = 1)\). For ACC production scores on irregular past participles no main effect for Time was found either \((F_{1, 43, 37.2} = 0.96, p = .909, \eta_p^2 = 0.004, \text{power} = .06)\). Because the assumption of sphericity was not satisfied for Time, Greenhouse-Geisser, estimates are reported for this analysis. Bonferroni corrected pairwise comparisons further revealed significant gains from pre- to posttest \((p = .001)\), significant loses from post-to delayed posttest \((p = .005)\), and no significant differences between performance on the pre- and delayed posttest.
((p=.223). Portuguese proficiency was not a statistical covariate in this model. Figures 25 and 26 show the comparative performance between groups for each verb type over time.

Figure 25. ACC scores for regular past participles by group.

Figure 26. ACC scores for irregular past participles by group.
Follow-up RM ANCOVAs were conducted to explore differential performance on ACC production scores for regular versus irregular past participles for each group separately at each point in time, with verb type as the within-subject factor and Portuguese proficiency as a covariate. For the No Spanish group, results revealed significant differences between ACC production scores on regular and irregular past participles in the pretest ($F_1, 26=4.26, p=.049, \eta^2_p=0.14, \text{power}=0.51$), but no significant differences in the post- ($F_1, 26=0.83, p=.370, \eta^2_p=0.03, \text{power}=0.14$) or in the delayed posttest ($F_1, 26=2.09, p=.160, \eta^2_p=0.07, \text{power}=0.93$). Verb type interacted with Portuguese proficiency in the pretest, ($F_1, 26=10.57, p=.003, \eta^2_p=0.29, \text{power}=0.88$), and delayed posttest, ($F_1, 26=12.7, p=.001, \eta^2_p=0.33, \text{power}=0.93$). For the L2 Spanish group, results showed no significant differences in ACC production scores for regular versus irregular past participles in either the pretest ($F_1, 26=0.49, p=.488, \eta^2_p=0.205, \text{power}=0.10$), the posttest ($F_1, 26=1.24, p=.281, \eta^2_p=0.04, \text{power}=0.19$), or in the delayed posttest, ($F_1, 26=2.84, p=.104, \eta^2_p=0.10, \text{power}=0.37$). Figures 27 and 28 show the comparative performance of each group on the different verb types.

![Graph](image)

Figure 27. ACC scores for past participles by the No Spanish group.
Summary. These results show that for both types of past participles taken together, there
were no overall differences between groups in accuracy production scores. However, when each
type of past participle was analyzed separately, ACC production scores for irregular past participles
significantly differed between groups in both post- and delayed posttest, with the No Spanish group
outperforming the L2 Spanish group at both points in time, as predicted, indicating possible
negative CLI from Spanish. The two groups did not differ in ACC production scores for regular past
participles at any point in time. These results did not confirm the hypothesis that L2 Spanish
participants would have an advantage over the No Spanish group on the production of regular past
participles due to positive CLI from Spanish. There is also no differential performance on the
production of regular versus irregular past participles within groups, except for the No Spanish
group in the pretest. This result was expected for the No Spanish group, but not for the L2 Spanish
group, for which it was hypothesized that positive CLI from Spanish would result in better
performance on regular past participles compared to irregular past participles. In terms of changes over time, both groups showed significant increase in performance in the production of regular forms from pre- to posttest, and did not show significant decrease in performance from post- to delayed posttest. For irregular past participles, both groups showed a significantly increase in performance from pre- to posttest and a significant decrease in performance from post- to delayed posttest. However, for the No Spanish group there was still a significant different between pre- and delayed posttest scores for irregular past participles, indicating that some gain in performance was retained after one week. For the L2 Spanish scores, on the other hand, there was no statistical difference between production scores for pre- and delayed posttest, indicating that after one week this group were not able to retain performance gains due to treatment.

**CLI effects on agreement production scores (AGR) for regular and irregular PPs.**

Table 23 shows the descriptive statistics for subject-verb agreement production scores (AGR) in the production of regular and irregular past participles. All participants completed all tasks and there were no cases of missing data. For AGR, it was hypothesized that the L2 Spanish group would perform better than the No Spanish group on both types of past participles, drawing on their knowledge of subject-verb agreement from Spanish. Univariate ANCOVAs conducted for each type of verb separately revealed no significant differences between groups for the AGR of regular past participles in the pretest ($F_{1, 53} =0.09, p=.761, \eta^2_p=0.02, \text{power}=.06$). There was, however, a significant difference between groups in AGR of irregular past participles in the pretest ($F_{1, 53} =6.04, p=.017, \eta^2_p=0.10, \text{power}=.32$) after means were corrected for the effects of Portuguese proficiency ($F_{1, 53} =16.8, p<.001, \eta^2_p=0.23, \text{power}=.98$).

For AGR of irregular past participles, the L2 Spanish group outperformed the No Spanish group. These results were expected, since the same agreement rules that apply to past participles in passive voice constructions in Spanish, also apply to past participles in the same context in
Portuguese. It could be assumed, therefore, that any gains in AGR scores from pre- to posttest and from pre- to delayed posttest for regular past participles were due to treatment rather than to any preexisting difference between groups. However, for AGR of irregular past, results must be interpreted with caution, since the L2 Spanish group showed an advantage over the No Spanish group before treatment. To account for performance differences in the pretest, AGR scores from all three points in time entered the mixed model ANCOVA analysis.

Table 23

Descriptive statistics for AGR scores

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest M (SD)</th>
<th>Posttest M (SD)</th>
<th>Del. Posttest M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGR Regular PPs</td>
<td>0.64 (1.64)</td>
<td>4.39 (2.25)</td>
<td>4.61 (2.78)</td>
</tr>
<tr>
<td>AGR Irregular PPs</td>
<td>0.82 (1.87)</td>
<td>3.50 (2.06)</td>
<td>2.75 (2.19)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGR Regular PPs</td>
<td>1.50 (2.49)</td>
<td>5.53 (1.99)</td>
<td>6.61 (1.91)</td>
</tr>
<tr>
<td>AGR Irregular PPs</td>
<td>3.86 (2.69)</td>
<td>4.43 (2.33)</td>
<td>4.32 (2.52)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 9 points.

The 2x3x2 mixed models ANCOVA for AGR production scores returned no main effect for Group ($F_{1, 53}=2.77, p=.102, \eta^2_p=0.05, \text{power}=.37$) for the combined scores of regular and irregular past participles, after means had been adjusted for the effects of Portuguese proficiency, $F(1, 54)=18.36, p<.001, \eta^2_p=0.26, \text{power}=.99$. There was a main effect Verb, $F(1, 53)=8.11, p=.006, \eta^2_p=0.13, \text{power}=.06$, showing overall higher performance on AGR of regular compared to irregular past participles for the combined scores of both groups. There was also a main effect for Time, $F(2, 106)=24.68, p<.001, \eta^2_p=0.32, \text{power}=.1$. No interaction was found between Group and Verb ($F_{1, 53}=0.115, p=.736, \eta^2_p=0.002, \text{power}=.06$), between Group and Time, ($F_{2, 106}=.02, p=.364, \eta^2_p=0.02, \text{power}=.22$), or between Verb and Time ($F_{2, 106}=.035, p=.702, \eta^2_p=0.01, \text{power}=.11$). Portuguese proficiency was not a statistical covariate in the within-subject analysis. Figures 29 (regular past participles) and 30 (irregular past participles) display AGR scores for each type of verb and each
group over time. Figure 31 shows the distribution of AGR scores for regular and irregular past participles over time.

Figure 29. AGR production scores for regular past participles.

Figure 30. AGR production scores for irregular past participles.
Follow-up Paired-Samples t-tests were conducted to further investigate the main effect for Verb for each group separately. Results showed that for the No Spanish group, differential performance on AGR of regular and irregular past participles was statistically different only in the delayed posttest ($t_{27}=-6.01, p<.001, d=0.74$), with better performance on AGR of regular forms. For the L2 Spanish group, differential performance on regular and irregular past participles was significant in the pretest ($t_{27}=-3.75, p=.001, d=-0.91$) and delayed posttest ($t_{27}=-4.60, p<.001, d=0.51$), approaching significance in the posttest ($t_{27}=-2.03, p=.052, d=0.99$). Figures 32 and 33 show the comparative performance on AGR of each verb type for each group separately. In regards to changes over time, Bonferroni corrected pairwise comparisons showed significant gains in AGR for both types of past participles and both groups taken together from pre- to posttest ($p<.001$) and from pre- to delayed posttest ($p<.001$), but not from post- to delayed posttest. This suggests that the two groups improved on their use of AGR for both types of past participles after treatment and were able to retain performance gains one week later.
Summary. These results show that there are no overall differences between groups on AGR of either type verb in the post- and delayed posttests, despite the initial advantage of the L2 Spanish group on AGR of regular past participles. This result was not as predicted, since L2 Spanish group was expected to outperform the No Spanish group on AGR of both types of verbs at all points in
time. However, the initial positive CLI from Spanish that the L2 Spanish group enjoyed in the pretest did not hold after treatment. Results also show that performance on AGR of regular past participles is overall superior to performance on AGR of irregular past participles, but this difference is statistical for both groups only in the delayed posttest, pointing to better retention of AGR of regular past participles compared to irregular past participles. Superior performance on AGR of regular past participles was expected for the No Spanish group, but only because AGR of regular past participles is null, which could presumably facilitate processing and subsequent production of these forms. Differential performance in AGR was not expected for the L2 Spanish group, since the rules for AGR in linguistic contexts where regular and irregular past participles appear are the same in Portuguese and Spanish. However, these differences are not surprising, as participants in the L2 Spanish group, being L2 learners of Spanish, may not have had acquired the Spanish AGR rules for both types of verbs equally at the time of the experiment. In terms of changes in performance over time, both groups were able to improve after treatment and did not significantly lose these gains one week later, therefore retaining knowledge of AGR for both regular and irregular past participles.

**CLI effects on choice-of-form scores (FORM) for regular and irregular PPs.**

Table 24 shows the descriptive statistics for the correct choice of form (FORM) in the production of regular and irregular past participles. All participants completed all tasks and there were no cases of missing data. It was hypothesized that for choice of FORM the L2 Spanish group would perform better than the No Spanish group in the accurate choice of form (verb stem) for regular past participles, due to positive Spanish CLI. It was also hypothesized that the N2 Spanish group would perform worse the No Spanish group in the accurate choice of form for irregular past participles, due to negative CLI effects from Spanish. Univariate ANCOVAs conducted for each type of verb separately revealed no significant differences between groups on FORM of regular past participles.
participles in the pretest ($F_{1,53}$=1.01, $p=.319$, $\eta^2_p=0.02$, power=.17) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}$=5.93, $p=.018$, $\eta^2_p=0.10$, power=.67). There was also no significant difference between groups on FORM of irregular past participles in the pretest ($F_{1,53}$ =0.15, $p=.700$, $\eta^2_p=0.003$, power=.07). It could be assumed, therefore, that any gains in FORM scores from pre- to posttest and from pre- to delayed posttest for regular and irregular past participles were due to treatment rather than to any preexisting difference between groups.

Table 24

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest M (SD)</th>
<th>Posttest M (SD)</th>
<th>Del. Posttest M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish (N=28)</td>
<td>FORM Regular PPs</td>
<td>0.25 (0.70)</td>
<td>3.32 (1.94)</td>
</tr>
<tr>
<td></td>
<td>FORM Irregular PPs</td>
<td>0.71 (0.26)</td>
<td>4.04 (1.43)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td>FORM Regular PPs</td>
<td>0.96 (1.23)</td>
<td>4.71 (1.86)</td>
</tr>
<tr>
<td></td>
<td>FORM Irregular PPs</td>
<td>0.18 (0.39)</td>
<td>1.68 (1.22)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 9 points.

The 2x3x2 mixed models ANCOVA for the combined FORM scores for both types of verbs returned no significant between-subject effects, $F(1, 53)=0.66$, $p=.418$, $\eta^2_p=.012$, power=0.26. For this analysis, the equality of variances as measured by Levene’s Test of Equality of Error Variances was not satisfied in the posttest for regular past participles ($F_{1,54}=13.20$, $p=.001$), nor for irregular past participles ($F_{1,54}=24.46$, $p<.001$) in the delayed posttest. There was a significant main effect for Verb (regular versus irregular), $F(1, 53)=8.33$, $p=.006$, $\eta^2_p=.14$, power=0.81, and a main effect for Time, $F(1.7, 89.6)=46.21$, $p<.001$, $\eta^2_p=.47$, power=1. Because the assumption of sphericity was not satisfied for time, Greenhouse-Geisser estimates are reported for this analysis. An interaction was found between Group and Verb ($F_{1,53}=20.17$, $p<.001$, $\eta^2_p=.28$, power=0.99). The ANCOVA also found a significant interaction between Group, Verb, and Time, $F(1.98, 105.13)=6.37$, $p=.003$, $\eta^2_p=.11$, power=0.89, indicating that performance on the two types of past participles varied by group and by time. Portuguese proficiency was not a statistical covariate in this model. Figure 34
and 35 illustrate the performance on choice of FORM by group for each type past participle separately. Figure 36 shows the distribution of FORM scores for both verb types and both groups over time.

Figure 34. FORM scores for regular past participles.

Figure 35. FORM scores for irregular past participles.
To address the main effect for Verb, it is necessary to interpret this effect via the significant interactions between Group and Verb, and between Group, Verb, and Time. To investigate differential performance on FORM of regular versus irregular past participles, Paired-samples T-tests were conducted with the results from the post- and delayed posttest FORM scores for each group and point in time separately. Results for the No Spanish group showed that, there was no differential performance on FORM for regular versus irregular past participles in the pretest ($t_{27}=1.72, p=.096, d=0.34$), posttest ($t_{27}=1.56, p=.129, d=0.41$), or delayed posttest ($t_{27}=0.06, p=.949, d=0.01$). For the L2 Spanish group, performance on regular FORM versus irregular FORM statistically differed in the pretest ($t_{27}=3.39, p=.002, d=0.86$), posttest ($t_{27}=6.14, p<.001, d=1.93$), and delayed posttest ($t_{27}=9.44, p<.001, d=2.95$), with higher scores on regular FORMS. Figures 37 and 38 show the comparative performance on FORM of regular and irregular past participles over time by group.
Since CLI from Spanish was expected to affect performance on regular FORM and irregular FORM differently after treatment (positively and negatively, respectively) it is important to investigate differences between groups on each type of form separately, as the combined score for
both types of FORM may cancel out the effects of Spanish CLI for the L2 Spanish group. Therefore, follow-up Independent T-tests were carried out for each type of verb with scores from the post- and delayed posttest, having Group as the independent variable. For FORM scores of regular past participles, results showed that the two groups statistically differed in the posttest, ($t_{54} = -2.74, p=.008, d = -0.73$) and delayed posttest ($t_{43} = -3.32, p=.002, d = -0.89$). The L2 Spanish group outperformed the No Spanish group on FORM of regular past participles at both points in time.

For irregular past participles, there was a significant difference in performance between groups in the posttest ($t_{54}=6.65, p<.001, d=2.46$) and in the delayed posttest ($t_{38.5}=3.77, p=.001, d=1.01$). This time, the No Spanish group outperformed the L2 Spanish group in both points in time. For this analysis, the equality of variances, as measured by Levene’s Test of Equality of Error Variances, was not satisfied for regular ($F_{1, 54}=12.98, p=.001$) and irregular past participles ($F_{1, 54}=34.11, p<.001$) in the delayed posttest, so the adjusted values are reported. Next, Paired-sampled T-tests were carried out for each group and verb type separately to investigate changes in performance from pre- to posttest, from post- to delayed posttest, and from pre- to delayed posttest. For the No Spanish group, performance on FORM of regular past participles significantly improved from pre- to posttest ($t_{27} = -8.54, p<.001, d = -2.09$) and did not significantly decrease from post- to delayed posttest ($t_{27}=0.26, p=.800, d=0.05$). One week after treatment, scores for FORM on regular past participles from the delayed posttest ($t_{27} = -2.39, p=.024, d = -3.99$) were still significantly higher than on the pretest. For the L2 Spanish group, performance on FORM of regular past participles also significantly improved from pre- to posttest ($t_{27} = -8.74, p<.001, d = -2.83$) and did not significantly decrease from post- to delayed posttest ($t_{27} = -0.79, p=.474, d = -0.16$). One week after treatment, the L2 Spanish group’s scores for FORM on regular past participles from the delayed posttest ($t_{27} = -2.39, p=.024, d = -3.99$) were still significantly higher than on the pretest.
Results for performance on FORM of irregular past participles by the No Spanish group showed that participants significantly improved from pre- to posttest ($t_{27} = -14.98, p < .001, d = -3.24$) and did not significantly decrease from post- to delayed posttest ($t_{27} = 1.68, p = .105, d = 0.37$). One week after treatment, scores for FORM on irregular past participles from the delayed posttest ($t_{27} = -5.67, p < .001, d = -1.16$) were still significantly higher than on the pretest. For the L2 Spanish group, performance on FORM of irregular past participles also significantly improved from pre- to posttest ($t_{27} = -6.15, p < .001, d = -1.66$). This time, there was a significant decrease in performance from post- to delayed posttest ($t_{27} = 3.66, p = .001, d = -0.62$). One week after treatment, scores for FORM on irregular past participles from the delayed posttest ($t_{27} = -2.39, p = .024, d = 0.65$) were still significantly higher than on the pretest.

**Summary.** These results show that, although there were no differences between groups in the pretest for performance on FORM of both regular and irregular past participles, after treatment the L2 Spanish group outperforms the No Spanish group on FORM of regular past participles in the post and delayed posttest, while the No Spanish group outperforms the L2 Spanish group on FORM of irregular past participles in the post and delayed posttest. These results were expected, indicating positive CLU from Spanish on the production of regular past participles and negative CLI from Spanish in the production of irregular past participles. Also, in analyzing performance within groups, results show that there were no statistical differences in performance on regular versus irregular past participles for the No Spanish group at any point in time. On the other hand, for the L2 Spanish group, performance on regular past participles was statistically superior than on irregular past participles at all points in time. These results were also expected. They show that for this group either negative Spanish CLI affects the choice of form of irregular past participles or positive Spanish CLI is at play on the production of regular forms. The No Spanish group is not subject to CLI for FORM and their performance on the two types of verbs is similar. Finally, both
groups were able to significantly improve from pre- to posttest on regular forms and to retain performance gains in the delayed posttest. The No Spanish group show a similar performance curve for regular and irregular verbs. Somewhat differently, the L2 Spanish group significantly improved from pre- to posttest on FORM of irregular past participles, but had a significant decrease in performance from post- to delayed posttest, still managing to show statistical gains on FORM of irregular past participles from pre- to delayed posttest.

Table 25 shows a summary of the directionality of Spanish CLI based on the results reported above for the recognition and production of regular and irregular Portuguese past participles. It was hypothesized that CLI from Spanish would have a positive effect on recognition and production (both ACC and FORM) scores of regular past participles at all points in time. It was also hypothesized that CLI from Spanish would positively affect performance on AGR for both types of verbs, regular and irregular past participles. These hypotheses were partially met, with positive CLI for AGR found only in the pretest, and positive CLI found for FORM (but not for ACC) of regular verbs in the post- and delayed posttests. On the other hand, it was hypothesized that negative CLI from Spanish would affect the recognition and production (Both ACC and FORM) of irregular past participles after treatment. This hypothesis was confirmed.

Table 25

*Type of Spanish CLI on the recognition and production of Portuguese morphosyntactic items*

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Posttest</th>
<th>Delayed Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regular PPs</td>
<td>Irregular PPs</td>
<td>Regular PPs</td>
</tr>
<tr>
<td>Recognition</td>
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<td>none</td>
</tr>
<tr>
<td>Production ACC</td>
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<td>none</td>
</tr>
<tr>
<td>Production AGR</td>
<td>none</td>
<td>+</td>
<td>none</td>
</tr>
<tr>
<td>Production FORM</td>
<td>none</td>
<td>none</td>
<td>+</td>
</tr>
</tbody>
</table>

= Negative (non-facilitative) CLI; + = positive (facilitative) CLI; PPs= past participles; ACC= total accuracy scores; AGR= agreement; FORM=choice of verb stem.
Research Question 3 – CLI Effects on the Recognition and Written Production of Lexical Items at Different Learning Stages.

Research Question 3 asked how CLI from Spanish affected different learning stages in the acquisition of Portuguese lexical items. Because there were no differences in performance within groups between the recognition or the production of cognates versus non-cognates, their scores were collapsed into a single lexical-item score for each task. Learning stages were operationalized based on Leow’s (2015a) model of the L2 learning process in ISLA, which draws on theories of information processing (McLaughlin, 1987), levels of processing (Craik & Lockhart, 1972), and awareness (Schmidt, 1990; Tomlin & Villa, 1994, Robinson, 1995; Leow, 1998). For the purpose of this study, three learning stages were associated with outcomes of three learning tasks: the recognition task in the immediate posttest (Task 1), the production task in the immediate posttest (Task 2), and the production task in the delayed posttest (Task 3). It is important to note that task outcomes are learning products that result from learning processes, but do not directly reflect the processes themselves. Any assumption regarding the nature or depth of processing taking place during the completion of tasks can only be inferred indirectly. In this study, tasks 1 and 2 correspond to Leow’s (2015a) Learning Stages 2 and 6, representing the initial intake of language input and further processed intake, or immediate knowledge lodged in the internal system beyond storage in working memory, respectively. Task 3 represents a stage beyond Leow’s Learning Stage 6, in which language information has been robustly internalized in the internal system.

To investigate if Spanish CLI affected these three stages differently, slope variances between groups for learning curves representing performance changes between Tasks 1 and 2 and between Tasks 2 and 3 were analyzed using 2x2 mixed models ANCOVAs. In both analyses, Group was the main factor, Task was the within-subjects factor, and Portuguese proficiency was entered as a covariate. To guarantee that performance on the posttest recognition task was exclusively due to
effects of treatment, only participants who scored zero on the pretest recognition task entered the analysis, for a total of 13 participants in the No Spanish group and 14 participants in the L2 Spanish group. Table 26 shows the descriptive statistics for lexical-item scores for tasks 1, 2, and 3. All participants completed all tasks and there was no case of missing data.

Table 26

Descriptive statistics for lexical items in Tasks 1, 2, and 3

<table>
<thead>
<tr>
<th>Group</th>
<th>Task 1 M (SD)</th>
<th>Task 2 M (SD)</th>
<th>Task 3 M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish (N=13)</td>
<td>12.85 (3.1)</td>
<td>9.15 (3.67)</td>
<td>5.61 (3.55)</td>
</tr>
<tr>
<td>L2 Spanish (N=14)</td>
<td>7.86 (6.04)</td>
<td>7.64 (3.20)</td>
<td>3.80 (1.53)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 10 points.

Analysis.

The mixed models ANCOVA comparing lexical scores from Tasks 1 and 2 did not return a significant main effect $F(1, 24)=3.02, p=.095, \eta_p^2=.11$, power=0.38. There was a main effect for Task, $F(1, 24)=14.11, p=.001, \eta_p^2=.37$, power=0.95, showing that performance statistically decreased from Task 1 to Task 2 for both groups together. An interaction was found between Task and Proficiency, $F(1, 24)=8.67, p=.008, \eta_p^2=.26$, power=0.80, but no interaction was found between Group and Task, $F(1, 24)=0.82, p=.777, \eta_p^2=.003$, power=0.06, indicating that differential performance on Tasks 1 and 2 was similar across groups. Figure 39 displays the curve slopes between Tasks 1 and 2 for each group.
Figure 39. Lexical items scores for both groups across tasks 1 and 2.

The mixed models ANCOVA comparing lexical scores from Tasks 2 and 3 found a significant main effect $F(1, 24)=5.81, p=.024, \eta^2_p=.19$, power=0.64. There was a main effect for Task, $F(1, 24)=7.75, p=.010, \eta^2_p=.24$, power=0.76, showing that performance statistically decreased from Task 2 to Task 3 for both groups together. No interaction was found between Group and Task, $F(1, 24)=0.80, p=.782, \eta^2_p=.003$, power=0.06, indicating that differential performance on Tasks 2 and 3 was similar across groups. Figure 40 displays the curve slopes between Tasks 2 and 3 for each group.
Summary.

These results show that, although Spanish CLI was found in the recognition and production of cognates and non-cognates for each posttest task separately (as shown by the analyses for RQ1), the differential performance on the recognition versus production of lexical items did not statistically differ between groups. This suggests that the effects of Spanish CLI carried out from one learning stage to another, but were not more pronounced at any specific learning stage. In other words, CLI seems to have affected the initial intake of lexical items and further processed intake similarly. The same results were found for performance on the production of lexical items in the immediate posttest versus on the production of lexical items in the delayed posttest. Both groups showed similar decreases in performance, suggesting that the effect of Spanish CLI carried out from Task 2 (representing processed intake) to Task 3 (representing L2 knowledge), but with the same magnitude on both learning stages.
Research Question 4 – CLI Effects on the Recognition and Written Production of Morphposyntactic Items at Different Learning Stages

This question asked how CLI from Spanish affected different learning stages in the acquisition of Portuguese morphosyntactic items, that is regular and irregular past participles of abundant verbs. Like for RQ3, learning stages were operationalized as the recognition task in the immediate posttest (Task 1), the production task in the immediate posttest (Task 2), and the production task in the delayed posttest (Task 3), representing initial intake, further processed intake or immediate knowledge, and robust or retained L2 knowledge, respectively. The three tasks also respectively correspond to Leow’s (2015a) Learning Stages 2 and 4, and to a stage beyond Leow’s Learning Stage 6. Slope variances between groups for learning curves representing performance changes between Tasks 1 and 2 and between Tasks 2 and 3 were analyzed in 2x2 mixed model ANCOVAs with Group as the main factor and Task as the within-subjects factor. To guarantee that performance on the posttest recognition task were due to effects of treatment, only participants who scored zero on the pretest recognition task entered the analysis, for a total of 14 participants in the No Spanish group and 17 participants in the L2 Spanish group. Table 26 (above) shows the descriptive statistics for lexical-item scores for tasks 1, 2, and 3. All participants completed all tasks and there was no case of missing data.

For performance on morphosyntactic items, scores for regular and irregular past participles are considered separately, since CLI was found to interact with these forms in different ways. For instance, when total accuracy scores (ACC) or choice of verb stem (FORM) were considered, results from RQ2 showed that negative Spanish CLI affected performance on irregular past participles in Tasks 1, 2 and 3. No CLI from Spanish was found for AGR of irregular and regular past participles in the posttest and delayed posttest production tasks. For regular past participles, results showed that positive Spanish CLI affected only performance on FORM in Tasks 2 and 3. To
guarantee that performance on the posttest recognition task was exclusively due to effects of
treatment, only participants who scored zero on the pretest recognition tasks were considered for
this analysis. However, because no participants in the L2 Spanish group scored zero in the
recognition of regular past participles in the pretest, results for the regular past participles were not
computed. To answer RQ4, therefore, only performance on ACC and FORM of irregular past
participles entered the analysis, for a total of 14 participants in the no Spanish group and 17
participants in the L2 Spanish group. Table 27 shows the descriptive statistics for the recognition
and production of irregular past participles (ACC and FORM) scores on Tasks 1, 2, and 3.

Table 27

<table>
<thead>
<tr>
<th></th>
<th>No Spanish (SD)</th>
<th>L2 Spanish (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Task 1 – Recognition Posttest</strong></td>
<td>5.00 (1.61)</td>
<td>3.21 (2.48)</td>
</tr>
<tr>
<td><strong>Task 2 – Production Posttest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACC</td>
<td>2.14 (1.53)</td>
<td>1.11 (1.37)</td>
</tr>
<tr>
<td>FORM</td>
<td>4.03 (1.43)</td>
<td>1.68 (1.22)</td>
</tr>
<tr>
<td><strong>Task 3 – Production Del. Post.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACC</td>
<td>1.03 (1.26)</td>
<td>0.25 (0.70)</td>
</tr>
<tr>
<td>FORM</td>
<td>3.18 (2.99)</td>
<td>0.82 (1.41)</td>
</tr>
</tbody>
</table>

* Out of a maximum of 9 points.

**CLI effects on ACC scores for irregular PPs at different learning stages.**

The mixed models ANCOVA comparing irregular past participles ACC scores for Tasks 1 and 2 found a significant main effect $F(1, 28)=6.57, p=.016, \eta_p^2=.19$, power=0.70. There was a
main effect for Task, $F(1, 28)=10.55, p=.003, \eta_p^2=.27$, power=0.88, showing that performance statistically decreased from Task 1 to Task 2 for both groups together. No interaction was found
between Group and Task, $F(1, 28)=0.06, p=.941, \eta_p^2=0$, power=0.05, indicating that differential performance on Tasks 1 and 2 was similar across groups. Portuguese proficiency was not a
statistical covariate in this model. The mixed models ANCOVA comparing ACC scores for Tasks 2 and 3 found a significant main effect for Group $F(1, 28)=7.34, p=.011, \eta_p^2=.21$, power=0.74. There
was not a main effect for Task, $F(1, 28)=2.06, p=.162, \eta_p^2=.07$, power=0.28, showing that
performance did not statistically decrease from Task 1 to Task 2 for the combined scores of both groups. There was an interaction between Task and Proficiency ($F_{1, 28}=8.45$, $p=.007$, $\eta_p^2=.23$, power=0.80) and between Group and Task ($F_{1, 28}=5.30$, $p=.029$, $\eta_p^2=.16$, power=0.60). Figure 41 displays the curve slopes between Tasks 1, 2, and 3 for each group. The interaction between Group and Task indicates that the differential performance on Tasks 2 and 3 for ACC scores of irregular past participles varied by group. Because Portuguese proficiency was not a statistical covariate between groups, it was not entered as a covariate in the post hoc analyses. To further investigate the interaction between Group and Task, follow-up Paired-Samples T-tests were conducted for each group separately. Results showed a significant decrease in performance from Task 2 to Task 3 for both the No Spanish ($t_{16}=2.28$, $p=.037$, $d=.58$) and the L2 Spanish ($t_{13}=2.19$, $p=.048$, $d=1.38$) groups. However, the corrected mean difference between Tasks 2 and 3 for the L2 Spanish totaled -0.26, while for the No Spanish group it totaled -1.60, showing that the decrease in performance from Task 2 to Task 3 was greater for the No Spanish group.

Figure 41. Irregular past participles ACC scores across tasks 1, 2, and 3.
CLI effects on FORM scores for irregular PPs at different learning stages.

The mixed models ANCOVA comparing irregular past participles FORM scores for Tasks 1 and 2 found a significant main effect for Group $F(1, 28)=9.93, p=.004, \eta^2=.26$, power=0.86, with the No Spanish group scoring higher than the L2 Spanish group. There was no main effect for Task, $F(1, 28)=0.06, p=.937, \eta^2=0$, power=0.05, showing that performance did not statistically decrease from Task 1 to Task 2. No interaction was found between Group and Task, $F(1, 28)=0.94, p=.340, \eta^2=.03$, power=0.15, indicating that differential performance on Tasks 1 and 2 was similar across groups. Portuguese proficiency was not a statistical covariate in this model. The mixed models ANCOVA comparing irregular past participles FORM scores for Tasks 2 and 3 found a significant main effect for Group $F(1, 28)=9.66, p=.004, \eta^2=.26$, power=0.85, with the No Spanish group scoring higher than the L2 Spanish group. There was no main effect for Task, $F(1, 28)=0.09, p=.924, \eta^2=0$, power=0.05, showing that performance did not statistically decrease from Task 2 to Task 3. No interaction was found between Group and Task, $F(1, 28)=1.48, p=.234, \eta^2=.05$, power=0.22, indicating that differential performance on Tasks 2 and 3 was similar across groups. Portuguese proficiency was not a statistical covariate in this model. Figure 42 displays the curve slopes for FORM scores between Tasks 1, 2, and 3 for each group.
Figure 42. Irregular past participles FORM scores across tasks 1, 2, and 3.

**Summary.**

Although the analyses performed to answer RQ2 found evidence of negative Spanish CLI for performance on Tasks 1, 2, and 3, these results show that the magnitude of Spanish CLI was similar on Tasks 1 and 2, with both groups showing comparable decrease in performance on ACC of irregular past participles. This suggests that negative CLI from Spanish affected initial intake and further processed intake of irregular past participles to the same degree. On the other hand, results comparing performance on Tasks 2 and 3 revealed that, while ACC scores for both groups significantly decreased from Task 2 to Task 3, this decrease was statistically greater for the No Spanish group. This suggests that negative CLI from Spanish was not as pronounced in the delayed production task and might not have affected retention of L2 knowledge as it affected earlier processing.

These results show that there were no significant differences in performance between Tasks 1 and 2 or between Tasks 2 and 3, and that the variance across tasks were similar for both groups. Therefore, although negative Spanish CLI had been found in the recognition of irregular past
participles in the posttest (Task 1) and for performance on FORM for Tasks 2 and 3 (See results for RQ2), the effects of Spanish CLI on FORM seem to be comparable at the different learning stages represented by Tasks 1, 2, and 3.

Research Question 5– The Role of Linguistic Item Type in the Acquisition of Nonnative Portuguese and the Effects of Language Background

This research question asked whether there are differences in the recognition and/or in the production of Portuguese lexical items (nouns) versus morphosyntactic linguistic items (past participles). RQ5 also asked whether there was variance between groups, that is whether performance on lexical versus morphosyntactic items varied according to the participants’ language background. To answer this question, scores for cognates and non-cognates were combined into a single score for lexical items, since results from RQ1 showed no differences in performance for these two types of nouns for either group. Scores for regular and irregular past participles were analyzed separately, as they have been shown to be affected by participants’ language background in different ways. Because there were different number of trials in the recognition and production tasks, recognition and production scores were converted to percentage scores. A series of Univariate ANCOVAs were conducted on the pretest recognition and production scores of lexical and morphosyntactic items to establish whether the two experimental groups were statistically similar in ability at the outset of the study. These analyses were followed by separate 2x2x3 mixed model ANCOVAs conducted on participants’ scores using a one between-subject, two within-subject design, with Portuguese proficiency as a covariate. The between-subject factor was Group (No Spanish vs. L2 Spanish) and the within-subject factors were Item Type (nouns versus past participles) and Time (pretest vs. posttest vs. delayed posttest). Each ANCOVA was also followed by a Bonferroni post hoc test and means comparisons. First, the recognition of lexical items was
compared to the recognition of past participles. Then, performance on the production of lexical items was compared to the total accuracy production scores (ACC) for past participles. Production of lexical items was also compared to performance on AGR and FORM separately, to understand how the learning of lexical items compares to the learning of different morphosyntactic features.

**Recognition of lexical items versus regular PPs.**

Univariate ANCOVAs were carried out with recognition scores for lexical items and regular past participles in the pretest. Results showed no differences between groups in the pretest for either lexical items ($F_{1,53}=1.26$, $p=.267$, $\eta^2_p=.02$, power=.19) or regular past participles ($F_{1,53}=1.80$, $p=.185$, $\eta^2_p=.03$, power=.26). Portuguese proficiency was a significant covariate in the pretest only for regular past participles ($F_{1,53}=4.51$, $p=.038$, $\eta^2_p=.10$, power=.55). All participants completed all tasks and there was no case of missing data. It could be assumed, then, that any gains in recognition scores from the pretest to the posttest and delayed posttest were due to the treatment rather than to any preexisting difference between groups. Table 28 shows the descriptive statistics for the recognition of lexical items (nouns) and morphosyntactic items (past participles).

**Table 28**

Descriptive statistics for the recognition of lexical and morphosyntactic items

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M % (SD)</td>
<td>M % (SD)</td>
<td>M % (SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nouns</td>
<td>17.68 (15.36)</td>
<td>69.28 (16.37)</td>
<td>63.93 (15.36)</td>
</tr>
<tr>
<td>Regular PPs</td>
<td>34.92 (5.36)</td>
<td>65.48 (19.21)</td>
<td>61.90 (20.16)</td>
</tr>
<tr>
<td>Irregular PPs</td>
<td>17.86 (15.52)</td>
<td>55.55 (17.89)</td>
<td>46.43 (20.96)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nouns</td>
<td>14.46 (13.56)</td>
<td>48.75 (25.99)</td>
<td>46.07 (18.12)</td>
</tr>
<tr>
<td>Regular PPs</td>
<td>48.02 (8.16)</td>
<td>61.51 (22.11)</td>
<td>65.87 (23.02)</td>
</tr>
<tr>
<td>Irregular PPs</td>
<td>15.08 (16.89)</td>
<td>35.71 (27.61)</td>
<td>19.05 (22.19)</td>
</tr>
</tbody>
</table>

PPs = Past participles

The 2x2x3 ANCOVA for the recognition of lexical items versus regular past participles found a main effect for Group ($F_{1,53}=4.29$, $p=.043$, $\eta^2_p=.07$, power=.53), with the No Spanish group overall outperforming the L2 Spanish group. There was no main effect for Item Type ($F_{1,53}=1.04$, power=.34).
\( p=.298, \eta^2_p=.02, \text{power}=.18 \), but a main effect was found for Time \( (F_{2, 106}=33.61, p<.001, \eta^2_p=.39, \text{power}=1) \). An interaction was found between Group and Item Type \( (F_{1, 53}=5.76, p=.020, \eta^2_p=.10, \text{power}=.65) \), Group and Time \( (F_{2, 106}=3.81, p=.025, \eta^2_p=.07, \text{power}=.68) \), and Item Type and Time \( (F_{2, 106}=3.46, p=.035, \eta^2_p=.06, \text{power}=.64) \). Portuguese proficiency was not a statistical variable in this model. To address the main effects for Group and Time, it is necessary to interpret these main effects via the significant interactions between Group and Item Type, Group and Time, and Item Type and Time, visually displayed in Figures 43 and 44.

The interaction between Group and Item Type suggests that differential performance on lexical items versus regular past participles varied by group and by time. Follow-up Paired-Samples T-tests were conducted for each group separately in each point in time to further investigate the performance on the two types of linguistic items. For the No Spanish group, results showed a significant difference in performance on lexical items versus regular past participles in the pretest \( (t_{27}=4.57, p<.001, d=1.11) \) with higher scores on regular past participles, but not in the posttest \( (t_{27}=-1.05, p=.302, d=-0.20) \) or in the delayed posttest \( (t_{27}=-0.43, p=.672, d=-0.11) \). In the post and delayed posttests, scores for both item types were practically identical, with slightly higher scores on lexical items. For the L2 Spanish group, results showed that there was a significant difference in performance on the recognition of lexical items versus regular past participles in the pretest \( (t_{27}=8.13, p<.001, d=2.09) \) and in the delayed posttest \( (t_{27}=3.53, p=.002, d=0.96) \), with differential performance approaching significance in the posttest \( (t_{27}=1.98, p=.058, d=0.53) \). In all points in time, the L2 Spanish group scored higher on the recognition of regular past participles.
Recognition of lexical items versus irregular PPs.

Univariate ANCOVAs were carried out with recognition scores for lexical items and irregular past participles in the pretest. Results showed no differences between groups in the pretest for either lexical items ($F_{1,53}=1.26$, $p=.267$, $\eta^2_p=.02$, power=.19) or irregular past participles ($F_1$.}
All participants completed all tasks and there was no case of missing data. It could be assumed, then, that any gains in recognition scores from the pretest to the posttest and delayed posttest were due to the treatment rather than to any preexisting difference between groups. Table 28 (above) shows the descriptive statistics for the recognition of lexical items (nouns) and irregular past participles. The 2x2x3 ANCOVA for the recognition of lexical items versus irregular past participles found a main effect for Group ($F_{1, 53}=23.31, p<.001, \eta^2_p=.30, \text{power}=.99$), with the No Spanish group overall outperforming the L2 Spanish group. There was no main effect for Item Type ($F_{1, 53}=1.57, p=.215, \eta^2_p=.03, \text{power}=.23$), but a main effect was found for Time ($F_{2, 106}=27.87, p<.001, \eta^2_p=.34, \text{power}=1$). No interaction was found between Group and Item Type ($F_{1, 53}=0.17, p=.897, \eta^2_p=0, \text{power}=.05$). An interaction was found between Group and Time ($F_{2, 106}=8.16, p=.001, \eta^2_p=.13, \text{power}=.95$) and between Item Type and Time ($F_{2, 106}=3.904, p=.023, \eta^2_p=.07, \text{power}=.69$). Portuguese proficiency was not a statistical variable in this model.

To address the main effect for Time, it is necessary to interpret this main effect via the significant interactions between Group and Time, and Item Type and Time, visually displayed in Figures 45 and 46, which suggest that the relationship between groups and between item types varied in time. Follow-up 2x2 mixed models ANOVAs were conducted for each point in time with Group as the between-subjects factor and Item Type as the within-subjects factor. Results for pretest scores revealed no main effect for Group ($F_{1, 54}=1.43, p=.237, \eta^2_p=.03, \text{power}=.22$), no main effect for Item Type ($F_{1, 54}=0.15, p=.904, \eta^2_p=0, \text{power}=.05$), and no interaction between Group and Item Type ($F_{1, 54}=0.04, p=.947, \eta^2_p=0, \text{power}=.05$). In the posttest, there was a significant main effect for Group ($F_{1, 54}=22.58, p<.001, \eta^2_p=.29, \text{power}=.99$) and a main effect was found for Item Type ($F_{1, 54}=9.902, p=.003, \eta^2_p=.15, \text{power}=.87$), with overall higher scores on lexical items. No interaction was found between Group and Item Type ($F_{1, 54}=0.07, p=.935, \eta^2_p=0, \text{power}=.05$). This shows that
there were differences in the recognition of lexical items versus irregular past participles, but these differences were similar across groups. In the delayed posttest, the ANOVA returned a significant main effect Group ($F_{1, 54} = 41.08, p < .001, \eta^2_p = .43, \text{power}=1$). A main effect for Item Type approached significance ($F_{1, 54} = 3.84, p = .055, \eta^2_p = .07, \text{power}=.49$) and no interaction was found between Group and Item Type ($F_{1, 54} = 3.34, p = .073, \eta^2_p = .06, \text{power}=.43$).

Figure 45. Recognition scores for lexical items and irregular PPs for the No Spanish group

Figure 46. Recognition scores for lexical items and irregular PPs for the L2 Spanish group.
Production of lexical items versus ACC of regular PPs.

Univariate ANCOVAs were conducted with production scores for lexical items and ACC of regular past participles in the pretest. Results showed a significant difference in performance between groups in the pretest for the production of lexical items ($F_{1,53}=4.91, p=.031, \eta^2_p=.08$, power=.57) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=9.04, p=.004, \eta^2_p=.15$, power=.84), with the No Spanish group outperforming the L2 Spanish group. No differences were found between groups for the production of regular past participles ($F_{1,53}=.357, p=.552, \eta^2_p=.01$, power=.09) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=9.17, p=.004, \eta^2_p=.15$, power=.84). All participants completed all tasks and there was no case of missing data. Since there were differences in the production of lexical items in the pretest, results from post- and delayed posttest must be interpreted with caution. To compensate for these differences, scores for all points in time entered the ANCOVA model. Table 29 shows the descriptive statistics for the production of lexical items (nouns) and regular past participles.

Table 29

Descriptive statistics for the ACC scores on lexical and morphosyntactic items

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M % (SD)</td>
<td>M % (SD)</td>
<td>M % (SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nouns</td>
<td>4.11 (5.78)</td>
<td>47.68 (17.77)</td>
<td>32.68 (16.69)</td>
</tr>
<tr>
<td>Regular PPs</td>
<td>1.59 (4.98)</td>
<td>23.41 (22.89)</td>
<td>19.05 (18.36)</td>
</tr>
<tr>
<td>Irregular PPs</td>
<td>0.79 (2.91)</td>
<td>23.81 (17.03)</td>
<td>11.51 (14.02)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nouns</td>
<td>3.21 (4.57)</td>
<td>32.50 (16.36)</td>
<td>18.57 (10.70)</td>
</tr>
<tr>
<td>Regular PPs</td>
<td>3.57 (7.44)</td>
<td>32.14 (18.72)</td>
<td>2.78 (7.78)</td>
</tr>
<tr>
<td>Irregular PPs</td>
<td>0 (0)</td>
<td>12.30 (15.22)</td>
<td>2.78 (7.78)</td>
</tr>
</tbody>
</table>

The 2x2x3 ANCOVA for the production of lexical items versus ACC of regular past participles found a between-subjects effect ($F_{1,53}=8.38, p=.005, \eta^2_p=.14$, power=.81) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=20.54, p<.001, \eta^2_p=.28$, power=.99), with the No Spanish group overall outperforming the L2 Spanish group. Because the assumption of sphericity was not satisfied for the interaction between Time and Item Type ($p<.001$), Greenhouse-
Geisser corrections are reported for this analysis. There was no main effect for Item Type \((F_{1,53}=0.65, p=.423, \eta^2_p=.012, \text{power}=.65)\), but a main effect was found for Time \((F_{1.9, 84.4}=13.65, p<.001, \eta^2_p=.20, \text{power}=.99)\). A triple interaction was found between Group, Item Type, and Time \((F_{1.6, 84.4}=7.46, p=.002, \eta^2_p=.12, \text{power}=.89)\); between Group and Item Type \((F_{1,53}=28.98, p<.001, \eta^2_p=.35, \text{power}=1)\), and between Time and Proficiency \((F_{1.9, 84.4}=3.28, p=.041, \eta^2_p=.06, \text{power}=.61)\). This indicates that the differential performance on Item Type varied by group and Time.

To further investigate the interaction between Group and Item Type and the main effect for Time, 2x2 mixed models ANCOVAs were carried out for each point in time with Group as the between-subjects factor and Item Type as the within-subjects factor. Results for pretest scores revealed no main effect for Group \((F_{1,53}=2.63, p=.111, \eta^2_p=.05, \text{power}=.36)\) after means were corrected for the effect of Portuguese proficiency \((F_{1,53}=13.56, p=.001, \eta^2_p=.20, \text{power}=.95)\). There was no main effect for Item Type \((F_{1,53}=1.02, p=.316, \eta^2_p=.02, \text{power}=.17)\), and no interaction between Group and Item Type \((F_{1,53}=1.34, p=.252, \eta^2_p=.02, \text{power}=.21)\). For posttest scores, there was a significant main effect for Group \((F_{1,53}=6.49, p=.014, \eta^2_p=.11, \text{power}=.71)\) after means were corrected for the effect of Portuguese proficiency \((F_{1,53}=11.12, p=.002, \eta^2_p=.17, \text{power}=.91)\). There was no overall main effect for Item Type \((F_{1,53}=.765, p=.386, \eta^2_p=.01, \text{power}=.14)\), but an interaction was found between Group and Item Type \((F_{1,53}=13.44, p=.001, \eta^2_p=.20, \text{power}=.95)\), indicating that differences in the production of lexical items versus ACC of regular past participles depended on group. To address the lack of main effect for Item Type in the posttest, therefore, it is necessary to interpret this main effect via the significant interaction between Group and Item Type displayed in Figures 47 and 48. Follow-up Paired-samples T-tests were conducted for each group separately. Results showed that the No Spanish group scored significantly higher on the production of lexical items compared to ACC of regular past participles \((t_{27}=5.49, p<.001, d=1.18)\) on the
posttest, but there were no differences in performance on the different item types for the L2 Spanish group in the posttest ($t_{27}=0.81$, $p=.936$, $d=0.02$).

Results for the delayed posttest returned a significant main effect for Group ($F_{1,53}=4.54$, $p=.038$, $\eta^2_p=0.08$, power=.55) after means were corrected for the effect of Portuguese proficiency ($F_{1,53}=13.43$, $p=.001$, $\eta^2_p=0.20$, power=.95). There was no overall main effect for Item Type ($F_{1,53}=0$, $p=.999$, $\eta^2_p=0$, power=.05), but an interaction was found between Group and Item Type ($F_{1,53}=22.20$, $p<.001$, $\eta^2_p=0.29$, power=.99), indicating that differences in the production of lexical items versus ACC of regular past participles depended on group. To address the lack of main effect for Item Type in the delayed posttest, therefore, it is necessary to interpret this main effect via the significant interaction between Group and Item Type, also displayed in Figures 47 and 48. Follow-up Paired-samples T-tests were conducted for each group separately. Results for the delayed posttest scores showed significantly higher performance on the production of lexical items compared to ACC of regular past participles for the No Spanish group ($t_{27}=3.99$, $p<.001$, $d=0.78$) and significantly higher scores on ACC of regular past participles over lexical items for the L2 Spanish group ($t_{27}=-4.03$, $p<.001$, $d=-0.92$).
Figure 47. Production scores for lexical items and ACC of regular PPs for the No Spanish group.

Figure 48. Production scores for lexical items and ACC of regular PPs for the L2 Spanish group.
Production of lexical items versus ACC of irregular PPs.

Univariate ANCOVAs were conducted out with production scores for lexical items and ACC of irregular past participles in the pretest. Results showed a significant difference in performance between groups in the pretest for the production of lexical items ($F_{1, 53}=4.91, p=.031, \eta_p^2=.08, \text{power}=.57$) after means were corrected for the effects of Portuguese proficiency ($F_{1, 53}=9.04, p=.004, \eta_p^2=.15, \text{power}=.84$), with the No Spanish group outperforming the L2 Spanish group. No differences were found between groups for the production of irregular past participles ($F_{1, 53}=2.33, p=.133, \eta_p^2=.04, \text{power}=.32$). All participants completed all tasks and there was no case of missing data. Since there were differences in the production of lexical items in the pretest, results from post- and delayed posttest must be interpreted with caution. To compensate for these differences, scores for all points in time entered the ANCOVA model. Table 29 (above) shows the descriptive statistics for the production of lexical items (nouns) and irregular past participles.

The 2x2x3 ANCOVA for the production of lexical items versus ACC of irregular past participles found a between-subjects effect ($F_{1, 53}=37.79, p<.001, \eta_p^2=.42, \text{power}=1$) after means were corrected for the effects of Portuguese proficiency ($F_{1, 53}=12.23, p=.001, \eta_p^2=.19, \text{power}=.93$), with the No Spanish group overall outperforming the L2 Spanish group. Because the assumption of sphericity was not satisfied for Time ($p<.001$), Greenhouse-Geisser corrections are reported for this analysis. There was no main effect for Item Type ($F_{1, 53}=2.07, p=.156, \eta_p^2=.04, \text{power}=.29$), but a main effect was found for Time ($F_{1.6, 85.4}=13.65, p<.001, \eta_p^2=.20, \text{power}=.99$). An interaction was found between Group and Item Type ($F_{1, 53}=6.58, p=.013, \eta_p^2=.11, \text{power}=.71$) and between Group and Time ($F_{1.6, 85.4}=13.02, p<.001, \eta_p^2=.20, \text{power}=.99$). This suggests that the differential performance on Item Type varied by Group and by Time. To address the effect for Item Type, it is necessary to interpret this main effect via the significant interaction between Group and Item Type, displayed in Figures 49 and 50. Follow-up Paired-Samples T-tests were conducted for each group.
separately and each point in time with Item Type as the within-subject factor. Portuguese proficiency was not a significant factor within groups, so it was not included as a covariate in post hoc analyses. For the No Spanish group, results showed that there were significant differences in the production of lexical items versus ACC of irregular past participles in the pretest ($t_{27} = 3.09, p = .005, d = 0.72$), posttest ($t_{27} = 6.44, p < .001, d = 1.37$), and delayed posttest ($t_{27} = 5.31, p < .001, d = 1.37$). At all points in time, the No Spanish group scored higher on lexical items. For the L2 Spanish group, results showed that there were also significant differences in the production of lexical items versus ACC of irregular past participles in the pretest ($t_{27} = 3.72, p = .001, d = 0.99$), posttest ($t_{27} = 5.65, p < .001, d = 1.28$), and delayed posttest ($t_{27} = 5.97, p < .001, d = 1.69$). At all points in time, the L2 Spanish group also scored higher on lexical items.

Figure 49. Production scores for lexical items and ACC of irregular PPs for the No Spanish group.
Univariate ANCOVAs were conducted with production scores for lexical items and AGR of regular past participles in the pretest. Results showed a significant difference in performance between groups in the pretest for the production of lexical items ($F_{1,53}=4.91$, $p=.031$, $\eta_p^2=.08$, power=.57) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=9.04$, $p=.004$, $\eta_p^2=.15$, power=.84), with the No Spanish group outperforming the L2 Spanish group. No differences were found between groups for AGR of regular past participles ($F_{1,53}=0.94$, $p=.761$, $\eta_p^2=.002$, power=.06). All participants completed all tasks and there was no case of missing data. Since there were differences in the production of lexical items in the pretest, results from post- and delayed posttest must be interpreted with caution. To compensate for these differences, scores for all points in time entered the ANCOVA model. Table 30 shows the descriptive statistics for the production of lexical items (nouns) and AGR of regular past participles.
Table 30

*Descriptive statistics for the production of lexical items and AGR of morphosyntactic items*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M % (SD)</td>
<td>M % (SD)</td>
<td>M % (SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Items</td>
<td>4.11 (5.78)</td>
<td>47.68 (17.77)</td>
<td>32.68 (17.69)</td>
</tr>
<tr>
<td>AGR Regular PPs</td>
<td>7.14 (18.19)</td>
<td>48.81 (24.99)</td>
<td>51.19 (30.89)</td>
</tr>
<tr>
<td>AGR Irregular PPs</td>
<td>9.13 (20.73)</td>
<td>38.89 (22.93)</td>
<td>30.56 (24.31)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Items</td>
<td>3.21 (4.56)</td>
<td>32.50 (16.36)</td>
<td>18.57 (10.70)</td>
</tr>
<tr>
<td>AGR Regular PPs</td>
<td>16.67 (27.63)</td>
<td>61.51 (22.10)</td>
<td>73.41 (28.56)</td>
</tr>
<tr>
<td>AGR Irregular PPs</td>
<td>42.86 (29.89)</td>
<td>49.20 (25.91)</td>
<td>48.01 (24.79)</td>
</tr>
</tbody>
</table>

The 2x2x3 ANCOVA for the production of lexical items versus AGR of regular past participles returned no between-subjects effect ($F_{1,53}=2.80, p=.100, \eta^2_p=.05, \text{power}=.38$) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=20.05, p<.001, \eta^2_p=.27, \text{power}=.99$). A main effect was found for Item Type ($F_{1,53}=10.30, p=.002, \eta^2_p=.16, \text{power}=.88$) and for Time ($F_{2,106}=20.09, p<.001, \eta^2_p=.27, \text{power}=1$). A triple interaction was found between Group, Item Type, and Time ($F_{2,106}=4.39, p=.015, \eta^2_p=.08, \text{power}=.75$), between Group and Item Type ($F_{1,53}=19.32, p<.001, \eta^2_p=.27, \text{power}=.99$), and between Item Type and Time ($F_{2,106}=4.61, p=.012, \eta^2_p=.08, \text{power}=.77$). This suggests that the differential performance on Item Type varied by group and by time. To address the effect for Item Type, it is necessary to interpret this main effect via the significant interactions between Group, Item Type, and Time, displayed in Figures 51 and 52.

Follow-up Paired-Samples T-tests were conducted for each group separately at each point in time with Item Type as the within-subjects factor. Portuguese proficiency was not a statistical covariate within groups, so it was not included in the post hoc analyses. Results showed that for the No Spanish group, there was no difference in the production of lexical items versus AGR of regular past participles in both the pretest ($t_{27}=-.931, p=.360, d=-.22$) and the posttest ($t_{27}=-.226, p=.823, d=-.05$), but participants scored significantly higher on AGR of regular past participles on the delayed posttest ($t_{27}=-3.25, p=.003, d=-.74$). Participants in the L2 Spanish group scored significantly higher on AGR of regular past participles versus production of lexical items in the
pretest ($t_{27} = -2.583, p=.016, d=-0.68$), posttest ($t_{27} = -6.1, p<.001, d=-1.16$), and the delayed posttest ($t_{27} = -14.27, p<.001, d=-3.26$). Interestingly, all groups scored higher on AGR on the delayed posttest, compared to the immediate posttest.

Figure 51. Production scores for lexical items and AGR of regular PPs for the No Spanish group.

Figure 52. Production scores for lexical items and AGR of regular PPs for the L2 Spanish group.
Production of lexical items versus AGR of irregular PPs.

Univariate ANCOVAs were conducted with production scores for lexical items and AGR of irregular past participles in the pretest. Results showed a significant difference in performance between groups in the pretest for the production of lexical items ($F_{1, 53} = 4.91, p = .031, \eta^2_p = .08, \text{power} = .57$) after means were corrected for the effects of Portuguese proficiency ($F_{1, 53} = 9.04, p = .004, \eta^2_p = .15, \text{power} = .84$), with the No Spanish group scoring higher than the L2 Spanish group. There was also a significant difference between groups for AGR of irregular past participles ($F_{1, 53} = 6.04, p = .017, \eta^2_p = .10, \text{power} = .67$) after means were corrected for the effects of Portuguese proficiency ($F_{1, 53} = 16.18, p < .001, \eta^2_p = .23, \text{power} = .98$), with the L2 Spanish group outperforming the No Spanish group. All participants completed all tasks and there was no case of missing data.

Since there were differences in the production of lexical items and AGR of irregular past participles in the pretest, results from post- and delayed posttest must be interpreted with caution. To compensate for these differences, scores for all points in time entered the ANCOVA model. Table 30 (above) shows the descriptive statistics for the production of lexical items (nouns) and AGR of irregular past participles.

The 2x2x3 ANCOVA for the production of lexical items versus AGR of irregular past participles returned no between-subjects effect ($F_{1, 53} = 2.08, p = .155, \eta^2_p = .04, \text{power} = .29$) after means were corrected for the effects of Portuguese proficiency ($F_{1, 53} = 34.89, p < .001, \eta^2_p = .40, \text{power} = 1$). Because the assumption of sphericity was not satisfied for the interaction between Time and Item Type ($p = .016$), Greenhouse-Geisser corrections are reported for this analysis. There was no main effect for Item Type ($F_{1, 53} = 0.39, p = .532, \eta^2_p = .01, \text{power} = .09$), but a main effect was found for Time ($F_{1.7, 92} = 9.92, p < .001, \eta^2_p = .16, \text{power} = .98$). An interaction was found between Group and Item Type ($F_{1, 53} = 15.72, p < .001, \eta^2_p = .23, \text{power} = .97$) and between Group and Time ($F_{1.7, 92} = 6.88, p = .003, \eta^2_p = .11, \text{power} = .89$). This suggests that the differential performance on Item Type varied.
by group and that the performance of each group was also different over time. Although no main effect was found for Item Type for the combined scores of both groups, it is necessary to interpret this main effect via the significant interactions between Group and Item Type, and Group and Time, displayed in Figures 53 and 54. Follow-up Paired-Samples T-tests were conducted for each group separately at each point in time with Item Type as the within-subjects factor. Portuguese proficiency was not a statistical covariate within groups, so it was not included in the post hoc analyses. Results showed that for the No Spanish group, although participants scored slightly higher on lexical items, there were no significant differences in the production of lexical items versus AGR of irregular past participles in either the pretest ($t_{27} = -1.27, p = .216, d = -0.33$), posttest ($t_{27} = 1.97, p = .059, d = 0.43$), or delayed posttest ($t_{27} = .420, p = .678, d = 0.10$). On the other hand, participants in the L2 Spanish group scored significantly higher on AGR of irregular past participles versus production of lexical items in the pretest ($t_{27} = -7.07, p < .001, d = -1.85$), posttest ($t_{27} = -3.42, p < .001, d = -0.77$), and the delayed posttest ($t_{27} = -5.15, p < .001, d = -1.40$).

![Production scores for lexical items and AGR of irregular PPs for the No Spanish group.](image)

Figure 53. Production scores for lexical items and AGR of irregular PPs for the No Spanish group.
Production scores for the L2 Spanish Group

![Graph showing production scores for lexical items and AGR of irregular PPs for the L2 Spanish group.]

Figure 54. Production scores for lexical items and AGR of irregular PPs for the L2 Spanish group.

Production of lexical items versus FORM of regular PPs.

Univariate ANCOVAs were conducted with production scores for lexical items and FORM of regular past participles in the pretest. Results showed a significant difference in performance between groups in the pretest for the production of lexical items ($F_{1,53}=4.91$, $p=.031$, $\eta^2_p=.08$, power=.57) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=9.04$, $p=.004$, $\eta^2_p=.15$, power=.84), with the No Spanish group scoring higher than the L2 Spanish group. There were no significant differences between groups for FORM of regular past participles ($F_{1,53}=1.01$, $p=.319$, $\eta^2_p=.02$, power=.17) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=5.93$, $p=.018$, $\eta^2_p=.10$, power=.67). All participants completed all tasks and there was no case of missing data. Since there were differences in the production of lexical items in the pretest, results from post- and delayed posttest must be interpreted with caution. To compensate for these differences, scores for all points in time entered the ANCOVA model. Table 31 shows the
descriptive statistics for the production of lexical items (nouns) and FORM of regular past participles.

Table 31

Descriptive statistics for the production of lexical items and FORM of morphosyntactic items

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Del. Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (%SD)</td>
<td>M (%SD)</td>
<td>M (%SD)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Items</td>
<td>4.11 (5.78)</td>
<td>47.68 (17.77)</td>
<td>32.68 (17.69)</td>
</tr>
<tr>
<td>FORM Regular PPs</td>
<td>2.78 (7.78)</td>
<td>36.90 (21.71)</td>
<td>35.71 (27.44)</td>
</tr>
<tr>
<td>FORM Irregular PPs</td>
<td>0.79 (2.91)</td>
<td>44.84 (15.85)</td>
<td>35.32 (33.27)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Items</td>
<td>3.21 (4.56)</td>
<td>32.50 (16.36)</td>
<td>18.57 (10.70)</td>
</tr>
<tr>
<td>FORM Regular PPs</td>
<td>10.71 (13.69)</td>
<td>52.38 (20.70)</td>
<td>55.56 (24.31)</td>
</tr>
<tr>
<td>FORM Irregular PPs</td>
<td>1.98 (4.33)</td>
<td>18.65 (13.54)</td>
<td>9.13 (15.73)</td>
</tr>
</tbody>
</table>

The 2x2x3 ANCOVA for the production of lexical items versus FORM of regular past participles returned no between-subjects effect \( (F_{1,53}=2.01, \ p=.162, \ \eta^2_p=.04, \ \text{power}=.29) \) after means were corrected for the effects of Portuguese proficiency \( (F_{1,53}=16.13, \ p<.001, \ \eta^2_p=.23, \ \text{power}=.98) \). A main effect was found for Item Type \( (F_{1,53}=7.06, \ p=.010, \ \eta^2_p=.12, \ \text{power}=.74) \) and for Time \( (F_{2,106}=20.37, \ p<.001, \ \eta^2_p=.28, \ \text{power}=.1) \). A triple interaction was found between Group, Item Type, and Time \( (F_{2,106}=9.53, \ p<.001, \ \eta^2_p=.15, \ \text{power}=.98) \), between Group and Item Type \( (F_{1,53}=39.32, \ p<.001, \ \eta^2_p=.43, \ \text{power}=.1) \), and between Item Type and Time \( (F_{2,106}=20.37, \ p<.001, \ \eta^2_p=.28, \ \text{power}=.1) \). This suggests that the differential performance on Item Type varied by group and by time. To address the effect for Item Type, it is necessary to interpret this main effect via the significant interactions between Group, Item Type, and Time, displayed in Figures 55 and 56.

Follow-up Paired-Samples T-tests were conducted for each group separately at each point in time with Item Type as the within-subjects factor. Portuguese proficiency was not a statistical covariate within groups, so it was not included in the post hoc analyses. Results showed that for the No Spanish group, there was no difference in the production of lexical items versus FORM of regular past participles in both the pretest \( (t_{27}= 0.80, \ p=.428, \ d= 0.19) \) and the delayed posttest \( (t_{27}= -0.63, \ p=.534, \ d= -0.13) \), but participants scored significantly higher on lexical items in the immediate
posttest ($t_{27}=3.16, p=.004, d=0.39$). Participants in the L2 Spanish group scored significantly higher on FORM of regular past participles versus production of lexical items in the pretest ($t_{27}=-2.99, p=.006, d=-0.73$), posttest ($t_{27}=-4.49, p<.001, d=-1.10$), and the delayed posttest ($t_{27}=-12.07, p<.001, d=-2.75$).

![Production scores for the No Spanish Group](image1)

Figure 55. Production scores for lexical items and FORM of regular PPs for the No Spanish group.

![Production scores for the L2 Spanish Group](image2)

Figure 56. Production scores for lexical items and FORM of regular PPs for the L2 Spanish group.
Production of lexical items versus FORM of irregular PPs.

Univariate ANCOVAs were conducted with production scores for lexical items and FORM of irregular past participles in the pretest. Results showed a significant difference in performance between groups in the pretest for the production of lexical items ($F_{1,53}=4.91$, $p=.031$, $\eta^2_p=.08$, power=.57) after means were corrected for the effects of Portuguese proficiency ($F_{1,53}=9.04$, $p=.004$, $\eta^2_p=.15$, power=.84), with the No Spanish group scoring higher than the L2 Spanish group. There were no significant differences between groups for FORM of irregular past participles ($F_{1,53}=2.03$, $p=.700$, $\eta^2_p=.003$, power=.07). Portuguese proficiency was not a statistical covariate in this model. All participants completed all tasks and there was no case of missing data. Since there were differences in the production of lexical items in the pretest, results from post- and delayed posttest must be interpreted with caution. To compensate for these differences, scores for all points in time entered the ANCOVA model. Table 31 (above) shows the descriptive statistics for the production of lexical items (nouns) and FORM of irregular past participles.

The 2x2x3 ANCOVA for the production of lexical items versus FORM of irregular past participles returned a between-subjects effect ($F_{1,53}=35.12$, $p<.001$, $\eta^2_p=.40$, power=1). Because the assumption of sphericity was not satisfied for the interaction between Time and Item Type ($p=.026$), Greenhouse-Geisser corrections are reported for this analysis. A main effect was found for Item Type ($F_{1,53}=8.32$, $p=.006$, $\eta^2_p=.14$, power=.81) and for Time ($F_{1.9,102.5}=25.76$, $p<.001$, $\eta^2_p=.33$, power=1). A triple interaction was found between Item Type, Time, and Proficiency ($F_{1.8,102.5}=6.62$, $p=.003$, $\eta^2_p=.15$, power=.88), between Item Type and Time ($F_{1.8,102.5}=4.50$, $p=.017$, $\eta^2_p=.08$, power=.72), and between Group and Time ($F_{1.9,102.5}=14.84$, $p<.001$, $\eta^2_p=.22$, power=.99). No interaction was found between Group and Item Type ($F_{1,53}=0.53$, $p=.471$, $\eta^2_p=.01$, power=.11). This suggests that the differential performance on Item Type varied by time, but was constant across groups. To address the effect for Item Type, it is necessary to interpret this main effect via the
significant interactions between Item Type and Time, displayed in Figures 57 and 58. Follow-up 2x2 mixed models ANCOVAs were conducted for each point in time with Group as the between-subjects factor, Item Type as the within-subjects factor, and Portuguese proficiency as a covariate. For the pretest, results returned no between-subjects effect ($F_{1, 53} = 1.91, p = .172, \eta^2_p = .03, \text{power} = .27$) after means were corrected for the effect of Portuguese proficiency ($F_{1, 53} = 7.78, p = .007, \eta^2_p = .13, \text{power} = .78$), and no main effect for Item Type ($F_{1, 53} = 0.20, p = .656, \eta^2_p = .004, \text{power} = .07$). An interaction was found between Group and Item Type ($F_{1, 53} = 5.18, p = .027, \eta^2_p = .09, \text{power} = .61$).

However, follow-up RM ANCOVAs conducted for each group separately with pretest scores further revealed no main effect for Item Type for either the No Spanish group ($F_{1, 26} = 0.128, p = .724, \eta^2_p = .01, \text{power} = .06$) or the L2 Spanish group ($F_{1, 26} = 0.09, p = .756, \eta^2_p = 0, \text{power} = .06$). For the posttest scores, results showed a between-subjects effect ($F_{1, 53} = 38.95, p < .001, \eta^2_p = .42, \text{power} = 1$), a main effect for Item Type ($F_{1, 53} = 5.11, p = .028, \eta^2_p = .09, \text{power} = .60$), with higher performance on lexical items compared to FORM of irregular past participles. Results also showed an interaction between Item Type and Proficiency ($F_{1, 53} = 16.52, p < .001, \eta^2_p = .24, \text{power} = .98$). For the delayed posttest scores, results returned a between-subjects effect ($F_{1, 53} = 17.29, p < .001, \eta^2_p = .25, \text{power} = .98$). A main effect was found for Item Type ($F_{1, 53} = 7.23, p = .010, \eta^2_p = .12, \text{power} = .75$) and an interaction was found for Item Type and Proficiency ($F_{1, 53} = 11.48, p = .001, \eta^2_p = .18, \text{power} = .91$). No interaction was found between Group and Item Type ($F_{1, 53} = 0.18, p = .671, \eta^2_p = .003, \text{power} = .07$).
Summary.

These results show that there is a difference in the recognition of lexical items versus recognition of regular PPs after treatment when the combined scores of both groups are considered.
Further analyses revealed that differential performance on both items types even out after treatment for the No Spanish group, while the L2 Spanish group continues to perform higher on the recognition in the post- and delayed posttests. For the recognition of lexical items versus irregular PPs, although no differences were found for either group in the pretest, both groups performed better on lexical items over irregular PPs on the posttest. This differential performance was still present in the delayed posttest, but is not statistical for either group. No differences were found between the production of lexical items and ACC of regular PPs for either group in the pretest. However, the No Spanish group scored significantly higher on lexical items over regular PPs on both post- and delayed posttests. The L2 Spanish group, on the other hand, performed similarly on both types of items in the posttest, and higher on ACC of regular PPS in the delayed posttest. For the production of lexical items versus ACC of irregular PPs, significant differences were found for both groups in the pre-, post-, and delayed posttests. The effect size for this differential performance was smaller in the pretest for both groups. Results also showed similar effects sizes for both groups in the posttest, while the largest effect size was found for the L2 Spanish group in the delayed posttest.

For the comparative performance between production of lexical items and AGR of regular PPS, the No Spanish group was found to score significantly higher on AGR of regular PPs in the delayed posttest only, while the L2 Spanish group scored significantly higher on AGR at all points in time. For AGR of irregular PPs versus production of lexical items, no differences were found for the No Spanish group at any point in time, while the L2 Spanish group scored significantly higher on AGR of irregular PPs at all points in time. Results for the comparative performance on FORM of regular PPs versus production of lexical items showed that the No Spanish group did significantly better on lexical items only in the immediate posttest, while the L2 Spanish group scored significantly higher on FORM of regular PPs at all points in time. Finally, for scores on FORM of
irregular PPs versus production of lexical items, both groups performed similarly: there were no significant differences in performance by item type in the pretest, and both groups produced significantly higher scores on lexical items compared to FORM in both post- and delayed posttests.

Overall, these results show that there are differences in performance on lexical versus morphosyntactic linguistic items in both recognition and production tasks, and that these differences in performance not only vary by type of morphosyntactic item (regular versus irregular) and feature of morphosyntactic item (total accuracy, subject-verb agreement, or choice of verb stem), but are also influenced by the participant’s language background (L2 Spanish versus no knowledge of Spanish). In general, results show that participants performed better on the recognition of regular past participles compared to lexical items, but scored better on the recognition of lexical items compared to irregular past participles. In addition, when ACC production scores were considered, participants tended to score better on lexical items than on regular and irregular past participles.

When comparing performance on lexical items to performance on different morphosyntactic features, results were less homogeneous. For instance, L2 Spanish participants tended to score better on AGR for both regular and irregular past participles over time compared to lexical items, but the No Spanish participants for the most part performed similarly in both item types for both types of past participles. In addition, while both groups did better on lexical items compared to Form of irregular past participles over time, The L2 Spanish group had superior performance on FORM of regular past participles, while the No Spanish group sustained better performance on lexical items instead, but only in the posttest. Table 32 summarizes the differences in performance between lexical and morphosyntactic items/features.
**Table 32**

*Comparative performance of lexical versus morphosyntactic items*

<table>
<thead>
<tr>
<th></th>
<th>Regular PPs</th>
<th>Irregular PPs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Spanish</td>
<td>L2 Spanish</td>
</tr>
<tr>
<td><strong>Recognition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>&gt; PPs **</td>
<td>&gt; PPs **</td>
</tr>
<tr>
<td>Posttest</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Delayed Post.</td>
<td>—</td>
<td>&gt; PPs*</td>
</tr>
<tr>
<td><strong>Production ACC</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Posttest</td>
<td>&gt; LEX**</td>
<td>—</td>
</tr>
<tr>
<td>Delayed Post.</td>
<td>&gt; LEX**</td>
<td>&gt; ACC**</td>
</tr>
<tr>
<td><strong>Production AGR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>—</td>
<td>&gt; AGR*</td>
</tr>
<tr>
<td>Posttest</td>
<td>—</td>
<td>&gt; AGR**</td>
</tr>
<tr>
<td>Delayed Post.</td>
<td>&gt; AGR*</td>
<td>&gt; AGR**</td>
</tr>
<tr>
<td><strong>Production FORM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>—</td>
<td>&gt; FORM*</td>
</tr>
<tr>
<td>Posttest</td>
<td>&gt; LEX*</td>
<td>&gt; FORM**</td>
</tr>
<tr>
<td>Delayed Post.</td>
<td>—</td>
<td>&gt; FORM**</td>
</tr>
</tbody>
</table>

*p<.05, ** p<.001, PPs= Past participles, ACC = total accuracy, AGR = subject-verb agreement; FORM= choice of form, LEX= Lexical items.

**Research Question 6 – The Relationship Between Aptitude and Performance on the Recognition and Written Production of Portuguese Lexical Items.**

This research question asked whether aptitude scores, defined either as grammatical sensitivity, grammar inferencing, or both (i.e. analytical ability), related to performance on the recognition and production of the Portuguese target lexical items. More specifically, it asked if changes in aptitude scores corresponded to similar changes in scores on the recognition and production of lexical items. The hypothesis concerning the relationship of aptitude and performance was unidirectional (positive relationship). Scores on grammatical sensitivity and grammar inferencing first entered the analysis separately and were later combined into a single analytical ability score. Also for this analysis, scores for cognates and non-cognates were combined into a single lexical-item category totaling a maximum of 20 points possible in each task (recognition and production). In addition, since this question does not ask about Spanish CLI, both experimental groups were collapsed into a single group. A previous inspection of the data using regression
scatterplots revealed that on the production tasks the relationship between aptitude scores and performance scores was not linear. Therefore, bivariate one-tailed Spearman’s correlations were conducted for both recognition and production. Table 33 shows the descriptive statistics for grammatical sensitivity, grammar inferencing, and analytical ability for both groups.

Table 33

Descriptive statistics for average aptitude score by group

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grammatical Sensitivity (out of 45 points)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Spanish</td>
<td>28</td>
<td>21.36</td>
<td>6.36</td>
<td>1.20</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td>28</td>
<td>25.79</td>
<td>6.17</td>
<td>1.16</td>
</tr>
<tr>
<td>Grammar Inferencing (out of 100 points)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Spanish</td>
<td>28</td>
<td>58.57</td>
<td>20.50</td>
<td>3.87</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td>28</td>
<td>55.00</td>
<td>25.46</td>
<td>4.81</td>
</tr>
<tr>
<td>Analytical Ability (Combined % scores)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Spanish</td>
<td>28</td>
<td>53.02</td>
<td>14.61</td>
<td>2.76</td>
</tr>
<tr>
<td>L2 Spanish</td>
<td>28</td>
<td>56.15</td>
<td>16.96</td>
<td>3.20</td>
</tr>
</tbody>
</table>

The correlation analyses found a weak negative correlation between analytical ability and the recognition of lexical items in the pre- ($r_s = -0.223, p = 0.049, 95\% \text{ CI } [-0.46, 0.04]$) and posttest ($r_s = -0.247, p = 0.033, 95\% \text{ CI } [-0.40, 0.02]$), as well as a weak negative correlation between grammatical sensitivity and the recognition of lexical items in the delayed posttest ($r_s = -0.239, p = 0.038, 95\% \text{ CI } [-0.47, 0.11]$). The small effect sizes and the CIs for the statistical correlations found above suggest that we must interpret these results with caution. There were no statistical correlations between aptitude scores and performance scores for lexical items on the production tasks. Correlation coefficients for the recognition and production tasks are shown in Table 34. The overall results and distribution of the data suggest that there is no strong relationship between the different aptitude scores and performance on lexical items.
Table 34

One-tailed Spearman’s correlation coefficients between aptitude scores and performance on lexical items.

<table>
<thead>
<tr>
<th></th>
<th>Grammar Inferencing (Llama F) r_s (N=56)</th>
<th>Grammatical Sensitivity (WS) r_s (N=56)</th>
<th>Analytical Ability (WS + LlamaF) r_s (N=56)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition Pretest</td>
<td>-.184</td>
<td>-.120</td>
<td>-.223*</td>
</tr>
<tr>
<td>Recognition Posttest</td>
<td>-.042</td>
<td>-.194</td>
<td>-.146</td>
</tr>
<tr>
<td>Recognition Delayed</td>
<td>-.161</td>
<td>-.238*</td>
<td>-.247*</td>
</tr>
<tr>
<td>Production Pretest</td>
<td>-.59</td>
<td>.011</td>
<td>-.068</td>
</tr>
<tr>
<td>Production Posttest</td>
<td>.003</td>
<td>.013</td>
<td>-.027</td>
</tr>
<tr>
<td>Production Delayed</td>
<td>.004</td>
<td>.022</td>
<td>-.005</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level.

Research Question 7 – The Relationship Between Aptitude and Performance on the Recognition and Written Production of Portuguese Morphosyntactic Items.

This research question asked whether aptitude scores, defined as grammatical sensitivity, grammar inferencing, or both (i.e. analytical ability) related to performance on the recognition and production of the Portuguese target morphosyntactic items. More specifically, it asked if changes in aptitude scores corresponded to similar changes in scores on the recognition and production of regular and irregular past participles. The hypothesis concerning the relationship of aptitude and performance was unidirectional (positive relationship). Scores on grammatical sensitivity and grammar inferencing entered the analysis separately and also combined into a single analytical ability score. Table 33 (above) shows the descriptive the descriptive statistics for grammatical sensitivity, grammar inferencing, and analytical ability for both groups.

The analyses conducted to answer RQ-2 pointed at differences between performance on regular and irregular past participles in the recognition and production tasks for both groups, so scores for regular and irregular forms were analyzed separately. The different aptitude scores were also analyzed in relation to performance on subject-verb agreement and choice of form separately. Since this question does not ask about Spanish CLI either, both experimental groups were collapsed
into a single group. An inspection of the data using regression scatterplots revealed that for great part of the data the relationship between aptitude scores and performance scores was not linear. Therefore, bivariate one-tailed Spearman’s correlations were also used for morphosyntactic items.

Results found a weak positive correlation between grammar inferencing and the recognition of regular forms in the pre- ($r_s=.23$, $p=.044$, 95% CI [-.035, .464]) and posttest ($r_s=.287$, $p=.016$, 95% CI [.027, .511]). Grammatical sensitivity also positively correlated with performance on the recognition of regular forms in the pre- ($r_s=.288$, $p=.016$, 95% CI [.028, .512]) and delayed posttest ($r_s=.262$, $p=.026$, 95% CI [0, .491]). The analytical ability compound score showed weak to moderate positive correlations with performance on regular forms in the pre- ($r_s=.33$, $p=.007$, 95% CI [.074, .545]), post- ($r_s=.236$, $p=.040$, 95% CI [-.028, .469]) and delayed posttest ($r_s=.27$, $p=.022$, 95% CI [.008, .497]). Therefore, there is some evidence that aptitude relates to the recognition of regular forms. For the production of regular forms, results returned a strong positive correlation with grammatical sensitivity ($r_s=.448$, $p<.001$, 95% CI [.21, .635]) in the delayed posttest, and a weak positive correlation with analytical ability ($r_s=.266$, $p=.024$, 95% CI [.004, .494]), also in the delayed posttest. For the recognition of irregular forms, the only statistical results were a moderate negative correlation between irregular forms and grammatical sensitivity on the delayed posttest ($r_s=-.448$, $p<.001$, 95% CI [-.635, -.21]). In the production of irregular past participles, a weak negative correlation was found between performance on past participles and both grammar inferencing ($r_s=-.268$, $p=.023$, 95% CI [-.495, -.06]) and analytical ability ($r_s=-.268$, $p=.023$, 95% CI [-.495, -.006]) in the pretest. In the delayed posttest there were moderate to strong negative correlations between the production of irregular past participles and both grammatical sensitivity ($r_s=-.499$, $p<.001$, 95% CI [-.673, -.272]) and analytical ability ($r_s=-.401$, $p=.001$, 95% CI [-.6, -.155]). Looking at subject-verb agreement and choice-of-form scores separately in the production of past participles, we find that, while there were no significant correlations between choice of form
for regular past participles and aptitude scores, for irregular past participles the correlations are mostly negative, mirroring the total accuracy scores for these forms. For instance, there was a weak negative correlation between FORM of irregular past participles and analytical ability in the pre- \((r_s=-.23, p=.044, 95\% \text{ CI } [-.464, .035])\) and delayed posttest \((r_s=-.256, p=.024, 95\% \text{ CI } [-.486, .007])\). Correlations between FORM of irregular past participles and grammatical sensitivity were mixed: while a moderate negative correlation was found in both the pre- \((r_s=-.334, p=.006, 95\% \text{ CI } [-.548, .078])\) and delayed posttest \((r_s=-.394, p=.001, 95\% \text{ CI } [-.594, -.147])\), a moderate positive correlation was found in the posttest \((r_s=.337, p=.006, 95\% \text{ CI } [.082, .551])\). Regarding the performance on subject-verb agreement, the only statistical correlations were a moderate positive correlation between grammatical sensitivity and AGR of regular past participles in the delayed posttest \((r_s=.358, p=.003, 95\% \text{ CI } [.105, .567])\), and moderate to weak correlations between grammatical sensitivity and irregular past participles in the pre- \((r_s=.409, p=.001, 95\% \text{ CI } [.164, .606])\) and posttest \((r_s=.264, p=.024, 95\% \text{ CI } [.002, .492])\). Table 35 and 36 show a summary of the correlation coefficients for aptitude scores and performance on past participles.

Table 35

\begin{center}

\textit{One-tailed Spearman’s correlation coefficients for aptitude scores and ACC of morphosyntactic items}

\begin{tabular}{|l|c|c|c|}
\hline
 & Gram. Inferencing (Llama F) & Grammatical Sensitivity (WS) & Analytical Ability (WS + Llama F) \\
 & \(r_s\) (N=56) & \(r_s\) (N=56) & \(r_s\) (N=56) \\
\hline
Recognition Regular PPs - Pretest & .230* & .288* & .330** \\
Recognition Regular PPs - Posttest & .287* & .152 & .236* \\
Recognition Regular PPs - Delayed & .182 & .262* & .267* \\
Recognition Irregular PPs - Pretest & -.122 & -.144 & -.155 \\
Recognition Irregular PPs - Posttest & -.095 & -.193 & -.137 \\
Recognition Irregular PPs - Delayed & -.014 & -.448* & -.222 \\
Production Regular PPs - Pretest & .010 & .181 & .052 \\
Production Regular PPs - Posttest & -.088 & .053 & -.094 \\
Production Regular PPs - Delayed & .116 & .448** & .226* \\
Production Irregular PPs - Pretest & -.268* & -.101 & -.268* \\
Production Irregular PPs - Posttest & .002 & -.075 & -.043 \\
Production Irregular PPs - Delayed & -.205 & -.499** & -.401** \\
\hline
\end{tabular}

* Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.001 level. PPs= past participles.
\end{center}
Results showed a weak negative correlation between analytical ability and the recognition of lexical items in the pre- ($r_s = -0.223, p = 0.049, 95\% \text{ CI} [-0.46, 0.04]$) and posttest ($r_s = -0.247, p = 0.033, 95\% \text{ CI} [-0.40, 0.02]$), as well as a weak negative correlation between grammatical sensitivity and the recognition of lexical items in the delayed posttest ($r_s = -0.239, p = 0.038, 95\% \text{ CI} [-0.47, 0.11]$). The small effect sizes and the CIs for the statistical correlations found above suggest that we must interpret these results with caution. There were no statistical correlations between aptitude scores and performance scores for the production tasks on lexical items. The overall results and distribution of the data suggest that there is no strong relationship between the different aptitude scores and performance on morphosyntactic items.

**Research Question 8 – Is Spanish CLI in L3 Portuguese Acquisition Mediated by Aptitude?**

This question asked if aptitude enhanced positive CLI from Spanish or if it acted as a mitigating factor in the event of negative CLI. In other words, it asked if higher aptitude scores would help participants in the L2 Spanish group perform better on the recognition and production of
lexical and morphosyntactic items in tasks for which negative or positive CLI from Spanish played a role. The main assumption in answering this question was that aptitude scores correlated with better performance in Portuguese learning tasks in general, irrespective of participants’ language background, which is what RQ6 and RQ7 sought to answer. Results from RQ6 and RQ7, however, were not conclusive. On the contrary, for lexical items the different aptitude scores either did not correlate or correlated negatively with performance. For morphosyntactic items, there were some positive correlations between the three aptitude scores (grammar inferencing, grammatical sensitivity, and analytical ability) and the recognition and production of regular past participles when total accuracy was considered. For the separate analysis of AGR and FORM, only grammatical sensitivity weakly correlated with AGR of regular and irregular past participles, and with FORM of irregular past participles.

While keeping in mind that aptitude did not clearly correlate with better performance, different approaches were taken in an effort to answer Research Question 8. First, Independent-samples T-tests were conducted to verify if there were aptitude differences between groups and how these differences related to overall performance. Second, one-tailed bivariate Spearman’s correlations were conducted (for the L2 Spanish group only) with aptitude scores and the scores for tasks in which either positive or negative CLI had been found to verify if (a) higher aptitude scores correlated with higher performance scores in positive CLI tasks (maximizing effect) and/or if higher aptitude scores correlated with higher performance scores in negative CLI tasks (mitigating effect).

Results for the Independent-Samples T-tests showed that there was a statistical difference in grammatical sensitivity scores between groups ($t_{54} = -2.66, p = .011, d = -0.70, 95\% CI [-0.78, -1.07]$), with the No Spanish (M=21.36, SD=6.35) group showing a lower level of grammatical sensitivity compared to the L2 Spanish (M=25.78, SD=6.17) group. No statistical differences between groups were found for grammar inferencing and analytical ability. Since the No Spanish group had superior
performance in almost all tasks compared to the L2 Spanish group, the higher level of grammatical sensitivity found for the L2 Spanish group did not seem to have given them an advantage to the point of cancelling possible negative CLI.

The second step in answering Research Question 8 was to verify maximizing and mitigating CLI effects due to differences in aptitude in the performance of the L2 Spanish group. Since grammatical sensitivity correlated to higher performance on tasks in which the L2 Spanish group scored higher than the No Spanish group (for regular past participles), and since the L2 Spanish group had higher grammatical sensitivity scores in general, it was hypothesized that grammatical sensitivity played a role maximizing positive Spanish CLI on the learning of morphosyntactic items. To test this hypothesis, a one-tailed bivariate Spearman’s correlation between aptitude scores and performance scores for all tasks for which positive CLI had been found were conducted for the L2 Spanish group. Results returned only one statistical positive correlation between grammatical sensitivity and ACC scores for regular past participles in the delayed posttest ($r_s=.417, N=28, p=.014, 95\%, 1$-tailed, CI [.053, .683]). This suggests that higher scores in grammatical sensitivity might be related to better retention in the learning of regular past participles (as in Robinson, 2002).

To investigate mitigation of CLI effects, one-tailed bivariate Spearman’s correlations were conducted between the aptitude scores and performance scores on tasks for which negative Spanish CLI had been found (L2 Spanish group only). Results returned only two statistical negative correlations. There was a moderate negative correlation between grammatical sensitivity and the recognition of irregular past participles in the delayed posttest ($r_s=-.476, N=28, p=.005, 95\% \text{ CI } [-.721, -.126])$, and a weak negative correlation between analytical ability and FORM of irregular forms in the posttest ($r_s=-.317, N=28, p=.050, 95\% \text{ CI } [-.617, -.063])$. It seems, then, that aptitude scores did not have any mitigating effect on Spanish CLI, and could even be associated with
increased CLI in some tasks. Table 37 shows the results for all statistical correlations between aptitude scores and performance tasks, and the corresponding CLI effects found for each task.

Table 37

**Correlations between performance of both groups and aptitude scores, and the corresponding CLI effects**

<table>
<thead>
<tr>
<th>Gram. Inferencing (Llama F)</th>
<th>Grammatical Sensitivity (WS)</th>
<th>Analytical Ability (WS + Llama F)</th>
<th>CLI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition Regular PPs - Pretest</td>
<td>.230*</td>
<td>.288*</td>
<td>.330**</td>
</tr>
<tr>
<td>Recognition Regular PPs - Posttest</td>
<td>.287*</td>
<td>.152</td>
<td>.236*</td>
</tr>
<tr>
<td>Recognition Regular PPs - Delayed</td>
<td>.182</td>
<td>.262*</td>
<td>.267*</td>
</tr>
<tr>
<td>Prod. ACC Regular PPs - Delayed</td>
<td>.116</td>
<td>.448**</td>
<td>.226*</td>
</tr>
<tr>
<td>Prod. AGR Regular PPs - Delayed</td>
<td>.070</td>
<td>.358**</td>
<td>.182</td>
</tr>
<tr>
<td>Prod. AGR Irregular PPs - Pretest</td>
<td>-.011</td>
<td>.409**</td>
<td>.181</td>
</tr>
<tr>
<td>Prod. AGR Irregular PPs - Posttest</td>
<td>-.046</td>
<td>.264**</td>
<td>.065</td>
</tr>
<tr>
<td>Prod. FORM Irregular PPs - Posttest</td>
<td>-.058</td>
<td>.337**</td>
<td>.092</td>
</tr>
</tbody>
</table>

**Debriefing Questionnaire**

Participants in the No Spanish group responded to 19 questions, while participants in the L2 Spanish group responded to 26 questions. All participants responded to six general questions about the tasks. Table 38 shows the results for the five-point Likert scale to questions 1 and 2. In question 3, participants were asked if they thought the training exercises helped them learn; 52 (93%) participants said ‘yes,’ two (5%) said ‘more or less,’ and one (2%) said ‘no.’ In question 4, participants were asked if the prompts were easy to understand; 41 (73%) participants answered ‘yes,’ 14 (25%) answered ‘more or less,’ and one person (2%) answered ‘no.’ In the space for further comments for this question, participants who answered ‘more or less’ explained that comprehension was not problematic in general, but there were a few words that they did not know, and that the English translations were helpful. In question 5, participants were asked if they had studied or learned Portuguese past participles before participating in this study, 56 (100%) participants answered ‘no.’ Question 6 was the last question presented to participants and asked if
they had any further comments about their experience participating in the study. Some participant mentioned that they enjoyed participating in the study, while others said they wished they had received explanations about the target items or more explicit feedback.

Table 38

**Answers to Questions 1 and 2 of the Debriefing Questionnaire in a 1-5 Likert Scale.**

<table>
<thead>
<tr>
<th></th>
<th>1 (easy)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (difficult)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘How easy were the learning exercises?’</td>
<td>11 (20%)</td>
<td>1 (2%)</td>
<td>35 (63%)</td>
<td>4 (7%)</td>
<td>5 (9%)</td>
</tr>
<tr>
<td>‘How easy were the testing tasks?’</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>27 (48%)</td>
<td>10 (18%)</td>
<td>17 (30%)</td>
</tr>
</tbody>
</table>

Questions 7 to 9 aimed at eliciting participants’ different levels of awareness about the target items. Question 7 asked participants if they had noticed any specific grammar patterns or structures. Question 8 asked participants if they became aware of any grammar rule that applied to the grammar structures in the task. Question 9 asked if they were able to explain how to use the different forms of past participles. Answers to all these three questions were coded for three levels of awareness based on cognitive effort demands: *awareness at the level of noticing, awareness at the level of reporting, and awareness at the level of understanding* (adapted from Leow, 1997, 2012, 2015). More details about how answers were coded are given in the Coding section of Methods.

Table 39 shows the number of comments representing each level of awareness reported by each group. Table 7 (above) shows examples of comments for each level of awareness.

Table 39

**Number of reported observations by level of awareness**

<table>
<thead>
<tr>
<th></th>
<th>No Spanish Group</th>
<th>L2 Spanish Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness at the Level of Noticing</td>
<td>24</td>
<td>17</td>
<td>41</td>
</tr>
<tr>
<td>Awareness at the Level of Reporting</td>
<td>12</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Awareness at the Level of Understanding</td>
<td>13</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>49</td>
<td>37</td>
<td>86</td>
</tr>
</tbody>
</table>

Three questions aimed at measuring participants’ intrinsic motivation. Question 10 asked students if their choice of studying Portuguese was unrelated to their program requirements. In the
No Spanish group, 25 out of 28 (90%) participants said that their choice was unrelated to their academic program, while in the L2 Spanish group 18 out of 28 (64%) participants said the same. Question 11 asked how many hours participants spent using the Portuguese language outside the classroom and learning about Portuguese-speaking countries and cultures. The No Spanish group reported an average of 1.03 hours/week and the L2 Spanish group reported an average of 0.79 hours/week. Question 12 used a five-point Likert scale to ask participants how much they enjoyed learning Portuguese. Table 40 shows the number of answers given for each level in the Likert scale for question 12. Results from question 10, 11, and 12 were then combined into a composite motivation score. To enter the composite motivation score, results from question 10 counted as 1 (yes) or 0 (no); results from question 11 were entered as raw scores; and results from the Likert scale in question 12 counted as 0.2 increments from 1 to 5 (such as that 1 was worth 0.2 points and 5 was worth 1 point). The mean motivation score for the No Spanish group was 2.67 (SD=0.86), and the mean motivation score for the L2 Spanish group was 2.12 (SD=0.97). An Independent-Samples T-test found no significant differences in intrinsic motivation between the two groups, $t_{54}=2.21, p=.031, d=0.60$, with the No Spanish group scoring higher than the L2 Spanish group.

<table>
<thead>
<tr>
<th>Answer to question 12 ‘How much do you enjoy learning Portuguese?’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (not at all)</td>
</tr>
<tr>
<td>No Spanish (N=28)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
</tr>
</tbody>
</table>

Questions 13 to 19 inquired about the participants’ assessment of the learning process. First, they were asked to self-assess their overall and specific Portuguese skills (questions 13 to 17) using a five-point Likert scale, in which one corresponded to the lowest level of proficiency and 5 to the highest. Figure 59 shows the distribution of answers given to each level in the Likert scale by each group and by language skill. Participants in the L2 Spanish group tended to rate both their overall
and specific abilities in Portuguese higher than the No Spanish group, showing greater confidence in their language abilities.

Figure 59. Distribution of self-assessment scores in Portuguese proficiency in a Likert Scale by number of participants (1= low proficiency; 5=high proficiency).

Next average scores were calculated for each group for each language skill separately. Independent-Samples T-Tests comparing the groups’ average scores found that the L2 Spanish participants significantly rated themselves with higher proficiency than the No Spanish participants in Portuguese reading skills ($t_{39}=-7.88, p<.001, d=-2.11$), listening skills ($t_{54}=-6.78, p<.001, d=-1.81$), writing skills ($t_{54}=-9.44, p<.001, d=-2.52$), speaking skills ($t_{54}=-9.43, p<.001, d=-2.50$), and for overall Portuguese proficiency ($t_{45}=-9.39, p<.001, d=-2.52$). Table 41 shows the number of answers per level in the Likert-scale for self-assessment of Portuguese proficiency and Table 42 shows the average scores per group on each language ability.
Table 4

Self-assessment average scores for Portuguese proficiency in a 5-level Likert Scale

<table>
<thead>
<tr>
<th></th>
<th>1 (low proficiency)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (high proficiency)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No Spanish Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>14 (50%)</td>
<td>7 (25%)</td>
<td>3 (10.7%)</td>
<td>4 (14.3%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Listening</td>
<td>17 (60.7%)</td>
<td>5 (17.9%)</td>
<td>3 (10.7%)</td>
<td>3 (10.7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Writing</td>
<td>21 (75%)</td>
<td>3 (10.7%)</td>
<td>2 (7.14%)</td>
<td>2 (7.14%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Speaking</td>
<td>21 (75%)</td>
<td>2 (7.14%)</td>
<td>4 (14.3%)</td>
<td>1 (3.57%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Overall</td>
<td>21 (75%)</td>
<td>1 (3.57%)</td>
<td>5 (17.9%)</td>
<td>1 (3.57%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>L2 Spanish Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>0 (0%)</td>
<td>1 (3.57%)</td>
<td>6 (21.4%)</td>
<td>21 (75%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Listening</td>
<td>1 (3.57%)</td>
<td>2 (7.14%)</td>
<td>10 (35.7%)</td>
<td>15 (57.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Writing</td>
<td>0 (0%)</td>
<td>2 (7.14%)</td>
<td>11 (39.3%)</td>
<td>15 (57.6%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Speaking</td>
<td>0 (0%)</td>
<td>2 (7.14%)</td>
<td>13 (46.4%)</td>
<td>13 (46.4%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Overall</td>
<td>0 (0%)</td>
<td>1 (3.57%)</td>
<td>14 (50%)</td>
<td>13 (46.4%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Table 41

Question 18 asked participants how easy it was learning Portuguese for them. For both groups, most answers to this question fell between scores 3 and 4 of the Likert scale, in which 5 corresponded to ‘very easy.’ Question 19, inspired in Thompson’s (2013) measure of Perceived Positive Language Interaction (PPLI), asked how helpful participants perceived to be the knowledge of (any) foreign languages in helping them learn Portuguese. The Likert scale levels for this question were labeled as follows: 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), 5 (strongly agree). For both groups, around 30% of participants responded that they neither agreed or disagreed, and another 30 to 40% responded that they agreed. Table 43 shows answers to questions 18 and 19. Data from only 15 participants in the No Spanish group (who
reported knowing at least one language other than their first language and Portuguese) were counted for question 19.

Table 43

*Distribution of answers for questions 18 and 19 for each level in the Likert Scale*

<table>
<thead>
<tr>
<th>Question 18</th>
<th>1 (very hard)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (very easy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish (N=28)</td>
<td>0 (0%)</td>
<td>2 (7%)</td>
<td>8 (29%)</td>
<td>14 (50%)</td>
<td>4 (14%)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td>0 (0%)</td>
<td>3 (11%)</td>
<td>12 (43%)</td>
<td>10 (36%)</td>
<td>3 (11%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 19</th>
<th>1 (strongly disagree)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (strongly agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Spanish (N=15)</td>
<td>1 (6.67%)</td>
<td>3 (20%)</td>
<td>5 (33.33%)</td>
<td>5 (33.33%)</td>
<td>1 (6.67%)</td>
</tr>
<tr>
<td>L2 Spanish (N=28)</td>
<td>0 (0%)</td>
<td>4 (14.29%)</td>
<td>9 (32.14%)</td>
<td>11 (39.29%)</td>
<td>4 (4.29%)</td>
</tr>
</tbody>
</table>

Questions 20 to 24 targeted only the L2 Spanish group. They investigated the notion of psychotypology, probing the Spanish-speaking participants’ perception and beliefs about the structural proximity of Spanish and Portuguese and about the influence of Spanish in their own process of acquiring Portuguese. Table 44 shows the responses to questions 20 to 23 in a five-point Likert scale. Most participants rated Spanish and Portuguese as very (35%) or exceptionally close (32%). More than half of the participants said they believed their Spanish knowledge was very (43%) or exceptionally helpful (18%) for learning Portuguese. The answers to the two questions about the helpfulness of Spanish regarding specific Portuguese features (nouns and past participles) were more spread out between ‘just a little’ and ‘very much.’

Table 44

*Distribution of answers to questions 20 to 23 for each level in the Likert Scale*

<table>
<thead>
<tr>
<th></th>
<th>1 (‘not at all’)</th>
<th>2 (‘just a little’)</th>
<th>3 (‘moderately’)</th>
<th>4 (‘very much’)</th>
<th>5 (‘exceptionally’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘How closely related do you believe Spanish and Portuguese to be?’</td>
<td>0 (0%)</td>
<td>1 (3.57%)</td>
<td>8 (28.57%)</td>
<td>10 (35.71%)</td>
<td>9 (32.1%)</td>
</tr>
<tr>
<td>‘How much do you believe knowing Spanish helps you learn Portuguese?’</td>
<td>1 (3.57%)</td>
<td>2 (7.14%)</td>
<td>8 (28.57%)</td>
<td>12 (42.86%)</td>
<td>5 (17.86%)</td>
</tr>
<tr>
<td>‘Do you think your knowledge of Spanish has helped you learn Portuguese past participles?’</td>
<td>3 (0.71%)</td>
<td>9 (32.14%)</td>
<td>10 (35.71%)</td>
<td>6 (21.43%)</td>
<td>0 (0 %)</td>
</tr>
<tr>
<td>‘Do you think your knowledge of Spanish has helped you learn Portuguese nouns?’</td>
<td>0 (0 %)</td>
<td>8 (28.57%)</td>
<td>8 (29.57%)</td>
<td>9 (32.14%)</td>
<td>3 (10.71%)</td>
</tr>
</tbody>
</table>
Question 24 was an open-ended question and asked if participants had further comments about the influence of Spanish on Portuguese acquisition. A recurrent comment made by participants was that Spanish made it easier to understand and recognize Portuguese words, verb conjugations, and structures, but it made it more difficult to remember the correct ‘spelling’ of a word or to differentiate Spanish from Portuguese words. There were 48 positive comments (about the facilitative role of Spanish), 55 negative comments (about how Spanish made learning Portuguese nouns or verbs more difficult), and two neutral comments (e.g. “I think that my knowledge of Spanish did not hurt or help my understanding of Portuguese verb forms”). Negative and positive comments are broken down into specific categories in Table 45. All participants made at least one positive and one negative comment. Some of the comments about the role of Spanish in Portuguese learning are shown in examples (6-19).

(6) “I think it helped because I was able to recognize the sentence structures.”

(7) “Overall the effect is positive compared to where you would be without Spanish.”

(8) “It certainly makes it easier to make an educated guess.”

(9) “I could generally guess what I felt to be the correct answer in Portuguese by deriving it from Spanish.”

(10) “I think in most cases it helped, because even if I didn’t get the exact Portuguese word correct, it helped me at least get close.”

(11) “It makes it easier in the sense that I can access Portuguese words more easily, i.e. it’s easier to read and identify.”

(12) “Overall though, I would say it is beneficial as I have come across more cognates than false cognates thus far.”

(13) “Ultimately it tainted my perception of the words.”

(14) “I think it makes vocabulary much more difficult because I feel like I just rely on cognates.”
(15) “In some ways it made it harder because I was a little over confident and then I would get tripped up.”

(16) “It definitely made it harder. I found myself confusing Spanish words for Portuguese.”

(17) “The presence of multiple forms (some closer to Spanish than others) would make me second-guess myself.”

(18) “I find that Spanish creeps in to all of my attempts at writing Portuguese.”

(19) “I had much difficulty correctly spelling Portuguese words and remembering which words were Spanish cognates and which weren’t.”

Table 45

*Positive and negative comments about the effects of Spanish on Portuguese learning.*

<table>
<thead>
<tr>
<th>Positive Comments</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was overall helpful</td>
<td>11</td>
</tr>
<tr>
<td>It helped me with reading comprehension</td>
<td>11</td>
</tr>
<tr>
<td>The presence of so many cognates was helpful</td>
<td>7</td>
</tr>
<tr>
<td>It gave me an advantage with grammar and structure</td>
<td>5</td>
</tr>
<tr>
<td>It helped me guess words I did not know</td>
<td>5</td>
</tr>
<tr>
<td>It helped me with verb conjugation</td>
<td>3</td>
</tr>
<tr>
<td>It helped me learn and remember words in Portuguese</td>
<td>2</td>
</tr>
<tr>
<td>It helped me recognize the tense of verbs</td>
<td>2</td>
</tr>
<tr>
<td>It helped me when words were different enough</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negatives Comments</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>It made it more difficult to write and spell words correctly</td>
<td>11</td>
</tr>
<tr>
<td>It made the learning process confusing</td>
<td>9</td>
</tr>
<tr>
<td>It made conjugation/form of verbs harder to learn</td>
<td>7</td>
</tr>
<tr>
<td>It made more difficult to remember Portuguese words</td>
<td>5</td>
</tr>
<tr>
<td>It was difficult to differentiate Spanish and Portuguese</td>
<td>5</td>
</tr>
<tr>
<td>It made me second guess myself</td>
<td>4</td>
</tr>
<tr>
<td>I caught myself making false translations</td>
<td>3</td>
</tr>
<tr>
<td>It made me spend less time trying to memorize the Portuguese words</td>
<td>3</td>
</tr>
<tr>
<td>It was hard to overcome subtle differences</td>
<td>2</td>
</tr>
<tr>
<td>It made it harder to construct sentences</td>
<td>2</td>
</tr>
<tr>
<td>It made me too over confident</td>
<td>2</td>
</tr>
<tr>
<td>It tainted my perception</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
</tr>
</tbody>
</table>
The last two questions of the questionnaire also only targeted the L2 Spanish group. Question 25 inquired about which differences between Spanish and Portuguese nouns participants had noticed while completing the tasks. Question 26 inquired about which differences between Spanish and Portuguese past participles participants had noticed while completing the tasks. Many comments were general observations about how Portuguese and Spanish words sometimes coincided in form and sometimes did not. There were 41 specific comments about the differences between Portuguese and Spanish nouns and 17 general observations, one among which was an inaccurate remark. There were 15 specific comments about the differences between Portuguese and Spanish past participles, three among which were not correct explanations, and 16 general observations. Some of the specific comments about crosslinguistic differences between Portuguese and Spanish nouns are shown in examples (20-25).

(20) “For -ción words in Spanish, they became -ção (populación vs. população).”
(21) “The Portuguese version of Spanish words are often shorter.”
(22) “In Portuguese, there are more “z” and accents and “h” in the word that through you off when you are trying to spell it. Spanish is way easier.”
(23) “I don’t see a pattern I just think they are different in a confusing way, but at least part of the words are similar.”
(24) “I noticed the nh used in Portuguese instead of the Spanish ñ.”
(25) “Different letters, such as ç and â, but there is a sort of pattern amongst Portuguese words that aligns with an equivalent Spanish pattern.”

Some of the comments related to Portuguese and Spanish past participles are shown in examples (26-32):

(26) “Many forms have the same endings, so if you speak Spanish then you know how to conjugate in Portuguese.”
(27) “The formation of the tense resembles each other greatly.”
(28) “I think Spanish always has extra vowels in the middle of words, like muerto.”
(29) “I noticed that in Portuguese there’s also feminine endings.”
(30) “There seemed to exist more irregulars in Portuguese.”
(31) “The irregulars are the same verbs, but follow different patterns.”
(32) “Some of them have similar endings, but then the verb is a little different.”
CHAPTER FIVE: Discussions and Conclusions

The purpose of this study was to investigate CLI from Spanish in the initial states of L3 Portuguese acquisition. More specifically, the study aimed at verifying if CLI from Spanish played a role in the intake and written production of lexical versus morphosyntactic Portuguese items and whether this role was facilitative (positive transfer) or non-facilitative (negative transfer). The studied also investigated whether CLI affected different learning stages, operationalized as the different task types (recognition versus production) at different points in time (immediate and delayed posttests). Furthermore, the study looked at the interaction of language aptitude (as either analytical ability, grammatical sensitivity, or grammar inferring) and performance, and whether aptitude mitigated or enhanced Spanish CLI. In the previous chapter, the results for each of the eight research questions were presented and summarized. In this chapter, I discuss these empirical findings, considering current TLA models and the literature regarding the role of linguistic item types and aptitude in language learning. Finally, the limitations and pedagogical implications of the present study are reviewed, and final conclusions are presented with suggestions for future research in the field of CLI and Portuguese acquisition.

RQ1 – Spanish CLI Effects on the Recognition and Written Production of L3 Portuguese Lexical Items

This question asked how CLI from Spanish affected the recognition and production of L3 Portuguese cognate and non-cognate lexical items. To answer this question, the performance of the No Spanish group was compared to the performance of the L2 Spanish group at three points in time: prior to exposure to the target items (pretest), immediately after exposure (posttest), and one week after exposure (delayed posttest). It was hypothesized that negative CLI from Spanish would affect the performance of the L2 Spanish group on cognates, but not on non-cognates. No difference was found between groups in the pretest, but the No Spanish group performed significantly better than the
L2 Spanish group on the recognition of non-cognates and cognates in the immediate posttest. Cohen’s
effect sizes of these differences were large (d=1.08 and d=0.65, respectively), suggesting high
practical significance. In the delayed posttest, there was again a significant advantage for the No
Spanish group on the recognition of cognates, but no differences between groups in the recognition of
non-cognates. Cohen’s effect size for the differential performance on cognates in the delayed posttest
was again large, at d=0.73. The posttest results partially confirmed our hypothesis: while they showed
evidence of negative CLI from Spanish on the recognition of cognates (as predicted), they also
showed that negative CLI affected the recognition of non-cognates (unlike predicted). Results from
the delayed posttest, however, aligned with our initial hypothesis, showing evidence of negative
CLI only for the recognition of cognates. Regarding the performance of the No Spanish group
alone, there were no differences in the recognition of cognates versus non-cognates, as predicted.

Lexical production pretest scores revealed no differences between groups for cognates, but
showed a significant difference for non-cognates between the No Spanish group (M=0.14,
SD=0.45) and the L2 Spanish group (M=0.25, SD=0.51). However, the partial eta-squared effect
size for the difference regarding the production of non-cognates was very low ($\eta_p^2=.08$), and since
the magnitude of the difference between groups is close to negligible, we could assume that both
groups performed similarly before treatment. In both the post- and delayed posttests the No Spanish
group significantly outperformed the L2 Spanish group on cognates and non-cognates. Again, these
results only partially confirmed our hypothesis that negative CLI from Spanish would be found for
cognates and not for non-cognates. While the effect size for the overall differences between groups
was large ($\eta_p^2=.41$), when looking at cognates and non-cognates separately we found that the effect
size of the differences in the production of cognates was large ($\eta_p^2=.32$ in both post- and delayed
posttests), but the effect size of the differences in the production of non-cognates was low ($\eta_p^2=.18
in the posttest, and $\eta_p^2=.19$ in the delayed posttest) (Cohen, 1988; Richardson, 2011). Therefore,
negative CLI from Spanish seems to be more accentuated for cognates, supporting our initial hypothesis. For the No Spanish group alone there was no difference in the production of cognates versus non-cognates, as predicted.

A few conclusions can be drawn from these findings. First, there is evidence that prior knowledge of Spanish resulted in negative CLI, affecting the recognition and production of new target items in L3 Portuguese, which confirms anecdotal observations from the PSS literature. Second, neither positive nor negative CLI from L1 English was found for either group on the recognition of Portuguese words that were cognates with English, as shown by the similar performance on Portuguese/Spanish and Portuguese/Spanish/English cognates by both groups. This suggests that the typological proximity between Portuguese and Spanish was the primary factor for transfer, blocking the effects of L1 English. However, since there was no L1 Spanish-L2 English group, no definite conclusions can be drawn regarding the primacy of typology over the foreign language effect. Third, the negative CLI from Spanish found for cognates seems to contradict cognate facilitation effects reported in many studies of bilingual word recognition (De Groot & Nas, 1991; Dijkstra et al., 1999; Schwartz et al., 2007, Dijkstra et al., 2010). In these studies, however, results are based on a superior comprehension level for cognates or on participants’ accurate selection of the source language of target items (e.g. if a target item is an English word or not, or if it is a Dutch or English word) rather than on their ability to recognize the correct cognate form in the target language. Also, in experiments conducted by Dijkstra and collaborators, performance on cognates is compared to performance on non-cognates. In this type of design, typological similarity has a priming effect compared to unrelated forms that leads to faster lexical access. However, these studies do not investigate what happens when learners try to make sense of typological formal contrasts, and if they can distinguish between correct cognate forms and incorrect renditions of words in the target language, as in the case of the current study. Therefore, results from this study
do not necessarily contradict the cognate effect as established in the SLA literature, but show a more complex interaction of factors involved in the learning of cognates, suggesting that the cognate effect on learning of correct noun morphology can actually be negative. This is not surprising, considering that Dijkstra et al. (2010) also found negative effects for cognate recognition in certain types of tasks. However, because in the current study negative CLI from Spanish was found for both cognates and non-cognates, we cannot immediately assume the existence of a negative cognate effect. In that respect, the overall performance on lexical items showed that while negative CLI from Spanish continued to affect production of cognates and non-cognates one week after treatment, the negative effects of CLI on the recognition of non-cognates wore off in the delayed posttest. Therefore, negative CLI from Spanish was somewhat more persistent for cognates than for non-cognates. Not only was the partial formal similarity of cognates detrimental for the intake of Portuguese forms, but this detrimental effect was more pervasive.

Finally, CLI effects are at play even in conditions where attentional demands for comprehension are minimized and learners can focus on form. In the current study, comprehension was facilitated by having participants complete a vocabulary learning task and by the presentation of English translations along with the sentence stimuli and feedback during the exposure phase. English translations were also presented alongside the Portuguese prompts in the production tasks. Results from the debriefing questionnaire indicated that participants from both groups successfully processed meaning, with most participants (73%) expressing not having had any problems understanding the experimental stimuli or learning the meaning of target words (which were new to them). The remainder of the participants (25%) explained that, although they experienced some initial difficulty understanding a few Portuguese words, the English translations ultimately helped, and comprehension turned out to be easy in the second and third experimental sessions. Only one person (2%) reported finding the prompts “a little challenging.” If comprehension was not effortful,
we could assume that in line with VanPatten’s (1990, 2002, 2004) Model of Input Processing, all learners were able allocate greater attentional resources to the processing of less salient items and grammatical forms. But it is still possible that L2 Spanish speakers enjoyed a receptive advantage in recognizing the meaning of cognates compared to non-Spanish speakers, which may have further reduced the amount of cognitive effort L2 Spanish speakers dispensed on comprehension, allowing increased focused attention on form and greater intake of target words compared to the No Spanish group. If this is true, we would expect the L2 Spanish group to perform better at least on recognition tasks. Nonetheless, results show a different picture. The performance of the L2 Spanish group was overall inferior compared to the performance of the No Spanish group. While this study was not designed to test the predictions of VanPatten’s Primacy Content Principle, results suggest that even if L2 Spanish speakers enjoyed heightened attention to and greater noticing of forms, factors other than processing capacity interfered with input processing, affecting intake.

One possibility is that, even if attentional resources were freed up, CLI from Spanish may have affected the actual focus and level of attention and/or awareness involved in the detection and noticing of morphological features in the input. N. Ellis’s (2006b) Associative Learning Theory corroborates this idea. It states that mechanisms such as overshadowing and blocking (or learned inattention) cause learners to overlook less informative cues in the input, which could be the case of subtle morphological or orthographical differences across languages. Furthermore, proactive inhibition could explain why retention of Portuguese forms is affected by similar linguistic experiences (formally and semantically) from prior knowledge of Spanish, as in the case of non-identical cognates. Hall’s (2002) Parasitic Hypothesis offers a similar explanation for the diminished intake of Portuguese forms by L2 Spanish learners by positing that the automatic exploitation of existing lexical material (in this case the L2) sharing phonological and orthographic form with the L3 interferes with the establishment of initial memory representations in the L3,
which would have repercussions for later recognition and production. Both the Associative Learning Theory and the Parasitic Hypothesis could account for the lower performance on non-identical cognates by the L2 Spanish group compared to the No Spanish group, if we assume that early representations of Portuguese forms are associated with pre-existing representations of Spanish forms during early processing. An alternative interpretation of results is provided by Park and Han (2008). They posited that when knowledge of two or more typologically close languages is involved, learners approach to input-processing is meaning-oriented, while for typologically distant language pairs learners’ approach tend to be form-oriented. It is possible than, that the L2 Spanish group focused on meaning, disregarding form, and that the No Spanish group focused more on form, learning the Portuguese morphology more successfully.

In the current study, results for cognates also support Dijkstra and Van Heuven’s (2002b) BIA+ model that predicts differential acquisition based on degree of crosslinguistic relatedness. As discussed above, results partially contradict Dijkstra et al. (2010), who found facilitatory effects for non-identical cognates in an English lexical decision task. In their study, non-identical cognates were processed more slowly than identical cognates, showing a relative detrimental effect for crosslinguistic neighbors, but the overall effect was still facilitatory when compared to non-cognates. The degree of facilitation depended on the degree of crosslinguistic orthographic overlap and word frequency. In the language decision task, however, Dijkstra et al. found an inhibitory effect for orthographic similarity on RTs, with a discontinuous increase in inhibition from nearly-identical cognates to fully identical cognates. While in their lexical decision task participants were asked to decide whether a stimulus item was a word or a non-word in the target language, in their language decision task participants were asked to decide whether the item belonged to one or another language (Dutch or English, in their case). Dijkstra et al. assumed that in their lexical decision task only one language is activated, while in their language decision task there was dual
activation of the English and Dutch linguistic systems. The contrast between Dijkstra et al.’s and the findings of the current study can be explained in terms of task design differences. In the current study, participants were asked to select the correct Portuguese word out of two possible options, making decisions based solely on one linguistic system. However, the Portuguese words were presented with either a Portuguese non-word or a Spanish word, which may have activated the Spanish language node, intensifying response competition and causing inhibition effects. If that is true, the current findings contribute to the BIA+ model, by extending the predictions of inhibitory effects during parallel language activation to the initial states of input processing for both cognates and to non-cognates. The differential performance between groups on the production of non-cognates, on the other hand, is not as clearly predicted by the BIA+ or any of the approaches mentioned above, especially since participants had completed the production task before the recognition task, which otherwise could have caused them to carry on the Portuguese/Spanish dual activation from the first to the second task. Results from production tasks, therefore, do not support the BIA+ model, unless we assume that for closely related languages, prior knowledge of closely related languages (in this case Spanish) is in a constant state of activation whenever the later acquired system (in this case, Portuguese) is used. For the recognition of non-cognates, which were presented in the same task as Spanish/Portuguese cognates and Spanish distractors, the assumptions of the BIA+ model still hold.

The negative CLI found in the recognition and production of cognates may seem surprising considering the findings of lexical recognition studies and the common assumption that the more similar a foreign word is to a previously learned language the easier it is to learn (Lado, 1972; Meara, 1982). However, the differential effect of non-identical cognates in vocabulary acquisition had been noted long before the work done by Dijkstra and collaborators. For instance, Laufer (1991) suggested that while cognates in general have a facilitative effect on comprehension, they
may cause difficulties in production. Laufer analyzed examples of English sentences produced by Swedish speakers in Ringbom’s (1995) study and which contained lexical errors such as *guld* for *gold* and *från* for *from*. She hypothesized that these errors were caused by either the learners’ conscious assumption that non-identical cognates are identical instead of just similar or by an unconscious activation of word neighbors in the learner’s mental lexicon.

From the perspective of CLI models of L3 acquisition, if we assume that the TPM predicts a global (non-feature specific) reliance on strategies from prior languages based on psychotypological proximity, we should expect negative CLI in the recognition and production of non-cognates, which indeed was found. Slabakova’s (2016) Scalpel Model, on the other hand, predicts no transfer in the absence of local similarity—that is, no negative transfer for non-cognates, unlike the results of this study. However, both the TPM and the Scalpel model have only been used to describe morphosyntactic phenomena. While it is not clear what predictions these models make regarding lexical learning, as this study shows, CLI may affect different types of lexical items differently based on type and degree of similarity. If we consider that the assumptions of the TPM and Scalpel Model apply equally to morphosyntactic and lexical learning, then these results support the TPM and contradict the Scalpel Model. The results for non-identical cognates are even more complicated to interpret considering the above-mentioned models. The twofold nature of non-identical cognates make it difficult to classify them as contrasting or converging items: while they converge in meaning in both languages, they only partially converge in form. Neither the TPM nor the Scalpel Model directly addresses this singularity. If we consider the observations from CA studies and PSS instructors, non-identical cognates offer an advantage for comprehension, but present challenges in terms of formal accuracy. Because of that, non-identical cognates are considered here as crosslinguistic contrasts. However, for both the TPM and the Scalpel Model any degree of formal and semantic similarity seems to count as convergence, triggering positive transfer. That being so,
and extending the predictions of L2 models to lexical learning, results showing negative CLI for non-identical cognates would not support the TPM or the Scalpel Model. Finally, evidence of negative CLI from Spanish challenges the premises of the Cumulative Enhancement Model (CEM), which only predicts positive transfer or no transfer at all. Overall, the results are more in line with predictions of the TPM. It is important to keep in mind, however, that the negative CLI found for non-cognates was based on differential performance between groups with small effect sizes, so more research may be necessary to determine if these findings hold for this type of linguistic item.

Despite the evidence of negative CLI, both groups significantly improved on the recognition of cognates and non-cognates from pre- to posttest and sustained the same level of performance one week later. The effects sizes for the recognition of cognates and non-cognates from pre- to delayed posttest for the No Spanish group were \(d=-3.75\) and \(d=-2.21\), respectively, and for the L2 Spanish group they were \(d=-1.77\) and \(d=-1.74\). For the production of lexical items, both groups significantly improved from pre- to posttest on both cognates and non-cognates, and although there was a significant decline in performance between the post- and delayed posttest for both groups on both lexical item types, their ultimate gains one week after treatment were still significantly higher than their performance on the pretest. Effects sizes for performance differences between pre- and delayed posttests on cognates and non-cognates were \(d=-1.92\) and \(d=-2.14\) for the No Spanish group and \(d=-1.46\) and \(d=-1.35\) for the L2 Spanish group, respectively. This means that despite participants’ limited exposure to the target items in the experimental condition (approximately 45 minutes of training), they considerably advanced their knowledge of Portuguese lexical items by completing the incidental focus-on-form tasks. Participants from both groups performed better on recognition than on production of both lexical items. These results were expected, since language production involves different cognitive processing mechanisms and the development of more stable linguistic representations.
RQ2 – Spanish CLI Effects on the Recognition and Production of Portuguese Morphosyntactic Linguistic Items

This question asked how CLI from Spanish affected the recognition and production of regular and irregular past participle forms of abundant verbs in L3 Portuguese. To answer this question, the performance of the No Spanish group was compared to the performance of the L2 Spanish group at three points in time: prior to exposure to the target structures (pretest), immediately after exposure (posttest), and one week after exposure (delayed posttest). It was hypothesized that positive CLI from Spanish would affect the performance of the L2 Spanish group on regular past participles and that negative CLI from Spanish would affect the performance of the L2 Spanish group on irregular past participles. In the production tasks, evidence of negative CLI from Spanish was expected only for FORM of irregular past participles, and positive CLI from Spanish was expected for FORM of regular past participles and for AGR of both regular and irregular past participles. Results for morphosyntactic linguistic items confirmed the hypotheses concerning negative CLI from Spanish, with the No Spanish group scoring significantly higher than the L2 Spanish group for recognition, ACC, and FORM. Negative CLI was found for recognition of irregular past participles in both post- and delayed posttest, with large effect sizes ($d=0.85$ and $d=1.27$, respectively). Negative CLI on ACC scores was also found in the post- and delayed posttests, but with very small effect sizes ($\eta_p^2=0.13$ and $\eta_p^2=0.09$, respectively). Power for the analysis of the delayed posttest was .61, indicating that results could be due to a small sample size. Negative CLI on FORM was also found for both the post- and delayed posttests, with effect sizes $d=2.46$ and $d=1.01$, respectively.

The initial hypotheses concerning positive CLI from Spanish were only partially confirmed. On the recognition task, for instance, the No Spanish group outperformed the L2 Spanish group on irregular past participles as expected, but the L2 Spanish group showed no advantage on regular
past participles, unlike expected, with both groups performing at similar levels. These patterns were observed for both the recognition scores and accuracy production scores (ACC) on the post- and delayed posttests. The absence of positive CLI for regular past participles was surprising, particularly in the recognition tasks, since Spanish speakers are thought to benefit from heightened receptive skills due to the high degree of mutual intelligibility between the two languages. The regular past participle forms in both languages are almost identical and participants were exposed to written input, circumventing comprehension problems that could have arisen from differences in pronunciation. Therefore, superior performance by the L2 Spanish group in the recognition task was expected even in the pretest, which did not happen (note that the performance of the L2 Spanish group on the recognition of regular past participles was superior to that of the No Spanish group in the pretest, but the difference was not statistically significant).

The separate analysis of AGR scores revealed no statistical differences between groups for both types of past participles, although both groups performed better on regular than on irregular past participles. Performance patterns for AGR of regular past participles were comparable for both groups, who started at very similar levels, showed similar gains after treatment, and similar retention rates one week later. Again, these results were not expected, since knowledge of Spanish agreement rules was hypothesized to give L2 Spanish speakers an advantage. For AGR of irregular past participles, the developmental pattern was somewhat different for both groups, with the L2 Spanish group starting with an advantage in the pretest, both groups reaching almost the exact same level after treatment, and the L2 Spanish group showing slightly better (although not significantly different) retention. After treatment, therefore, there was no positive CLI from Spanish for either type of past participle. Since in the current study L2 Spanish speakers did not show an advantage over the No Spanish group regarding AGR, results contrast with findings from Guijarro-Fuentes et al. (2008) who found that at early stages of Portuguese acquisition Spanish speakers were able to
transfer gender features from Spanish to Portuguese. Finally, results for FORM confirmed the predictions for regular past participles, with the L2 Spanish group outperforming the No Spanish group in both post- and delayed posttest (effect sizes $d = -0.73$ and $d = -0.89$, respectively), providing evidence of positive CLI. FORM results also confirmed the predictions for irregular past participles, with the No Spanish group outperforming the L2 Spanish group in both post- and delayed posttests, providing evidence of negative CLI. Results showing negative CLI on FORM corroborate the findings from Carvalho and Silva (2006), who found negative CLI from Spanish in the production of future subjunctive forms compared to present subjunctive forms.

The current findings provide evidence of negative CLI from Spanish in the recognition and production (for ACC and FORM scores) of Portuguese morphosyntactic linguistic items. The interpretation of these results mirrors the interpretation of results for lexical items. Even if L2 Spanish speakers had an advantage processing Portuguese meaning, they still did not show superior processing for form and syntactic distribution of past participles, against the predictions of VanPatten’s (1990, 2002, 2004) Input Processing Theory. N. Ellis’s (2006b) Associative Learning Theory also explains these results if we consider that mechanisms such as overshadowing, blocking, and proactive inhibition made it more difficult for L2 Spanish speakers to attend to the syntactic distribution cues and verb morphology in L3 Portuguese. In other words, not needing to differentiate between the two syntactic contexts in Spanish may have caused participants in the L2 Spanish group to ignore this distinction in Portuguese (much more than the No Spanish group), assuming that both languages were similar in this respect. This assumption is consistent with psychotypological proximity theories (Kellerman, 1977; Ringbom, 2008). Negative CLI results are also in line with theories of parsing-biases in second language processing (see Witzel, Witzel, & Nicol, 2012 for a review) and differential sensitivity to morphosyntactic cues (Jiang, 2004, 2007; Liu & Nicol, 2010; MacWhinney, 2002) and syntactic information (Marinis, Roberts, Felser, &
Regarding irregular past participles, results for recognition and ACC scores in the delayed posttest showed that the L2 Spanish group was not able to retain the small gains found in the immediate posttest. Instead, their performance on these items was similar to their performance on the pretest, indicating that they ultimately did not benefit from treatment, unlike the No Spanish group. Overall, both groups showed small gains over time in ACC scores, which indicates that the syntactic distribution and morphology of past participles are not easily acquired, especially in the absence of explicit instruction, negative evidence, and considering the limited time of exposure.

Hall’s (2002) Parasitic Hypothesis also explains difficulties related to the learning of irregular morphology. It assumes that the irregular Portuguese representations will be stored in close connection with the representations of regular Spanish forms, which are more stable and deeply entrenched, causing the Spanish rather than the Portuguese words to be activated in early stages of Portuguese acquisition. In fact, a qualitative inspection of the L2 Spanish group’s production items showed that participants in this group employed both regular and irregular past participles in both syntactic contexts, suggesting that (1) they understood to some extent that two different forms were associated with the same verb, but (2) they were not quite able to grasp the syntactic constraints determining the use of one and the other form, and (3) they did not transfer strategies from Spanish in the use of regular forms in perfective constructions successfully but rather seemed to have second-guessed themselves in respect to the use of these strategies. Although the L2 Spanish group produced a significantly higher number of regular forms in contexts where the irregular form was licensed, even when they correctly chose the irregular form, they still produced a higher number of orthographic mistakes compared to the No Spanish group. This points to CLI effects over morphology, supporting the Parasitic Hypothesis. However, in the current study, syntactic context (the choice of form) and morphology (orthographic accuracy) were conflated in the recognition and ACC tasks, and we cannot affirm with confidence that the inferior performance
of the L2 Spanish group on irregular past participles for these tasks is caused exclusively by shortcomings in the learning of morphology. Conscious overcorrection strategies may also help explain the lack of positive CLI from Spanish in AGR. By noticing a difference between the two languages (the existence of two different verb forms), it is possible that L2 Spanish speakers did not trust their intuitions for AGR in either linguistic context, which could have led them to purposefully select a rule different from Spanish. If that is true, a confusion caused by the initial exposure to two different verb forms may have mitigated positive CLI effects. Although this strategy was not reported by any participant in the debriefing questionnaire, it cannot be completely dismissed.

The analysis for AGR showed that the L2 Spanish group started with a significant advantage on AGR of irregular past participles, even though the effect size of this difference was small ($\eta^2=0.10$). However, there was again no benefit for the L2 Spanish group after treatment for AGR of either regular or irregular past participles. One way to look at these results is by taking into account that AGR of regular past participles is null (there is no overt agreement). If participants in the No Spanish group transferred their AGR strategies for regular past participles from English, this would have worked to their advantage, since Portuguese, Spanish, and English AGR strategies coincide in this case. This could explain the lack of difference between groups for AGR of regular past participles. If that is true, performance on AGR may have directly affected results for ACC of regular past participles. For AGR of irregular past participles, an alternative explanation is that L2 Spanish speakers may have not fully acquired AGR rules for passive-voice constructions in Spanish or that knowledge of AGR was similar for both groups prior to treatment. Although precautions were taken to control for participants’ knowledge of Spanish (minimum scores on the Spanish C-test and minimum time of formal Spanish instruction), participants did not complete a specific test on Spanish subject-verb agreement prior to the experiment. If L2 Spanish speakers did not successfully acquire the pertaining agreement rules in Spanish prior to the experiment, they consequently could
not transfer these rules to L3 Portuguese. A group of L1 Spanish speakers could help clarify whether the performance on AGR was due to incomplete acquisition of AGR in L2 Spanish.

Overall, results partially support the predictions of both the TPM (Rothman, 2011) and the Scalpel Model (Slabakova, 2016). Both models predict positive transfer of converging structures, not confirmed for recognition, ACC, and AGR, but confirmed for FORM. However, neither model posits that CLI will be realized in the L3 100% of the time. Instead, they argue for the primacy of conditioning factors that will most likely result in transfer. While the TPM predicts both positive and negative transfer based on a general perception of psychotypological proximity (wholesale transfer, in Slabakova’s words), the Scalpel Model predicts localized transfer based on the similarity of individual structures and not of the whole linguistic system. Negative transfer of contrastive localized structures as past participles found in the current study is, therefore, predicted by both models. It is also possible, that the lack of positive CLI for performance on recognition, AGR, and ACC are due to the interaction of CLI and other factors. The Scalpel Model, for instance, suggests that structure-specific variables such as complexity, frequency, and misleading information may attenuate or increase CLI effects. Whatever these variables might be, in the current study they could have affected AGR more than FORM. If we consider, for instance, that the acquisition of subject-verb agreement is a long-term nonlinear process and that the intermediate L2 Spanish speakers in this study may not have entirely mastered the Spanish agreement rules, then it is possible that a wider range of positive CLI effects for regular past participles were masked by this incomplete acquisition. Data from an L1 Spanish group or an advanced L2 Spanish group on recognition, ACC, and AGR tasks for regular past participles would allow us to test this hypothesis. The current findings also offer support to the L2 Status Factor against the L1 Status Factor, by providing evidence of primacy of L2 transfer over L1 transfer in the acquisition of past participles. However, the absence of an L1 Spanish group does not allow us to completely refute the L2 Status
Factor claim that L2 blocks L1 effects, since the current results could also be explained by typological proximity. Furthermore, the evidence of negative CLI found in this study provides counter evidence to the predictions of the CEM.

**RQ3 – CLI Effects on the Recognition and Written Production of Lexical Items at Different Learning Stages**

Research Question 3 asked how CLI from Spanish affected different learning stages in the acquisition of Portuguese lexical items, operationalized as the differential performance between the immediate posttest recognition task (Task 1) and the immediate posttest production task (Task 2), and between the immediate posttest production task (Task 2) and the delayed posttest production task (Task 3). Results from Task 1 were interpreted as a measure of initial intake of Portuguese forms corresponding to Leow’s (2015a) Learning Stage 2. Results from Task 2 were interpreted as corresponding to Leow’s (2015a) Learning Stage 6, and results from Task 3 were interpreted as retained knowledge, a stage beyond Leow’s (2015a) Learning Stage 6. The analyses conducted in the current study showed evidence of negative CLI in the performance of the L2 Spanish group, whose scores were significantly lower than scores for the No Spanish group in all three tasks for the combined scores of cognates and non-cognates. It also showed that the curve slopes for each of the two task pairs were similar for both groups, suggesting that (although constant) the effects of negative CLI from Spanish were not more pronounced at any specific learning stage. In other words, CLI seems not to have affected further processing of intake (measured by production in immediate delayed production tasks) in additional ways compared to its effects on initial input processing. Moreover, neither groups showed significant losses in performance from Task 2 to Task 3, which suggests that all participants were able to retain some of what they learned during treatment. Decreased performance from Task 1 to Task 2 was expected, since intake information may be lost before becoming available for production, and other processes related to memory
activation may be involved in production, but not in recognition (De Groot & Keijzer, 2000). Decreased performance from Task 2 to Task 3 was also expected, as not all knowledge may be stored robustly in long-term memory and form more stable and complex connections that allow for its retention.

It is not possible from the current results to pinpoint the exact cognitive processes and mechanisms affected by CLI. We could assume that, since CLI was found for the recognition of lexical items, if nothing else it affected the input processing stage. According to Leow (2015a), processing of input is largely dependent upon the level of attention (peripheral, selective, or focal) and can be accompanied or not by depth of processing, awareness, and cognitive registration of data, leading to different phases of intake: attended intake, detected intake, and noticed intake. Detected intake (which implies some level of cognitive registration and amount of selective attention paid to linguistic information), noticed intake (which implies deeper processing and some level of awareness in addition to selective attention and cognitive registration), and, to a lesser extent, attended intake may all be logged in working memory and available for subsequent recognition (Leow, 2015a, p. 243). Therefore, diminished intake could reflect different types of allocated attention, depth of processing, and/or levels of awareness during input processing. Only an experimental design that captured the distinction between these three processing mechanisms would allow us to draw any conclusions about how they interact with CLI. Our results, therefore, can only inform us about the effect of CLI on the product of input processing—that is, on the amount of linguistic information that entered working memory. It is also not clear from the current findings whether the differential performance between groups on Task 2 and Task 3 is simply a reflection of the initial CLI that affected input processing, or if CLI interacted with further processing of intake or processes involved in production. Since the differential performance of the L2 Spanish group on the recognition task versus the lexical immediate production task was not different from the No
Spanish group, we could assume that CLI did not introduce additional levels of difficulty to cognitive processes during immediate production. CLI also did not affect retention (measured by the delayed production task) more than it affected immediate production, which suggests that CLI did not affect storage in long-term memory.

From a theoretical perspective, N. Ellis’s (2006b) Associative Learning Theory offers a plausible explanation for the effects of CLI on attention and levels of awareness that may have affected input processing, limiting the learners’ detection and noticing of morphological differences in non-identical cognates. It is not so clear, however, how the theory would account for diminished intake of non-cognates, unless mechanisms such as blocking and overshadowing could be extended to words that do not overlap in form but overlap in meaning. A qualitative analysis of the L2 Spanish group’s production of non-cognates revealed that L2 Spanish speakers employed a small number of borrowings (13%) compared to developmental (or intra-lingual) errors (87%). This means that L2 Spanish speakers, for the most part, realized that the Portuguese target words were not Spanish cognates and avoided the Spanish morphology when attempting to produce them, but were less successful than the No Spanish participants in accurately acquiring the Portuguese morphology. If the scope of linguistic phenomena affected by learned inattention goes beyond item learning at the word level, it could have hindered the perception of Portuguese language phonotactic constraints and morphological rules. Hall’s (2002) Parasitic Hypothesis, on the other hand, assumes that in early stages of vocabulary development learners automatically exploit existing lexical materials when forming initial memory representations “via pattern-matching between the contents of working-memory (the new form) and long-term lexical memory (the L1 and L2 mental lexicons)” (p. 82). Cognates would function as magnets based on their level of phonological and orthographic similarity, attracting the new word and causing them to be stored in the learner’s mental lexicon in close proximity to the existing cognates. If the initial representation of L3
cognates are too closely associated with pre-existing words, these representations may mistakenly incorporate elements of the pre-existing words, or pre-existing words may be activated during recognition. This hypothesis offers an alternative explanation for how CLI affects the intake of Portuguese cognate forms: they may interfere with the development and retrieval of lexical representations rather than affect learners’ attention to form. The Parasitic Hypothesis, however, does not explain the results found for non-cognates. The comparative performance on different assessment tasks is, in and of itself, a contribution to the field of CLI. One of the few CLI studies to compare performance on different task types is De Groot and Keijer (2000). They investigated the learning of pseudo-words (cognates or non-cognates with Dutch) by L1 Dutch speakers with different L2s, comparing comprehension and forgetting of abstract and concrete nouns, and found that learners performed better on immediate recognition tasks than on production tasks, in line with the findings of the current study.

RQ4 – CLI Effects on the Recognition and Written Production of Morphosyntactic Items at Different Learning Stages

Research Question 4 asked how CLI from Spanish affected different learning stages in the acquisition of regular and irregular past participles of abundant Portuguese verbs. Learning stages were operationalized as the differential performance between the immediate posttest recognition task (Task 1) and the immediate posttest production task (Task 2), and between the immediate posttest production task (Task 2) and the delayed posttest production task (Task 3). As with RQ3, results from Task 1 were interpreted as a measure of initial intake of Portuguese forms corresponding to Leow’s (2015a) Learning Stage 2. Results from Task 2 were interpreted as representing immediate learned knowledge, corresponding to Leow’s (2015a) Learning Stage 6, and Task 3 were interpreted as the result of retained L3 knowledge (beyond Leow’s Learning Stage 6), respectively. To answer this question, only irregular past participles were analyzed, since none of
the L2 Spanish participants scored zero on the recognition of regular past participles in the pretest, which would have conflated the effects of the experimental training task and participants’ prior knowledge. Results from a total of 31 participants entered this analysis. Since no CLI effects were found for AGR on irregular past participles, only results for FORM and ACC of irregular past participles were analyzed. The analysis of CLI at different learning stages for ACC scores revealed that the differential performance from Task 1 to Task 2 was similar across groups. From Task 2 to Task 3, the loss in performance was more pronounced for the No Spanish group. Negative CLI was still found for both Tasks 2 and 3. The performance of both groups significantly decreased from Task 1 (posttest recognition) to Task 2 (posttest production) and again from Task 2 (posttest production) to Task 3 (delayed production). The effect sizes for differential performance from Task 2 to Task 3 was \( d = .58 \) for the No Spanish group and \( d = 1.38 \) for the L2 Spanish group.

Also, given the results for RQ2, we must consider the fact that, although the No Spanish group showed more pronounced losses in ACC scores for irregular past participles from the immediate posttest to the delayed posttest, the difference between ACC scores in the pretest and delayed posttest were still significant for the No Spanish group, showing that they were able to retain some of the gains from treatment. That was not true for the L2 Spanish group, whose ACC scores from the pretest and delayed posttest were not statistically different, showing that although their losses from post- to delayed posttest were not as pronounced, in the end they did not retain any significant gains from treatment. The analysis of CLI at different learning stages for FORM scores showed that differential performance from Task 1 to Task 2 and from Task 2 to Task 3 was similar between groups. The performance of both groups did not significantly decrease from Task 1 (posttest recognition) to Task 2 (posttest production) or from Task 2 (posttest production) to Task 3 (delayed production). Overall results for ACC and FORM scores on irregular past participles show that CLI was not more pronounced in later stages of learning, remaining constant across tasks. The
impoverished retention of gains in ACC scores by the L2 Spanish group in the delayed posttest could be due to their low performance on the immediate posttest.

Similar to the analysis for lexical items, one way to interpret these results is to assume that CLI did not interact with additional process involved in production, but only affected the cognitive mechanisms involved in initial input processing. Since differences in levels of attention and awareness, as well as depth of processing, can lead to differentiated intake (attended intake, detected intake, or noticed intake), it is likely that CLI interacted with one or all these processes, although the measures used in the current study do not allow us to identify exactly which processes were affected and to what extent. If we that consider activation and inhibition processes are also involved in retrieval for recognition (and not only production), as posited by theories of vocabulary development, such as the Parasitic Hypothesis (Hall, 2002; Ecke, 2014), then it is possible that CLI reflects the specific way in which mental representations of closely related languages are formed and stored in the multilingual brain. While theoretical frameworks such as the Parasitic Hypothesis and the BIA+ (Dijkstra & van Heuven, 2002a) apply more directly to lexical acquisition, their predictions could be easily extended to morphosyntactic phenomena if we assume no difference between item and rule learning (Perruchet & Vinter, 1998; Perruchet, 2008; Ellis, 1998, 2008; Taylor, 2002; Tomasello, 2009).

RQ5 – Differential Performance on the Recognition and Written Production of Lexical Versus Morphosyntactic Linguistic Items in L3 Portuguese

This research question asked if there were differences in the recognition and production of lexical versus morphosyntactic items and whether CLI affected these two linguistic item types differently. To answer this question, scores for cognates and non-cognates were combined into a single lexical item score, which was then compared to regular past participles and irregular past participles separately. The analysis of scores for all participants in the recognition task showed that
both groups in general performed better on regular past participles on the pretest. In the delayed posttest a differential effect for item type was found for the L2 Spanish group only, with higher scores on regular past participles. For lexical items versus irregular past participles, when scores of all participants were taken together, performance was significantly higher for lexical items compared to verbs in the posttest and approached significance in the delayed posttest (the opposite pattern was found for lexical items versus regular past participles). At all points in time, both groups showed similar performance patterns on lexical versus irregular past participles. Results for the recognition scores showed that differential performance on linguistic items cannot be reduced to the distinction between lexical versus morphosyntactic items, but rather depends on each specific structure. Lexical items were easier to recognize than irregular past participles, but more difficult to recognize than regular past participles, with a slightly advantage for the L2 Spanish group. This advantage, which appears in the delayed posttest results, could be attributed to positive CLI from Spanish. It is possible that the regularity of verb endings (made more salient due to frequency and the lack of overt agreement) made the regular past participles more recognizable for both groups, overriding any advantages of lexical items, as predicted by VanPatten’s (1990, 2002, 2004) Input Processing Theory.

For production, lexical scores were first compared to ACC scores, and then to AGR and FORM. For lexical items versus ACC of regular past participles there was no difference between linguistic item type on the pretest for either groups. However, while the No Spanish group scored higher on lexical items on both post- and delayed posttests, the L2 Spanish group scored higher on ACC of regular past participles in the delayed posttest. Also, all groups scored significantly higher on lexical items compared to irregular past participles at all points in time. Therefore, the production of lexical items was overall easier than the accurate production of verb forms, with exception of regular past participles by the L2 Spanish group. It seems that knowledge of the Spanish regular past past
participles continued to give the L2 Spanish group an advantage in the production of their Portuguese counterparts. This positive CLI effect becomes a statistical advantage for the L2 Spanish group one week later, improving retention of regular verb forms more than nouns.

The comparison between the production of lexical items and AGR revealed that the L2 Spanish group scored significantly higher on AGR of regular past participles at all points in time, while the No Spanish group scored significantly higher on AGR of regular past participles on the delayed posttest only (with no differential performance by item type in the pre- and posttests). Results were similar for irregular past participles, with the L2 Spanish group scoring higher on these forms over lexical items at all points in time, and the No Spanish group showing no differential performance for item type at any point in time. Again, CLI from Spanish seems to have played a role facilitating the production of AGR over lexical items, even though this effect was not captured by the comparative performance on AGR between groups examined in RQ2. In the absence of CLI from Spanish, differences in the production of AGR versus lexical items are negligible. These results differ from results for the accurate production of morphosyntactic items, which was overall more problematic than lexical items.

The comparison between the production of lexical items and FORM showed that, as with the results for the recognition task, there was an effect for item type for the No Spanish group only in the posttest, with higher scores on lexical items. On the other hand, the L2 Spanish group scored significantly higher on FORM of regular past participles at all points in time (even before treatment), confirming the positive CLI from Spanish found in the analysis for RQ2. This superior performance on FORM over lexical items on the pretest was not due to differences between groups, since results from the Univariate ANCOVAs showed that the two groups performed at similar levels on FORM of regular past participles on the pretest. Finally, the comparison between production of lexical items and FORM of irregular past participles showed no effect for item type in
the pretest by either group, and significantly higher performance on lexical items for both groups in
the posttest and delayed posttest. These results are similar to those for recognition and ACC,
suggesting that the recognition and production of lexical items were overall easier than the
recognition and production of irregular past participles. However, when considering the acquisition
of irregular past participles, AGR did not appear to be an element of difficulty. Instead, it seems that
FORM was the key element predicting difficulty or diminished performance. While FORM relates
to the syntactic distribution of the two types of past participles, ACC involves both the syntactic
distribution of verbs and orthographic accuracy, as well as AGR, so it is possible that orthography
contributed to the increased difficulty associated with irregular past participles.

These results show not only that differential performance on lexical versus morphosyntactic
items are structure-specific, but that they depend on the different features associated with the same
linguistic structure, such as syntactic constraint, morphology, spelling, agreement, etc. In the current
study, the fact that both groups scored at similar levels on cognates and non-cognates (especially in
the recognition tasks) indicate that these two types of linguistic items were similar in terms of
salience. In contrast, results for the morphosyntactic items point to differences in both salience and
complexity making regular forms easier to learn (at least for the L2 Spanish group), even though
both forms have the same communicative value (irregular forms convey number and gender, but
this information is redundant, also represented by a subject pronoun). An argument could be made
that irregular past participles are more complex than regular past participles, in line with Hulstijn
and Graaff’s (1994) definition of complexity. To arrive at the correct irregular form, learners would
have to apply one derivational rule for syntactic distribution and an additional rule for agreement, a
step not required for regular forms. This view is also supported by DeKeyser’s (2005) notion of
complexity of form, as one of the factors determining grammatical difficulty, especially if we consider
that learners are less sensitive to plural marking (and perhaps gender agreement) morphology (Jiang,
2004). On the other hand, it is possible that regular past participles were rendered more salient due to
the repetition of the verb endings –ADO and –IDO compared to irregular past participles, which
present greater variation in suffixation (e.g. –ESO, –EGO, –TO, –IDO). Moreover, irregular past
participles inflect for gender and number, so one single verb ending can take four different
realizations (e.g. –EGO, –EGA, –EGOS, –EGAS). The greater homogeneity of regular endings
could also have resulted in their lexicalization, as proposed by Greenslade et al. (1999).

In this study, participants were exposed to each of these ending variations just twice during
treatment, which introduces the element of frequency: since regular past participles do not vary by
gender and number, each of them appeared eight times during training—that is, four times more
than each individual instance of irregular past participle. Inferior performance on less salient
structures is in line with findings from SLA studies that found superior performance on present
tense forms compared to subjunctive forms, which were deemed less salient (Leow, 1995; Leow,
2001a; Leow et al., 2003). Our results, however, contrast with Collentine (1997), who found
learning of irregular subjunctive forms to be superior to learning of regular subjunctive forms. In
Collentine’s study, however, and unlike the current study, both forms were subject to the same
syntactic constraints, so results essentially reflected learning of morphology. In general, when
disregarding the positive effects of CLI from Spanish, lexical items were learned better than
morphosyntactic items, corroborating the claims about the relative difficulty associated with
learning of L2 morphosyntax (Parodi, Schwartz, & Clahsen, 2004; Hahne, Mueller, & Clahsen,
2006). Results also support the item-based versus rule-based learning distinction if we consider that
(1) for syntactic distribution item learning is less likely to occur (De Graaff, 1997), (2) lexical items
are more noticeable or salient (Schmidt, 1995; Gass et al., 2003) and (3) lexical items are processed
first (VanPatten, 1990, 2002, 2004). However, an important contribution of this study to research on
linguistic item type is that is shows that prior language knowledge interacts with intrinsic and
contextual characteristics of linguistic structures. The effects found for CLI in interaction with linguistic item type were more prominent for FORM of regular past participles and for AGR of both types of past participles, where the effect was facilitative. Negative CLI did not seem to have an effect on the differential performance of the two linguistic item types.

RQ6 – The Role of Aptitude in the Recognition and Written Production of Portuguese Lexical Items

This research question was motivated by Robinson’s (1997) and Trofimovich et al.’s (2007) claim that grammatical sensitivity enhances awareness of forms, helping learners notice more linguistic features in the input, which facilitates learning and the intake of forms. It was also motivated by Odlin’s (1989) suggestion that greater language aptitude is associated with less interference from prior language knowledge. RQ6 asked whether aptitude (defined either as grammatical sensitivity, grammar inferencing, or analytical ability) related to performance on the recognition and production of Portuguese target lexical items (the combined scores for cognates and non-cognates). Results showed no significant positive relationships between aptitude and the recognition or production of lexical items. In fact, especially for recognition, correlations between aptitude components and performance tended to be negative. Significant but small negative correlations were found between recognition scores and both grammatical sensitivity ($r_s = -.24$) and analytical ability ($r_s = -.25$) scores. These results are unexpected when we consider the large number of studies showing aptitude (and especially grammatical sensitivity) as a predictor of L2 lexical acquisition (Ehrman & Oxford, 1995; Ranta, 2002, 2005; Erlam, 2005; Trofimovich et al., 2007). On the other hand, results are in line with Robinson’s (1995, 1997b, 2002a) findings for the role of aptitude in incidental tasks. In his studies, aptitude (defined as grammatical sensitivity) positively correlated with learning in explicit and implicit conditions, but not in incidental conditions.
Robinson’s incidental condition, however, required learners to focus only on comprehension, prompted by task instructions and comprehension questions immediately after exposure. In the current study, the training tasks (the picture-matching recognition task and the controlled multiple-choice translation task) were designed to promote deeper processing compared to the comprehension-based tasks typically found in studies on spontaneous noticing (e.g. Robinson, 1997b, 2002a; Laufer, 2001; Martinez-Fernandez, 2007; Park & Han, 2008; Park, 2011). However, it is possible that the tasks in the current study did not require the type of ability measured by grammatical sensitivity and grammar inferencing tests and that other cognitive abilities, such as working memory, are more closely related to the learning of vocabulary. It is also possible that both of these aptitude components are involved in the extraction and inferencing of meaning, rather than attention to form. They may only play a role in more advanced stages of second language acquisition and not at initial stages, as suggested by Robinson (2002a). Although greater grammatical sensitivity is believed to promote higher degrees of spontaneous awareness, aiding the development of explicit knowledge (Ellis & Larsen-Freeman, 2006), the limited time of exposure combined with learners’ relative inexperience in the target language may not have allowed explicit knowledge to develop. Thus, the benefits of higher grammatical sensitivity and grammar inferencing may not have been captured by the experimental design, even though some participants showed awareness at the level of understanding for morphosyntactic items, as measured by the debriefing questionnaire. This incipient explicit knowledge, however, did not reflect accurate understanding in the case of grammatical rules. Also, explicit knowledge of lexical items is not exactly the same as knowledge of grammar. With respect to lexical items, results from the debriefing questionnaire showed that participants were somewhat aware of morphological contrasts between Spanish and Portuguese, but could not pinpoint the differences with precision, referring to them in general terms, as length of words, missing letters, etc. One possible explanation is that
working memory, rather than analytical components of aptitude, is more closely related to the ability of perceiving and remembering subtle morphological contrasts. Furthermore, considering that analytical ability increases noticing of forms in the input, it is possible that learners with higher analytical ability did notice a greater number forms, but performance was hindered by competing cognitive processes. This hypothesis could only be tested with online measures that elicited participants’ attention and awareness to form during training.

RQ7 – The Role of Aptitude in the Recognition and Written Production of Portuguese Morphosyntactic Items

As with Research Question 6, this research question was motivated by Robinson’s (1997) and Odlin’s (1989) claims about the beneficial effects of higher aptitude in promoting increased intake of forms and diminished CLI, respectively. Also, according to Tolentino and Tokowicz (2014), grammatical sensitivity is associated with better performance on L2 morphosyntax. RQ7 asked, therefore, whether aptitude (defined either as grammatical sensitivity, grammar inferencing, or analytical ability) related to performance on the recognition and production of Portuguese morphosyntactic items. Regular and irregular past participles were analyzed separately, since RQ2 showed evidence of differential performance on these two item types for both groups. Results showed that the different aptitude components did indeed correlate with performance on the two types of past participles differently. There were significant positive correlations between the recognition of regular past participles and grammar inferencing (pretest, posttest), grammatical sensitivity (pretest, delayed posttest), and analytical ability (pre-, post-, and delayed posttest). However, these correlations were weak (from $r_s=.23$ to $r_s=.33$). Results for accuracy production scores (ACC) for regular past participles were mixed, but there was a positive moderate correlation between ACC of regular past participles and grammatical sensitivity ($r_s=.45$), as well as a positive weak correlation between ACC of regular past participles and analytical ability ($r_s=.23$).
Grammatical sensitivity also positively correlated with AGR of regular past participles ($r_s=.36$), but there were no significant correlations between FORM and aptitude. These results point to some beneficial effects for all aptitude components in the recognition of regular past participles, in line with findings from de Graaff (1997). Similar to Robinson’s (2002a) and Trofimovich et al.’s (2007) findings, results for ACC of regular past participles showed that both grammatical sensitivity and analytical ability had a more prominent effect in the delayed posttest, and therefore may be related to better retention. Furthermore, of all aptitude components, grammatical sensitivity correlated more closely with better performance on regular past participles than the other aptitude components.

On the other hand, the correlations between the recognition of irregular past participles and aptitude components were in general negative. The only significant correlation was between recognition and grammatical sensitivity ($r_s=-.45$). ACC of irregular past participles showed significant moderate correlations with both grammatical sensitivity ($r_s=-.50$) and analytical ability ($r_s=-.40$), but, again, the correlations were negative. In addition, there were weak to moderate negative correlations between grammatical sensitivity and AGR (pre- and posttests), and FORM (pre- and delayed posttest). The only positive correlation between irregular past participles and grammatical sensitivity was found for FORM in the posttest ($r_s=.34$). These results contradict findings from de Graaff (1997), Ranta (2002), and Tolentino and Tokowicz (2014). Again, it is possible that the current findings relate to the reliability of regular past participle verb endings, making them more salient than irregular forms. Advantages in aptitude could have been enough to help leaners with more salient morphology, but not enough to have a facilitative effect for the more complex irregular forms which combined a greater variety of endings in addition to number/gender agreement. The analysis for irregular past participles can be compared to that for lexical items. While the relationship between aptitude and performance on morphosyntactic items was more evident compared to lexical items, it is still possible that the nature of the training and assessment
tasks contributed to the lack of robust results. Also for morphosyntactic items, grammatical sensitivity was the aptitude component with better correlations.

Similar to the analysis for lexical items, the explicit knowledge developed after exposure to target items in the experimental tasks may not have been enough to facilitate learning, so the lack of correlation between aptitude and performance may be due to task effects and limited time of exposure. Also, results could be related to observations made by Yilmaz (2013) and Yilmaz and Granena (2016), according to which this cognitive ability seems to be more helpful in explicit learning conditions (explicit feedback rather than implicit feedback, in their case) rather than in incidental or implicit conditions. Overall, results suggest that aptitude, and especially grammatical sensitivity, may be a predictor of performance for some but not all morphosyntactic items. Again, the role of aptitude in second language learning depends not only on the type of linguistic item, but on specific features of these items.

RQ8 – The Relationship between Aptitude and Spanish CLI

This question asked if aptitude (as either grammatical sensitivity, grammar inferencing, or analytical ability) enhanced positive CLI or mitigated negative CLI from Spanish. First, a comparison between groups showed that the L2 Spanish group had significantly higher scores on grammatical sensitivity compared to the No Spanish group. However, although the L2 Spanish group was learning Portuguese as an L3 and the No Spanish group was learning Portuguese as an L2, this advantage cannot be attributed to a bilingual/monolingual distinction, since many participants in the No Spanish group also spoke a second language. As discussed above, when considering the performance of both groups, grammatical sensitivity was the aptitude component that correlated more closely with better performance, corroborating findings from Ehrman and Oxford (1995), Ranta (2002), and Hummel (2009). Positive correlations between grammatical sensitivity and better performance coincided with positive CLI from Spanish in (1) the recognition
of regular past participles in the pretest and (2) AGR of irregular past participles in the pretest. When the performance of the L2 Spanish group was analyzed separately, the only statistical correlation was between grammatical sensitivity and ACC scores for regular past participles in the delayed posttest. There was no differential performance between groups for this task—that is, no negative or positive CLI from Spanish. Results from the Univariate ANCOVAs, however, showed that after the effects of grammatical sensitivity were partialed out from AGR scores for irregular past participles in the pretest, there were no differences between groups. This suggests that grammatical sensitivity played a role in the performance of the L2 Spanish group in the pretest, contributing to the positive CLI found for this task, contrary to what Spearman’s correlation coefficients indicated. However, since the difference between groups for AGR scores for irregular past participles had a very small effect size, it is possible that the statistical difference found between groups was simply the result of a Type I error. Most importantly, grammatical sensitivity was not shown to enhance positive CLI effects of Spanish after treatment in any case. Regarding the role of other aptitude components in cases where positive CLI was verified, grammar inferencing only revealed a positive correlation with the recognition of regular past participles in the pretest. It seems, then, that the interaction of positive CLI and grammar inferencing was negligible, suggesting that this aptitude component did not help optimize the use of prior knowledge too much. Almost the same relationships found between grammatical sensitivity and performance were found for analytical ability when considering the L2 Spanish group separately. Given the small interaction of grammar inferencing and CLI, however, we could assume that results for analytical ability are due to the effect of grammatical sensitivity.

The analysis of the role of the different aptitude components in cases where negative CLI was found for lexical and morphosyntactic items returned only negative correlations between (1) grammatical sensitivity and the recognition of irregular past participles in the delayed posttest, and
(2) analytical ability and FORM of irregular forms in the posttest. At a first glance, the overall trend in negative correlations between aptitude and performance on irregular past participles suggests that the cognitive abilities measure in the current study not only did not help but actually hindered performance on this type of linguistic item. However, we should keep in mind that the L2 Spanish group was the group with higher grammatical sensitivity scores and that negative CLI affected the performance of this group, so the actual role of aptitude in the learning of irregular past participles may be masked by the effects of negative CLI. Results from the Univariate ANCOVAs indeed indicated that after the effects of the different aptitude components were partialed out, negative CLI was still present for all tasks in which it had originally been found.

**Summary of Conclusions**

This study addressed the question of whether negative CLI from Spanish affected learning of L3 Portuguese by comparing the performance of learners of Portuguese who spoke L2 Spanish at the intermediate level to the performance of learners of Portuguese with no knowledge of Spanish. It also investigated if CLI differed in the recognition and production of lexical versus morphosyntactic items, how CLI affected different learning stages, and whether CLI was mediated by aptitude (operationalized as grammatical sensitivity, grammar inferencing, or both). Findings from this study make valuable contributions to the field of CLI and PSL by providing evidence of both negative and positive CLI from Spanish after initial exposure to Portuguese input. Contrary to an overall facilitative effect for cognates, results suggest that certain aspects of cognate learning can be negatively affected by typological proximity (or formal overlap). In this study, evidence of negative CLI was found for the recognition and production of both cognates and non-cognates, although small effect sizes for non-cognates indicate that negative CLI was more evident in the learning of cognate nouns. These results suggest that, although knowledge of Spanish is known to facilitate comprehension of Portuguese cognates, negative CLI effects may outdo the receptive
advantage enjoyed by L2 Spanish speakers when it comes to learning formal aspects of Portuguese and subtle morphological contrasts. These results are in line with Ringbom (1983), who found that typological proximity resulted in more negative transfer, and with his assumption that in early stages of SLA, typologically close structures are stored in memory based on form.

Negative CLI was also found for ACC and FORM scores (but not for AGR) of irregular past participles, suggesting that overall accuracy in the production of these items may depend more heavily on choice of form. Therefore, learning associated with choice of form (i.e. their syntactic distribution) seems to be more strongly affected by CLI than agreement. Importantly, results show a more nuanced CLI role in nonnative language acquisition, which not only depends on linguistic item type, but on specific features related to discrete structures and syntactic contexts. This localized type of transfer is supported by the Scalpel Model of L3 Acquisition (Slabakova, 2016) and in line with results from Guijarro-Fuentes et al. (2008) and Cabrelli et al. (2008), who found evidence of positive transfer from uninterpretable Spanish features into Portuguese. However, in the current study, positive CLI effects were not as prevalent as negative CLI effects. Evidence of positive CLI after exposure was only found for FORM of regular past participles. Some prior knowledge of Spanish gave learners of Portuguese a slight advantage for AGR of irregular past participles on the pretest only, suggesting that L2 Spanish speakers used their knowledge of Spanish as an initial strategy. For some reason, knowledge of Spanish did not result in superior performance on Portuguese subject-verb agreement after treatment, contradicting findings from Guijarro-Fuentes et al. (2008), Cabrelli et al. (2008), and Iverson (2009). However, since agreement features have been shown to be transferable in the CLI literature, these results may reflect the interaction of CLI and other factors, e.g. task effects, nonlinear development, or incomplete L2 acquisition. Evidence of negative CLI in this study adds to the findings of various studies in the CLI literature (Birner & Ward, 1998; Hammarberg, 2001; Bohnacker, 2006; Llama et al., 2010; Bardel & Falk, 2007, 2012;
Falk & Bardel, 2011; Tsang, 2011; Kulundary & Gabriele, 2012; Karkafi, 2014; García Mayo & Slabakova, 2015; Slobakova & García Mayo, 2015) and is particularly relevant to the area of typologically close languages. They also offer support to the extensive list of anecdotal observations describing negative CLI from Spanish into Portuguese and studies that produced evidence of such interference in the form of borrowings (e.g. Rasuk, 2008; Graça Pinto & Carvalhosa, 2012), transfer of pronunciation (Cabrelli-Amaro & Rothman, 2010; Trude & Tokowicz, 2011), or rule transfer (Carvalho & Silva, 2006; Montrul et al, 2011; Giancaspro et al., 2015).

More importantly, this study approaches CLI from a different perspective—not simply as a quantification of transferred structures in the interlanguage of Portuguese learners or the verification of CLI source, but as an investigation of the effects of CLI in initial language development after first exposure to linguistic input, showing that CLI from Spanish can affect the intake of Portuguese lexical and morphosyntactic items either positively or negatively during initial input processing. In this sense, the current study is innovative, as it is one of the few studies outside the area of speech perception and phonology to directly investigate Spanish CLI in the intake of Portuguese forms. Although this study does not directly address the processing mechanisms affected by negative CLI, the lack of differential effects between recognition and production tasks suggests that CLI primarily affects mechanisms involved in the noticing of Portuguese forms. Further supporting this conclusion, results from the Debriefing Questionnaire showed that the No Spanish group produced more instances of awareness of target forms than the L2 Spanish group.

Although different theoretical approaches offer plausible explanations as to how prior knowledge may affect input processing and the learning of forms, justifying the interpretation of results as evidence of CLI, it is important to consider other factors that may have influenced performance of the two populations investigated in this study. As results from the debriefing questionnaire showed, the two groups differed in motivation (operationalized as time of exposure to
the language outside the classroom), enjoyment in learning Portuguese, and personal versus program-related reasons for enrolling in a Portuguese course. The higher motivation found for the No Spanish group may have led them to approach the experimental tasks differently, with higher involvement and interest in learning. Similarly, the fact that the L2 Spanish group enjoyed higher proficiency, may have caused them to be overly confident. Time on task, however, was similar for both groups in the delayed posttest (M=9.025 for the No Spanish group and M=8.97 for the L2 Spanish group) and slightly higher for the L2 Spanish in the posttest (M=10.97) compared to the No Spanish group (M=9.13). Since the tasks were not timed, if the groups approached the tasks in different ways, this difference was not reflected on the time they spent in training and assessment tasks.

This study also makes contributions to research on linguistic item type not only by looking at the differential intake and written production of lexical versus morphosyntactic items in Portuguese acquisition, but also by comparing different types of lexical and morphosyntactic items based on the type of CLI triggered by knowledge of L2 Spanish. Learners performed better overall on lexical items compared to morphosyntactic items, but when we look at regular and irregular past participles, as well as at ACC, AGR, and FORM scores separately, we see a more complex picture. While both groups performed better on the recognition of lexical items compared to irregular past participles, they performed better on the recognition of regular past participles than on lexical items. Production of lexical items was in general easier than ACC scores on both morphosyntactic items. Performance of AGR and FORM of regular past participles was overall better for both groups than the production of lexical items, and even easier for the L2 Spanish group. However, AGR and FORM of irregular past participles proved to be more difficult than the production of lexical items for both groups in general. The role of aptitude as either grammatical sensitivity, grammar inferencing, or analytical ability was not pivotal to performance and had no mitigating effect on negative CLI. However, grammatical sensitivity was the aptitude component that best correlated
with superior performance, but only for the recognition and production of regular past participles. No strong correlations were found between the aptitude components and recognition and production of lexical items.

**Theoretical Implications**

Results were discussed considering generative CLI models of L3 acquisition and multilingual psycholinguistic models of lexical representation and processing. While findings for cognates support both the BIA+ model and the Parasitic Hypothesis, by pointing to the initial dependence of Portuguese representations on prior knowledge of Spanish (materialized as Spanish CLI), findings for non-cognates are not as clearly explained by these approaches, unless we consider a general dependence of the emerging L3 Portuguese forms on Spanish representations based the overall proximity of the two languages. One could argue that the non-facilitative CLI effects for non-cognates can be explained in terms of overconfidence and overuse of transfer strategies (Corder, 1983; Faerch and Kasper, 1987). Indeed, in this study L2 Spanish participants rated themselves with significantly higher proficiency than the No Spanish participants in reading, writing, listening, and speaking skills, as well as in overall proficiency. 68% of L2 Spanish speakers also reported finding Portuguese and Spanish exceptionally similar and easy to learn. However, a closer look at the L2 Spanish production of non-cognates showed that these learners struggled more with morphology than with lexical item choice. This suggests that CLI from Spanish interacted with the intake of Portuguese forms by affecting mechanisms involved in input processing, such as attention to form and noticing. While it is possible that overconfidence and overgeneralization strategies resulted in diminished attention to form, associative phenomena such as contingency, overshadowing, and blocking, as posed by Ellis’s (2006b) Associative Learning Theory, could also explain the diminished intake of both cognates and non-cognates by L2 Spanish participants. Since associative approaches to language learning do not differentiate between rule and item-based
learning, they could also explain the effects of CLI on morphosyntactic items. However, only by assessing the differential attention, depth of processing, and noticing of Portuguese forms between learners with and without knowledge of Spanish, would we be able to support perceptual learning theories. Despite not being able to pinpoint differences in processing between groups, this study makes an important contribution to the field of CLI and PSS by showing that CLI acts at the level of input processing affecting the intake of Portuguese forms, even when attentional resources are not mainly allocated to the processing of meaning, in line with Long (1996) and contrary to VanPatten’s (2004) claims that learners will most likely process form when they need not dispense cognitive effort on comprehension.

In general, results offered support to typological proximity theories of CLI, showing the primacy of typology over order of acquisition with facilitative CLI effects from L2 Spanish over L1 English for regular past participles. Since CLI effects were found for L2 Spanish in L3 Portuguese, results partially confirm predictions of the L2 Status factor, but the hypothesis that L1 Spanish effects would be blocked by L2 English were not tested. Results also challenge the predictions of the CEM by showing evidence of non-facilitative effects. Overall, results support Rothman’s TPM approach to TLA, according to which typology yields both positive and negative transfer between languages, irrespective of their order of acquisition. Although the TPM does not make predictions regarding lexical learning, if we consider this model as proposing a wholesale role for typological proximity as a factor for transfer, the TPM could be easily extended to explain results for cognates and non-cognates. The predictions of the Scalpel Model are not easily confirmed by this study. For instance, if we assume that the Scalpel Model predicts positive transfer in the case of cognates and no transfer for non-cognates, the model is not supported by the current findings. However, this study showed that CLI type depends on typological similarity and contrasts at a local level. Moreover, results for morphosyntactic items align well with the predictions of both the TPM and
the Scalpel Model. See tables 46 and 47 for a summary of the predictions of TLA models regarding the type of CLI (positive or negative) extended to lexical items and actual findings. Since none of these models address strategies used in L3 prior to language exposure (as in the Competition Model), no predictions were made for the results of the pretest. Other factors that deserve further investigation as a factor triggering CLI from Spanish concern leaners’ intrinsic motivation and communicative needs (Gardner, 2000, 2010; Dörnye, 2009) and attitudes towards bilingualism (Thompson, 2013; Thompson & Aslan, 2014). As the results for the debriefing questionnaire showed, participants’ composite motivation score was significantly higher for the No Spanish group, who also spent more hours outside the classroom using their L3.

Table 46

**Predictions of TLA models for type of CLI on lexical items and actual findings**

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<tr>
<th>Recognition Task</th>
<th>Model Predictions</th>
<th>Current Study</th>
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<td>Cognates</td>
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<td>Non-Cognates</td>
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<th>Model Predictions</th>
<th>Current Study</th>
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<td>Non-Cognates</td>
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= Negative (non-facilitative) CLI; + = positive (facilitative) CLI; n/p = no predictions
Table 47

Predictions of TLA models for type of CLI on morphosyntactic items and actual findings

<table>
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<tr>
<th>Recognition Task</th>
<th>Model Predictions</th>
<th>Current study</th>
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<td>Regular PPs</td>
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<td>ACC Regular PPs</td>
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<td>FORM Regular PPs</td>
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<td>FORM Irregular PPs</td>
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= Negative (non-facilitative) CLI; + = positive (facilitative) CLI; PPs= past participles; ACC=accuracy scores; AGR=agreement; FORM=choice of verb form; n/p= no predictions.

Limitations and Future Research

To better understand the findings presented, it is important to discuss the limitations of the current research. In this section I discuss six limitations: sample sizes, learning conditions, recognition task design, choice of target forms, operationalization of processing, and measures of aptitude. Suggestions are made to address these limitations in future research and to further advance
the CLI field, particularly in the context of typologically close languages. One of the biggest challenges conducting research on CLI from Spanish in Portuguese learning in the context of American universities is finding participants who have never been exposed to Spanish and can be assigned to a control group. To assemble a modest sample of 28 participants, participants were drawn from eight different universities in the United States during two academic semesters. Spanish experience also poses a problem in this type of research, since Spanish learners in postsecondary courses have very different language backgrounds. Not only do L2 Spanish learners differ in level of proficiency but also in learning context and order of acquisition. For that reason, our sample sizes are relatively small. For more robust results, future research would certainly benefit from larger sample sizes and from a more specific evaluation of participants’ Spanish proficiency, using assessments that specifically measure linguistic knowledge of the selected target structures.

While the learning condition in this study was designed to emulate incidental tasks adequate for investigating intake and learning resulting from spontaneous attention and noticing, results for morphosyntactic items indicated that this type of task may not promote the type of processing necessary for the learning of morphosyntactic structures, such as the distribution of past participles, as suggested by Laufer and Hulstijn (2001) and Leow (2015a). Thus, future research should consider investigating CLI from Spanish using tasks that promote deeper processing, such as problem-solving and interpretation tasks (Leow, 2015a). Research has also shown that processing of linguistic information depends on mode of exposure and language use (Leow, 1993, 1995). In order to advance the study of L3 acquisition, future research should look at Spanish CLI in aural receptive and production tasks. The replication of this study in the aural model could help us separate CLI from the effects of orthographic transfer. Furthermore, since non-facilitative CLI was found for SSLPs in the absence of explicit information, it would be important to investigate whether explicit instruction and feedback aimed at raising awareness of crosslinguistic contrasts mitigate non-
facilitative CLI or enhance facilitative CLI, as suggested in Gass et al. (2003). The inclusion of explicit learning conditions would allow us to contribute to Tolentino and Tokowicz’s (2014) inquiry regarding the interaction between type of instruction, manipulated salience, and typological proximity at the local level.

In the current study, the two-option lexical decision task allowed for a 50% chance for accurate selection of Portuguese words, which was not ideal. Different measures could be employed for the recognition of lexical items in the pre- and posttests to reduce the chance margins, such as four-option multiple-choice tasks and vocabulary lists (in which participants underline or circle all words they recognize as instances of the target language). Moreover, the use of Spanish words as distractors in the lexical decision task should be avoided, so that interference from Spanish is not maximized by the unintentional activation of the Spanish node. Another limitation in this study concerns the choice of Portuguese lexical items, which did not conform to rigorous criteria in terms of number of syllables, frequency, and degree of similarity with Spanish, although items were controlled for number of syllables and length. The choice of target lexical items was partially motivated by curricular content, making sure that items were not among the vocabulary lists used in the first weeks of Portuguese instruction, and controlling for leaners’ knowledge of the Spanish counterparts (via a pilot test with Spanish intermediate learners). Drawing participants from different Portuguese programs made the process of controlling for exposure to target items more difficult. New target items could be selected from corpora studies investigating texts produced by native speakers or second language learners, such as the COPLE2 (Mendes, Antunes, Janssen, & Gonçalves, 2016). Also, corpora studies of the vocabulary used in language courses could be conducted to determine the different frequency of words L2 Spanish learners have acquired at the intermediate level, and which words Portuguese learners in beginning courses are more likely not to have been exposed to. Such studies could examine both the instructors’ oral production and aural/written pedagogical
materials. Controlling for prior exposure would entail either (1) a pre-planned controlled classroom design (highly dependent on the instructors’ cooperation and training) or (2) a laboratorial experiment design with absolute beginners—that is, learners with no knowledge of Portuguese.

Research on cognate effects may also help define a set of criteria for degree of typological similarity. The different effects of stem morphology versus suffix morphology described in Dijkstra et al. (2010) for English and Dutch could be applied to Spanish and Portuguese. For the Portuguese/Spanish pair, examples could include word pairs such as praça (Portuguese) versus plaza (Spanish) for stem morphology, and the word pair emoção (Portuguese) versus emoción (Spanish) for suffix morphology. Also, following Font (2001), the effects of CLI could be examined for different types of neighbor cognates based on the position of deviating letter/morphemes. Font found that the amount of cognate facilitation depended on whether cognates differed by letters at the end of the word (e.g. French text versus Spanish texto) or inside the word (e.g. French usuel versus Spanish usual), with letter-ending contrasts yielding larger facilitation effects.

Other aspects of lexical items may be worth investigating in relation to CLI, such as the number and type of contrasting letters and word position, as in studies of perceptual salience (Barcroft & Rott, 2010; Barcroft, 2000, 2008). Results for morphosyntactic items revealed that the distribution of double past participles was challenging for both groups. Future research should consider the effects of Spanish CLI on structures involving simpler syntactic rules or looking only at verb morphology (e.g. stem-changing verbs). In the domain of morphology, Akerberg (2013) investigated the production of experienced Portuguese learners and found positive CLI from Spanish for cognate verbs and nouns that followed the same derivational rule (e.g. llegar>llegar, chegar>chegada ‘to arrive>arrival’), words with different lexical base (e.g. desarrollar>desarrollo; desenvolver>desenvolvimento ‘to develop> development’), and words with salient suffixes (e.g. crer>crença ‘to believe>belief’). She also identified areas of negative CLI from Spanish (non-
facilitative effect), including cognate words that follow different derivational rules (e.g. *apto* > *aptidud/aptidão* ‘capable>capability’), infrequent words with less salient suffixes (e.g. *doido* > *doidice* ‘crazy>craziness’), peculiar word formation in Portuguese (e.g. *cair* > *queda* ‘to fall>fall’), and words for which variants are found in the dictionary (e.g. *conversar* > *conversal/conversação* ‘to talk>talk’). It would be interesting to investigate whether these patterns are different for non-Spanish speakers and if CLI affect processing of these items at initial states of Portuguese acquisition as well. Akerberg’s (2013) study reintroduces the issue of salience as a result of crosslinguistic contrasts and how the properties of input affect attention to and noticing of forms.

Another limitation of the current study was that the experimental tasks were not conducive to the elicitation of learners’ verbalizations using think-aloud protocols. In the absence of an online measure, no conclusions can be drawn regarding the effects of CLI on attention to and noticing of Portuguese forms (Odlin, 2003; Leow et al., 2011; Leow, 2015a). Future research should, therefore, consider different tasks, as suggested above, or other online measures that capture learners’ processing differences and allow us to isolate the effects of CLI on initial processing from its effects on the emergence of memory representations, knowledge strengthening, activation, and retrieval. Another methodological aspect future research should consider is the inclusion of multiple measures of aptitude. First, the administration of the full battery of tests, such as the MLAT (Carroll & Sapon, 1959) and LLAMA (Meara, 2005), could offer a more complete assessment of aptitude than analytical ability alone, capturing an interaction between aptitude and CLI or confirming the lack of correlation between the two. Following the development of aptitude research (Sawyer & Ranta, 2001; Robinson, 2005; Safar & Kormos, 2008; DeKeyser & Koet, 2011), the role of working memory should also be investigated in CLI studies. Also, even in studies looking at TLA initial states, it might be useful to assess learners’ metalinguistic awareness of both their L2 and L3, however incipient their L3 knowledge might be, since grammatical sensitivity and grammar
inferencing might not quite capture the abilities involved in developing language awareness.

Furthermore, although explicit knowledge (and the type of aptitude that facilitates explicit learning) has been contemplated as a mitigating factor in negative CLI by PSS researchers, it is possible that the type of aptitude involved in implicit learning (as in Granena, 2013) relate more closely with prior knowledge and how it mediates L3 processing and could be measured by battery tests such as the Hi-LAB (Linck et al, 2013), which incorporates measures of working memory, as well as alternative measures of inductive learning, such as semantic priming and reaction time tasks.

Future research investigating Spanish CLI in L3 Portuguese should also look at the effects of context and order of acquisition, by including L1 and heritage language Spanish groups, providing further evidence in support of the TPM or confirming a stronger role for the typologically close L1, as found for L1 Spanish in Child’s (2014) study of L3 Portuguese mood preferences. Furthermore, longitudinal studies or cross-sectional studies covering a wider range of proficiencies could help us understand CLI effects at later stages of Portuguese acquisition, helping to demystify or confirm whether there are areas in the interlanguage of SSLPs that are vulnerable to fossilization. A deeper understanding of the effects of Spanish CLI would also require a comparison of its effects with those of other Romance languages that bear different degrees of similarity to Portuguese, such as Italian, French, and Romanian. Finally, to test TLA models for typologically close languages, a more fine-grained elaboration of existing models’ predictions would be necessary, taking into account type and degree of typological proximity at the local level, and extending these models to incorporate the factors triggering CLI on the acquisition of lexical items, collocations, and pragmatics. Finally, the role of motivation should continue to be explored, especially with regard to communication needs, looking at the possibility that the high degree of intelligibility between the two languages and the rapid development of communicative skills may result in diminished attention to form and motivation to learn, as pointed out by Rojas (2006) and Ferreira (1995).
Pedagogical Implications

Results from the current study have provided some evidence of differential development in the initial states of Portuguese acquisition due to non-facilitative CLI from Spanish that might justify differential instruction for this particular group. Despite the receptive advantages SSLPs enjoy in classroom settings, results suggest that knowledge of Spanish reduces the intake of certain linguistic forms. The reason why prior knowledge of Spanish appears to diminish the intake and learning of certain Portuguese forms is not clear, but since CLI affects were found for recognition and written production after immediate exposure, it is possible that CLI affected processing of linguistic information by interfering with different cognitive mechanisms related to attention and noticing of forms. Results for morphosyntactic items may not come as a surprise to language instructors who, based on the findings of CA studies and classroom observations, would expect improved performance on converging structures (e.g. regular past participles) and diminished performance on diverging structures (i.e. crosslinguistic contrasts, such as the target irregular past participles). However, this study shows that SSLPs do not benefit quite as much from Spanish knowledge during initial states of Portuguese acquisition in all of areas in which we would normally expect facilitation effects, such as subject-verb agreement and the syntactic distribution of past participles. Instead, L2 Spanish leaners seem to struggle as much as learners with no knowledge of Spanish in those areas, which is not surprising given that certain aspects of second language acquisition, such as subject-verb agreement, are naturally challenging for L1 English speakers. Also, non-facilitative CLI is pronounced for diverging forms, especially in morphological accuracy. Non-facilitative CLI also affects learning of non-cognates, which may be caused by overconfidence in transferring Spanish strategies. Moreover, although cognitive effects may still facilitate comprehension, they have a detrimental effect on the intake of lexical morphology.
The fact that Spanish CLI affects initial processing of input provides support to the recommendations from the PSS field that instructors should favor awareness-raising activities, drawing attention to crosslinguistic contrasts. The development of explicit knowledge may indeed help separate the two linguistic systems in the minds of learners during recognition and production in early stages of acquisition, avoiding overreliance on the Spanish lexicon and forms. More than explicit explanations and metalinguistic comments, SSLPs could benefit from focus-on-form activities and other methodologies that promote deeper processing. Contextualized input, such as that provided in task-based instruction, could help raise awareness of pragmatic contrasts and Portuguese preferred lexical choices. Formative assessment would help instructors monitor the degree of CLI from Spanish and adjust the curriculum to the needs of learners for additional grammar-based and vocabulary reinforcement activities. Results from this study show that the effects of CLI not only affect production, which is more evident in the classroom, but also the recognition of lexical and morphosyntactic items. Oral production activities in the classroom often focus on communication and fluency, which are not problematic for SSLPs even when they use a great number of Spanish borrowings in their speech. To overcome shortcomings in the accurate intake of Portuguese forms, SSLPs may benefit from writing activities featuring explicit feedback and task-essential recognition practice.

It would be hard to make the case that non-facilitative CLI from Spanish requires that SSLPs be exposed to more time of instruction or completely different methods than those used in L2 classrooms. Portuguese learners with other language backgrounds often experience the same difficulties in learning certain Portuguese structures as do SSLPs and may encounter other problems due to interference of their own L1 and L2. However, courses specifically for SSLPs are still justified based on the superior receptive skills Spanish knowledge gives these learners. That is not to say that grammar and formal aspects of language should be disregarded in the PSS classroom.
simply because Portuguese and Spanish contrasts rarely cause breakdowns in communication. In that respect, SSLPs share many of the pedagogical needs of heritage speakers, who enjoy advanced communicative skills in introductory level language classes, but who still need to develop knowledge of grammatical nuances and work on morphological and orthographic accuracy. Instead of expanding vocabulary, as in the case of heritage speakers, SSLPs need to be able to test their hypotheses about which lexical and morphosyntactic constructions are transferable to Portuguese. They also need to overcome selective attention and perception biases that interfere with the noticing of crosslinguistic contrasts. This learning process, although different from that of other L2 learners, may involve exposure to the same initial-level vocabulary and grammar and the same laborious work in the memorization of word endings, derivational rules, chunks and formulaic expressions. Therefore, differentiated but not accelerated courses may be more adequate to maximize learning for SSLPs. Clearly, decisions about the PSS curriculum should involve the discussion about the role of accuracy in L2 and L3 Portuguese attainment. This discussion is closely linked to course objectives—that is, what learners need to be able to do with the language and how accurate they need to be in their oral and written production. However, it also relates to native speaker perceptions, learners’ confidence, and, above all, to the decision of adopting or rejecting a monolingual norm as the end-point of Portuguese programs. Besides understanding the particularities of SSLPs’ interlanguage (with a more comprehensive knowledge of CLI effects in the short and long term), instructors need to decide what level of negative CLI is acceptable when CLI does not impede communication. The most fruitful CLI research on nonnative Portuguese development will be that which helps identify the factors that trigger the most undesirable kinds of Spanish CLI at different stages of language acquisition and the types of instruction that most successfully aid learners to overcome this undesirable influence as they develop their proficiency in Portuguese.
APPENDIX A – Language Background Survey


2. What is your student status?
   ___ Freshman
   ___ Sophomore
   ___ Junior
   ___ Senior
   ___ MA Graduate
   ___ PhD Graduate

3. What is your major program of study?

______________________________________________________________________________________

4. What is your first language(s)?

______________________________________________________________________________________

5. Where did you grow up? (from birth to 7 years old)

______________________________________________________________________________________

6. Did you grow up speaking Portuguese at home (from 0 to 7 years old)? ________________

7. If you did not grow up in a Spanish-speaking country, did you grow up speaking Spanish at home (from 0 to 7 years old)? ________________

8. If you did not grow up in an English-speaking country, did you speak English at home (from 0 to 7 years old)? __________________________

9. If you answered yes to question 7 or 8 please explain with whom you learned or spoke Spanish or English (e.g. caregivers such as your mother, father, siblings, teachers, etc.), in which contexts and situations (at home, in family gatherings, etc.).

_______________________________________________________________________________________

_______________________________________________________________________________________

_______________________________________________________________________________________

_______________________________________________________________________________________

10. Are you proficient in any other language besides English and Spanish? If yes, please specify the language and level of proficiency (beginner, intermediate, advanced):

    Language ___________________________________  Level: ________________________________
Do you currently speak Portuguese, Spanish, or English as a second or third language at home? (with parents, grandparents, spouse, other). If yes, please explain.

______________________________________________________________________________________
______________________________________________________________________________________
______________________________________________________________________________________

Indicate the amount of time you have spent in formal study of Spanish or English (whichever is your second language). List the number of semesters studying Spanish in each type of school, e.g. middle school, high school, college (if none, say 0)

______________________________________________________________________________________  Semesters: __________
______________________________________________________________________________________  Semesters: __________
______________________________________________________________________________________  Semesters: __________
______________________________________________________________________________________  Semesters: __________

Indicate the amount of time you have spent in formal study of Portuguese. List the number of semesters studying Spanish in each type of school, e.g. middle school, high school, college (if none, say 0)

______________________________________________________________________________________  Semesters: __________
______________________________________________________________________________________  Semesters: __________
______________________________________________________________________________________  Semesters: __________
______________________________________________________________________________________  Semesters: __________

Please list the name and date of Spanish or English courses (whichever is your second language) that you have taken at Georgetown University or elsewhere.

Course__________________________________________________________  Date: __________
Course__________________________________________________________  Date: __________
Course__________________________________________________________  Date: __________

Please list the name and date of Portuguese courses that you have taken at Georgetown University or elsewhere.

Course__________________________________________________________  Date: __________
Course__________________________________________________________  Date: __________
Course__________________________________________________________  Date: __________
16. Describe any experience you had living/studying in Spanish-speaking countries (if you are a native speaker of English) or any experience you had living/studying in English-speaking countries (if you are a native speaker of Spanish), and living/studying in Portuguese-speaking countries, including where, how much time you were there and the purpose of the visit (travel, study, living, etc.).

<table>
<thead>
<tr>
<th>DATE</th>
<th>COUNTRY</th>
<th>AMOUNT OF TIME</th>
<th>PURPOSE</th>
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17. Please rate your abilities in Spanish or English (whichever is your second language) on a scale of 1-4 (1= weak; 4 = strong):

<table>
<thead>
<tr>
<th>Weak/novice</th>
<th>Strong/advanced</th>
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<tbody>
<tr>
<td>Reading</td>
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<td>Listening</td>
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<tr>
<td>Writing</td>
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<tr>
<td>Speaking</td>
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<tr>
<td>Overall Proficiency</td>
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18. Please use the space below for any other relevant comments you might have about your language background experience or about this survey.
APPENDIX B - Sample Item of the Portuguese C-test

As ocupações de Roberto

Meu nome é Roberto e sou estudante de economia. Este é o m________ segundo a_______ na facul_______ e eu fa_______ quatro au_______ neste sem_______ : matemática, ciên_______ políticas, comé_______ internacional e inglês. Estudo pe_______ manhã e dep_______ do almoço te_______ um emp_______ na Bolsa de Valores de São Paulo. Além di_______, eu part_______ de um gr_______ de estudos que ate_______ pessoas com prob_______ de dinh_______ . Estou constan_______ estudando e escre_______ projetos acadê_______ por isso não sa_______ com ami_______ com frequ_______ durante a sem_______ . Gosto de ser uma pessoa produtiva, mas confesso que tantas atividades me deixam estressado.

Figure C1 – Sample item of the Portuguese C-test, consisting of one paragraph of authentic Portuguese text in which parts of the words were sistematically deleted.
Incredibly: Cambian a sus hijos por internet gratis

Fueron varios los padres que pactaron entregar a sus respectivos hijos a cambio de acceso Wi-Fi gratuito. Claro que ellos no sabían. Todo fue parte de un experimento para demostrar que no se tomaría la molestia de leer los Términos y Condiciones (T&C). El establecimiento fue creado para destinar los peligros del uso público de Internet Wi-Fi. Se piensa a los londinenses es de acuerdo con los términos y condiciones para conectarse y utilizar conexión Wi-Fi en un café situado en un concierto distrito financiero. Las condiciones de acceso incluía una cláusula en la cual se proporcionaba la conexión Wi-Fi sólo si ‘el destinatario acordaba dar su primer hijo nacido.’ En sólo 30 minutos había 250 dispositivos conectados al punto de acceso — algunos de ellos automáticamente debido a su configuración.

Figure C2 – Sample item of the Spanish C-test, consisting of one paragraph of authentic Spanish text in which parts of the words were sistematicaly deleted.
APPENDIX D – Sample Items of the Picture Matching Recognition Task

Instructions
For each question in this task, you will see 2 pictures and a written sentence in Portuguese. Your task is to select the picture that best matches the sentence. Pay attention to the meaning of the sentence.

To select a picture, use the left button of your mouse and click on the picture. Clicking on a picture will direct you to the next question, so be sure of your choice before making the selection. Once you move on to the next question, you cannot go back to the previous question.

Press the space bar when you are ready to start

Figure F1 – Instructions to the Picture Matching Tasks

A criminosa foi presa

Figure F2 – Picture Matching Task trial containing past participle form in passive voice construction
Figure F3 – Picture Matching Task trial containing non-identical cognate in a present perfect construction.

O tubarão está atacando o barco

Figure F4 – Feedback in Picture Matching Task trial containing non-identical cognate

The correct answer is: O tubarão está atacando o barco
APPENDIX E – Sample Items of Part IV of the MLAT

PART IV: WORDS IN SENTENCES

There are 45 questions in MLAT Part IV. The following exercise consists of only 4 practice questions. The MLAT questions test recognition, analogy, and understanding of a far greater range of syntactic structures than the 4 sample questions shown here.

In each of the following questions, we will call the first sentence the key sentence. One word in the key sentence will be underlined and printed in capital letters. Your task is to select the letter of the word in the second sentence that plays the same role in that sentence as the underlined word in the key sentence.

Look at the following sample question:

Sample: JOHN took a long walk in the woods.
Children in blue jeans were singing and dancing in the park.

A B C D E

You would select “A.” because the key sentence is about “John” and the second sentence is about “children.”

NOW GO RIGHT AHEAD WITH THESE SAMPLE QUESTIONS.

Write down your answers so that you can check them when you are finished.

1. MARY is happy.
   From the look on your face, I can tell that you must have had a bad day.
   A B C D E

2. We wanted to go out, BUT we were too tired.
   Because of our extensive training, we were confident when we were out sailing,
   A B C D E
   yet we were always aware of the potential dangers of being on the lake.
   D E

3. John said THAT Jill liked chocolate.
   In our class, that professor claimed that he knew that girl on the television
   A B C D E
   news show.
## APPENDIX F– Debriefing Questionnaire

<table>
<thead>
<tr>
<th>Questions</th>
<th>Type</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General questions about the tasks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. How easy were the learning exercises?</td>
<td>likert scale (1-5)</td>
<td>All</td>
</tr>
<tr>
<td>2. How easy were the testing tasks?</td>
<td>likert scale (1-5)</td>
<td>All</td>
</tr>
<tr>
<td>3. Do you think the training exercises helped you learn?</td>
<td>yes/more-or-less/no</td>
<td>All</td>
</tr>
<tr>
<td>4. Were the prompts easy to understand?</td>
<td>yes/more-or-less/no</td>
<td>All</td>
</tr>
<tr>
<td>5. Did you study or learn Portuguese past participles before participating in this study?</td>
<td>yes/no</td>
<td>All</td>
</tr>
<tr>
<td>6. Additional comments</td>
<td>open ended</td>
<td></td>
</tr>
<tr>
<td><strong>Awareness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Did you notice any grammar patterns or grammatical structures?</td>
<td>yes/no (+comments)</td>
<td>All</td>
</tr>
<tr>
<td>8. Did you become aware of any particular rule that applied to grammar structures while completing the tasks?</td>
<td>yes/no (+comments)</td>
<td>All</td>
</tr>
<tr>
<td>9. Could you explain the rules for the use of the different past participle forms (for the same verb) in Portuguese?</td>
<td>yes/no (+comments)</td>
<td>All</td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Was studying Portuguese a personal choice unrelated to program requirements?</td>
<td>yes/no</td>
<td>All</td>
</tr>
<tr>
<td>11. How many hs do you spend per week using your Portuguese, or learning about Port. speaking countries/culture?</td>
<td>open ended</td>
<td>All</td>
</tr>
<tr>
<td>12. How much do you enjoy studying Portuguese?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td><strong>Assessment of the Learning Process</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. How do you rate your overall Portuguese proficiency?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td>14. How do you rate your Portuguese speaking ability?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td>15. How do you rate your Portuguese listening-comprehension ability?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td>16. How do you rate your Portuguese reading-comprehension ability?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td>17. How do you rate your Portuguese writing ability?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td>18. How easy is learning Portuguese for you?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td>19. How much knowing other foreign languages helped you learn Portuguese?</td>
<td>likert scale (1 to 5)</td>
<td>All</td>
</tr>
<tr>
<td><strong>Psychotypology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. How closely related do you believe Spanish and Portuguese to be?</td>
<td>likert scale (1 to 5)</td>
<td>L2 Spanish</td>
</tr>
<tr>
<td>21. How much do you believe knowing Spanish helps you learn Portuguese?</td>
<td>likert scale (1 to 5)</td>
<td>L2 Spanish</td>
</tr>
<tr>
<td>22. Do you think your knowledge of Spanish has helped you learn Portuguese past participles?</td>
<td>likert scale (1 to 5)</td>
<td>L2 Spanish</td>
</tr>
<tr>
<td>23. Do you think your knowledge of Spanish has helped you learn Portuguese nouns?</td>
<td>likert scale (1 to 5)</td>
<td>L2 Spanish</td>
</tr>
<tr>
<td>24. Comments on the effect of knowing Spanish</td>
<td>open ended</td>
<td>L2 Spanish</td>
</tr>
<tr>
<td><strong>Crosslinguistic Awareness (Spanish/Portuguese)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. What differences did you notice between Portuguese and Spanish past participle forms?</td>
<td>open ended</td>
<td>L2 Spanish</td>
</tr>
<tr>
<td>26. What differences did you notice between Portuguese and Spanish nouns?</td>
<td>open ended</td>
<td>L2 Spanish</td>
</tr>
</tbody>
</table>
APPENDIX G – Survey of the Use of Portuguese and Spanish Participle Forms by Native Speakers of Spanish.

I. Por favor complete los espacios en blanco con la forma verbal en portugués que más te parezca aceptable.

1. As batatas foram _____________________(cozinhar) junto com o bacalhau.
2. O navio afundou, mas todos os tripulantes foram _____________________(salvar).
3. Ela queria ter _____________________(prender) o cabelo para a festa, mas não teve tempo.
5. O professor anda nervoso e tem _____________________(expulsar) muitos alunos da aula.
6. Que felicidade! Fui _____________________(aceitar) no programa de doutorado!
7. Se estivesse usando cinto de segurança, ela teria se _____________________(salvar).
8. Ela tem _____________________(morrer) pouco a pouco de desgosto.
9. As luzes foram _____________________(acender).
10. Os ladrões foram _____________________(pegar) em flagrante roubando a loja.
11. Para economizar, não temos mais _____________________(acender) as luzes da varanda.
12. Os brasileiros têm _____________________(eleger) políticos corruptos.
13. A aluna que só falava ao telefone foi _____________________(expulsar) da aula.
15. Toda a família foi _____________________(morrer) em um acidente de carro.
16. Recebo muitos convites para sair, mas não tenho _____________________(aceitar) nenhum.
17. Dilma Russef foi _____________________(eleger) a primeira mulher presidente no Brasil.
18. Nós vamos de metrô, não temos _____________________(pegar) mais o ônibus.
19. O ladrão foi _____________________(prender) em flagrante.
20. Estou de dieta, não tenho _____________________(cozinhar) batatas ultimamente.

II. Por favor complete los espacios en blanco con la forma verbal que más te parezca aceptable. No hay respuestas correctas o incorrectas.

1. Las papas han sido _____________________(cocinar) en el aceite.
2. Muchas personas han _____________________(morir) por culpa del dengue.
3. Las luces finalmente fueron _____________________(encender).
4. Porque sale más caro, los profesores no han _______________(imprimir) en color los materiales didácticos.
5. La policía ha _________________(aprehender/prender) pocos ladrones.
6. Para ahorrar más no hemos _________________(encender) las luces del balcón.
7. Una enfermera neonatal se reúne con los todos los bebés que ha _________________(salvar).
8. En 1767 fueron _________________(expulsar) 2641 jesuitas de España.
9. Los soldados fueron _________________(morir).
10. Los brasileños han _________________(elegir) políticos corruptos por muchos años.
11. El gobierno ha _________________(proveer) alimentos a los ciudadanos más pobres.
12. Sí, las papas ya han sido _________________(freír).
13. Hungría ha _________________ casi 5.000 refugiados este año.
14. El gato que se quedó atrapado entre fierros fue _________________(salvar).
15. Fueron _________________(imprimir) cien páginas más que el necesario.
17. El pago del de compensación fue _________________(proveer) a las víctimas.
18. Los soldados fueron _________________(aprehender/prender) por el ejército enemigo.
19. Estoy en una dieta, así que no he _________________(cocinar) pasta.
20. Ella ha _________________(freír) las papas.
APPENDIX H – Survey of the Use of Participle Forms by Portuguese Native Speakers

I. Por favor, complete com a forma conjugada do verbo em parêntesis. Lembre-se: não há respostas certas ou erradas. Complete a frase da maneira que soe o mais natural possível para você.

1. As batatas foram _____________________(cozinhar) junto com o bacalhau.
2. O navio afundou, mas todos os tripulantes foram _____________________(salvar).
3. Ela queria ter _____________________(prender) o cabelo para a festa, mas não teve tempo.
5. O professor anda nervoso e tem _____________________(expulsar) muitos alunos da aula.
6. Que felicidade! Fui _____________________(aceitar) no programa de doutorado!
7. Se estivesse usando cinto de segurança, ela teria se _____________________(salvar).
8. Ela tem _____________________(morrer) pouco a pouco de desgosto.
9. Meus filhos têm _____________________(gastar) muito tempo no computador.
10. As luzes foram _____________________(acender).
11. Os ladrões foram _____________________(pegar) em flagrante roubando a loja.
12. Ultimamente ele tem _____________________(expressar) seus sentimentos claramente.
13. Para economizar, não temos mais _____________________(acender) as luzes da varanda.
14. Os brasileiros têm _____________________(eleger) políticos corruptos.
15. Ana tem _____________________(entregar) seus trabalhos escolares dentro do prazo.
16. A aluna que só falava ao telefone foi _____________________(expulsar) da aula.
17. O político corrupto infelizmente foi _____________________(soltar) naquele gesto.
18. Toda sua raiva foi _____________________(expressar) antes das obras do viaduto serem concluídas.
19. Toda a família foi _____________________(morrer) em um acidente de carro.
20. Recebo muitos convites para sair, mas não tenho _____________________(aceitar) nenhum.
22. Nós vamos de metrô, não temos _____________________(pegar) mais o ônibus.
23. No dia dos namorados muitas flores foram _____________________(entregar) em nosso departamento.
24. O ladrão foi _____________________(prender) em flagrante.
25. Estou de dieta, não tenho _____________________(cozinhar) batatas ultimamente.
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