The emergence of L1 innovations in Spanish-English bilinguals: Evidence from cross-linguistic structural priming

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THE EMERGENCE OF L1 INNOVATIONS IN SPANISH-ENGLISH BILINGUALS:
EVIDENCE FROM CROSS-LINGUISTIC STRUCTURAL PRIMING

by

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ABSTRACT

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This dissertation explores the hypothesis that structural priming is an internal mechanism motivating processes of convergence in bilinguals. The focus of the investigation is linguistic innovations in Spanish produced by Spanish-English bilinguals. Innovations involve both changes in the frequency of alternative constructions and existing patterns produced in new contexts modeled on English equivalents. From structural priming techniques that model convergence, the data assess the extent of English influence on Spanish, in a contact setting (New York, United States) and a non-contact setting (Córdoba, Argentina).

In the field of language contact, convergence may manifest itself as an increase in the use of native language patterns shared with the contact language. Another outcome of convergence is grammatical replication, where native language structures acquire a new context of use resembling the contact language. Structural priming is the tendency for speakers to repeat previously processed structures. Cross-linguistic priming has been shown to increase the use of shared constructions; this investigation tests the applicability of priming to the study of grammatical replication.

Three experiments examine the voice, reciprocal, and dative alternations. First, a picture description task in Spanish and English establishes baseline frequencies: the voice and reciprocal alternations have a similar distribution in English and Spanish; the dative alternation, however, differs between the two languages. Second, a within-language priming
task (Spanish-to-Spanish) confirms strong priming effects for all three alternations and yields extremely low rates of grammatical replication. Third, a cross-language priming task demonstrates that English primes Spanish and increases grammatical replication rates, only with the alternations that have similar cross-linguistic distributions (voice, reciprocal). The priming effect did not differ between the contact and non-contact groups, but the bilinguals in the contact setting had higher grammatical replication rates.

The data support the view that structural priming could be a catalyst facilitating language change in bilingual communities. We argue that this process is better explained with priming as implicit learning and suggest additional considerations. The data also support models of contact as an accelerant of processes already in motion in the native language, rather than as a trigger of the creation of completely new patterns.
To my mother, who dreamed of being a bilingual in New York
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1 INTRODUCTION

1.1 The goal of this investigation

This dissertation seeks to explore the hypothesis that a processing phenomenon extensively discussed in the psycholinguistics literature, structural priming, might be understood as an internal mechanism motivating processes of convergence that scholars have described in the speech of Spanish-English bilinguals in the US. The discussion focuses on linguistic innovations, the term we use to refer to changes in the frequency of language patterns, as well as their emergence in new contexts, modeled on the usage of their English equivalents.

*Structural priming* is the tendency for speakers to repeat structures previously comprehended or produced. Since structural priming has been documented cross-linguistically, we can use this phenomenon to explore the processing mechanisms underlying convergence: could structural priming be the catalyst leading to increased production of shared constructions in bilinguals? Furthermore, could structural priming facilitate language change in bilingual communities? The investigation reported in this dissertation suggests that structural priming techniques could serve as a tool for determining to what extent innovations are in fact encouraged by English influence, informing our understanding of the way that languages interact in situations of contact.

1.2 The role of contact

For the purposes of this study, we apply the concept of *language contact* to refer to the physical or social circumstances where one language co-exists with another and is thus ‘in contact’ with it. The contact setting that we will be concerned with is New York, where Spanish is spoken by a quarter of the city’s population (U.S. Census, 2013). This definition also assumes that the situation of contact, whereby speakers are constantly making use of
both languages, can lead to cross-linguistic influences. While it is conceivable that these effects are bidirectional, this investigation only focuses on the role that the societal or what we call the contact language, English, may play in the shaping of the home or native language, in this case Spanish.

It has been argued that anything can happen to the native language in a contact situation (Thomason, 2001). However, many of the changes that take place are also extremely common in the world’s languages, independently of contact. A frequent explanation is that the native language adjusts to the contact language through processes of change also found in monolingual settings: contact does not induce the change, it accelerates it (Silva-Corvalán, 1994a). In sociolinguistics, this hypothesis is corroborated by quantifying the occurrence of competing forms over time, to document shifts in their relative frequency of use. The assumption is that variation observed synchronically in speakers that differ in their age or degree of exposure to English (i.e., first vs. second generation immigrants) may reflect diachronic stages in real time (Silva-Corvalán, 1994a). With a similar aim, by comparing the productions of two groups of speakers, one residing in the United States and another in Argentina, we hope to gain insight into the role of English in a contact and a non-contact setting.

1.3 Convergence

Another concept relevant to this dissertation is the notion of convergence, defined as “the enhancement of inherent structural similarities found between two linguistic systems” (Bullock & Toribio, 2004, p. 91). Often, the underlying assumption is that, as an outcome of contact, structural properties from one language are imposed on the other language. In this study, however, we follow Bullock & Toribio’s (2004) account and understand convergence as an ongoing process (rather than an end-state) in which one language may come to approximate the other through variable rather than categorical changes. Thus, convergence
may manifest as changes in the frequency of particular constructions in one language that resemble the usage of those constructions in the other language. For example, patterns that are minimally used in one language might be used more if there is an equivalent in the other language. Conversely, features in one language might decrease in usage if they lack a counterpart in the other language. Another possibility is the phenomenon of grammatical replication (Heine & Kuteva, 2005), where one language attains a new pattern on the model of the other language.

1.4 Structural priming

By seeking to explain the processing mechanisms underlying convergence, this study lends a psycholinguistic lens to a phenomenon typically discussed in the field of language contact. This lens is the notion of syntactic or structural priming (Bock, 1986), the tendency that speakers have to repeat structures they previously heard or produced. Earlier experiments measured the way participants processed the dative and the voice alternations. For example, the likelihood that a speaker will produce a prepositional object (PO) instead of a double object construction (DO) (e.g., The chef gives a cookie to the man instead of The chef gives the man a cookie) increases after he or she has heard that structure (Bock 1986). The same is true cross-linguistically, where bilinguals tend to use a passive in one language after they have heard one in the other (Hartsuiker et. al. 2004).

1.5 Alternations

We tested the viability of syntactic priming by looking at three alternations: the voice alternation, the reciprocal alternation, and the dative alternation. While these constructions convey similar meanings in English and Spanish, their surface structures are not directly analogous. For example, the voice and reciprocal alternations have almost parallel patterns
in both languages. The dative alternation, however, has different instantiations in the two languages: it is well-established in English but is generated by scrambling in Spanish, resulting in a dispreferred form.

We also wanted to know whether English structures contributed to the emergence of Spanish patterns in new contexts following the English usage, leading to what we refer to as grammatical replication (Heine & Kuteva, 2005). In order to generate potential patterns of replication, we compared the surface configurations of English and Spanish for each alternation. By eliminating the non-overlapping elements, we posited Spanish constructions to be elicited by structural priming, featuring the absence of the accusative marker a, dative clitic le, reciprocal pronoun se, and dative marker a.

1.6 The empirical evidence

We will report the findings for three experiments that explore the possible relationship between cross-linguistic priming and innovations/replications, using the same design with bilingual participants in the United States and in Argentina. The first experiment, a picture description task in Spanish and in English, helps us establish the baseline frequencies of use for the three alternations under study absent any priming. As we will report below, the voice and reciprocal alternations had a similar distribution in English and Spanish, unlike the dative alternation, where the distributions in English and Spanish differed. The second and third experiments are cross-linguistic priming tasks, designed to assess the extent of English and Spanish influence on the choice of Spanish constructions. The experiments measure whether the variant that participants produce matches the variant previously read in a prime. As we will report below, Spanish (within-language) primes yielded strong priming effects for all three alternations, while English (cross-language) primes produced priming only in the voice and reciprocal alternations, not the dative alternation. We will argue that cross-linguistic priming is more likely when the variants have similar frequencies.
in both languages. The US and Argentina groups did not differ in terms of priming effects, although the US participants had a higher incidence of grammatical replication patterns. We will argue that this suggests that contact may play a role in some aspects of bilingual processing and not in others: bilinguals in a contact setting may be more prone to producing certain Spanish constructions following the English usage. However, increased exposure to English alone does not seem to be sufficient to introduce structures that are not present in Spanish. In this sense, our data support the view that contact is likely to accelerate changes that are already in motion in the native language, rather than to create completely new patterns.

1.7 Organization of the dissertation

This dissertation is organized as follows. In Chapter 2, we review the literature on language contact and language change. We start with a brief discussion of interference and transfer, followed by an overview of innovations, internal and external change, and the possibility of contact-induced language change. We end Chapter 2 with the notion of convergence and its relation to the goals of the dissertation.

In Chapter 3, we turn to the literature on structural priming. We begin by describing the phenomenon and reviewing studies focusing on various languages and methodologies. We then turn to a review of structural priming theories and the functions of priming. We end Chapter 3 by discussing the relevance of structural priming to the studies presented in Chapter 4.

In Chapter 4, we state the research questions, and provide an overview of the experiments, the constructions under study, and our general predictions. We then proceed to describing each experiment in detail, and reporting and discussing the results.

Lastly, in Chapter 5, we provide an overview of the results obtained in the experiments, followed by a discussion of the contribution of the work presented in this
dissertation. We end with an exploration of some of the broader implications of our findings and the general conclusion.
2 CONVERGENCE AND LANGUAGE CHANGE

2.1 Introduction

On any given day, more than half of the world’s speakers resort to using two or more languages, with varying degrees of proficiency, to conduct their routine interactions (Grosjean, 2012). Speakers may limit their utterances to just one language, or the languages may alternate in the discourse so that words or phrases in one language are inserted between strings in the other language. Grosjean (2001) claims that, in neural modeling terms, bilinguals navigate a continuum between a monolingual and a bilingual mode. In a monolingual mode, one language is fully activated and the other language is minimally activated. As the speaker moves towards a bilingual mode, the activation of the other language increases, and he or she is able to access it from time to time in the form of borrowings or during code-switching. But even when speakers’ contributions are restricted to just one of those languages, the other language is still ‘live’ to some degree. Since the languages are never fully deactivated, it is possible for “interferences” to occur, that is, “deviations from the language being spoken to due to involuntary influences from the other [...] language” (Grosjean, 2001, p. 2). Indeed, there is growing evidence that neither language is ever completely suppressed in bilinguals, as suggested by the language contact phenomena described in this chapter, and by studies on bilingual language production reviewed in Chapter 3.

In this dissertation, we are interested in how one language, English, may influence the other, Spanish. We are not concerned with influences like borrowing or code-switching, where lexical items from one language are interspersed in utterances produced in the other language—the productions we analyze have only Spanish lexical items. Rather, we examine the influence of English on the choice of Spanish structures. These innovations are manifested, on the one hand, in the frequency of use of alternating structures that follow
frequency distributions in English and, on the other, in the deployment of certain constructions in a context resembling the English usage. We also explore whether these innovations are unique to a situation of language contact, or if they can take place in a monolingual setting, hoping to increase our understanding of contact-induced change.

In this chapter, we will review the terminology regarding cross-linguistic influence in language contact and the notion of innovation. Then, we lay out some basic assumptions about frequency in language, which inform our conception of linguistic change. We go on to discuss internal versus external change and the possibility of grammatical change. Finally, we explain our understanding of convergence and how it might lead to innovations in bilinguals.

2.2 Cross-linguistic influence in bilinguals

Over the years, there have been many attempts to describe the influence that one of the bilingual’s languages may have on the other. Haugen (1950, p. 212) used borrowing to encompass a wide range of cases involving the “reproduction in one language of patterns previously found in another.” The loan may be more or less similar to the original model, depending on the patterns available in the borrowing language. An example of a close resemblance between the model and the loan might be the English importation of (1) from French, where the last sound [dʒ] is reproduced aided by speakers’ familiarity with words like edge (p. 226):

(1) rouge ‘red’

If instead the “patterns of the model are new to the borrowing language, a compromise is likely to take place between the two sets of patterns” (p. 213), leading the speaker to make adjustments to the loan. An illustration of a greater difference between the model and the
loan is the Spanish (2) modeled on the English *skyscraper* (p. 214), where the makeup of the compound is imported but the specific lexical items and their word order are not:

(2) *rascacielos* ‘skyscraper’

Borrowings may also extend to the phrase level, such as the American Portuguese expression (3). Here, both the configuration and the meaning are imported and reproduced with native lexicon (p. 220):

(3) *responder para atrás* ‘to talk back’

Weinreich (1974) used the broad-brush notion of *interference* to encompass any “instances of deviation from the norms of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language” (p. 1). By comparing the two languages and delineating their differences, a list of potential patterns of interference emerges. For example, if the languages A and B have different word order patterns, it creates the possibility for novel configurations to arise in A on the model of B. This is the case when, for instance, a German speaker utters the English expression in (4) based on the German *gestern kam er*, or when Portuguese-Americans say (5), following English adjective placement (p. 38):

(4) *yesterday came he*

(5) *Português Recreativo Club* ‘Portuguese Recreational Club’ (cf. *Club Recreativo Português*)

Another illustration comes from Andean Spanish, where word order often reflects Quechua influence, even though the lexicon and morphology are Spanish. The example in (6), with its double possessor marking (*mi, su*), and locative (*en*) contrasts with the monolingual *Voy a la casa de mi mamá* (Muysken, 2004, p. 148):

(6) *De mi mamá en su casa estoy yendo* ‘I go to my mother’s house’

Adolfo Elizaincín (personal communication) reports another case from Uruguayan Spanish in contact with Brazilian Portuguese, where (7) is presumably modeled on the Portuguese *Eu gosto da cerveja* ‘I like beer’:

(7)
Other examples regarding word order are reported in the speech of Spanish-English bilinguals in the US (Silva-Corvalán, 1994a, p. 183):

(8) \textit{cuatro otros alumnos} ‘four other students’ (cf. \textit{otros cuatro alumnos})

(9) \textit{la más importante persona} ‘the most important person’ (cf. \textit{la persona más importante})

Another example of interference is when units of content that are partly similar between the languages (as in the case of cognates) adjust and acquire new meanings for fuller congruence. In US Spanish, the use of (10) was extended to include ‘Protestant ecclesiastic,’ in line with the English \textit{minister}. At the phrase level, we find (11) instead of \textit{hacer dormir} or \textit{adormecer}, where the combination is unusual but the lexical items maintain their ordinary meanings (p. 38):

(10) \textit{ministro} ‘cabinet official’

(11) \textit{poner a dormir} ‘put to sleep’

In an attempt to distinguish between the different kinds of effects that interference could have Thomason & Kaufman (1988) proposed the terms \textit{borrowing transfer} and \textit{substratum transfer}. Borrowing transfer refers to the influence of a second language (or third, or fourth) on a previously acquired language, normally beginning at the lexical level. In such cases, a speaker inserts words from a later learned language into his native tongue, typically to express concepts for which his native language does not have lexical terms. For example, an English-Yiddish bilingual might say (12) (Thomason, 2001, p. 132):

(12) \textit{When I come in I smell the kugel} (a type of pudding)

Substratum transfer represents the opposite scenario, that is, a native or previously acquired language affects the acquisition of a subsequent language, and this is usually most evident at the phonological or syntactic level. Thomason (2001) prefers to call this type of transfer \textit{shift-induced interference}, as it mostly reflects situations of language shift, where one group of speakers learns the language of another. Here, speakers employ sounds or
syntactic structures of their native language to fill the gaps that exist in their knowledge of another language. For example, Hebrew speakers learning English have been observed to follow Hebrew rather than English norms for the placement of adverbs (Selinker, 1969) (cited in Odlin, 1989, p. 96):

(13) *I like very much movies*

Strictly, the distinction between borrowing transfer and substratum transfer refers in the first instance to the direction in which language influence takes place, not to the specific results each could yield. That is, even though in most cases borrowing transfer begins with the insertions of words from a second language into the first, the extent and intensity of language contact could potentially cause other elements of the grammar (phonology, syntax, morphology) to be borrowed as well. Similarly, while substratum transfer is typically observed as first language sounds or structures present in a second language, the specific circumstances of contact could cause other components of the grammar—such as the lexicon— to also be affected (Thomason, 2001).

In the present study, we are interested in bilinguals for whom Spanish is their home language (the language of the parents) and therefore the first language they were exposed to. Some of them acquired English simultaneously or soon after in their childhood, and others did not learn it until later during high school. In Thomason’s terms, then, we are concerned with phenomena of borrowing transfer, that is, the influence of a second language on the first or native language. However, to avoid confusion, we will refrain from using this concept because of its traditional association with mostly lexical loans. Instead, following Heine & Kuteva (2005) we will use the term *transfer* to indicate the transmission of features from one language to another, corresponding more closely to Haugen’s (1950) sense of borrowing or to Weinreich’s (1974) interference.
2.3 Innovation and language change

Historical linguists distinguish between an *innovation*—the creation of a new element or feature by a single speaker—and a *change*, which happens when an innovation is widely adopted by the speech community (Joseph & Janda, 2003). While not all innovations may lead to change, the field has tended to overlook them in search of more dramatic contrasts that occur over centuries, in this way favoring diachronic over synchronic studies. Drawing on a geology analogy, Joseph & Janda (2003) observe that just as a mountain is not eroded overnight, language change also takes time: geologists do not learn from before-and-after snapshots, but rather from the careful observation of intermediate stages. They add that the use of time-lapse photography in the study of how flowers bloom or how plants grow, for example, allows for an appreciation of the spatiotemporal connectedness between two states. It is through the examination of each subsequent piece that one becomes aware of the slow but continuous motion that leads from the beginning to the end stage (Joseph & Janda, 2003).

A different metaphor might be helpful here to communicate the idea that language change is not expected to be abrupt, as older forms often co-exist with newer ones.¹ For example, an 1825 railroad car might well have had a lengthy working life that allowed it to share the rails with a model built in 1850. In this way, train-car change is reflected “through variation due to overlap, not via periodic abrupt replacement of entire vintages of train-cars” (Joseph & Janda, 2003, p. 47). However, one cannot truthfully say that the first train-car ‘physically changed into’ the second train-car, since the manufacture of the former was followed, over the next several years, by the building of many similar train-cars that did not systematically differ from it. Hence, even though the 1825 and the 1850 train-cars

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¹ This is akin to what Hopper and Traugott (2003, p. 124) call *layering* or *variability* (see also Thomason, 2003).
“represent a chronologically accurate series, they do not actually form an unbroken chain” (Joseph & Janda, 2003, p. 48).

For the purposes of this investigation, we define innovation as “any element of usage (or grammars) which differs from previous usage (or grammars)” (Andersen, 1989, p. 13). By observing speakers’ contrasting usages, innovations allow us to study diachronic developments in their smallest components, providing a glimpse into speakers’ subtly shifting patterns. Though they might appear to be minor events, innovations inform our understanding of the mechanisms of language change, as it is “the aggregations of gradual changes across time that give the impression of ‘changes in the language” (Hopper & Traugott, 2003, p. 47). Once innovations are introduced, they may contribute to language variation by overlapping with traditional forms. With time, an innovation may become the preferred form or it may go out of use, yielding to the older form or to a newer innovation (Andersen, 1989).

By assuming that speakers’ distributional patterns are fluid rather than fixed, this study adopts a usage-based definition of grammar, as the “cognitive organization of one’s experience with language” (Bybee, 2006, p. 711), underlining the idea that patterns of language use have an effect on speakers’ representations. In other words, language structure is “an on-going response to the pressure of discourse, rather than [...] a pre-existent matrix” (Bybee & Hopper, 2001, p. 3). This is also consistent with the view that that the language system adapts to and learns from its processing experience (see Chapter 3).

If the relative distribution of competing forms at any given moment constitutes a snapshot of linguistic knowledge, any shift in speakers’ frequencies could be taken to reflect a change in the mental grammar (Guy, 2005), suggesting that changes can occur in adult grammar throughout the course of language use (Croft, 2000). In this sense, our conception of language change does not necessarily involve an abrupt replacement of
discrete parameters; it manifests in "statistical skewings" rather than "categorical air-tight occurrences and non-occurrences" (Otheguy & Zentella, 2012, p. 8).

Bybee & Hopper (2001, p. 19) point out that “patterns of usage and particular choices made by speakers at any given moment are heavily influenced by both immediate and long-range experience with language.” Our work assumes that bilinguals’ experience in one language can affect patterns of use in the other language. Thus, repeated exposure to alternative constructions in the contact language may loosen the constraints of the traditional linguistic environment in the native language, driving frequency changes in the paradigm or introducing a new form that co-exists with the others (Hopper & Traugott, 2003). By tracking how speakers’ experience with English may motivate their choices in Spanish, we hope, in Haugen’s (1950, p. 212) terms, to “isolate the leap of the pattern from one language to the other” and thus document innovations suggestive of language change.

2.4 Internal vs. external (contact-induced) change

As an illustration of the overlap that may exist between older and newer forms, consider lexical replacements that took place in English (Thomason, 2001, p. 88): when (14) entered the language from Latin, it co-existed and was synonymous with the Germanic (15):

(14) animal

(15) deer

Eventually, animal acquired its current general meaning; deer was not lost but took on a more restricted sense, to refer to a particular species. The very same process has been observed absent any borrowings: years ago, the generic word for ’photocopy’ was (16), which was later replaced by (17) as the preferred term, after a transition period during which speakers used both:

(16) Xerox copy

(17) photocopy
Note that although *animal* was introduced from another language and *photocopy* was created out of existing English morphemes, the stages through which change took place were very similar, in the sense that the traditional and new form coexisted for some time. Thomason (1995) takes the view that the processes involved in language-internal change (such as the development of a particular dialect) are fundamentally the same as those attributed to language contact. As the above examples showed, the only difference between internal and external change is the origin of the feature in question.

Internal changes are usually seen as those that are initiated absent any language contact, or are deemed *likely* to occur in the language. The criteria for what is likely to happen typically include the existence of a historical precedent in the language (King, 2000), appeal to universal simplification mechanisms\(^2\), markedness\(^3\) (G. Sankoff, 2002; Silva-Corvalán, 1994a, 1994b, 1995, 2001), or the occurrence of a similar process in a related

\(^2\) The question of whether language contact inevitably leads to a simpler grammar remains a matter of debate. *Simplification* is an umbrella term used for any processes that result in a reduced system (Silva-Corvalán, 1991). From this perspective, the linguistic circumstances of bilinguals might be seen as creating an additional cognitive load, which in turn motivates them to make one of their languages less complex or less marked. For instance, marked features are often eliminated by language contact: glottalized stops in Ma’á, a Tanzanian language, were lost due to Bantu influence (the relevant Bantu languages lack glottalized stops). But one must be careful with such universal claims, as counterexamples are also found: some Bantu languages, like Zulu, are believed to have acquired click phonemes, an extremely rare feature, from neighboring Khoisan languages (Thomason, 2001, pp. 64–65). So the introduction or loss of a form does not necessarily simplify a paradigm, and, even when it does, the change may render other areas of the grammar more complex (Aikhenvald, 2002; Battistella, 1990; Heine & Kuteva, 2005; Thomason, 1995, 2001). For instance, Battistella (1990) argues that the loss of the subjunctive in English complicated the grammar by introducing modal auxiliaries.

\(^3\) The idea of universality, naturalness or typological frequency has often been used as a way to quantify markedness. Battistella (1990) offers a set of criteria which—taken as a whole—are possible predictors of (un)markedness. For example, an unmarked form (relative to its marked counterpart) tends to be more underdetermined semantically, more perceptually accessible, and formally simpler, and additionally may have a greater freedom of distribution. Nevertheless, note that the relativeness of these values could cause the same feature to be labeled as both marked and unmarked, depending on the point of reference one wishes to adopt. For instance, a feature A of a language L could be marked when compared to the features of all languages, and unmarked with respect to its interaction with feature B within L. Thus, “the universality of markedness values is only partial” (Battistella, 1990, p. 24).
language or variety, or across languages generally. The fact that there is such a breadth of potential explanations for the likelihood of any particular change could lead to an ‘over diagnosis’ of internally motivated changes, since what cannot be attributed to a previous state of the language, simplification or markedness, could instead be credited to changes common in other languages.

External or contact-induced changes tend to be seen as those that are solely due to the influence of another language. In essence, one has to eliminate all the other options reviewed above, and so this source of language change is difficult to prove (Thomason, 2003). Consider the case of Swahili and the loss of its tone phonemes (Thomason, 2001), which one proposal claimed to be due to massive borrowing from Arabic, and thus contact-induced. The counterargument presented was that, because Tumbuka (another Bantu language) also lost its tones without any influence from Arabic, the change should be considered internally-motivated: Swahili, like Tumbuka, could have a latent tendency to abandon these suprasegmental features. Thus, contact-induced change could only be responsible only for those changes that have never been found elsewhere to be the result of internal causation. But Thomason (2001) contends that although contact is sometimes responsible for very rare changes, it is much more often the cause of changes that are also very common language internally. In this way, she defines contact-induced change as any change that would have been less likely to take place outside a contact situation.

However, as Heine and Kuteva (2005, p. 22) maintain, “there is no reason to assume that contact-induced change is restricted to unlikely or less likely linguistic changes.” They explain that contact-induced change tends to be “in accordance with universal principles of grammaticalization, which have been established already primarily on the basis of language-internal developments.” (2005, p. 258). In his study of Pipil, an Aztecan language of El Salvador, Campbell (1987) claims that the changes he describes are extremely common in the world’s languages, and so natural that they often occur independently. Still, he attributes a series of innovations in Pipil to the influence of corresponding Spanish
structures. Take, for example, the use of conditional and imperative forms in ways that parallel the Spanish subjunctive (18). In (18c), the Pipil conditional suffix –skiya, which typically means ‘would’, is at times equivalent to ‘should’, just like the Spanish past subjunctive has both conditional (18a) and obligational (18b) connotations (Campbell, 1987, p. 266):

(18a)  
*Si hubiera hecho algo*

if had (past subjunctive) done something

‘If (he) had/would have done something’.

(18b)  
*Que hubiera hecho algo*

that had (past subjunctive) done something

‘(He) should have done something’/ ‘Oh that he had done something’

(18c)  
*ma: ki-maka ne konse:hoh ke:n ki-chiwa-skiya*

that him-give the advice how it-do-COND

‘Let him give advice (about) how he should do it’

Similarly, Pipil imperative morphemes *xi-/x-* are sometimes employed as subjunctives (19c), just like Spanish imperative forms are identical, or nearly so, to the subjunctive forms (19a)-(19b) (Campbell, 1987, pp. 266–267):

(19a)  
*Coman*

‘eat!’ (third-person pl. imp.),

(19b)  
*Quiero que coman*

want-I that eat (third-person pres. subjunctive)

‘I want them to eat’

(19c)  
*tesu ni-k-neki ma: xi-k-mikti.*

no I-it-want IMP IMP-it-kill

‘I don’t want you to kill it.’ (Literally, ‘I want that you not kill it.’)
Another example is the emergence of the periphrastic future with a verb for ‘go’ (20), like the Spanish, e.g., lo voy a hacer ‘I’m going to do it’, in place of the traditional future suffixes -s/-s-ke-t, which have been practically lost:

(20) n-yu ni-mtsin-ilwitia.
   I-go I-you pl.-show
   ‘I am going to show you (pl.)’.

As the case of Pipil suggests, the fact that a particular innovation is likely or found cross-linguistically does not mean it could not be contact-induced (Heine & Kuteva, 2005).

A similar example comes from Canadian French (e.g., Poplack, Zentz, & Dion, 2012), which seems to display a much more widespread use of preposition stranding in relative clauses (21) than other Francophone areas.

(21) j’avais pas personne à parler avec (Otheguy, 2012, p. 226)
   ‘I had no one to talk to’

Because of speakers’ extensive bilingualism and the parallelism to the English equivalent, this feature is believed to be due to language-external influence. However, the fact that prepositions can appear without an adjacent complement in main clauses (22), suggests that the feature could have merely extended to relative clauses, leading to language-internal change.

(22) il veut pas payer pour (Otheguy, 2012, p. 226)
   ‘He doesn’t want to pay for’

But in an incisive treatment, Otheguy (2012, p. 227) argues that the answer need not be a mutually-exclusive proposition; rather, preposition stranding could very well be understood as a case of both “French origins and English support.” A similar view regarding multiple causation is advanced by Johanson (2002a, p. 286): “cases in which the data seem to admit both external and internal motivations [...] are often instances of externally motivated internal tendencies” (in Heine & Kuteva, 2005, p. 12). This conclusion resonates with Thomason’s (2001) argument that many linguistic changes have internal and external
causes; it is often the case that one of those causes is related to a particular contact situation. But even then, it may be that language contact serves as the trigger for other changes to take place, or that changes that are independent of contact are at some point affected by it (Heine & Kuteva, 2005).

Similarly, the innovations we discuss in this work cannot be explained solely by internal motivations, or only by language contact, but they suggest an interplay between the two. Thus, contact is assumed to play at least a partial role in accelerating the changes under study (see Chapter 5).

2.5 Is contact-induced structural change possible?

A debate about language contact flourished in the 19th century, as it had major implications for language classification and language change, two popular issues of the time (Odlin, 1989). For the most part, observed changes received explanations in terms of a family tree model of language relationships. In other words, the parent language undergoes changes that are systematically manifested in its daughter languages. The assumption is that the sister languages, in turn, share similarities by virtue of having developed from the same source. Since lexical borrowings could make language classification more challenging, scholars relied on grammar, which they felt to be impervious to outside influence, as an indicator of ‘true essence,’ so to speak, “the blood and soul” of the language, and a reliable key to distinguish any language (Odlin, 1989, p. 8).

The degree of permeability of the grammatical system remains a polemical issue in language contact research. Some scholars believe that there are constraints on the kinds of features that can be transmitted across languages (King, 2000; G. Sankoff, 2002; Weinreich, 1974). Usually, these restrictions take the shape of a “cline of borrowability” (G. Sankoff, 2002, p. 658) that limits what is likely to be borrowed. In general, the view is that the open lexicon is the most easily borrowable component, while morphology and syntax are the least
likely to be imported (G. Sankoff, 2002). This gradient relates to the premise that at the onset of contact, speakers are not necessarily fluent in the other language. Thus, when borrowing begins, it tends to start with words like nouns, adjectives and verbs, which do not require full fluency in that language and can be readily inserted into existing constructions in the other language (Thomason, 2001). The assumption is that, as the intensity and length of contact increases, so do the speakers’ fluency and their ability to recognize and process more abstract features. At this point, the borrowing of relatively superficial phonological (stress placement) or syntactic features (word order) may occur. The borrowing of other features like inflectional morphology, for example, is less likely, although still possible (Thomason, 2001). Similarly, Haugen (1950) states that all aspects of the grammar can be borrowed, but offers a hierarchy of which are most likely to be adopted. His “scale of adoptability” is correlated with the “fundamental patterning of language”: nouns are easily borrowed presumably because they do not have a lasting impact in the language, they merely fulfill the need of the moment; structural features are frequently repeated and thus harder to change, so they are less likely to be influenced by borrowing (224).

Thomason (1995) claims that in a contact situation ‘anything can happen’ to a language. In other words, there is no component of a grammar (lexicon, phonology, morphology, syntax) that is immune to change (see also Comrie, 1989). Rather, what can be transferred from one language to another has been seen as related to the extent and intensity of contact, and not to the inherent characteristics of different aspects of the grammar (Curnow, 2001). However, Thomason warns that possibilities and probabilities are different questions. While, in principle, all linguistic features are available for importation, she identifies certain tendencies among what has been borrowed in various contact situations. For example, non-basic vocabulary—rather than the kinds of words that tend to be present in all languages, such as ‘mother’, ‘hand’, ‘water’ (Thomason, 2001, p. 71)—is borrowed in circumstances of casual contact, but as the intensity of contact increases, so do
the kind of borrowed features\textsuperscript{4}. But for Thomason, typologies are mere guides and should not be interpreted as fixed constraints, as intensity of contact relates to subjective factors such as speakers’ attitudes and their language proficiency. Fluency in the source language is not necessary in order to borrow vocabulary, but speakers need some knowledge of the language’s structure before they import structural features: because “you cannot borrow what you do not know, control of the source language structure is certainly needed before structural features can be borrowed” (Thomason, 2001, p. 69). However, this prediction does not actually hold in all situations: some cultures consider the borrowing of words inappropriate (e.g., Aikhenvald, 2002), though structural components may be adopted, perhaps unconsciously. Also, when the speakers responsible for the innovations are second language learners, as occurs during language shift, the most common interference features are structural, not lexical (Thomason, 2001). Based on these reasons, Thomason maintains that the outcomes of language contact remain essentially unpredictable.

In this study, we are interested in whether English structures can influence Spanish structures. Making the case for contact-induced change is easier with lexical loans, which betray their origin directly, than with structural features, where the native lexicon is maintained and the equivalences between the languages may be more abstract (Thomason, 2001). Since they fall within a domain in which speakers are least metalinguistically aware, as the intended meanings are usually understandable (Weinreich, 1974), such importations are harder to categorize (Mackey, 1962). The next section describes how these innovations can be identified and understood through the process of convergence.

\textsuperscript{4} Terms for low numerals and pronouns are also considered basic vocabulary, yet they have been known to be borrowed: in Japanese and Korean, many uses of numbers have been borrowed from Chinese, and English they was borrowed from Scandinavian (Comrie, 1989). Also, while bound morphemes are considered less likely to be borrowed than free morphemes, negative attitudes towards loanwords in northwest Amazonia resulted in speakers preferring the former, which “are not so easily recognizable as unwelcome intruders” (Aikhenvald, 2002, p. 13).
2.6 Convergence

In the field of contact linguistics, it has been argued that languages undergo convergence, leading towards structural similarity between a given aspect of their grammars (e.g., Silva-Corvalán, 1994a, 1995). Through this ‘search for parallels’ (Toribio, 2004, p. 168), bilinguals often equate the paradigms of the two languages, giving rise to the possibility that forms from one language will influence forms from the other language (Otheguy & Zentella, 2012). These correspondences between languages are sometimes referred to as equivalence relations or isomorphisms, where parallel structures of different languages are conceptualized as being the same (Heine & Kuteva, 2005, p. 4).

2.6.1 Frequency changes

One of the outcomes of convergence is the higher frequency of use of one form in a particular context at the expense of another, where the more frequent form tends to be the one that most closely resembles the contact-language form in that context. Thus, bilinguals might activate patterns that are minimally used in their native language and use them more whenever they find a convenient model in the contact language. This appears to be the most common case of contact-induced transfer (Heine & Kuteva, 2005).

For instance, Salmons (1990) reports that German speakers in Gillespie County, Texas, and Dubois County, Indiana, employ the discourse marker (23) more often than has been observed in European German and use the phrase with the same functions as those of English you know (Heine & Kuteva, 2005).

(23) weibt du ‘you know’

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5 Weinreich (1974) called them interlingual identifications.

6 This outcome of convergence has also been called generalization (Silva-Corvalán, 1995)
That is, while both German *weißt du* and English *you know* are used to establish shared or common knowledge, the German marker is not used for floor holding, hesitation, or repairs as much as the English marker, although this function has increased in some varieties of German spoken in the US.

Drawing on an example from the present work, we expect relatively infrequent Spanish constructions such as periphrastic passives (e.g., Gámez, Shimpi, Waterfall, & Huttenlocher, 2009) (e.g., *El príncipe fue empujado por la cocinera* ‘The prince was pushed by the chef’) and scrambled datives (e.g., *la enfermera le dio al ángel una maleta* ‘the nurse gave the angel a suitcase’) to increase in a contact setting, where we presume that speakers are more exposed to English passives and double object constructions (see Chapter 4).

Conversely, bilinguals might decrease the usage of a native language feature that lacks a counterpart in the contact language. Mougeon & Béniak (1991) call it covert interference, which could lead to the feature’s “gradual decline and eventual loss” (Poplack, 1997, p. 289). For example, speakers of pro-drop languages such as Spanish, Russian, Serbian and Hungarian use this feature less when immersed in English-speaking settings (Heine & Kuteva, 2005). Second and third generation Spanish speakers living in the US show a lower occurrence of the morphological future and the preterit tense compared to their first generation counterparts (Silva-Corvalán, 1991). Greek spoken in the US and Turkish in Germany also exhibit reduced tense-aspect systems, affecting the forms lacking equivalents in the contact language (Johanson, 2002b).

Even though these processes can be initiated in monolingual communities—where different linguistic forms co-exist and speakers show a tendency to prefer one over the other—they are often strengthened or accelerated (Silva-Corvalán, 1994a) by the situation of contact. In studies involving the subjunctive in Spanish-speaking communities, for

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7 Silva-Corvalán (1994a) refers to this outcome as the shrinking or contracting form in simplification processes.
example, one can observe a change in patterns of usage over time: even in monolingual or Spanish-dominant communities, there is an increasing tendency to use the indicative or conditional in place of the subjunctive (Lantolf, 1978; Lipski, 1994; Lorenzo, 1966; Pousada & Poplack, 1981; Torres, 1989). However, it is clear that the subjunctive is even less frequent in contact situations, presumably because English does not overtly mark this mood. Ocampo (1990) and Silva-Corvalán (1994b) examine usages of the subjunctive in the Spanish in Los Angeles and report a decrease in the use of this mood that is replaced more and more with the indicative, even in obligatory contexts. In the Texas-Mexico border region, García and Terrell (1977) report that Mexican-Americans are increasingly abandoning the traditional mood distinctions. In grammaticality judgments based on a written questionnaire, Guitart (1982) also found a decrease in the use of the subjunctive by bilingual speakers. Besides Spanish, similar results are also apparent in Canadian French (Poplack, 1997).

2.6.2 Grammatical replication

Another outcome of convergence is grammatical replication\textsuperscript{8} (Heine & Kuteva, 2005). Resulting from language contact, the receiving or native language attains a new pattern on the model of the contact language. Crucially, because in most cases the emerging structure is built on an existing construction in the native language, it is seldom completely new. Rather, the structure is new for a particular verb, preposition, or noun class, involving changes to lexically-specified combination patterns.\textsuperscript{9} In this sense, speakers “simplify or

\textsuperscript{8} Most commonly, grammatical replication has been described under the headings such as grammatical calquing, loanshift, diffusion, congruence, attrition, or structural borrowing. However, it corresponds more closely to the framework laid out in Johanson (2002b) as selective copying (Heine & Kuteva, 2005, p. 6, and references therein).

\textsuperscript{9} This concept is similar to Silva-Corvalán’s(1995) overgeneralization, or Harris and Campbell’s (1995, p. 52) definition of extension, as the “further deployment of a structure in an entirely new area of the grammar of a language.” Extensions are often gradual, in that they apply to one or few words at a time; they may progressively remove usage exceptions;
overgeneralize rules but do not introduce elements which would cause radical changes in the structure of the language” (Silva-Corvalán, 1994a, p. 6). The outcome is not an exact copy of the model but rather a new structure that is shaped by factors such as what is available in the native language, what speakers consider pragmatically appropriate, and the extent and intensity of contact (Heine & Kuteva, 2005).

Making just this assumption, Otheguy (1993, 1995, 2006a, 2006b) argues that many phrasal innovations that apparently reveal an English structure, like the well-known example in (24), fit within the structural and lexical canons of Spanish. As he notes, such cases are “curious instances of the use and exploitation of an intact linguistic structure” (Otheguy, 1995, p. 215):

(24)  **llamar para atrás** ‘to call back’

_Llamar para atrás_, consisting of the sequence V_PP, is not directly analogous to the English _call back_, an instance of V_Adv. The V_PP structure is not itself novel, as verbs followed by adverbial prepositional phrases, particularly _para atrás_, are common in monolingual Spanish (Toribio, 2004):

(25)  **mirar para atrás** ‘look back’

(26)  **caminar para atrás** ‘walk backwards’

In other words, the notion is that speakers build their utterances to conform with already existing patterns, even if the specific lexical selections for particular types of reference are innovative. The term _atrás_, denoting ‘back’ or ‘backwards’, appears to have extended its range of application to include the concept of repetition, presumably motivated by the meaning of the English _back_. Thus we find—in Los Angeles Spanish—expressions such as (27) and (28) (Silva-Corvalán, 1994b, p. 175):

(27)  **dar para atrás** ‘give back’

(28)  **pagar para atrás** ‘pay back’

and they may be used interchangeably with the older norm, producing variation (Harris & Campbell, 1995, p. 49)
Similarly, Mackey (1962, p. 47) reports on French-English bilinguals who exhibit a novel use of French prepositions: when they say (29), (30), and (31) they are modeling on the English expressions on the committee, in fifteen days, and under study

(29) sur le comité 'on the committee'
(30) dans quinze jours 'in fifteen days'
(31) sous étude 'under study'

Although the prepositions and nouns under consideration are commonly available in other French constructions, the speakers combine them in a way that more closely resembles the English usage. A similar example is found in the Spanish of Spanish-English bilinguals (32), where the preposition en is innovatively accompanied by los sábados (M. E. García, 1995, p. 207), and (32), where at is used in place of en in/on/at' (Silva-Corvalán, 1994a, p. 186):

(32) en los sábados trato de no hacer mucho estudio 'on Saturdays I try not to do a lot of studying’
(33) me recogió a la biblioteca 'he/she picked me up at the library,’

Another case of replication comes from Bunte & Kendall (1981, p. 5), who observe the emergence of a new grammatical category in Verde Valley Yavapai and Kaibab Paiute of Arizona. Bilingual speakers there have been found to produce utterances such as (34) when using English:

(34) he fell off his bike, they say

The use of they say, even when it is clear that there is nobody who said anything, is the speakers’ way of mimicking grammatical markers of evidentiality\textsuperscript{10} common in Yavapai and Paiute. Because English lacks a corresponding category, Yavapai and Paiute speakers attempted to create it by drawing on the English phrase they say\textsuperscript{11} (Heine & Kuteva, 2005,

\textsuperscript{10} “These words are grammatical markers which are required in many contexts and social settings to indicate what kind of evidence speakers have to make utterances [...] e.g., whether they are reporting rumors or inferences” (Heine & Kuteva, 2005, p. 36). 

\textsuperscript{11} The choice of they say—as opposed to the adverb apparently, for example—arises from the fact that it is the indigenous verb ‘to say’ that is exploited in situations beyond those
Similarly, Hungarian-English bilinguals immersed in an English setting use tag questions such as (35), traditionally not present in Hungarian (Seliger & Vago, 1991, p. 8):

(35) *Eztnem tudod, tudod?* ‘You don’t know this, do you?’

Sometimes, grammatical replication results in double marking when the old and new categories co-occur in the same construction. In Tariana, the North Arawak language of northwestern Brazil, speakers use interrogative pronouns as relative clause markers, imitating the Portuguese usage of pronouns. However, they do not replace the Tariana relative construction; rather, they retain it and simply add their own interrogative pronoun. Similar processes are found in Basque, Pipil, and Nahuatl, modeled on Spanish (Heine & Kuteva, 2005, p. 130). In this work, for example, we examine the viability of Spanish reciprocal constructions such as (36), where the absence of the reciprocal pronoun *se* is presumed to be modeled on the English equivalent construction.

(36) *La bailarina y la cantante Ø abrazaron* ‘the dancer and the singer hugged’

(cf. *la bailarina y la cantante se abrazaron*)

Since reciprocal constructions lacking *se* are already available to speakers from expressions such as *la cocinera y el policia discutieron* ‘the chef and the policeman argued’, we speculated that expressions such as (36) are plausible innovations given sufficient exposure to English reciprocal structures, which do not exhibit this particle.

In other words, bilinguals may often resort to forms available in the native language and distribute them based on the rules of the contact language (Silva-Corvalán, 1991). In the case of grammatical replication, the old and new usage may coexist as alternative constructions, resulting in variation. In fact, excluding cases of attrition, contact situations that refer to speaking or talking: speakers “use these verbs to report hearsay evidence or rumor, to describe the intentions, emotions or interior states of persons or animate beings who are not present or not capable of speaking, [...] to report thoughts or dreams and to report hypotheses deduced from circumstantial or indirect evidence” (Bunte & Kendall, 1981, p. 3).
“tend to lead not to the reduction and loss of existing grammatical categories, but rather to diversification and to the creation of new grammatical categories in one language on the model of another language” (Heine & Kuteva, 2005, p. 258).

2.7 Conclusion

In this chapter, we surveyed the notion of cross-linguistic influence in bilinguals in contact and opted for the term “transfer” to describe the transmission of patterns from one language into the other, and the term “innovation” to refer to the result of such transfer. We discussed these innovations as the seeds of language change, involving changes in speakers’ distributional frequencies and the phenomenon of grammatical replication. If speakers’ patterns of use have an effect on linguistic representations, the emergence of innovations would lend support to the view of contact as a driver of language change.
3 STRUCTURAL PRIMING

3.1 Introduction

In order to manipulate speakers’ exposure to English, this dissertation uses an experimental paradigm extensively discussed in the psycholinguistic literature, namely, structural priming. This approach will allow us to assess whether English can affect the distributional frequencies of Spanish structures, by tracking changes in the favored and disfavored patterns. Priming studies also provide a way to elicit grammatical replication and measure their likelihood of occurrence based on previous activation of English configurations. If Spanish innovations are found to be a function of the form of previous English sentences, it would lend support to the claim that contact-induced change can be mediated by priming. More broadly, this dissertation leans on the notion of structural priming as a theoretical framework for thinking about the interplay between the languages of a bilingual, where structural repetition is one of the by-products of such interaction. In this chapter, we review the relevant structural priming literature and discuss its suitability for the study of language contact and change.

3.2 The phenomenon of structural priming

In studying sentence production, researchers have unveiled an intriguing aspect of the language system: while speakers are capable of creating and understanding an unlimited number of utterances, they tend to unintentionally repeat the same structure that they or their interlocutors recently generated (Bernolet, Hartsuiker, & Pickering, 2007; Bock, 1986; Pickering & Ferreira, 2008; Tannen, 1987). This tendency for non-deliberate structural repetition is called priming.
The redundancy of speakers’ utterances has been observed in various realms of production. Speech errors offer examples of this systematic, nonrandom structural recurrence. At the phonological level, consider the infelicitous (1) and (2) (Bock & Griffin, 2000, p. 177):

(1) bake your bike (cf. take your bike)
(2) Bush’s boodget (cf. Bush’s budget)

It is worth noting that repetition in language is often intentional, serving stylistic, social, and rhetorical purposes. For instance, rhymes are created through the replication of phonological segments. Also, syntactic repetition can be used for humor, as evident in the following excerpt (3) (Tannen, 1987, p. 586):

(3) Marge: Can I have one of these Tabs?
    Do you want to split it?
    Do you want to split a Tab?

    Kate: Do you want to split MY Tab? (laughter)

However, in the case of the aforementioned speech errors, repetition occurs without the speaker’s awareness, automatically, and fulfills no obvious function. The same is true for non-erroneous locutions, where the repetition of linguistic structures is considered too abstract and complex to be driven by speaker intention. For example, speakers may repeat semantic components, such as spatial descriptions (e.g., Garrod & Anderson, 1987) or conceptual operations involved in telling the time (Meeuwissen, Roelofs, & Levelt, 2004). At the syntactic level, there are also cases of unwitting repetitions, such as (4) (Loebell & Bock, 2003, p. 792):

(4) Once you’re in it, you can’t get out it (cf. you can’t get out of it)

The next exchange illustrates another example (5). Here, two women discuss the choice of wallpaper. Note the persistence of the what-construction (NP+is+what+Subject+V) across utterances and speakers (Godfrey, Holliman, & McDaniel, 1992; cited in Loebell & Bock, 2003, p. 792):
(5) Speaker 1:  *Repeating patterns is what you have to check for when you buy your paper.*

Speaker 2:  *Yes ... that’s what I needed and I didn’t think about that. I got a Mickey Mouse print is what I got.*

This unconscious tendency to reproduce the syntactic pattern of a previous sentence is called *syntactic or structural priming.*

3.3 Researching structural priming

The first systematic investigation of syntactic priming in natural language use was Schenkein (1980), who reported this kind of repetition in exchanges between burglars over walkie-talkies. Next, Weiner & Labov (1983) showed that the occurrence of a passive in spontaneous discourse is associated with the presence of another passive within the previous five sentences. Tannen (1987) illustrated the pervasiveness, role, and automaticity of repetition in taped and transcribed conversations. More recently, computational methods allowed researchers to quantify repetition in fairly large corpora (e.g., Gries, 2005; Szmrecsanyi, 2005). Within the variationist tradition, the presence of a feature has been shown to predict the occurrence or perseveration of the same feature in subsequent strings, such as subject expression (Cameron & Flores-Ferrán, 2004; Torres Cacoullos & Travis, 2011; Travis, 2007) and the plural marker -s (Poplack, 1980, 1982).

Experimental work on syntactic priming began with Levelt & Kelter (1982). They interviewed shopkeepers on the phone and found repetition in a sequence of questions and answers. For example, the question (6a), containing a sentence-initial PP, tended to elicit a PP in the response (6b):

(37a)  *At what time does your shop close?*

(42b)  *At five o’clock.*
On the other hand, (7a), where the PP is absent, was more frequently followed by (7b), a phrase also lacking a PP:

(7a)  What time does your shop close?

(7b)  Five o’clock

While such findings could be attributed to factors such as lexical repetition, the maintenance of the question in working memory, socially motivated matching of forms in dialogue, or the possibility that communicative intentions predispose structures, no single effect could account for them. In Levelt & Kelter (1982), the structures produced differed, even though the communicative intention was the same. In Weiner & Labov’s sociolinguistic interviews, despite speakers’ diverse communicative intentions, the syntactic forms they used persisted.

Levelt & Kelter’s study was followed by a highly influential experiment from Bock (1986), which elicited priming of ditransitive, transitive, and passive structures through picture descriptions (Bock & Griffin, 2000; Bock & Loebell, 1990; Bock, 1989; Loebell & Bock, 2003).

Bock (1986) argued that the patterning of structures in speech results from the activation of syntactic procedures. An increase in the activation level or strength of these procedures raises the probability that they will be used in a subsequent utterance, resulting in syntactic priming. While previous studies revealed the existence of syntactic repetition, the mechanism governing this paradigm was difficult to isolate from other communicative strategies. Bock’s priming experiment introduced a tool to assess syntactic representations directly and investigate the activation or strengthening hypothesis in conditions that made alternative explanations less likely. This supported the autonomous view of syntactic knowledge as distinct from other forms of knowledge, such as semantic features or other surface properties of utterances (Pickering & Ferreira 2008).

Under the guise of a memory task, participants first heard a sentence and then repeated it. Next, they were asked to describe an unrelated picture. As a distracter, after
each sentence and picture, they had to indicate whether or not they had encountered it before. As in Levelt & Kelter’s study, primes exploited the property to express the same message through different structures. In English, there are a number of ditransitive verbs that can combine with their arguments in two different ways, and take the form presented either in (8a) or (8b) below (Bock, 1986, p. 359):

(8a) Prepositional object (PO) construction (NP_PP):

   The corrupt inspector offered a deal to the bar owner

(8b) Double object (DO) construction (NP_NP):

   The corrupt inspector offered the bar owner a deal

Similarly, a transitive sentence can be expressed in an active or passive form, as in (9a) or (9b) (Bock, 1986, p. 361):

(9a) Active construction:

   One of the fans punched the referee

(9b) Passive construction:

   The referee was punched by one of the fans

The results of the study showed that picture descriptions tended to match the form of the preceding primes. That is, prime (8a) was followed by PO constructions, (8b) by DO constructions, (9a) by active constructions, and (10b) by passives.

In this way, Bock showed that syntactic repetition occurred in two different types of sentences, with the use of the alternative forms of each type varying as a function of the form of a previous sentence. These variations took place independently of word order or grammatical roles, and in conditions that offered no motivation for the maintenance of priming sentences in memory, as the relationships between the sentences were abstract. The sentences and pictures were presented as isolated, semantically unrelated instances, so priming could not have been driven by conceptual representations or the need to create discourse coherence. Also, the participants were not aware of the connections between the priming sentences and the pictures, which suggests that the priming effect was not
conscious or strategic. Bock concluded that the variation in the syntactic form of the participants’ description of the pictures could only have been correlated to the syntactic structure of the priming sentence, confirming her activation hypothesis: “an utterance takes the grammatical form that it does because the procedures controlling its syntax are more activated than the procedures responsible for an alternative form, with the higher level of activation being an automatic consequence of the prior production of the same form” (Bock, 1986, p. 379).

Subsequent studies eliminated the possibility that lexical repetition of the dative preposition might be responsible for the priming effects. Irrespective of whether the prepositions in the priming sentence matched those in the spontaneously produced sentences, the participants tended to produce structures similar to those of the priming sentences. For example, prepositional phrases with to (11a) and for (11b) equally predicted picture descriptions using to-datives (PO). This suggests that what is primed is the constituent configuration of the sentence, not the lexical items themselves (Bock, 1989).

(11a) *The secretary is taking a cake to her boss*

(11b) *The secretary is baking a cake for her boss*

This claim was also supported in a later study. Bock & Loebell (1990) showed that priming sentences where the constituent structure was equivalent, and the preposition was the same but differed in meaning, equally impacted the forms of the sentences produced. For instance, constructions with dative-*to* (12a) and locative -*to* (12b)—both containing a VP consisting of a verb, noun phrase, and prepositional phrase—primed the production of PO descriptions (V_NP_PP) at a comparable rate.

(12a) *The wealthy widow gave her Mercedes to the church*

(12b) *The wealthy widow drove her Mercedes to the church*
Passive (13a) and locative by (13b) were also tested, and behaved similarly in eliciting a passive construction:

(13a) The 747 was alerted by the control tower
(13b) The 747 was landing by the control tower

Crucially, priming sentences where constituent structures were different, but used the same prepositions and surface configurations, did not equally enhance the production of PO descriptions (14). The sentence frame is the locus of priming, independently of lexical arrangement and the meanings conveyed by the prepositions.

(14a) Susan brought a book to study
(14b) Susan brought a book to Stella

Priming experiments using ditransitive structures then expanded to include other methodologies. For example, in a sentence recall task, participants silently read a series of prime (15a) and target (15b) sentences and are asked to reproduce them after a brief intervening task (Potter & Lombardi, 1998, p. 268):

(15a) PO prime:

The tycoon willed that mansion to his young nephew very grudgingly

(15b) DO target:

The prompt secretary wrote her boss a message every week

Other studies modified the procedure so that the prime is part of the distracter task (e.g., Meijer & Fox Tree, 2003; Shin & Christianson, 2009). For example, a target sentence appears on the screen and participants read it. The sentence then disappears and is replaced by a prime sentence. Participants read the prime and press a key to continue, after which they have to complete a simple distracter task (e.g., a word appears on the screen and participants have to indicate whether it was present in the prime). Finally, a message on the screen asks participants to recall aloud the first sentence they read.

In a sentence completion task, participants are presented with sentence fragments, which they are asked to fill with whatever comes to mind. Prime fragments are designed to
elicit either PO (16a) or DO (16b) completions, while targets admit either construction (16c) (Pickering & Branigan, 1998):

(16a) PO prime:

*The racing driver showed the torn overall...*

(16b) DO prime:

*The racing driver showed the helpful mechanic...*

(16c) Target:

*The patient showed...*

In such tasks, participants type their answers using a computer keyboard, or complete them by hand in a booklet (e.g., Hartsuiker & Westenberg, 2000; Kaschak & Borreggine, 2008; Pickering, Branigan, & McLean, 2002). In an oral version, participants read the fragments from a computer screen and speak their answers (e.g., Branigan, Pickering, & Cleland, 2000; Hartsuiker & Westenberg, 2000; Salamoura & Williams, 2007).

The “confederate and naïve participant” task (Branigan et al., 2000) is another method for testing syntactic priming, aimed at assessing its effect in dialogue. Participants are told that the purpose of the experiment is to investigate how well people communicate when they cannot see each other. The experiment consists of a participant and a confederate, who take turns describing pictures to each other. The confederate has a script where he reads filler and priming sentences to the participant, who is asked to find—in a set of cards in front of him—the one that matches the description he just heard. The participant then takes a card from a different pile and describes it to the confederate, displaying a tendency to produce sentences with the same syntactic form as the prime. Syntactic coordination, then, occurs not only when participants produce a particular form, as Bock concluded, but also during comprehension in spontaneous dialogue (Bernolet et al., 2007; Branigan, Pickering, & McLean, 2005; Cleland & Pickering, 2003; Hartsuiker, Pickering, & Veltkamp, 2004; Schoonbaert, Hartsuiker, & Pickering, 2007).
In sum, structural priming studies have evolved to encompass different methodologies. In this investigation, we developed our own protocol based on picture description tasks in broad use in priming studies, where participants first read a sentence aloud and are then asked to describe an unrelated picture. Being the first priming study to measure bilinguals’ innovations in contact and non-contact settings, we sought to isolate structural factors as the sole sources of priming. For this reason, we chose a methodology that would limit speakers’ exposure to additional factors that could distract their attention and potentially distort the results, such as interlocutor accommodation. We decided on a task that measures speakers’ own comprehension and production processes in English and Spanish, rather than having a confederate read the primes, which in our case could have introduced unwanted influences in the form of the confederate’s Spanish and English dialect. For example, New York speakers of different Spanish varieties have been found to undergo dialect leveling (Otheguy, Zentella, & Livert, 2007; Otheguy & Zentella, 2012). Similarly, phonetic accommodation has been reported across dialects of Spanish (MacLeod, 2012) and English (Pardo, Gibbons, Suppes, & Krauss, 2012).

3.4 The omnipresence of priming

The seeming ubiquity of priming led Pickering & Ferreira (2008) to speculate that possibly all levels of representation show forms of priming. Besides occurring in ditransive and passive constructions, as described above, numerous studies have tested its effects in other structures. Syntactic priming has been observed on the production of Dutch locatives (17) (Hartsuiker, Kolk, & Huiskamp, 1999), verb-auxiliary placement (18) (Hartsuiker & Westenberg, 2000) and noun phrases (19) (Bernolet et al., 2007; Cleland & Pickering, 2003), English verb particles (20) (Gries, 2005), and relative-clause attachment patterns (Branigan et al., 2005; Desmet & Declercq, 2006; Ferreira, 2003; Scheepers, 2003):

(17) on the shelf lies the book / the book lies on the shelf
While the studies reviewed in the previous sections mostly refer to priming effects in production (i.e., speakers create the target sentences), there are a number of investigations that assess syntactic priming in comprehension, showing that merely perceiving a structure is sufficient to influence comprehension of subsequent sentences (Arai, van Gompel, & Scheepers, 2007; Bock, Dell, Chang, & Onishi, 2007; van Gompel, Pickering, Pearson, & Jacob, 2006). In Arai et al. (2007), participants read prime ditransitive sentences aloud; then they listened to a target structure while looking at a picture containing an agent, a recipient, and a theme. Using an eye-tracking device, the authors found that participants exhibited anticipatory gazes at recipient pictures following DO primes, and theme pictures following PO primes.

Finally, syntactic priming has been shown to operate in both the written and the spoken modalities at a comparable rate (e.g., Cleland & Pickering, 2006; Hartsuiker & Westenberg, 2000; Pickering et al., 2002).

In sum, structural priming studies have been conducted for a variety of constructions, exploring speakers’ patterns in comprehension and production, as well as in oral and written modalities. In this investigation, we assess speakers’ oral productions in the voice, reciprocal, and dative alternations (see Chapter 4).

### 3.5 Structural priming theories

If syntactic priming provides insight into the nature of the language system, the presence of priming between sentences may suggest an uniformity in the underlying representations on which these different processes rely (Pickering & Ferreira, 2008). The next section discusses two theoretical explanations of syntactic priming.
3.5.1 Implicit learning

Two theories have been advanced about how syntactic priming operates. The first one, proposed by Chang et al. (2006), is a connectionist, error-based learning account. When a token of one construction (e.g., DO) is processed, the model is tuned such that it will be more likely to produce the same construction (DO) than an alternative construction (PO) on a subsequent utterance. Here, learning about particular constructions (DO or PO) is kept separate from knowledge about the particular verbs used in those constructions. Syntactic priming, then, arises through the activation of an abstract structural representation that is unaffected by individual lexical items (Kaschak & Borreggine, 2008). Thus, studies that found priming effects in the absence of lexical repetition support this model (Bock & Griffin, 2000; Bock & Loebell, 1990; Bock, 1986, 1989).

Proponents of this view believe that syntactic priming reflects the operation of an implicit or procedural learning mechanism within the language processing system (Bock & Griffin, 2000; Chang et al., 2006). In implicit learning, the act of processing leaves a trace in the system, that is manifest in the performance of tasks that require the same operations involved in the original experience. For speakers to produce and comprehend language, they must learn how to map or relate different linguistic representations. These connections are acquired through experience, in the sense that processing sequences are strengthened with use. Hearing or producing the prime reinforces the syntactic processes involved in it; the processing of the target reveals this newly intensified knowledge (Pickering & Ferreira, 2008). In other words, the operation that is adequate for a specific message is strengthened as a result of processing the prime, so subsequent messages “are more likely to be channeled through the same structural procedures, incidentally giving them the same structural features of earlier utterances” (Loebell & Bock, 2003: 794)

There are several arguments for positing an implicit learning account of syntactic priming. First, syntactic priming appears to be largely unconscious. Lay language users are
unaware of the syntactic structures that organize their sentences, nor do they realize that those structures exhibit priming (Pickering & Ferreira, 2008).

Second, the priming effects are incidental and automatic. That is, they do not depend on specific intentions to reproduce a particular structure, and do not require paying attention to the form of the priming sentence (Bock & Griffin, 2000).

Third, syntactic priming is abstract, in that it involves generalizing a structure to new utterances with new lexical items (e.g., the sentence *Victor gave the monkey food* as a prime for *Patrick sent Connie a letter*). Besides manifesting in ditransitive constructions, priming has also been observed in more complex syntactic phenomena unrelated to lexical entries, such as relative-clause attachment preferences (Branigan et al., 2005; Desmet & Declercq, 2006; Ferreira, 2003; Scheepers, 2003). Also, syntactic priming occurs in the absence of lexical and thematic role repetition (e.g., Bock and colleagues) and with non-equivalent word-order from prime to target (e.g., Shin & Christianson, 2009).

Fourth, priming is independent of explicit memory (Pickering & Ferreira, 2008). When speakers are asked to remember whether they encountered certain sentences, they do not remember the ones that caused priming (Bock, Loebell, & Morey, 1992). Also, priming is preserved even in cases of amnesia, where explicit memory is severely impaired (e.g., Bock & Griffin, 2000).

Fifth, priming exhibits what has been called an *inverse preference* effect (Bernolet et al., 2007; Ferreira & Bock, 2006; Ferreira, 2003; Hartsuiker et al., 1999; Hartsuiker & Kolk, 1998; Kaschak, 2007; Scheepers, 2003). That is, structures that are produced relatively less often show stronger priming relative to a neutral baseline. This is consistent with the implicit learning assumption that systems are more sensitive to new than repeated representations. A case at hand is Hartsuiker & Westenberg (2000), who tested Dutch participle-final and auxiliary-final subordinate clauses. Initial baseline measurements revealed that speakers preferred the participle-final word order. During the experiment, they found that—relative to the baseline—participle-final primes increased participle-final
target clauses only slightly, whereas auxiliary-final primes had a stronger effect in decreasing participle-final target clauses.

Finally, syntactic priming effects have been shown to be long-lived (e.g., Bock et al., 2007; Bock & Griffin, 2000; Hartsuiker et al., 1999; Hartsuiker & Kolk, 1998; Kaschak, 2007). For example, Bock & Kroch (1989) found that priming effects were as strong when 10 or 0 sentences intervened between the prime and target (see also Bock et al., 2007; Branigan et al., 2000). Repeated exposure to priming manipulations of a particular structure makes that structure more available, which is considered an increase in the resting level of activation. The higher the resting level, the lower the additional activation needed to overcome a selection threshold. That is, producing a prime sentence raises the activation level of a given representation. This not only increases the probability of producing a subsequent target sentence with the same structure, but with each priming trial the resting level of the relevant representation is augmented (Hartsuiker et al., 1999, pp. 140–141).

While there is a large body of research suggesting that syntactic priming is relatively-long lasting, there is also evidence that points to the contrary. In a number of studies, syntactic priming has been found to decay over intervening sentences (e.g., Branigan, Pickering, & Cleland, 1999; Levelt & Kelter, 1982; Wheeldon & Smith, 2003). Kaschak & Borreggine (2008) argue that the different results might have to do with the modality of sentence production. When subjects are asked to speak their answers, priming effects last longer than when they write them. But perhaps a more critical factor in explaining these results is lexical repetition from prime to target sentences. Experiments that detected short-lived priming effects used the same verbs from prime to target sentences, whereas those that showed more durable effects did not (Pickering & Ferreira, 2008). The following account of priming is helpful in understanding how this occurs.
3.5.2 Residual activation
The second theory of syntactic priming is the residual activation account, put forth by Pickering and Branigan (1998). Here, lexical nodes are linked to combinatorial nodes. When the same verb is used between prime and target, residual activation of both the combinatorial node (e.g., NP_NP) and its link to the verb, will make the selection of the same combinatorial node more likely, causing a higher level of priming. The stronger priming effect obtained when verbs are repeated across utterances is called lexical boost.
Since the combinatorial nodes are shared between the different verbs, priming is also possible even without lexical correspondences, albeit weaker.

Ferreira & Bock (2006) suggest that the repetition of the verb might make priming a more episodic phenomenon (i.e. connected to the specific experience, including representational aspects, of the prime sentence), and this episodic memory may be more fragile and momentary (Pickering & Ferreira, 2008, p. 448). The overall priming effect may be enhanced by explicit memory of the immediately preceding prime sentence, where shared lexical items between prime and target make the prime sentence easily accessible. Retrieval of the prime sentence increases the likelihood that the structure of the prime will be used in the target sentence (Kaschak & Borreggine, 2008). This might explain the lexical boost effects when prime and target are adjacent, as well as account for the absence of lexical boost and the overall decrease of priming that is observed as the prime and target are further separated (e.g., Hartsuiker & Pickering, 2008).

3.5.3 Theoretical models of priming and their applicability to convergence phenomena
Let us briefly turn to how these accounts of structural priming relate to the research questions of this investigation. The implicit learning and the residual activation accounts help to explain different aspects of structural priming and, overall, make similar predictions regarding cross-linguistic priming. For example, when there are structurally different ways of conveying the same message, the notion of primed structural procedures or primed
combinatorial nodes can equally explain why bilinguals may prefer the alternative that is shared with the contact language, as discussed in Chapter 2. Because structurally parallel forms rely on the same procedures or nodes, if a construction is shared between the languages it promotes more frequent activation of specific structural procedures or combinatorial nodes over others. However, the implicit learning account is more suitable than the residual activation account with respect to other convergence phenomena, such as cases where constructions in one language prompt the use of more restricted alternatives in the other language. According to the residual activation model, if a given verb lacks a particular subcategorization, that alternative should not be primable (Loebell & Bock, 2003), and yet this happens in language contact situations (e.g., German-English bilinguals producing German PO datives, Loebell & Bock, 2003). In this sense, the implicit learning framework also comes in handy as a way to model grammatical replication, that is, the use of patterns in one language in contexts that resemble their usage in the other language. To the extent that implicit learning promotes generalization, it allows for the possibility that the use of procedures for assembling patterns in one language would encourage the use of the same procedure in the other language, even when it is not traditionally associated with the grammatical context in question. We come back to the applicability of these models to our data in the last chapter (Section 5.4).

3.6 The functions of priming

Since the effect of the prime must be maintained long enough to affect the target, it is clear that syntactic priming necessitates some form of memory (Pickering & Ferreira, 2008). As a transient event, priming serves a variety of discourse functions such as promoting cohesion through the use of parallel structures, facilitating gap-filling in elliptical utterances, and aiding the production and comprehension of answers to questions (Bock & Griffin, 2000).
Priming can also be conceived as a performance constraint (Bock, 1986). Linguistic competence, characterized by the speaker’s innate ability to create novel utterances, can be restricted by performance factors, such as memory limitations and distractibility. Although priming can lead to errors, as illustrated by examples (1), (2), and (4), it can also prevent errors. Frequently used forms are likely to be produced more fluently, with greater speed and accuracy (Branigan et al., 2005; Corley & Scheepers, 2002; Ferreira & Bock, 2006; Kaschak, 2006; Smith & Wheeldon, 2001; Wheeldon & Smith, 2003). Using previously activated procedures or nodes eliminates a wide array of syntactic options that can make unplanned speech more prone to errors and hesitations. This suggests that priming presents cognitive advantages by easing the demands of message formulation and facilitating the production of particular structures (Bock 1986). In this sense, priming may also contribute to alleviating bilinguals’ “linguistic burden” (Weinreich, 1974, p. 8) by limiting speakers’ choices to recently processed representations in either language.

In conversation, priming could also be regarded as a mechanism that promotes alignment (Pickering & Garrod, 2004), where interlocutors end up with similar mental states, or perceptions of the world, ensuring communicative success (Pickering & Ferreira, 2008). People switch between production and comprehension, having few pauses between turns and completing each other’s sentences by anticipating linguistic material (Pickering & Ferreira, 2008, p. 446). The tendency for speakers to repeat their own choices, added to the tendency of listeners to comprehend the utterances of their interlocutors in the same way that they are produced, leads to both participants making the same choices. The combination of all these sources of priming results in a “spiraling” effect, creating a mutually-influencing mechanism where one participant’s choices affect the other’s, which in turn affect the former’s (Branigan et al., 2005, p. 479).

But the longer-term component of syntactic priming appears to play a role in language learning and language change. The process of language acquisition, for example, depends on a great amount of constrained imitation, as learners use utterances that they
hear as models based on which to produce their own (Pickering & Ferreira, 2008). In a first-language acquisition study, Brooks & Tomasello (1999) reported developmental analogues of priming in the production of passives (Bock & Griffin, 2000). Similarly, Huttenlocher et al. (2004) and Shimpi et al. (2007) showed that children produced transitive and dative constructions after being exposed to sentences involving those structures (see also Savage, Lieven, Theakston, & Tomasello, 2003, 2006). In this sense, priming has significant implications for educational practice (Pickering & Ferreira, 2008). Repeated exposure to certain structures affects production and comprehension of those structures, promoting the development of grammatical skills. Additionally, by encouraging the use of abstract syntactic structures, priming enables generalization of an acquired structure to new, lexically non-specific utterances, promoting language learning (Pickering & Ferreira, 2008). For example, “children often produce their first instances of grammatical constructions only in the context of specific lexical items and later generalize them to other lexical items” (Bybee, 2006, p. 712).

In sum, priming serves both short and long-term functions. As a transient event, it aids communication by promoting fluency and alignment between interlocutors. In turn, its durable effects play a crucial role in language learning and change by facilitating the production of frequent structures and encouraging generalization.

3.7 Cross-language priming

Structural priming has also been found to operate across languages, where primes in one language influence target productions in the other language, such as Dutch-English (Cleland & Pickering, 2003; Desmet & Declercq, 2006), Spanish-English (Hartsuiker et al., 2004; Meijer & Fox Tree, 2003), Greek-English (Salamoura & Williams, 2007) and Korean-English (Shin & Christianson, 2009), suggesting an integrated syntactic representation between the languages.
For example, in a study involving Dutch-English bilinguals, Schoonbaert et al. (Schoonbaert et al., 2007) focused on the dative alternation, which has similar frequencies in both languages. They report priming within and between the languages in both directions, although the effect was strongest when prime and target were in the same language. They also found what they call a translation equivalence boost, whereby priming in one language is more likely to occur after the same verb is used in the other language. This is because translation equivalent verbs (e.g., English give and Dutch geven) are assumed to activate the same lemmas, by virtue of their strong conceptual overlap. However, this effect was not symmetrical. It was found from L1 to L2, but not from L2 to L1. The authors attribute this result to their participants being unbalanced bilinguals, more proficient in their L1 (Dutch) than in their L2 (English), since priming effects tend to be higher when primes are in the speaker’s dominant language (Loebell & Bock, 2003).

But what happens when the structures are not shared between the languages? In a study of German-English bilinguals, Loebell & Bock (Loebell & Bock, 2003) examined the voice and dative alternations, which operate differently in each language. For example, there was an absence of priming for passives, a construction that is not surface-equivalent in English and German. Similar findings are reported in Bernolet et al. (2007), where no priming was detected for relative-clauses between Dutch and English, which differ in word-order. For datives, they found priming in both directions, although it was stronger from L1 to L2. The effects were also higher for DOs, which are common to both languages, than for POs, which are more restricted in German.

The data support the claim that processing mechanisms are sensitive to probabilistic information. In bilinguals, restricted structures in one language can “become imperceptibly more acceptable for subsequent, less restricted use” in the other language, bridged by priming (Loebell & Bock, 2003, p. 813). In monolingual studies, there is evidence that speakers’ patterns of experience with particular constructions or verbs can affect subsequent base rates of production (Kaschak & Borreggine, 2008; Kaschak, 2007). Other
studies suggest that the same mechanism that operates in children’s language acquisition may also be at work in older speakers’ continued ability to learn new constructions and extend them to different sentence contexts (e.g., Kaschak & Glenberg, 2004; Kaschak, 2006). This is consistent with the idea that linguistic knowledge is in a state of flux, adapting to speakers’ experience with language.

The motivations for considering syntactic priming as a lens into contact phenomena is that it complements current inventories of usage with an explicit characterization of its underlying mental operations. Structural priming, as the observation of structural repetition, reflects speakers’ sensitivity to some aspects of linguistic knowledge (Ivanova, 2012). Given the success of this method to examine processing phenomena, we reasoned that it is well suited to approach the mechanism of convergence. By influencing the choice and ordering of phrase structure configurations, it allows for the manipulation of the probabilities of language use. Structural priming, then, could be a valuable research tool to hypothesize about, measure and model language change.

The greater availability of disfavored or restricted forms in one language, brought about by exposure to the other language, may further encourage their use and, in turn, increase their acceptability. This is consistent with the notion of syntactic satiation, where ungrammaticality ratings decrease after repeatedly judging their acceptability (Snyder, 2000). For example, moderately grammatical sentences received higher ratings from participants who had read them once before (Luka & Barsalou, 2005). Similarly, speakers produced dispreferred verbal configurations after being exposed to primes bearing the same anomaly (Ivanova, 2012).

To the degree that priming supports distributional biases, as well as the extension of certain forms to new environments, particularly those that resemble the contact language, it is also consistent with the notion of convergence, whereby languages tend to achieve greater structural similarity.
3.8 Conclusion

In this chapter, we laid out the notion of structural priming in natural language use and reviewed seminal studies documenting its operation in various linguistic realms. We also considered two processing theories that seek to approach the same phenomenon under different theoretical commitments. In addition, we described the short and long term functions of priming. Finally, we discussed evidence of structural priming in bilingual populations. With repeated exposure, not only is there an increase of shared structures, but restricted structures also become more accessible and acceptable, and may extend to further contexts. This suggests that priming could promote innovations in bilinguals, as well as facilitate language learning and change throughout the lifespan.
4 EMPIRICAL DATA ON L1 INNOVATIONS IN SPANISH-ENGLISH BILINGUALS

4.1 The purpose of this research

The main goal of this dissertation is to explore the mechanisms underlying convergence as the driver of linguistic innovations. In doing so, we designed an empirical tool with which to measure and model one of the ways in which one language may influence the other in a situation of contact and thus increase our understanding of language change in general. Specifically, we want to know whether English contributes to the emergence of innovations in Spanish, and whether the effects are different for bilinguals immersed in a situation of contact with English than for those who live where Spanish is the majority language. To address these questions, we developed the structural priming paradigm to track frequency changes and instances of grammatical replication in three constructions with two alternations each, in both English and Spanish, but which have different degrees of overlap between the two languages. Our experiments were conducted in New York City in the United States, and in Córdoba, Argentina, with Spanish-English bilinguals for whom Spanish was their first language. A group of English monolinguals was also recruited for the baseline experiment.

4.2 Overview of the experiments

The empirical evidence presented in this chapter comes from three experiments based on the same set of target items. Experiment 1 was designed as a baseline and was conducted with Spanish-English bilinguals and English monolinguals living in the US. Experiments 2 and 3 measured participants’ responses after English and Spanish primes respectively, and were run in parallel with Spanish-English bilinguals in US and Argentina.
4.2.1 Experiment 1: Picture description task
Participants were asked to describe a succession of 48 target pictures using the verb provided below each picture. Data from this experiment establish the baseline frequencies of use for the target constructions absent any priming. It was conducted in English with a group of English monolinguals and in Spanish with a group of Spanish-English bilinguals.

4.2.2 Experiment 2: Cross-language priming (English to Spanish)
Participants were asked to read sentences in English and describe pictures in Spanish, using the verb printed below the picture. The target verb was the translation-equivalent of the prime verb, so as to encourage the highest possible priming effect (Schoonbaert et al., 2007). The experiment was conducted in New York, United States, and Córdoba, Argentina. In order to ensure maximal difference between the groups, we compared the New York bilinguals with bilinguals from a Spanish-speaking country that was not among the largest Hispanic origin groups in New York or the US (i.e., Mexican, Puerto Rican, Cuban, Salvadoran, Dominicans, Guatemalans, Colombian, Honduran, Ecuadoran, Peruvians) (Brown & Lopez, 2013), such as Argentina.

4.2.3 Experiment 3: Within-language priming (Spanish to Spanish)
Participants were asked to read sentences in Spanish and describe pictures in the same language, using the verb printed below the picture. The target verb was the same as the prime verb, so as to encourage the highest possible priming effect (Pickering & Branigan, 1998). The experiment was conducted in New York and Córdoba, and the participants were the same two sets of bilinguals who participated in Experiment 2. Participants completed the cross-language priming procedure first, followed by the within-language priming procedure, after a short break during which they completed a brief vocabulary measure and a linguistic background questionnaire.
4.2.4 Summary
The planned experiments will offer an empirical basis that will allow us to speculate about language interaction in bilinguals, providing a tool through which to assess English influence. Comparing within and cross-language priming will allow us to measure the effect of English versus Spanish on target structures, informing the question of internally versus externally motivated change. Comparing speakers in US and Argentina will allow us to determine the effect of contact on Spanish structures, and whether language change is initiated or accelerated in contact settings. Conceivably, structural priming could not only be responsible for increasing the production of shared constructions but, more importantly, could potentially facilitate grammatical replication and introduce innovative patterns of use in bilingual speech. To the extent that English structures cause Spanish structures to change frequency or emerge in new contexts, structural priming could be conceived as one of the mechanisms underlying language change.

4.3 Alternations

Alternations refer to the verb’s ability to combine with arguments and adjuncts in different ways (Levin, 1993). This investigation focuses on three alternations allowing us to test the effects of convergence in a wide range of constructions: the voice alternation, the reciprocal alternation, and the dative alternation. These constructions have varying degrees of overlap in Spanish and English, in terms of both frequency and structure. For example, the voice and reciprocal alternations have almost parallel patterns in both languages but differ in frequency. The dative alternation, however, has different instantiations in the two languages: it is well-established in English but is generated by scrambling in Spanish, resulting in a dispreferred form.

The voice and dative alternations have been studied extensively using the priming paradigm, although mostly in English, whereas, to our knowledge, the reciprocal alternation
has never been tested with this methodology. We are aware of only two studies involving Spanish constructions (Hartsuiker et al., 2004; Meijer & Fox Tree, 2003), but they use Spanish primes and English targets. Thus, the Spanish production data presented in this chapter are the first available for these constructions.

4.3.1 Voice alternation

The first alternation has been studied extensively (Bock, 1986, 1989; Hartsuiker et al., 2004; Loebell & Bock, 2003), involving active (1a) and passive voice (1b):

(1)  Voice alternation
    a.  La cocinera empujó al príncipe (Active)
        ‘The chef pushed the prince’
    b.  El príncipe fue empujado por la cocinera (Passive)
        ‘The prince was pushed by the chef’

The alternative forms depicted in (1a) and (1b) have similar configurations in English and Spanish, the only difference being the accusative marker a in the Spanish version of the active construction (see Section 4.4.2). In terms of their distributional frequency, studies seem to suggest that the passive is more common in English (Roland, Dick, & Elman, 2007), whereas it is not used as liberally in Spanish (Gámez et al., 2009). Instead, Spanish speakers tend to use se-passives as a way to “defocus the agent and highlight the patient” (Quesada, 1997, p. 41).

4.3.2 Reciprocal alternation

This alternation occurs with reciprocal verbs, taking the form of a single (2a) or conjoined subject (2b):

(2)  Reciprocal alternation
    a.  La bruja abrazó al boxeador (Single subject)
        ‘The witch hugged the boxer’
b. La bruja y el boxeador se abrazaron (Conjoined subject)
   ‘The witch and the boxer hugged’

We are not aware of any studies involving the reciprocal alternation. Like the voice alternation, the alternatives are also quite similar in English and Spanish, although the verbs in the Spanish construction typically occur with the reciprocal pronoun se in the conjoined variant (see Section 4.4.2).

4.3.3 Dative alternation

The dative alternation is well-attested in the priming literature, particularly in English (Arai et al., 2007; Bock & Griffin, 2000; Bock & Loebell, 1990; Bock, 1986, 1989; Gries, 2005; Kaschak & Borreggine, 2008; Loebell & Bock, 2003; Pickering et al., 2002; Pickering & Branigan, 1998; Potter & Lombardi, 1998; Salamoura & Williams, 2007; Schoonbaert et al., 2007).

Unlike the previous two alternations, the dative alternation is not closely parallel in English and Spanish. In English, it can take the form of what is called a prepositional object construction (3a)—comprised of a verb, a noun phrase, and a prepositional phrase—and a double object construction (3b)—containing a verb and two noun phrases. In Spanish, the canonical construction (3a) resembles the English prepositional object construction, involving a verb, a noun phrase, and a prepositional phrase. However, the alternative is generated by changing the order of the constituents (a verb, a prepositional phrase, and a noun phrase), resulting in a scrambled version that maintains the dative marker a, unlike in English (3b). In addition, the Spanish scrambled variant typically occurs with the dative clitic le (see Section 4.4.2).
(3)  Dative alternation

a.  *El ladrón le dio un libro a la bailarina* (Canonical dative)
    ‘The thief gave a book to the dancer’ (PO)

b.  *El ladrón le dio a la bailarina un libro* (Scrambled dative)
    ‘The thief gave the dancer a book’ (DO)

The three chosen constructions offer a broad structural playing field, as it were, onto which to test the workings of convergence. The voice alternation is present in both languages and has a similar structure in English and Spanish, although the frequency of the passive is believed to be much lower in Spanish. The reciprocal alternation is also present in both languages; however, we have no comparative data between the English and Spanish usages. Finally, even though the dative alternation is common in English, it is not clear whether the relationship between POs and DOs in English is equivalent to that between the canonical and scrambled datives in Spanish. Studies show slight or no preference between the English alternatives (Pickering & Ferreira, 2008) but we have found no studies quantifying the Spanish version of the alternation. Given the absence of a corpus of English and Spanish usage for the constructions in question, the baseline experiment (Experiment 1) described in this chapter will give us a glimpse on the distributional patterns that are relevant to this study.

4.4. General predictions

As an exploration of innovations, this investigation is concerned with changes in the distribution of Spanish alternatives (discussed in Section 4.4.1), as well as instances of grammatical replication (discussed in Section 4.4.2).
4.4.1 Changes in frequency

First, we are interested in whether the choice of Spanish target descriptions changes as a function of the English primes. The expectation is that priming effects would be greater for alternations that have similar frequencies in both languages, than for alternations that are more restricted in one of the languages (Loebell & Bock, 2003). Also, if overlapping structural configurations are essential to priming (Loebell & Bock, 2003), then priming is likely to be weaker for the dative alternation, which is not parallel in English and Spanish.

In the Spanish to Spanish priming task, we anticipate a similar pattern of results. However, the effect will be stronger than in the cross-linguistic task, given that priming is typically greater when the prime and target are in the same language (Bernolet et al., 2007; Schoonbaert et al., 2007).

Regarding the comparison between the Córdoba and the New York groups, the prediction is not so clear. Even though both groups have Spanish as their L1, it is likely that English will be less dominant in the Córdoba bilinguals, making it less likely to influence their Spanish productions. If this is the case, bilinguals in Argentina will have stronger within-language (Spanish to Spanish) than cross-language (English to Spanish) priming, given that priming effects are typically strongest when prime and target are in the L1, and weakest when the prime is in the L2 and the target is in the L1 (Loebell & Bock, 2003; Schoonbaert et al., 2007). For bilinguals in the US, even if Spanish is their L1, it might not necessarily be the dominant language. Assuming that these participants are more proficient in English, it is likely that cross-language priming (English to Spanish) will be stronger than for the Córdoba group.

4.4.2 Grammatical replication

We also want to know whether English structures contributed to the emergence of Spanish patterns in new contexts, leading to grammatical replication (see Chapter 2). In order to postulate potential patterns of replication, we compared the surface configurations of
English and Spanish for each alternation and noted the non-overlapping elements (Weinreich, 1974), listed in (4)-(7) below. The symbol Ø stands for the omitted particles.

The first pattern we generated reflects the absence of the accusative marker a in the active construction (4). The second pattern results from the omission of the pronoun se in conjoined reciprocals (5). The third pattern shows the absence of the dative clitic le in scrambled datives (6). The final pattern presents the omission of the dative marker a in scrambled datives (7). It is worth pointing out that, even though the patterns examined here were inspired by the contrasts between English and Spanish in the voice, reciprocal and dative alternations, they do not only occur in the context of these alternations. In some cases, the patterns we generated may even reflect usages that have already been reported in some Spanish-speaking populations, as noted below for each case.

(4) Absence of accusative marker a:
La científica saluda Ø la cantante
‘The scientist greets the singer’

(5) Absence of reciprocal pronoun se:
El turista y la novia Ø abrazaron
‘The tourist and the bride hugged’

(6) Absence of dative clitic le:
El portero Ø dio a la enfermera un regalo
‘The janitor gave the nurse a gift’

(7) Absence of dative marker a:
El mesero envió Ø la princesa una carta
‘The waiter sent the princess a letter’

The examples in (4)-(7) were conceived taking into account solely the structure of the English alternative in each case. We hypothesized that these constructions would emerge as a result of speakers accessing recently processed English structures. However, we expect that those that happen to adhere to an existing Spanish pattern elsewhere in the
language are more likely to occur than those that rely on an unlicensed structure, one that is not already present in the language. This is in keeping with the phenomenon of grammatical replication discussed in Chapter 2, which does not impose foreign structures on the receiving language; instead, it retrieves an existing structure that might have previously been employed in a different grammatical context and gives it a new usage modeled on the contact language.

For example, noun phrases without accusative a, as displayed in (4) above (e.g., la científica saludó Ø el payaso ‘the scientist greeted the clown’) are not new in Spanish. While the presence of the accusative marker has been traditionally attributed to direct objects that are [+human] [+specific] (Zagona, 2002), the distribution of a often displays a variation that cannot be completely explained by binary categories; rather, it is best described by statistical tendencies (Heusinger & Kaiser, 2004). The more prominent a direct object is in terms of animacy and definiteness, the more likely it is to be overtly case marked (Leonetti, 2004), suggesting that unmarked direct objects, while rare, do occur in Spanish. Indeed the absence of accusative a with animate direct objects has been documented in Venezuela, Uruguay, Argentina, Spain and Peru (Alvarez & Barrios, 1992; Guijarro-Fuentes & Marinis, 2009; Heusinger & Kaiser, 2004). A similar trend is reported in studies with Spanish-English bilinguals (Guijarro-Fuentes & Marinis, 2009; Montrul & Bowles, 2009, 2010; Montrul, 2004). Since accusative a omission is already occurring in Spanish, even with animate/specific direct objects, we can expect this pattern to also surface in our data.

Even though the absence of the clitic se (5) (e.g., la princesa y la novia reunieron ‘the princess and the bride met’) might raise a flag for the specific lexical selections in question (i.e., the verb reunir ‘meet’), the configuration is extremely common in Spanish with other reciprocal verbs that do not require the clitic se (e.g., conversar ‘converse’, discutir ‘argue’, competir ‘compete’, to name a few). The opacity that defines which verbs allow this form in Spanish has been claimed as a motivation for its omission in US-born bilinguals (Silva-Corvalán, 1994a). This finding, together with the availability of a structure
lacking se associated with other reciprocal verbs, it is possible that our participants will also omit se in their descriptions.

Clitic le elision (6) (e.g., el boxeador ofrece al turista un café ‘the boxer offers the tourist some coffee’) is also present in Spanish, even to a small degree. The absence of the clitic le is extremely rare in canonical datives (Belloro, 2009) but even rarer in the scrambled variant, yielding a structure that is considered to be “stylistically marked” (Demonte, 1995, p. 20). Given the rarity of this pattern, this kind of grammatical replication might still be possible in our data, although perhaps less likely than in the previous examples. A slight incidence of clitic le omission has been reported in bilinguals in the US but only in canonical dative constructions (Silva-Corvalán, 1994a).

Finally, we also tested the possibility of dative a omission (7) (e.g., el portero envía a la guitarrista un libro ‘the janitor sends the guitarist a book’), a preposition that assigns case to the dative phrase (Zagona, 2002). Montrul & Bowles (2009, 2010) documented this phenomenon and found that bilinguals in the US accepted datives without dative a at a higher rate than the monolingually-raised control group. However, we are not aware of any production studies where participants spontaneously omit dative a. For this reason, we anticipate that this particular pattern is unlikely to surface in our data.

Instances of grammatical replication are expected to be more prominent in the cross-linguistic (English-Spanish) than in the within-language (Spanish-Spanish) experiment. In the latter, the procedures responsible for the English alternative that drives the replication will not be as strong a part of the implicit grammar; rather, Spanish primes will provide an alternative model that is likely to reduce reliance on the English structure.

Concerning the comparison between contact and non-contact settings, we anticipate that bilinguals in New York will produce more instances of grammatical replication than bilinguals in Argentina. The idea behind this is that English is likely to be more dominant than Spanish in US bilinguals, making Spanish more susceptible to English grammatical influence. Aiming to achieve maximal difference between the groups and strive for a more
accurate comparison, we recruited participants in Argentina, rather than a location that was closer to our New York bilinguals’ country of origin or ancestry.

To summarize, we anticipate that bilinguals in a contact setting will manifest the effects of convergence in ways that differ from those of their counterparts in non-contact settings. The expectation is for bilinguals in the US to be more sensitive to English influence and thus more likely to exhibit cross-linguistic priming and to introduce existing Spanish structures in new contexts, on the model of English. In turn, bilinguals in Argentina might be more prone to frequency manipulations of already existing alternations based on Spanish primes.

4.5 Experiment 1

This experiment establishes a baseline against which to compare the priming data. The experiment was conducted in English and in Spanish, so as to examine the distributional patterns for each of the three alternations in both languages. If changes in frequency are detected in the priming experiments, we want to know how the distributions might depart from the baseline patterns in Spanish, and whether they might bear any resemblance to the baseline patterns in English. In the Spanish version, we also recorded the occurrence of patterns of the type illustrated in (4)-(7), in order to assess to what extent, if any, the constructions that we attribute to grammatical replication in the priming experiment also occur in the absence of priming.

4.5.1 Method

Let us now turn to the method used in this experiment. In the following sections, we describe the participants, materials, procedure, and the scoring criteria.
Participants

In New York City, 12 Spanish-English bilinguals (9 female, 3 male) from the Queens College (City University of New York, CUNY) community took part in the Spanish experiment. Participants ranged in age from 18 to 31 years old, with a median age of 22. Half of them were born in the US and half of them arrived after the age of 5, with a median age of arrival of 11 for the latter group (SD=5.71). For all of them, Spanish was their and their parents’ first language. They came from Bolivia (1), Colombia (2), Dominican Republic (2), Ecuador (3), Mexico (2), Puerto Rico (1), and El Salvador (1). A separate group of English monolinguals (with no knowledge of Spanish) from the Orlando community in Florida, United States, participated in the English experiment.

Materials

We constructed 48 target pictures depicting different actions, using the free interface provided by Pixton, a comic-building website (http://www.pixton.com/). The target pictures depicted two characters in the materials for the voice and reciprocal alternations, and two characters and one object in the materials for the dative alternation. The position of the character performing the action, as well as the position of the object in the dative alternation, was counterbalanced such that, on half of the target pictures, the character appeared on the left side, and on the other half on the right side. A verb in the infinitive in English or Spanish was printed below each picture. Sixteen pictures contained verbs from the voice alternation (e.g., EMPUJAR/PUSH), sixteen from the reciprocal alternation (e.g., ABRAZAR/HUG), and sixteen from the dative alternation (e.g., DAR/GIVE). Examples are shown in Figure 1. There were two pictures for each of eight verbs, so that each verb was repeated twice with different characters (e.g., for one instance of EMPUJAR/PUSH, there is a dancer pushing a boxer, and for the other there is a clown pushing a nurse). The items were arranged in eight blocks of six items, with two different verbs from each of the three
alternations. The order of presentation was pseudo-randomized for each participant, so that the sequence varied within and between blocks.

Figure 1. Sample visual displays used in the Spanish/English target picture descriptions, depicting an example of each of the three alternations: voice alternation, reciprocal alternation, and dative alternation respectively.

Procedure

After a viewing a presentation containing the instructions and four practice items, participants were shown a sequence of a total of forty-eight pseudo-randomized displays and asked to produce a description in Spanish using the verb provided. When they were finished, they filled out a language background questionnaire. The display was controlled by DMDX (Forster & Forster, 2003) and participants’ responses were recorded through a headset with a microphone.

Scoring and data analysis

Participants’ responses were coded manually as active or passive for the voice alternation, single or conjoined subject for the reciprocal alternation, and canonical or scrambled for the dative alternation. Responses that did not fall within these categories were scored as “other”. These included null or inaudible responses, incomplete sentences where one of the depicted agents was not mentioned, and cases where the target verb was not used. In the Spanish
targets, instances of constructions like those illustrated in (4)-(7) were also coded for each category.

The data in this experiment were analyzed using one-way ANOVAs (excluding “other” responses) comparing the two variants in each alternation, so as to determine whether their frequencies are different. Separate ANOVAs were run with subjects ($F_1$) and items ($F_2$) as random factors. If the main effect of variant is found to be significant, it suggests that participants favor one alternative over the other; if it is not significant, it indicates that there is no particular preference for either construction. In the Spanish responses, grammatical replication data were noted for each alternation. In the voice alternation, we looked for accusative a omission, in the reciprocal alternation for reciprocal se omission, and in the dative alternation for dative le and dative a omission. These data were analyzed using one-tailed t-tests to determine the difference from a single mean ($\mu=0$) (i.e., to establish whether the incidence of grammatical replication is significantly greater than its non-occurrence).

4.5.2 Results
Let us now turn to the results of this experiment, where we expect to obtain a measure of Spanish and English distributional frequencies and grammatical replication patterns. The distribution of response types for the three alternations are presented separately, comparing the results for Spanish and English. In the last subsection, we describe the results for grammatical replication.

**Voice alternation**
Data for this alternation are displayed in Figure 2. For the Spanish group, out of a total of 192 responses (16 items x 12 participants), 170 (88%) were scored as active, 9 (5%) were
scored as passive, and 11 (7%) as other\textsuperscript{12}. For the English group, out of a total of 192 responses (16 items x 12 participants), 164 (85%) were scored as active, 21 (11%) were scored as passive, and 7 (4%) as other (Figure 2).

![Figure 2](image.png)

**Figure 2.** Percent of active, passive, and other responses for the voice alternation in Spanish and English (Experiment 1).

In order to compare the distribution of the variants in English and Spanish, we conducted a two-way ANOVA between participants, with the factors language (English, Spanish) and variant (Active, Passive). The results revealed no significant interaction \([F_1(1,22)=3.23 \ p>.080; F_2(1,30)=0.51 \ p>.40]\). The main effect of variant was significant \([F_1(1,22)=922.00 \ p<.0001; F_2(1,30)=148.00 \ p<.0001]\), but not the effect of language \([F_1(1,22)=1.51 \ p>.20; F_2(1,30)=2.35 \ p>.10]\). These results seem to indicate that both groups overwhelmingly favor the active construction, but that this preference does not appear to be particularly stronger in one group than in the other. Since the occurrence of passives was higher in English (11%) than in Spanish (5%), we performed a one-way ANOVA between participants to find out whether the difference was significant, but this was

\textsuperscript{12} Among these responses, there were two instances of se-passives (e.g., *la cocinera se impresionó con el ángel* ‘the chef was impressed with the angel’).
only the case for participants, not for items \( F_1(1,22)=8.00 \ p<.01; \ F_2(1,30)=1.01 \ p<.30 \). In other words, while the English group produced more passives than the Spanish group, this tendency appears to be tied to two verbs in particular (i.e., impress/impressonar and frighten/asustar) (see Section 4.5.3).

Reciprocal alternation

Data for this alternation are displayed in Figure 3. For the Spanish group, out of a total of 192 responses (16 items x 12 participants), 71 were scored as single subject (37%), 102 (53%) were scored as conjoined subject constructions, and 19 (10%) were scored as other. For the English group, out of a total of 192 responses (16 items x 12 participants), 75 were scored as single subject (39%), 89 (46%) were scored as conjoined subject constructions, and 28 (14%) were scored as other (Figure 3).

Figure 3. Percent single subject, conjoined subject, and other responses for the reciprocal alternation in Spanish and English (Experiment 1).

In order to compare the distribution of the variants in English and Spanish, we conducted a two-way ANOVA between participants, with the factors language (English, Spanish) and variant (Single subject, Conjoined subject). The results revealed no significant
interaction \([F_1(1,22)=0.52 \ p>.40;\ F_2(1,30)=0.23 \ p>.60]\) and no significant main effects of language \([F_1(1,22)=1.29 \ p<.20;\ F_2(1,30)=0.51 \ p>.40]\) or variant \([F_1(1,22)=3.68 \ p>.060;\ F_2(1,30)=1.61 \ p>.20]\). This suggests that there seems to be no clear preference for one or the other construction, and that languages do not differ with regards to this alternation.

**Dative alternation**

Data for this alternation are displayed in Figure 4. For the Spanish group, out of a total of 192 responses (16 items x 12 participants), 149 (78%) were scored as canonical datives, 5 (3%) were scored as scrambled datives, and 38 (19%) as other\(^{13}\). For the English group, out of a total of 192 responses (16 items x 12 participants), 57 (30%) were scored as canonical datives, 74 (38%) were scored as scrambled datives, and 62 (32%) as other.

\(^{13}\) This rather high number of other type of responses included transitive constructions (e.g., *el hombre esta rentando la bicicleta de la enfermera* ‘the man is renting the nurse’s bike’; *el príncipe y la mujer compran una televisorón* ‘the prince and the woman buy a television’) and constructions using an adjunct phrase introduced by *para* ‘for’ instead of the dative *a* ‘to’ (e.g., *la doctora compró un pastel para el cura* ‘the doctor bought a cake for the priest’).
In order to compare the distribution of the variants in English and Spanish, we conducted a two-way ANOVA between participants, with the factors language (English, Spanish) and variant (Canonical, Scrambled). The results revealed a significant interaction \([F_1(1,22)=46.00 \ p<.0001; \ F_2(1,30)=73.40 \ p<.0001]\), suggesting that the two groups of speakers behave differently with regards to this alternation, as expected. In the Spanish group, there is an overwhelming preference for the canonical construction: a one-way ANOVA excluding 'Other' responses revealed a highly significant main effect of variant \([F_1(1,11)=297.00 \ p<.0001; \ F_2(1,15)=73.40 \ p<.0001]\). Conversely, in the English group, there is no clear preference for one or the other construction. A one-way ANOVA excluding 'Other' responses revealed that there was no significant main effect of variant \([F_1(1,11)=0.58 \ p>.40; \ F_2(1,15)=1.28 \ p<.20]\).

**Grammatical replication**

Data for replications observed in this experiment are displayed in Figure 5. In the Spanish group, we noted instances of grammatical replication patterns of the type illustrated in (4)-(5). In the voice alternation, there were 3 (1.5%) cases where the accusative marker a was absent (e.g., *el policía golpeó Ø el turista* 'the policeman hit the tourist'). A one-tailed t-test was significant only for items \([t_1(11)=1.00 \ p>.10; \ t_2(15)=1.86 \ p<.05]\), as the patterns were all produced by the same participant. In the reciprocal alternation, there were 11 (6%) cases where the reciprocal se was absent (e.g., *el hombre y la mujer Ø van a reunir* 'the man and the woman are going to meet'). A one-tailed t-test was significant for both subjects and items \([t_1(11)=3.19 \ p<.005; \ t_2(15)=1.79 \ p<.05]\). Notably, in the dative alternation, there were no cases where the dative clitic le was absent in scrambled datives, or instances where the dative marker a was omitted.
4.5.3 Discussion

In this experiment, we were able to obtain a picture of the variability associated with each of the three alternations, and learned that Spanish and English behave quite differently. In the voice alternation, both groups show an overwhelming preference for the active construction but passives were significantly higher in the English group, confirming previous findings regarding the frequency of this construction (Gámez et al., 2009; Roland et al., 2007). However, passives in both languages only occurred with specific verbs (e.g., *impresionar* ‘impress’ and *asustar* ‘frighten’), suggesting the possibility that different verbs might encourage certain syntactic expressions more than others (Gries, 2005). Even so, the fact that the Spanish periphrastic passive did surface in spontaneous descriptions (i.e., 5% of responses) makes it a more likely candidate for priming than originally assumed, in the sense that speakers will be prompted to increase their production of a pattern they already use.

For the reciprocal alternation, the lack of differences between the variants or between the groups suggests that these constructions are used almost interchangeably in
both languages. The presence of such symmetry within and between the languages for this alternation creates the perfect conditions for priming.

The dative alternation proved to have the greatest contrast between the languages: the scrambled variant hardly occurs in Spanish, whereas in English the PO and DO constructions are indistinguishable in terms of frequency. Given these differences, we expect priming to be the lowest for this alternation.

We also measured the rate of grammatical replication patterns and found examples where the reciprocal pronoun *se* is absent, followed by cases where the accusative marker *a* is elided, although only the first pattern was achieved significance. Since these patterns are already present in the Spanish of US bilinguals, we are likely to see them increase in the subsequent experiments. We did not observe any instances of absent clitic *le* or absent dative marker *a* in scrambled datives. This is possibly due to the extremely low incidence of this variant, so perhaps we might come across more examples if we are able to elicit a higher number of scrambled datives in the subsequent experiments.

4.6 Experiment 2: cross-linguistic priming task (English-Spanish)

Having obtained the distributional patterns for each of the three alternations, as well as the rates of grammatical replication for the four hypothesized innovations, we now examine whether exposure to English structures might drive the production of parallel Spanish structures. Thus, in Experiment 2, speakers are exposed to prime sentences in English prior to describing target pictures in Spanish. As discussed in the introduction to the present chapter, we predicted that bilinguals will tend to produce the alternative in Spanish that matches the structure of the immediately preceding English alternative. Alternations that have a similar distribution in both languages (i.e., voice and reciprocal alternations) should exhibit a higher priming effect than alternations with contrasting distributions (i.e., dative alternation). Also, the constructions that should be more prone to grammatical replication
are those that rely on an already existing structure elsewhere in the language, particularly reciprocals without se, considering the results obtained in Experiment 1.

4.6.1 Method

Let us now turn to the method used in this experiment. In the following sections, we describe the participants, materials, procedure, and the scoring criteria.

Participants

A total of 24 students from the Queens College (CUNY) community took part in the New York experiment. A separate group of 24 students from Universidad Nacional de Córdoba, Argentina, also took part. All were Spanish-English bilinguals for whom Spanish was their home language. However, as we report below, the two groups differed in terms of their linguistic proficiency: bilinguals in New York reported higher scores in English and bilinguals in Córdoba did so in Spanish.

Their Spanish proficiency was assessed through a brief vocabulary test (adapted from Woodcock, Muñoz-Sandoval, McGrew, & Mather, 2005) (see Appendix D) and a linguistic background questionnaire (see Appendix E). A summary of the data obtained in these measures are displayed in Table 1 below.

<table>
<thead>
<tr>
<th></th>
<th>New York (N=24)</th>
<th>Córdoba (N=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>22 (SD=5.09)</td>
<td>28 (SD=4.68)</td>
</tr>
<tr>
<td>Age of English acquisition</td>
<td>6 (SD=4.81)</td>
<td>10 (SD=3.91)</td>
</tr>
<tr>
<td>Spanish vocabulary score (%)</td>
<td>39%</td>
<td>70%</td>
</tr>
<tr>
<td>Spanish use (%)</td>
<td>28%</td>
<td>72%</td>
</tr>
<tr>
<td>Spanish proficiency (%)</td>
<td>76%</td>
<td>98%</td>
</tr>
<tr>
<td>English proficiency (%)</td>
<td>89%</td>
<td>65%</td>
</tr>
</tbody>
</table>

Table 1. Summary of select questionnaire and vocabulary means for New York and Córdoba participants.

The Spanish vocabulary score reflects the number of correct answers out of a total of 30. Spanish use (from the first question on page 2 of the questionnaire, i.e., "What
languages do you use...?”) was calculated through a score that ranged from 0 (“always English”) to 5 (“always Spanish”) for each item and obtaining a percentage, indicating how often participants use Spanish as opposed to English. Table 2 provides further details on responses by participants to the language use question.

<table>
<thead>
<tr>
<th>What languages do you use...</th>
<th>New York (N=24)</th>
<th>Córdoba (N=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interacting with friends</td>
<td>2.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Interacting with family</td>
<td>3.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Listening to the radio</td>
<td>1.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Watching TV</td>
<td>1.4</td>
<td>2.2</td>
</tr>
<tr>
<td>Listening to music</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>On the Internet</td>
<td>0.5</td>
<td>1.8</td>
</tr>
<tr>
<td>On Facebook</td>
<td>0.9</td>
<td>3.2</td>
</tr>
<tr>
<td>When you read a book</td>
<td>1.0</td>
<td>3.3</td>
</tr>
<tr>
<td>When you read the news</td>
<td>0.9</td>
<td>3.4</td>
</tr>
<tr>
<td>When you read a magazine</td>
<td>0.8</td>
<td>3.6</td>
</tr>
<tr>
<td>When you write a text message</td>
<td>1.5</td>
<td>4.4</td>
</tr>
<tr>
<td>When you write yourself a note</td>
<td>0.9</td>
<td>4.2</td>
</tr>
<tr>
<td>When you write a paper</td>
<td>0.5</td>
<td>3.4</td>
</tr>
<tr>
<td>When you take notes in class</td>
<td>0.4</td>
<td>4.2</td>
</tr>
<tr>
<td>When you are thinking</td>
<td>1.7</td>
<td>3.8</td>
</tr>
<tr>
<td>When you are home</td>
<td>3.0</td>
<td>4.7</td>
</tr>
<tr>
<td>When you are at school</td>
<td>0.6</td>
<td>3.7</td>
</tr>
<tr>
<td>When you are at work</td>
<td>0.6</td>
<td>3.3</td>
</tr>
<tr>
<td>When you are on the phone</td>
<td>2.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Total</td>
<td>26.2</td>
<td>68.0</td>
</tr>
<tr>
<td>Percentage of total (x/95)</td>
<td>28%</td>
<td>72%</td>
</tr>
</tbody>
</table>

Table 2. Summary of questionnaire means reflecting Spanish use for New York and Córdoba participants. Responses were made on a 6-point Likert scale, with the endpoints “always Spanish” (tabulated as 0) and “always English” (tabulated as 5).

Spanish proficiency and English proficiency (from the second question on page 2 of the questionnaire, i.e., “How would you describe your proficiency in each language?”) were derived from a number ranging from 0 (“very poor”) to 5 (“very good”) for each item and obtaining the proportion out of the total, with 100% representing the maximum proficiency. Table 3 provides further details on responses by participants to the proficiency question.
<table>
<thead>
<tr>
<th></th>
<th>New York (N=24)</th>
<th>Córdoba (N=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spanish</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaking</td>
<td>3.6</td>
<td>4.8</td>
</tr>
<tr>
<td>Listening</td>
<td>4.6</td>
<td>5.0</td>
</tr>
<tr>
<td>Reading</td>
<td>3.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Writing</td>
<td>3.0</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3.8</td>
<td>4.9</td>
</tr>
<tr>
<td>Percentage of total (x/5)</td>
<td>76%</td>
<td>98%</td>
</tr>
<tr>
<td><strong>English</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaking</td>
<td>4.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Listening</td>
<td>4.7</td>
<td>3.3</td>
</tr>
<tr>
<td>Reading</td>
<td>4.5</td>
<td>3.9</td>
</tr>
<tr>
<td>Writing</td>
<td>4.2</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Percentage of total (x/5)</td>
<td>89%</td>
<td>65%</td>
</tr>
</tbody>
</table>

**Table 3.** Summary of questionnaire means reflecting Spanish and English proficiency for New York and Córdoba participants. Responses were made on a 6-point Likert scale, with the endpoints “very poor” (tabulated as 0) and “very good” (tabulated as 5).

In New York City, participants ranged in age from 18 to 33. There were 20 females and 4 males. Half of the participants were born in the US and report being exposed to English since infancy; the other half started learning English after the age of 5 upon their arrival to the country. Their place of origin—or their parents’ place of origin, for those born in the US—was either Bolivia (1), Colombia (3), Dominican Republic (6), Ecuador (3), Guatemala (2), Mexico (2), Peru (3), Puerto Rico (3), or Spain (1). Their median score for the Spanish vocabulary measure was 39%. In the questionnaire, their mean Spanish usage was 28%. Their self-assessed proficiency in Spanish was 76% and in English 89%, and a one-way ANOVA revealed that this difference was significant $[F_{1}(23)=6.52 \ p<.05]$. As expected, this group was more proficient in English than the Córdoba group $[F_{1}(23)=18.30 \ p<.0001]$.

In Córdoba, participants ranged in age from 21 to 36. There were 10 females and 14 males. They all started learning English in school after age 5, with a mean age of 10. Their median score for the Spanish vocabulary measure was 70%. In the questionnaire, their mean Spanish usage was 72%. Their self-assessed proficiency in Spanish was 98% and in English 65%, and a one-way ANOVA found this difference to be significant $[F_{1}(23)=48.60 \ p<.0001]$. 

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As expected, the Córdoba participants obtained higher scores than the New York participants in the three Spanish measures. One-way ANOVAs confirmed these results: vocabulary \( F_1(23)=100.00 \ p<.0001 \), Spanish usage \( F_1(23)=46.50 \ p<.0001 \), and Spanish self-perceived proficiency \( F_1(23)=46.50 \ p<.0001 \).

**Materials**

We constructed 48 experimental items, 16 for each of the three alternations. Each item consisted of a prime sentence, a picture to be verified against the prime sentence (match picture), and a target picture. The target pictures were the same as in Experiment 1.

The forty-eight prime sentences occurred in two conditions, each depicting one or the other variant for each of the alternations. The materials were counterbalanced across two lists, such that for each of the three alternations there were 8 items from each variant of the alternation. The items were arranged in eight blocks of six items, two from each alternation, one in the (a) and one in the (b) version but with different verbs. To further distract participants’ attention away from the target construction, the characters (e.g., chef, nurse, princess, guitarist) used in the target pictures were different from the characters in the prime sentences. The target verb, however, was always the translation-equivalent of the prime verb, to boost the possibility of priming.

(8) Voice alternation

a. The chef pushed the prince (Active)

b. The prince was pushed by the chef (Passive)

TARGET: A picture of a dancer pushing a janitor and the verb EMPUJAR ‘push’ below it (Figure 6).
Figure 6. Sample visual display of the target EMPUJAR ‘push’ in the voice alternation.

(9) Reciprocal alternation

a. The witch hugged the boxer (Single subject)

b. The witch and the boxer hugged (Conjoined subject)

TARGET: A picture of a policeman hugging a chef and the verb ABRAZAR ‘hug’ below it (Figure 7).

Figure 7. Sample visual display of the target ABRAZAR ‘hug’ in the reciprocal alternation.
Dative alternation

a. The thief gave a book to the dancer (PO)
b. The thief gave the dancer a book (DO)

TARGET: A picture of a scientist giving a suitcase to an angel and the verb DAR 'give' below it (Figure 8).

Figure 8. Sample visual display of the target DAR 'give' in the dative alternation.

Procedure

After viewing a presentation containing the instructions and completing four practice items, participants saw a prime sentence in English and were asked to read it aloud. A button press made the sentence disappear and participants had to decide whether it matched a subsequently presented picture by pressing the right or left SHIFT key, marked with a green or red sticker, respectively indicating a positive and a negative answer.

In order to minimize participants’ awareness of the priming manipulation, the experiment was presented as a measure of bilinguals’ ability to "speak and understand" Spanish and English. To this end, we incorporated an additional task in the trials, where participants were asked to verify whether the prime sentence matched or mismatched the subsequently presented pictures. This also ensured that participants paid attention to the
prime sentence. Half of the match pictures reflected the action described in the prime sentence and half did not.

After the matching decision was made and feedback was provided (a picture of thumbs up or down), the screen displayed an image that participants had to describe using the verb presented below the image. After speaking their answer, participants pressed the N key to move on to the next item. However, if 30 seconds elapsed, the next item appeared automatically. Figure 9 illustrates a sample sequence of the experimental trial. The display was controlled by DMDX (Forster & Forster, 2003) and participants’ verbal responses were recorded through a headset.

![The princess gives the boxer a gift.](image)

**Figure 9.** Sample visual displays used in the priming trials, depicting an example of the sequence in the dative alternation: from left to right, participants saw the prime sentence, the match picture (a mismatch, in this case), and the target picture.

**Scoring and data analysis**

Participants’ responses were manually coded as active or passive for the voice alternation, single or conjoined subject for the reciprocal alternation, and canonical or scrambled for the dative alternation. Responses that did not fall within these categories were scored as “other”. These included null or inaudible responses, incomplete sentences where one of the depicted agents was not mentioned, and cases where the target verb was not used. Instances of constructions like those illustrated in (4)-(7) were also be coded for each category.
The data in this experiment were analyzed using ANOVAs with subjects ($F_1$) and items ($F_2$) as random factors, excluding “other” responses. To compare the performance of the New York and Córdoba groups, we used a 2x2x2 design with the factors Location (New York, Córdoba), Prime (A, B) and Target (A, B): if an interaction is detected, it would suggest that the groups differ in terms of priming. To determine whether priming took place, we used a 2x2 design with the factors Prime (A, B) and Target (A, B) and looked for an interaction; that is, whether the choice of target changed as a function of the prime. Grammatical replication data were noted for each alternation. In the voice alternation, we looked for accusative a omission, in the reciprocal alternation for reciprocal se omission, and in the dative alternation for dative le and dative a omission. These data were analyzed using one-tailed t-tests to determine the effect of the primes by measuring the difference from a single mean ($\mu=0$) (i.e., to establish whether the incidence of grammatical replication is significantly greater than its non-occurrence).

4.6.2 Results
Let us now turn to the results of this experiment, where we aim to obtain a measure of English to Spanish priming and grammatical replication patterns. The distribution of response types along with priming effects for the three alternations are presented separately, comparing the results for New York and Córdoba. In the last subsection, we describe the findings regarding grammatical replication.

Voice alternation

Figure 10 displays the number of responses in all four conditions. At first sight, we see a tendency for targets to match the prime (i.e., there is an increase of passive responses following passive primes). In order to compare the performance of the New York and Córdoba groups, we conducted 2x2x2 ANOVAs with the factors Location (New York, Córdoba), Prime (Active, Passive), and Target (Active, Passive), but the interaction was not
significant \[F_1(1,46)<1 \, p> .50; \, F_2(1,30)<1 \, p> .50\], suggesting that there are no discernible differences between the groups in terms of priming of active/passive variants.

![Bar chart showing percent active, passive, and other responses for each prime type in the voice alternation (Experiment 2).](image)

**Figure 10.** Percent active, passive, and other responses for each prime type in the voice alternation (Experiment 2).

In the New York data, out of a total of 384 responses (16 items x 24 participants), 332 (86%) were scored as active, 29 (8%) were scored as passive, and 23 (6%) as other\(^\text{14}\). ANOVAs by participants and items were conducted with the factors Prime (Active, Passive) and Target (Active, Passive). As expected, there was a significant interaction between Prime and Target \[F_1(1,23)=25.80 \, p< .0001; \, F_2(1,15)=16.60 \, p< .001\], such that passive responses followed passive primes more often than active primes.

In the Córdoba data, out of a total of 384 responses (16 items x 24 participants), 312 (81%) were scored as active, 52 (14%) were scored as passive, and 20 (5%) as other\(^\text{15}\). ANOVAs for each subject and item were conducted with the factors Prime (Active, Passive) and Target (Active, Passive). As expected, there was a significant interaction

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\(^{14}\) More than half of these responses included se-passives (e.g., *la cocinera se impresionó del ángel* ‘the chef was impressed by the angel’).

\(^{15}\) Approximately half of these responses included se-passives (e.g., *el camarero se asustó con la bailarina* ‘the waiter was frightened with the dancer’).
between Prime and Target \([F_1(1,23)=12.40 \ p<.001; \ F_2(1,15)= 20.20 \ p<.001]\), such that passive responses followed passive primes more often than active primes.

*Reciprocal alternation*

Figure 11 displays the number of responses in all four conditions. At first glance, we observe a tendency for targets to match the prime (i.e., there is an increase of conjoined subject responses following conjoined subject primes), and the proportions appear quite similar in the two groups. In order to compare the performance of the New York and Córdoba groups, we conducted 2x2x2 ANOVAs with the factors Location (New York, Córdoba), Prime (Single subject, Conjoined subject), and Target (Single subject, Conjoined subject), but the interaction was not significant \([F_1(1,46)<1 \ p>.50; \ F_2(1,30)<1 \ p>.40]\), suggesting that there are no discernible differences between the groups in terms of priming of single/conjoined variants.

![Figure 11](image)

**Figure 11.** Percent single subject, conjoined subject, and other responses for each prime type in the reciprocal alternation (Experiment 2).

In the New York data, out of a total of 384 responses (16 items x 24 participants), 174 (45\%) were scored as single subject, 192 (50\%) were scored as conjoined subject, and
20 (5%) were scored as other. ANOVAs for each subject and item were conducted with the factors Prime (Single subject, Conjoined subject) and Target (Single subject, Conjoined subject). As expected, there was a significant interaction between Prime and Target
\[ F_1(1,23)=39.40 \ p<.0001; \ F_2(1,15)=42.10 \ p<.0001 \], such that single subject responses followed single subject primes more often than conjoined subject primes.

In the Córdoba data, out of a total of 384 responses (16 items x 24 participants), 159 (41.5%) were scored as single subject, 190 (49.5%) were scored as conjoined subject, and 35 (9%) were scored as other. ANOVAs for each subject and item were conducted with the factors Prime (Single subject, Conjoined subject) and Target (Single subject, Conjoined subject). As expected, there was a significant interaction between Prime and Target
\[ F_1(1,23)=31.80 \ p<.0001; \ F_2(1,15)=64.60 \ p<.0001 \], such that single subject responses followed single subject primes more often than conjoined subject primes.

**Dative alternation**

Figure 12 displays the number of responses in all four conditions. In order to compare the performance of the New York and Córdoba groups, we conducted 2x2x2 ANOVAs with the factors Location (New York, Córdoba), Prime (PO, DO), and Target (Canonical, Scrambled), but the interaction was not significant \[ F_1(1,46)<1 \ p>.7; \ F_2(1,30)<1 \ p>.7 \], suggesting that there are no discernible differences between the groups in terms of priming of canonical/scrambled variants.
In the New York data, out of a total of 384 responses (16 items x 24 participants), 304 (79%) were scored as canonical datives, 37 (10%) were scored as scrambled datives, and 43 (11%) as other\textsuperscript{16}. ANOVAs for each subject and item were conducted with the factors Prime (PO, DO) and Target (Canonical, Scrambled). The interaction between Prime and Target was significant for subjects but not for items [$F_1(1,23)=5.93$ $p<.05$; $F_2(1,15)=3.10$ $p>.05$].

In the Córdoba data, out of a total of 384 responses (16 items x 24 participants), 329 (86%) were scored as canonical datives, 34 (9%) were scored as scrambled datives, and 21 (5%) as other. ANOVAs for each subject and item were conducted with the factors Prime (PO, DO) and Target (Canonical, Scrambled). The interaction between Prime and Target was significant for items but not for subjects [$F_1(1,23)=3.56$ $p>.05$; $F_2(1,15)=8.67$ $p<.01$].

\textsuperscript{16} This rather high number of other responses included transitive constructions (e.g., \textit{el hombre esta rentando la bicicleta de la enfermera} ‘the man is renting the nurse’s bike’; \textit{el principe y la mujer compran una television} ‘the prince and the woman buy a television’), and constructions using an adjunct phrase introduced by \textit{para} ‘for’ instead of the dative \textit{a} ‘to’ (e.g., \textit{la doctora compró un pastel para el cura} ‘the doctor bought a cake for the priest’).
Grammatical replication

Data related to replication patterns are displayed in Figure 13. Starting with the omission of the accusative marker a (e.g., *la enfermera pateó Ø la novia* ‘the nurse kicked the bride’), there were 16 (4%) cases in the New York group and none in the Córdoba group. A one-tailed t-test for New York was significant for both subjects and items \(t_1(23)=1.97 \ p<.05; \ t_2(15)=3.87 \ p<.001\). A one-way ANOVA between the groups resulted in a significant effect of Location (New York, Córdoba) \(F_1(1,46)=3.87 \ p<.05; \ F_2(1,30)=15.0 \ p<.0005\).

With regards to the absence of reciprocal *se* (e.g., *el cantante y el turista Ø besaron* ‘the singer and the tourist kissed’), there were 30 (8%) cases in the New York group and 9 (2%) cases in Córdoba. A one-tailed t-test for New York was significant for both subjects and items \(t_1(23)=3.60 \ p<.001; \ t_2(15)=2.09 \ p<.05\); in Córdoba it was significant only for subjects \(t_1(23)=3.19 \ p<.005; \ t_2(15)=1.38 \ p>.05\). A one-way ANOVA between the groups revealed a significant effect of Location (New York, Córdoba) for subjects but not for items \(F_1(1,46)=5.70 \ p<.05; \ F_2(1,30)=1.77 \ p>.10\). We attribute this discrepancy to the fact that *se* was omitted with the target verb *pelear* ‘to fight’ (e.g., *el boxeador y el cura Ø pelearon* ‘the boxer and the priest fought’) for most cases in New York and for all cases in Córdoba.

Finally, there were 5 (1%) cases where the dative clitic *le* (e.g., *el súper Ø envió a la cantadora una rosa* ‘the janitor sent the singer a rose’) was omitted in New York and 11 (3%) cases in Córdoba. A one-tailed t-test was significant only for items in both New York \(t_1(23)=1.55 \ p=.067; \ t_2(15)=2.61 \ p<.05\) and Córdoba \(t_1(23)=1.52 \ p=.070; \ t_2(15)=3.90 \ p<.001\). A one-way ANOVA between the groups revealed no significant effects of Location (New York, Córdoba) \(F_1(1,46)<1 \ p>.40; \ F_2(1,30)=3.10 \ p>.080\).
4.6.3 Discussion

With respect to frequency distributions, the results of Experiment 2 point to the same tendencies we observed in the Spanish data from Experiment 1. In terms of their overall responses, speakers in both the New York and Córdoba groups preferred actives over passives, conjoined over single subjects, and canonical over scrambled datives. In terms of grammatical replication, participants also produced instances of reciprocal pronoun omission at a higher rate than other patterns. Like in the baseline, there were no cases of the absence of the dative marker.

Turning now to the priming component, we hypothesized that priming effects would be more likely for alternations that involve shared constructions between the languages, than for alternations where one of the variants is more restricted in one of the languages (Loebell & Bock, 2003). Experiment 1 established that the distributional frequencies in English and Spanish were comparable for the voice and reciprocal alternations, but not for the dative alternation, which seems to operate differently in the two languages. As predicted, Experiment 2 found priming effects for the voice and reciprocal alternation, as
revealed by the presence of significant interactions between prime and target types. We found no effects for the dative alternation, where differences between the English and Spanish configurations may have prevented priming. We also expected the performance of the New York and Córdoba groups to be different, with the former displaying greater sensitivity to English primes than the latter, but this proved not to be the case. We compared the priming effects of the New York and Córdoba groups, but, contrary to our expectations, there were no significant differences in any of the alternations, suggesting that living in a contact setting does not affect the way speakers use these constructions.

Regarding grammatical replication, the hypothesis that structures that are already present elsewhere in the language are more likely was confirmed by the higher incidence of reciprocal pronoun and accusative marker omission, and the lack of examples without the dative marker, as anticipated by Experiment 1. We also expected the New York group to produce more grammatical replication patterns than the Córdoba group and we were able to partly confirm this prediction: the differences in rates of omission were significant only for the accusative marker. These results suggest that the effects of contact are manifested in the emergence of existing patterns in new contexts, not in the distributional frequencies of alternative constructions.

4.7 Experiment 3: within-language priming task (Spanish-Spanish)

In this experiment, we replicated Experiment 2 with Spanish primes. We were interested in how participants responded in the absence of English stimuli and how these results compared to those in Experiment 2. This experiment was administered during the second half of the session for all participants. Because the purpose of this study is to investigate the effects of English structures on Spanish productions, we did not want to expose participants to Spanish experimental items before they had a chance to complete the cross-linguistic priming task, so as to avoid Spanish stimuli from influencing participants’ responses.
4.7.1 Method

Let us now turn to the method used in this experiment. In the following sections, we describe the participants, materials, procedure, and the scoring criteria.

Participants

The same bilinguals that took part in Experiment 2 completed Experiment 3 during the second half of their sessions.

Materials

The materials were identical to those in Experiment 2, except that the primes were the Spanish version of the alternate list.

Procedure

The procedure was the same as in Experiment 2, except that participants did not take the practice trials. Instead, they completed a Spanish vocabulary test (see Section 4.6.1 and Appendix D) administered in the form of a PowerPoint presentation. This measure provided a glimpse of their Spanish proficiency and also served as a break from the priming trials. At the end of the experimental session, participants filled out a language background questionnaire (see Section 4.6.1 and Appendix E).

Scoring and data analysis

These were the same as in Experiment 2.

4.7.2 Results

Let us now turn to the results of this experiment, where we expect to obtain a measure of Spanish to Spanish priming and grammatical replication patterns. The distribution of
response types along with priming effects for the three alternations are presented separately, comparing the results for New York and Córdoba. In the last subsection, we describe the findings regarding grammatical replication.

**Voice alternation**

Figure 14 displays the number of responses in all four conditions. At first sight, we observe a tendency for targets to match the prime (i.e., there is an increase of passive responses following passive primes). In order to compare the performance of the New York and Córdoba groups, we conducted 2x2x2 ANOVAs with the factors Location (New York, Córdoba), Prime (Active, Passive), and Target (Active, Passive), but the interaction was not significant \[ F_1(1,46)<1, p>.6; F_2(1,30)<1, p>.4, \] suggesting that there are no discernible differences between the groups in terms of priming of active/passive variants.

![Figure 14](image-url)

**Figure 14.** Percent active, passive, and other responses for each prime type in the voice alternation (Experiment 3).

In the New York data, out of a total of 384 responses (16 items x 24 participants), 288 (75%) were scored as active, 87 (23%) were scored as passive, and 9 (2%) as other. ANOVAs for each subject and item were conducted with the factors Prime (Active, Passive)
and Target (Active, Passive). There was a significant interaction between Prime and Target $[F_1(1,23)=34.00 \ p<.0001; \ F_2(1,15)=95.20 \ p<.0001]$, such that passive responses followed passive primes more often than active primes.

In the Córdoba data, out of a total of 384 responses (16 items x 24 participants), 293 (76%) were scored as active, 87 (23%) were scored as passive, and 4 (1%) as other. ANOVAs for each subject and item were conducted with the factors Prime (Active, Passive) and Target (Active, Passive). There was a significant interaction between Prime and Target $[F_1(1,23)=23.40 \ p<.0001; \ F_2(1,15)=63.50 \ p<.0001]$, such that passive responses followed passive primes more often than active primes.

Reciprocal alternation

Figure 15 displays the number of responses in all four conditions. At first glance, we discern a strong tendency for targets to match the prime in both directions (i.e., there is a majority of single subject responses following single subject primes, and a majority of conjoined subject responses following conjoined subject primes). In order to compare the performance of the New York and Córdoba groups, we conducted 2x2x2 ANOVAs with the factors Location (New York, Córdoba), Prime (Single subject, Conjoined subject), and Target (Single subject, Conjoined subject), but the interaction was not significant $[F_1(1,46)<1 \ p>.40; \ F_2(1,30)<1 \ p>.30]$, suggesting that there are no discernible differences between the groups in terms of priming of single/conjoined variants.
Figure 15. Percent single subject, conjoined subject, and other responses for each prime type in the reciprocal alternation (Experiment 3).

In the New York data, out of a total of 384 responses (16 items x 24 participants), 146 (38%) were scored as single subject, 226 (59%) were scored as conjoined subject, and 12 (3%) were scored as other. ANOVAs for each subject and item were conducted with the factors Prime (Single subject, Conjoined subject) and Target (Single subject, Conjoined subject). There was a significant interaction between Prime and Target \(F_1(1,23)=60.10\ p<.0001;\ F_2(1,15)=86.50\ p<.0001\), such that single subject responses followed single subject primes more often than conjoined subject primes.

In the Córdoba data, out of a total of 384 responses (16 items x 24 participants), 150 (39%) were scored as single subject, 226 (59%) were scored as conjoined subject, and 8 (2%) were scored as other. ANOVAs for each subject and item were conducted with the factors Prime (Single subject, Conjoined subject) and Target (Single subject, Conjoined subject). There was a significant interaction between Prime and Target \(F_1(1,23)=52.90\ p<.0001;\ F_2(1,15)=77.40\ p<.0001\), such that single subject responses followed single subject primes more often than conjoined subject primes.
Dative alternation

Figure 16 displays the number of responses in all four conditions. At a glance, we observe a tendency for targets to match the prime (i.e., there is an increase of scrambled dative responses following scrambled primes), and the effect appears to be more pronounced in the Córdoba group. In order to compare the performance of the groups, we conducted 2x2x2 ANOVAs with the factors Location (New York, Córdoba), Prime (Canonical, Scrambled), and Target (Canonical, Scrambled), but the interaction was significant only for items, not for subjects \[ F_1(1,46)=2.49 \ p>.10; \ F_2(1,30)=11.00 \ p<.005 \].

Figure 16. Percent canonical, scrambled, and other responses for each prime type in the dative alternation (Experiment 3).

In the New York data, out of a total of 384 responses (16 items x 24 participants), 301 (78.3%) were scored as canonical datives, 74 (19.3%) were scored as scrambled datives, and 9 (2.3%) as other. ANOVAs for each subject and item were conducted with the factors Prime (Canonical, Scrambled) and Target (Canonical, Scrambled). There was a significant interaction between Prime and Target \[ F_1(1,23)=11.10 \ p<.005; \ F_2(1,15)=94.40 \ p<.0001 \], such that scrambled dative responses followed scrambled dative primes more often than canonical dative primes.
In the Córdoba data, out of a total of 384 responses (16 items x 24 participants), 293 (76.3%) were scored as canonical datives, 82 (21.3%) were scored as scrambled datives, and 9 (2.3%) as other. ANOVAs for each subject and item were conducted with the factors Prime (Canonical, Scrambled) and Target (Canonical, Scrambled). There was a significant interaction between Prime and Target \[F_1(1,23)=27.30 \ p<.005; \ F_2(1,15)=85.30 \ p<.0001\], such that scrambled dative responses followed scrambled dative primes more often than canonical dative primes.

Grammatical replication

Data related to replication patterns are displayed in Figure 17. Starting with the omission of the accusative marker a (e.g., la enfermera pateó Ø la novia ‘the nurse kicked the bride’), there were 4 (1%) cases in the New York group and none in the Córdoba group. A one-tailed t-test for New York was significant for subjects and marginally for items \[t_1(23)=2.14 \ p<.05; \ t_2(15)=1.73 \ p=.052\]. A one-way ANOVA between the groups resulted in a significant effect of Location (New York, Córdoba) for subjects but not for items \[F_1(1,23)=4.60 \ p<.005; \ F_2(1,15)=3.00 \ p>.090\].

With regards to the absence of reciprocal se (e.g., el cantante y el turista Ø besaron ‘the singer and the tourist kissed’), there were 8 (2%) cases in the New York group and 1 (0.3%) cases in Córdoba. A one-tailed t-test for New York was significant for subjects but not for items \[t_1(23)=2.56 \ p<.05; \ t_2(15)=1.33 \ p>.10\]; in Córdoba, it was not significant \[t_1(23)=1.00 \ p>.10; \ t_2(15)=1.00 \ p>.10\]. A one-way ANOVA between the groups revealed a significant effect of Location (New York, Córdoba) for subjects but not for items \[F_1(1,23)=4.56 \ p<.05; \ F_2(1,15)=1.31 \ p>.20\]. We attribute this discrepancy to the fact that, for most cases, se was omitted with the target verb pelear ‘to fight’ (e.g., el boxeador y el cura Ø pelearon ‘the boxer and the priest fought’).

Finally, there were 4 (1%) cases where the dative clitic le (e.g., el súper Ø envió a la cantadora una rosa ‘the janitor sent the singer a rose’) was omitted in New York and none
in Córdoba. A one-tailed t-test for New York was significant for items but not for subjects \[t_1(23)=1.00 ~p>.10; ~t_2(15)=2.24 ~p<.05\]. A one-way ANOVA between the groups revealed a significant effect of Location (New York, Córdoba) for items but not for subjects \[F_1(1,46)=2.49 ~p>.10; ~F_2(1,30)=11.00 ~p<0.005\]. Notably, there were no instances where the dative marker a was omitted.

**Figure 17.** Percent grammatical replication patterns (4-6) for the voice (active/passive primes), reciprocal (single/conjoined primes) and dative (PO/DO primes) alternations in New York and Córdoba (Experiment 3).

4.7.3 Discussion

At first glance, the results of Experiment 3 point to the same tendencies we observed in Experiments 1 and 2. In terms of their overall responses, speakers in both the New York and Córdoba groups preferred actives over passives, conjoined over single subjects, and canonical over scrambled datives. These results, together with those of the previous experiments, suggest that speakers continue to favor the same variant, regardless of contact or the language of the prime.
Turning now to the priming component, we found priming effects for all three alternations, as revealed by the presence of significant interactions between prime and target types. Crucially, in this experiment, priming was observed in the dative alternation. If structural differences between English and Spanish prevented cross-linguistic priming for this alternation, one would expect within-language priming to take place, and our data confirms this prediction. It also suggests that restricted constructions such as scrambled datives can be encouraged by increasing speaker’s exposure to the same construction, and that this is more effective within the same language than across languages. In addition, we expected the performance of the New York and Córdoba groups to be different, with the latter displaying greater sensitivity to Spanish primes than the latter, but this proved not to be the case: we compared the priming effects of the New York and Córdoba groups and found no significant differences in any of the alternations.

Regarding grammatical replication, the hypothesis that structures that are already present elsewhere in the language would be more likely was confirmed by the higher incidence of reciprocal pronoun omission, and the lack of examples without the dative marker. We also expected the New York group to produce more grammatical replication patterns than the Córdoba group and found marginally significant differences only in the rates of omission for the accusative marker.

4.9 Conclusion

In this chapter, we sought to answer two questions. First, we asked whether for bilinguals the contact language, English, contributes to the emergence of innovations in the native language, Spanish. On one hand, innovations can take the form of changes in the frequency of distributional patterns, which we measured by tracking priming effects in three alternations. To this end, we designed three experiments: a picture description task, a cross-language priming task, and a within-language priming task. On the other hand,
innovations can be the result of grammatical replication, where an existing native language pattern is deployed in a new context that parallels its usage in the contact language. We explored the possibility of grammatical replication by positing four constructions that exploit the contrast between English and Spanish and documenting its incidence. Second, we asked whether bilinguals in a contact situation (New York) might exhibit different patterns of innovation than bilinguals living in a native language setting (Córdoba). To answer this question, we compared the results of the cross- and within-language experiments in both settings.

In Experiment 1, we obtained a baseline for the distributional frequencies for the three alternations and for the occurrence of grammatical replication. We found that the voice and reciprocal alternations had similar frequencies in English and Spanish, unlike the dative alternation.

In Experiment 2, we found that English did influence the choice of Spanish structures for the voice and reciprocal alternation, and not at all for the dative alternation. We expected the groups to differ in terms of priming of alternations; specifically, we anticipated that the New York group, being more proficient in English and having greater exposure to this language, would exhibit higher priming effects than the Córdoba group. However, this conclusion was not supported by the data. In this experiment, we also found instances of grammatical replication at a higher rate than in the baseline. Notably, there were no cases of dative a omission, as predicted. Here, the groups did show a significant difference, with New York producing more patterns than Córdoba, as anticipated given the latter group’s stronger proficiency in Spanish, but only for accusative a omission.

Experiment 3 revealed priming for all three alternations, and the priming effect size was bigger than in Experiment 2, as expected when the prime and target are in the same language. Contrary to our expectations, the groups did not differ in terms of priming here either. In terms of grammatical replication, the rate was lower than in Experiment 2, as
anticipated, given that Spanish primes discourage the incidence of novel constructions. Also as expected, the New York group produced more instances than the Córdoba group.

In sum, in this study we found that English does contribute to the emergence of Spanish innovations. The presence of priming effects suggests that exposure to alternative forms in one language can drive frequency changes in the other language. However, the effects are less likely for constructions that are more restricted in one of the languages. We compared the performance of bilinguals in New York and Córdoba and found no significant differences, suggesting that contact with English has not altered their distributional patterns. We also found that English can motivate the emergence of existing structures in new contexts, resulting in grammatical replication patterns. In this case, however, the groups did differ in their rates of production, indicating that years living in the US can influence Spanish in unique ways.

In the next and final chapter, we discuss the implications of our results and make further connections to the literature.
5 GENERAL DISCUSSION

5.1 Introduction

The purpose of this dissertation was to investigate whether structural priming might be conceived as an internal mechanism underlying processes of convergence in the Spanish productions of Spanish-English bilinguals in the US. By assessing the influence that English structures might have on speakers’ Spanish innovations, we sought to shed light on the ways that languages interact in a contact situation and better understand how language change takes place. We addressed this issue in three experiments in which bilingual participants described a series of pictures by using verbs that elicited the voice, reciprocal, and dative alternations. In what follows we provide a summary of our findings. We then discuss the contribution of the present work and the implications for current theories of language change and language processing. Finally, we explore future directions and provide the conclusion.

5.2 Summary of the results

Experiment 1, designed as a baseline, allowed us to compare speakers’ preferred constructions in Spanish and English for each alternation. Experiments 2 and 3 measured the priming effect for each alternation with English and Spanish primes, respectively, as well as the incidence of grammatical replication patterns.

5.2.1 Experiment 1

In this experiment, we examined the distribution of the voice, reciprocal, and dative alternations in Spanish and English. In Spanish, we found that speakers preferred actives over passives in the voice alternation, conjoined over single subject constructions in the
reciprocal alternation, and canonical over scrambled datives in the dative alternation. Grammatical replication patterns occurred, albeit slightly, as the absence of the accusative marker and the reciprocal pronoun, although only the latter was significant.

In English, we found that speakers also favor actives over passives, but display no preference for either variant in both the reciprocal and the dative alternations. A comparison of the distributions in English and Spanish revealed that that the groups differ only in the dative alternation, with the English group using the PO and DO variants almost interchangeably and the Spanish group showing an overwhelming preference for the canonical construction.

5.2.2 Experiment 2
In this experiment, we measured the priming effect produced by English structures. The effects were the highest for the reciprocal and the voice alternations, which have similar distributions in English and Spanish. The effects for the dative alternation were not significant, suggesting that speakers may not readily equate the alternatives in English and Spanish. The New York and Córdoba groups did not differ in terms of priming of alternatives, only in their rate of production of grammatical replication patterns, which was higher for the New York group (although only the absence of the accusative marker was significantly different). However, neither group produced datives lacking the dative marker.

5.2.3 Experiment 3
In this experiment, we measured the priming effect produced by Spanish structures and found strong effects for all three alternations. The New York and Córdoba groups did not differ in terms of priming of alternatives, only in their rate of production of grammatical replication patterns, which was higher for the New York group (although only the absence of the accusative marker was significant). In keeping with the previous data, neither group produced datives lacking the dative marker.
5.3 Contribution

In what follows, we discuss the contribution of this investigation regarding priming of shared structures, grammatical replication, and the role of contact.

5.3.1 Priming increases the production of shared constructions

The results of this investigation confirm the findings of other bilingual priming studies, where priming effects are observed between constructions that are present in both languages (Bernolet et al., 2007; Hartsuiker et al., 2004; Loebell & Bock, 2003; Schoonbaert et al., 2007). Experiment 1 showed that the voice and the reciprocal alternation occur with similar frequencies in English and Spanish, which made them more susceptible to priming manipulations in Experiments 2 and 3. This was not the case for the dative alternation. This alternation is well established in English, making it an ideal area for priming experiments (Arai et al., 2007; Bock & Griffin, 2000; Bock & Loebell, 1990; Bock, 1986, 1989; Gries, 2005; Kaschak & Borreggine, 2008; Loebell & Bock, 2003; Pickering et al., 2002; Pickering & Branigan, 1998; Potter & Lombardi, 1998; Salamoura & Williams, 2007; Schoonbaert et al., 2007); however, we did not observe the same flexibility in Spanish speakers, who overwhelmingly prefer the canonical construction. Earlier studies found no priming between constructions that are restricted in one of the languages (Bernolet et al., 2007; Loebell & Bock, 2003). In our investigation, this asymmetry resulted in the lack of priming effects in both the New York and Córdoba groups. If the vehicle of priming is the implementation of a sentence’s configuration, it could also be the case that, besides the scrambled variant being rare in Spanish, it was also structurally different than the English DO construction and speakers did not readily equate the two alternatives. Further research with English and Spanish datives would be helpful in clarifying the extent, if any, of their representational equivalence.
5.3.2 Priming encourages grammatical replication

While bilingual priming studies have been abundant, this is the first investigation to test the application of this methodology to the phenomenon of grammatical replication. In order to ascertain whether Spanish structures emerged in new contexts on the model of English, it was necessary to observe whether speakers produced them without this model. We compared speakers’ performance after being exposed to English or Spanish primes and found that grammatical replication patterns were more frequent when the primes were in English than when they were in Spanish. This outcome was anticipated: the English constructions in our study did not exhibit an accusative marker, a reciprocal pronoun, or a dative clitic, therefore strengthening processing operations that encourage its omission in Spanish. Conversely, the Spanish primes were constructions that contained all of these particles, making it more likely for speakers to use them in their subsequent descriptions, discouraging innovations.

In Chapter 2 we stipulated that grammatical replication takes place in cases where the model provided by English is already available elsewhere in Spanish, and our results seem to support this view. That is, we observed accusative marker a, dative clitic le, and reciprocal pronoun se omission in our data, but not dative a omission. Even though English DO dative primes do not display a dative marker, this was not enough to prompt speakers to omit it in their Spanish responses, presumably because the configuration particular to DO datives is not present in Spanish. Our data suggest that increased exposure to English structures might not be sufficient to overcome the constraints governing the production of Spanish datives. This is consistent with the argument that constructing a representation for a completely new structure is more costly than for known syntactic material (Kaschak & Glenberg, 2004), hence speakers will tend to use as much familiar information as possible (Ivanova, 2012). Lacking an existing model in the native language, speakers might be discouraged from importing English configurations that do not find a counterpart in the structural repertoire of Spanish.
5.3.3 Contact promotes grammatical replication

The results of this investigation did not confirm all of our predictions regarding the role of contact in bilinguals’ innovations. We had anticipated that bilinguals in New York, by virtue of being immersed in an English speaking setting, would be more prone to priming manipulations in English than bilinguals in Córdoba, where Spanish is the majority language and presumably less likely to be affected by English primes. Our data show that the priming effects for each of the three alternations were not significantly different between the groups. However, one area where contact does seem to play a role is in the rate of grammatical replication patterns. While both groups produced them, the New York group displayed a significantly higher occurrence than the Córdoba group for accusative a omission (Experiment 2) and a numerically greater incidence for the absence of reciprocal se and dative le. Our data seem to suggest that contact contributes to the emergence of existing Spanish structures in new contexts on the model of English. Crucially, contact does not promote completely novel structures, as these innovations are not exclusive to contact settings. For example, both groups produced examples of dative clitic and reciprocal pronoun omission, and, even though the accusative marker omission only occurred in the New York group, other studies have documented the phenomenon in Latin America and Spain (Alvarez & Barrios, 1992; Guijarro-Fuentes & Marinis, 2009; Heusinger & Kaiser, 2004).

However, the fact that neither group displayed instances where the dative marker is absent suggests that a structure’s increased availability in English does not necessarily translate into the production of that configuration in Spanish. This raises the question of what kinds of input, if any, are able to trigger the production of unlicensed structures. In her dissertation, Ivanova (2012) addressed this question and showed that English speakers produced sentences with dispreferred verbal subcategorization frames only after being exposed to primes bearing the same anomalous configuration with the same verb. This
relates to the idea that exposure to anomalous constructions mitigates the anomaly by rendering it more familiar and thus more acceptable (Snyder, 2000). This aspect of our findings points to two possibilities. On one hand, it might be that some Spanish structures are more resistant to change, even for bilinguals immersed in an English setting. On the other hand, it could be that contact can only accelerate, rather than initiate, structural changes in the native language. A broader range of constructions exhibiting grammatical replication would be necessary in order to continue to explore this question. A logical extension of our research would be conduct a parallel experiment, where the grammatical replication constructions act as primes (see Section 5.5). If Spanish innovative primes fail to yield priming effects, it would suggest that those constructions are unlikely to be adopted by speakers. It might be that, in order to process the anomaly, speakers repair the prime by accessing a familiar structure, which is immediately re-deployed when producing the target. In turn, if priming is observed, it would support the view that new structures have to be created and made available language-internally before they can be buttressed by contact. For example, regarding preposition stranding in Canadian French relative clauses, Otheguy (2012) invites a similar analysis, arguing that this feature could be interpreted as having both French origins and English support.

5.4 Implications

In the following sections, we discuss the implications of our work for language change, language learning, language integration and priming models.

5.4.1 Internal vs. external change

In Chapter 2, we entertained the question of whether bilinguals’ transfer phenomena might be attributable to language-internal (Spanish) or external (English) forces. One aspect of our data show that bilinguals are more likely to respond to Spanish rather than English
primes, confirming earlier studies that found a higher priming effect when the primes are in the native language, and when prime and target are in the same language (Schoonbaert et al., 2007). In this sense, we could argue that, being exposed to both English and Spanish, speakers’ adjust their Spanish productions to Spanish more than to English distributional patterns. This suggests that while both internal and external factors are able to influence bilinguals’ Spanish productions, language-internal distributional frequencies seem to be stronger motivators for frequency changes in that language.

With regards to grammatical replication, we found that English motivates grammatical replication patterns more so than Spanish, which is expected given that Spanish primes provided a model that discouraged innovative structures. But what if other Spanish structures lacking the accusative marker, the dative clitic, and the reciprocal pronoun were to serve as primes? (see Section 5.5). Even though we are able to claim that English structures can play a role in the emergence of these constructions, the added influence of language-internal factors cannot be completely ruled out. Having shown that Spanish primes yield higher priming effects than English primes, we can safely speculate that grammatical replication patterns will likely be affected by Spanish more than by English structures, making a case for the interplay of both internal and external factors as drivers of convergence phenomena. There is much work to be done and this issue will certainly remain a topic for future research.

5.4.2 Speakers adapt their linguistic habits throughout the lifespan

In Chapter 2, we advanced the view that speakers’ grammars are shaped by probabilistic information in their environment, and that a change in the frequencies of particular constructions can be taken to reflect linguistic change in its simplest form. In Chapter 3, we mentioned that the priming paradigm, by manipulating speakers’ exposure to certain structures, can be used to model how the mechanisms of language change might work. Our results are consistent with this idea, in that bilinguals’ productions changed as a factor of
the structures they were exposed to during the experimental session, suggesting that linguistic knowledge is dynamic and based on speakers’ experience with language (e.g., passive responses increased after participants were exposed to more passive constructions).

Our data also support the increasingly prominent notion that people continue to develop their language skills throughout their lives (Hopper & Traugott, 2003), not only adjusting the frequency of particular constructions, but also acquiring new ones. For example, it has been shown that adult speakers are able to learn a new structure in their native language and generalize it to new verbs (Kaschak & Glenberg, 2004; Kaschak, 2006), produce dispreferred sentences after they have been exposed to similar ones (Ivanova, 2012), and develop new linguistic conventions based on the habits of their interlocutors (Garrod & Anderson, 1987). Our findings suggest that bilinguals are not only able modify the frequency of their utterances in response to their changing availability, but also introduce existing structures in new contexts, on the model of English.

5.4.3 Language integration
A prominent debate in psycholinguistics is whether the languages of bilinguals are integrated or stored separately, and the presence of cross-linguistic priming is taken as evidence in favor of the former possibility (Hartsuiker et al., 2004). Our data also support this view, where the activation of a particular structure increases the likelihood that it will be used in a subsequent utterance, irrespective of language, suggesting that the some linguistic representations are shared between English and Spanish. The notion of an integrated system is also consistent with a recent proposal by García & Otheguy (n.d., p. 644) that sees bilinguals as translanguagers, who make use of their complete linguistic repertoire, mixing and matching as desired. In this view, speakers deploy an “array of disaggregated features” bearing “no inherent linguistic affiliation.”

However, other aspects of our work seem to indicate that language integration might be better understood as a kind of ‘Venn diagram,’ in the sense of having overlapping and
non-overlapping representations, therefore placing some constraints on what can be primed. Such a view might help explain differences in the magnitude of priming effects for different alternations, and the absence of innovations lacking the dative marker. In the next subsection, we speculate about what this might look like vis-à-vis structural priming models.

5.4.4 Models of structural priming
In Chapter 3, we discussed current models of structural priming, namely, the implicit learning model and the residual activation account. Because we did not contrast same and different verb conditions in our design, we have little to say about the residual activation model, at least until we conduct further experiments. However, the implicit learning model is informative about several aspects of our results. For instance, it can account for the finding that priming increased participants’ production of the dispreferred alternative (i.e., passives in the voice alternation and scrambled datives in the dative alternation). This is because, in this model, the processing system is more sensitive to new than repeated representations. In the context of language variation, this model also explains how the frequencies of particular constructions translate into the statistical skewings of language use: processed constructions tune the system towards that alternative, predisposing it to retrieve the structure in subsequent utterances. The privilege of the most recent production in shaping the target is due to it being the one that last tuned the model (Kaschak, 2007).

In addition, this model is consistent with the view that bilinguals resort to strategies aimed at lightening the cognitive load. It might be that the bulk of this load has to do with the effort required to tune out the other language—or, in Grosjean’s (2001) terms, to stay in a monolingual mode. When bilinguals let go of this burden, communication is enhanced. Frequently used forms are likely to be produced more fluently, with greater speed and accuracy, since processing becomes more efficient as the constructions accumulate in memory (Branigan et al., 2005; Corley & Scheepers, 2002; Ferreira & Bock, 2006; Kaschak, 2006; Smith & Wheeldon, 2001; Wheeldon & Smith, 2003). Thus, it makes sense that
speakers tend to resort to recently processed structures, regardless of the language in which they occurred, in order to prevent hesitations.

Nevertheless, the data presented in this dissertation suggests that additional fine-tuning is needed for the models to more accurately reflect bilingual language use. In the implicit learning account, “whenever languages share common procedures for building sentence structures, the use of the shared procedure in one language makes it more accessible to the other” (Loebell & Bock, 2003, p. 809). Following the residual activation account, Hartsuiker et al. (2004) proposed an integrated model where the lemmas in each language share a conceptual node. Thus, when the verb EMPUJAR ‘push’ is activated, so is PUSH by association, allowing for the processing of a verb in one language to activate the node of its counterpart in the other language. In our proposal, the model would have to weigh in the frequency of alternating constructions in both languages, perhaps by positing higher or lower resting levels of activation for different representations. The activation of a structure in one language will increase the likelihood that it will be used in a subsequent utterance, in either language. However, if that structure is restricted in the target language, higher additional activations will be needed in order to surpass a selection threshold. This is akin to what Hartsuiker et al. (1999) propose as an explanation for the cumulative effects of priming: producing a prime sentence raises the activation level of a given representation, which not only increases the probability of producing a subsequent target sentence with the same structure, but with each priming trial the resting level of the relevant representation is augmented (see Chapter 3). In addition, this proposal echoes Kaschak’s (2007) observation that structural priming theory would benefit from accommodating multiple levels of frequency (e.g., frequencies of use over a lifetime vs. more recent frequencies, frequencies of use for particular constructions, frequencies of use for particular verbs within those constructions).

In our work, we defined grammatical replication as the emergence of an existing Spanish structure in new contexts, on the model of English. In the implicit learning account,
this means that via priming the use of procedures for assembling English clauses causes the procedure to become more accessible for subsequent use in Spanish, even when it is different from procedures previously used for the verb in question (e.g., the procedure for assembling reciprocal sentences that lack a reciprocal pronoun is more likely to be used than the procedure for assembling reciprocal sentences that do include a reciprocal pronoun). In terms of the residual activation model, we postulate the following process allowing it to take place: when the English prime is processed, both the lemma and its combinatorial node are activated. In order to produce the target, the Spanish-equivalent lemma is also activated via the conceptual node that connects the two languages (Hartsuiker et al., 2004). When the surface structures are parallel between the languages, the combinatorial nodes are shared between the languages. When they are not, as is the case with grammatical replication patterns, the combinatorial nodes available to the Spanish lemma (e.g., the reciprocal verb reunir ‘meet’ + se) mismatch the most recently activated combinatorial node (associated with the English lemma, e.g., the reciprocal verb meet + Ø). If that node is already connected to another Spanish lemma (indicating that the structure is already part of Spanish, e.g., the reciprocal verb discutir ‘argue’ + Ø), an additional link is created to the most recent lemma. This is consistent with the view that, when an innovation is introduced, it often co-exists with older ones (Chapter 2), in this case reflected in the lemma’s ‘traditional’ combinatorial nodes. As the new pattern becomes more frequent, the link is strengthened, raising its resting level of activation relative to the older alternatives. If, however, it falls into disuse, the link will weaken and eventually disappear. A similar possibility where the weight of the link is altered with repeated activation of a rule is discussed by Pickering et al. (2000).

In light of our finding that grammatical replication appears to be more likely in a contact situation, we can speculate that for bilinguals outside of a contact setting, the combinatorial nodes available to the relevant Spanish lemma are more likely to override the prime-activated combinatorial node, discouraging grammatical replication. Conceivably, this
could be due to the higher frequency/activation of traditional nodes, as well as the lower frequency/activation of English nodes in non-contact settings.

The fact that a few examples of grammatical replication patterns were found in the baseline (Experiment 1), as well as in some parts of Latin America and Spain, as reported in other studies, points to the possibility that those new links have already been attempted, even if they were not yet consolidated, given their low frequency.

The idea that bilinguals create new configurations, drawing elements from the common pool of their linguistic repertoire, resonates with their role as translanguagers (O. García & Otheguy, n.d.). They adapt to the communicative terrain by mixing and matching features from both languages as required. While we share the integrative spirit of this notion, our data suggest that speakers’ translanguaging creativity might not operate completely ‘from scratch,’ but that it might be guided at least in part by frequency-sensitive activation thresholds.

5.5 Future directions

This investigation opens the door for further exploration of convergence phenomena in contact settings using the structural priming paradigm, both in terms of languages and structures. In the US alone, given the breadth of its linguistic diversity, there are countless opportunities to document priming effects in several different bilingual communities. By comparing how English primes might impact constructions in other languages, we might gain a better understanding of the workings of contact-induced change by assessing, for example, what innovations are common to languages in contact with English, and how speakers of other native languages might handle non-overlapping structures.

With Spanish, a number of questions remain, and will be addressed in ongoing extensions of our research. One such extension involves eliciting grammatical replication patterns within Spanish: this experiment would be a close replication of Ivanova’s (2012)
work on anomalous sentences within English. In one condition, the verb will be the same between prime and target, and we would test, in essence, whether grammatical replication patterns can prime the same type of pattern (e.g., *la bailarina y el mesero Ω casaron* as a prime for a picture depicting a pirate, a witch, and the verb CASAR 'to marry'). In another condition, the verb will be the different between prime and target. Since grammatical replication relies on already existing structures in the native language, this experiment would test whether innovative patterns (e.g., omission of reciprocal *se*: *la bailarina y el mesero Ω casaron*) might also be primed by non-innovative Spanish configurations (e.g., via reciprocal verbs that do not require *se*: *el turista y el portero discutieron*).

A second extension introduces language-external structures: in the present work, we were unable to elicit the production of ditransitive constructions without the dative marker, and we reasoned that this might be due to the absence of such a structure in Spanish, thus the English model had no native structure to ‘hold on to,’ so to speak. This experiment would explore additional cases where English and Spanish structures do not overlap, hoping to shed some light on what can and cannot be primed (e.g., could the passivization of ditransitive structures that occurs in English be elicited in Spanish? *El pirata fue dado la espada por la princesa* ‘the pirate was given the sword by the princess’).

One of the limitations of this investigation is the low incidence of Spanish scrambled datives. To address this limitation, a third extension of this research involves prompting participants to answer questions such as *What did the thief give the dancer?* in English. Given this kind of prime, speakers might be encouraged to respond with constructions like *El ladrón le dio a la bailarina un libro*, where the focus constituent and the answer to the question is placed at the end of the sentence. If such a task allows participants to become more accustomed to these context-appropriate scrambled datives, it is possible that they might also be more likely to include patterns lacking the dative *le* or even the dative *a*.

Another limitation of our design is related to the choice of verbs associated with each alternation, raising the question of whether some our data is lexically rather than
structurally driven. For example, we found that in the voice alternation passives were more likely to be produced with the target verbs *asustar* ‘frighten’ and *impresionar* ‘impress’; in the reciprocal alternation, the absence of *se* was more prominent for the target *pelear* ‘to fight’. A fourth extension and complement to this research would be to conduct an experiment that does not include these target verbs and that also incorporates a condition where the prime and target verbs are different.

Finally, analyzing the incidence of accusative *a* omission proved to be an arduous process, given that this particle is such a small element of the acoustic signal which could easily merge with adjacent vowels. Even though the answers were played several times, and great care was taken to ensure that every occurrence was carefully noted and that no cases were mistakenly marked as omissions, a fifth extension would be to create targets with greater contrast between the verb and the object phonemes, where the segments before and after *a* are consonants. For example, this experiment would create targets where the subject is plural so that the verb ends in /n/, and use objects that are feminine, in order to elicit *la* instead of *el* articles.

5.6 Conclusion

In this dissertation, we explored whether English structures encouraged innovations in Spanish, in the form of frequency changes of alternative constructions and emerging patterns of grammatical replication, and whether the effects were different for bilinguals in contact and non-contact settings. To this end, we conducted three experiments following the structural priming paradigm. In doing so, we hoped to model the processing mechanisms underlying convergence and the possibility of contact-induced language change.
We found that:

- For constructions where the languages have similar distributions (e.g., voice and reciprocal alternations) English primes did contribute to increasing less favored Spanish alternatives, although this effect was higher after Spanish primes. Contact did not seem to play a role.

- For constructions that are restricted in Spanish (e.g., scrambled datives), exposure to analogous English structures was not sufficient to drive their production in Spanish. However, when speakers were exposed to the same structure in Spanish, the incidence of this construction increased significantly. Contact did not have an effect here either.

- When it comes to grammatical replication, the only patterns that occur are those that are already available in Spanish, and their incidence is higher after English than after Spanish primes. Also, this is where the influence of contact could be observed: bilinguals in a contact setting exhibit higher rates than those in a non-contact setting.

Like other investigations concerning Spanish in the US (e.g., Otheguy & Zentella, 2012), our data exhibit patterns of both continuity and change in bilinguals. What remains the same is the way that speakers use the voice, reciprocal and dative alternations in contact and non-contact settings; the two groups adapt in similar ways to the frequencies of the constructions they are exposed to. Evidence of change, however, emerges in the rates of grammatical replication: bilinguals in US were more likely to align certain Spanish structures to the English model than bilinguals in Argentina. By mirroring the conditions of convergence, this investigation showed that the structural priming paradigm could serve as a valuable model to approach the study of innovations, allowing us to measure the influence of English and informing our understanding of the way that languages might interact in situations of contact.
APPENDICES

Appendix A: Practice items

The practice items in Experiment 1 contained only the target picture and the verb (rightmost column in items below) in the language of the trial: Spanish for one group, English for another. In Experiment 2, the primes were in English and the targets in Spanish. Experiment 3 had no practice items, as it followed Experiment 2.

<table>
<thead>
<tr>
<th>Prime</th>
<th>Match picture</th>
<th>Target picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>The boxer eats pizza.</td>
<td></td>
<td>COMER/EAT</td>
</tr>
<tr>
<td>The policeman walks in the park.</td>
<td></td>
<td>CAMINAR/WALK</td>
</tr>
<tr>
<td>The janitor is dancing.</td>
<td></td>
<td>BAILAR/DANCE</td>
</tr>
<tr>
<td>The waiter reads the newspaper.</td>
<td></td>
<td>LEER/READ</td>
</tr>
</tbody>
</table>
Appendix B: Experimental items

The experimental items contained the prime text (leftmost column in the items below), the match picture (middle column), and the target picture with the verb (rightmost column) for each of the three alternations: voice (B1), reciprocal (B2) and dative (B3). The two versions of each item are provided, in both languages. In Experiment 2, the primes were in English and the targets in Spanish. In Experiment 3, the primes were in Spanish and the targets in Spanish.

B1. Voice alternation

<table>
<thead>
<tr>
<th>List 1/List 2 prime</th>
<th>Match picture</th>
<th>Target picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. El portero saludó al príncipe. / El príncipe fue saludado por el portero.</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>The janitor greeted the prince./ The prince was greeted by the janitor.</td>
<td></td>
<td>SALUDAR/GREET</td>
</tr>
<tr>
<td>2. La cantante impresionó al cura. / El cura fue impresionado por la cantante.</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>The singer impressed the priest./ The priest was impressed by the singer.</td>
<td></td>
<td>IMPRESIONAR/IMPRESS</td>
</tr>
<tr>
<td>3. La enfermera insultó a la bailarina. / La bailarina fue insultada por la enfermera.</td>
<td>[Image]</td>
<td>[Image]</td>
</tr>
<tr>
<td>The nurse insulted the dancer./ The dancer was insulted by the nurse.</td>
<td></td>
<td>INSULTAR/INSULT</td>
</tr>
</tbody>
</table>
4. El payaso empujó a la cocinera./ La cocinera fue empujada por el payaso.

The clown pushed the chef./ The chef was pushed by the clown.

5. El policía asustó al ángel./ El ángel fue asustado por el policía.

The policeman frightened the angel./ The angel was frightenend by the policeman.

6. El cura pateó al ladrón./ El ladrón fue pateado por el cura.

The priest kicked the thief./ The thief was kicked by the priest.

7. La bruja acusó a la cantante./ La cantante fue acusada por la bruja.

The witch accused the singer./ The singer was accused by the witch.

8. La guitarrista golpeó a la cocinera./ La cocinera fue golpeada por la guitarrista.

The gitarist hit the chef./ The chef was hit by the gitarist.

9. La científica golpeó a la princesa./ La princesa fue golpeada por la científica.

The scientist hit the princess./ The princess was hit by the scientist.
10. El policía acusó al mesero./ El mesero fue acusado por el policía.

The policeman accused the waiter./ The waiter was accused by the policeman.

11. La científica pateó al payaso./ El payaso fue pateado por la científica.

The scientist kicked the clown./ The clown was kicked by the scientist.

12. La princesa asustó al turista./ El turista fue asustado por la princesa.

The princess frightened the tourist./ The tourist was frightened by the princess.

13. El policía empujó a la bruja./ La bruja fue empujada por el policía.

The policeman pushed the witch./ The witch was pushed by the policeman.

14. El pirata insultó al boxeador./ El boxeador fue insultado por el pirata.

The pirate insulted the boxer./ The boxer was insulted by the pirate.

15. La bailarina impresionó al ladrón./ El ladrón fue impresionado por la bailarina.

The dancer impressed the thief./ The thief was impressed by the dancer.
16. El turista saludó al mesero./ El mesero fue saludado por el turista.

The tourist greeted the waiter./ The waiter was greeted by the tourist.

<table>
<thead>
<tr>
<th>List 1/List 2 prime</th>
<th>Match picture</th>
<th>Target picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. El ángel besó al boxeador./ El ángel y el boxeador se besaron.</td>
<td>![Angel and Boxer Kiss]</td>
<td>![Match Picture]</td>
</tr>
<tr>
<td>The angel kissed the boxer./ The angel and the boxer kissed.</td>
<td>![Target Picture]</td>
<td></td>
</tr>
<tr>
<td>2. El mesero besó a la novia./ El mesero y la novia se besaron.</td>
<td>![Waiter and Bride Kiss]</td>
<td>![Match Picture]</td>
</tr>
<tr>
<td>The waiter kissed the bride./ The waiter and the bride kissed.</td>
<td>![Target Picture]</td>
<td></td>
</tr>
<tr>
<td>3. El turista abrazó al boxeador./ El turista y el boxeador se abrazaron.</td>
<td>![Tourist and Boxer Hug]</td>
<td>![Match Picture]</td>
</tr>
<tr>
<td>The tourist hugged the boxer./ The tourist and the boxer hugged.</td>
<td>![Target Picture]</td>
<td></td>
</tr>
<tr>
<td>4. La novia abrazó a la guitarrista./ La novia y la guitarrista se abrazaron.</td>
<td>![Bride and Guitarist Hug]</td>
<td>![Match Picture]</td>
</tr>
<tr>
<td>The bride hugged the guitarist./ The bride and the guitarist hugged.</td>
<td>![Target Picture]</td>
<td></td>
</tr>
</tbody>
</table>
5. La cantante se casó con el portero./ La cantante y el portero se casaron.
The singer married the janitor./ The singer and the janitor married.

6. El pirata se casó con la bailarina./ El pirata y la bailarina se casaron.
The pirate married the dancer./ The pirate and the dancer married.

7. El policía se peleó con la princesa./ El policía y la princesa se pelearon.
The policeman fought with the princess./ The policeman and the princess fought.

8. La cocinera se peleó con el turista./ La cocinera y el turista se pelearon.
The chef fought with the tourist./ The chef and the tourist fought.

9. La princesa se reunió con el cura en el castillo./ La princesa y el cura se reunieron en el castillo.
The princess met the priest at the castle./ The princess and the priest met at the castle.

10. El pirata se reunió con el mesero en el parque./ El pirata y el mesero se reunieron en el parque.
The pirate met the waiter at the park./ The pirate and the waiter met at the park.
11. El payaso se divorció de la cantante. / El payaso y la cantante se divorciaron.
The clown divorced the singer. / The clown and the singer divorced.

12. El príncipe se divorció del ángel. / El príncipe y el ángel se divorciaron.
The prince divorced the angel. / The prince and the angel divorced.

13. El portero se escondió con la novia. / El portero y la novia se escondieron.
The janitor hid with the bride. / The janitor and the bride hid.

14. La enfermera se escondió con el payaso. / La enfermera y el payaso se escondieron.
The nurse hid with the clown. The nurse and the clown hid.

15. La científica se afeitó con el pirata. / La científica y el pirata se afeitaron.
The scientist shaved with the pirate. / The scientist and the pirate shaved.

16. El cura se afeitó con el príncipe. / El cura y el príncipe se afeitaron.
The priest shaved with the prince. / The priest and the prince shaved.
### B3. Dative alternation

<table>
<thead>
<tr>
<th>List 1/List 2 prime</th>
<th>Match picture</th>
<th>Target picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. El príncipe le dio una pluma a la bailarina.</td>
<td><img src="image1" alt="Match picture" /></td>
<td><img src="image2" alt="Target picture" /></td>
</tr>
<tr>
<td>The prince gave a pen to the dancer.</td>
<td>DAR/GIVE</td>
<td></td>
</tr>
<tr>
<td>2. El mesero le rentó un auto al ángel.</td>
<td><img src="image3" alt="Match picture" /></td>
<td><img src="image4" alt="Target picture" /></td>
</tr>
<tr>
<td>The waiter rented a car to the angel.</td>
<td>RENTAR/RENT</td>
<td></td>
</tr>
<tr>
<td>3. La bailarina le ofreció leche al boxeador.</td>
<td><img src="image5" alt="Match picture" /></td>
<td><img src="image6" alt="Target picture" /></td>
</tr>
<tr>
<td>The dancer offered milk to the boxer.</td>
<td>OFRECER/OFFER</td>
<td></td>
</tr>
<tr>
<td>4. La princesa le envió un regalo al príncipe.</td>
<td><img src="image7" alt="Match picture" /></td>
<td><img src="image8" alt="Target picture" /></td>
</tr>
<tr>
<td>The princess sent a gift to the prince.</td>
<td>ENVIAR/SEND</td>
<td></td>
</tr>
<tr>
<td>5. La guitarrista le prestó una revista al portero.</td>
<td><img src="image9" alt="Match picture" /></td>
<td><img src="image10" alt="Target picture" /></td>
</tr>
<tr>
<td>The guitarist lent a magazine to the janitor.</td>
<td>PRESTAR/LEND</td>
<td></td>
</tr>
</tbody>
</table>
6. La científica le vendió un anillo al turista./ La científica le vendió al turista un anillo.
The scientist sold a ring to the tourist./ The scientist sold the tourist a ring.

7. El policía le mostró un artículo al cura./ El policía le mostró al cura un artículo.
The policeman showed an article to the priest./ The policeman showed the priest an article.

8. La novia le compró una mochila al payaso./ La novia le compró al payaso una mochila.
The bride bought a backpack for the clown./ The bride bought the clown a backpack.

9. La bruja le compró un vestido a la cocinera./ La bruja le compró a la cocinera un vestido.
The witch bought a dress for the chef./ The witch bought the chef a dress.

10. El boxeador le mostró un cuadro a la novia./ El boxeador le mostró a la novia un cuadro.
The boxer showed a painting to the bride./ The boxer showed the bride a painting.

11. El ángel le vendió un reloj a la bruja./ El ángel le vendió a la bruja un reloj.
The angel sold a clock to the witch./ The angel sold the witch a clock.
12. La cocinera le prestó una escalera a la enfermera./ La cocinera le prestó a la enfermera una escalera.
The chef lent a ladder to the nurse./ The chef lent the nurse a ladder.

13. La enfermera le envió una carta a la cantante./ La enfermera le envió a la cantante una carta.
The nurse sent a letter to the singer./ The nurse sent the singer a letter.

14. La enfermera le ofreció agua al ladrón./ La enfermera le ofreció al ladrón agua.
The nurse offered water to the thief./ The nurse offered the thief water.

15. El ladrón le rentó una raqueta a la guitarrista./ El ladrón le rentó a la guitarrista una raqueta.
The thief rented a racquet to the guitarist./ The thief rented the guitarist a racquet.

16. El portero le dio una bandera a la princesa./ El portero le dio a la princesa una bandera.
The janitor gave a flag to the princess./ The janitor gave the princess a flag.
Appendix C: Instructions

The instructions were presented in the form of a PowerPoint presentation for Experiments 1 and 2. Experiment 3 had no instructions, as it followed Experiment 2.

C1. Experiment 1
The first slide explained that the experiment consisted of describing pictures that involve common characters. The twenty characters were introduced (2 per slide), accompanied by their name in Spanish (left bubble) and English (right bubble). Participants were asked to describe the pictures in Spanish using the verb shown at the bottom, and press the yellow key to continue to the next picture. A list of possible answers to the sample picture was also provided.

Meet the characters:
The experiment consists of describing pictures that involve common characters.

They are listed in the next few slides, in English and Spanish.
C2. Experiment 2
The first 11 slides where the characters are described are the same as in Experiment 1 above. The remaining ones are presented below, with instructions that are specific to the priming component. Participants were instructed to read the prime sentence on the screen.

Possible answers might be:
- La enfermera comió una manzana
- La enfermera va a comer una manzana
- La enfermera está comiendo una manzana
- La enfermera estaba comiendo una manzana

JUST DO YOUR BEST!
There are no “wrong” answers, as long as your description includes the verb, characters, and objects involved in the picture.
and press a key to continue, then decide whether the following picture matched the sentence they just read by pressing the ‘yes’ or ‘no’ key, and finally to describe the next picture using the verb that appeared below it. The instructions were repeated with slides demonstrating each of the three steps. A list of possible answers to the sample picture was also provided.
Appendix D: Picture-naming task

Participants watched a PowerPoint presentation with a sequence of thirty pictures. They were asked to write the word depicted in each of these in a separate answer sheet, being as specific as possible. The answers are presented below. This measure is an excerpt from Batería III Woodcock-Muñoz (Prueba 14, items 17-46) (Woodcock et al., 2005).

1. Abeja ‘bee’
2. Tiburón ‘shark’
3. Cangurro ‘kangaroo’
4. Pulpo ‘octopus’
5. Seta ‘mushroom’
6. Palmera ‘palm tree’
7. Pedal ‘pedal’
8. Raqueta ‘raquet’
9. Cheque ‘check’
10. Microscopio ‘microscope’
11. Nudo ‘knot’
12. Caja registradora ‘cash register’
13. Llama ‘llama’
14. Armónica ‘harmonica’
15. África ‘Africa’
16. Bambú ‘bamboo’
17. Estetoscopio ‘stetoscope’
18. Torniquete ‘tourniquete’
19. Pilón ‘bowl’
20. Góndola ‘gondola’
21. Partenón ‘Parthenon’
22. San Basilio ‘Saint Basil’
23. Manivela ‘crank’
24. Barquilla ‘basket (in an air balloon)’
25. Pedestal ‘pedestal’
26. Fuelle ‘bells’
27. Clave ‘keystone’
28. Petroglifo ‘petroglyph’
29. Plinto ‘plinth’
30. Marioneta ‘marionette’
Appendix E: Language background questionnaire

<table>
<thead>
<tr>
<th>Age:</th>
<th>Sex:</th>
<th>Country of Origin/Family Ancestry:</th>
<th>Age of arrival to the US:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mother’s language: _____________________   Father’s language: _____________________

<table>
<thead>
<tr>
<th>How old were your parents when they started to learn...</th>
<th>Mother</th>
<th>Father</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When did you start learning English?</th>
<th>When did you start learning Spanish?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where?</td>
<td>Where?</td>
</tr>
</tbody>
</table>

In what country were you living... What languages were used in your education?
...during elementary school?
...during high school?
...during college?

Do you speak languages other than English and Spanish? If yes, please list them and indicate whether you speak them “fluently” or “only a little”:
_____________________________________________________

How many years have you spent in each language environment?
A country where English is spoken: A country where Spanish is spoken:

A school or working environment where English is spoken:
A school or working environment where Spanish is spoken:

Could you pass as a native speaker of English? YES NO
Could you pass as a native speaker of Spanish? YES NO
Do you think you have an accent in English? YES NO
Do you think you have an accent in Spanish? YES NO

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### What languages do you use...?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Always English</th>
<th>Always Spanish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interacting with friends</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Interacting with family</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Listening to the radio</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Watching TV</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Listening to music</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>On the Internet</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>On Facebook</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you read a book</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you read the news</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you read a magazine</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you write a text message</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you write yourself a note</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you write a paper</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you take notes in class</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you’re thinking</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you’re home</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you’re at school</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you’re at work</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>When you’re on the phone</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### How would you describe your proficiency in each language?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Very poor</th>
<th>Very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speaking</td>
<td>English</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>0</td>
</tr>
<tr>
<td>Listening</td>
<td>English</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>0</td>
</tr>
<tr>
<td>Reading</td>
<td>English</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>0</td>
</tr>
<tr>
<td>Writing</td>
<td>English</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Spanish</td>
<td>0</td>
</tr>
</tbody>
</table>

If you are *speaking* with someone who knows English and Spanish, which language do you prefer?  

If you have to *read* a text that is available in English and Spanish, which language do you prefer?  

Overall, what language do you feel most comfortable using? Why?
REFERENCES


